INTEGRATION OF THE CHRISTIAN WORLDVIEW IN THE TEACHING OF MATH AND SCIENCE

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ABSTRACT

The challenge for every Christian university is to integrate faith and learning in such a way that the teaching appropriately reflects the Christian faith while presenting the curriculum in a professional manner. The purpose of this essay is to focus on the teaching of math and science and the challenge they present for integration of the Christian worldview. The essay first endeavors to address the tension between naturalism and theism, a tension that for many seems especially formidable in the scientific realm. It reviews the principal arguments for theism, before moving on to integration approaches, and viable views of creation within a Christian worldview. It then turns to particular topics within the disciplines where integration is most natural, and ends with a discussion on how to handle biblical misconceptions concerning science.

Worldview influences everything people do, including teaching, whether it be in a traditional classroom setting or online. Regardless of the subject matter, instructors teach from their own worldview, that “comprehensive perspective from which we interpret all of reality” (Keller, p. 157). And from that worldview, that perspective or set of presuppositions about reality, instructors, consciously or not, influence how knowledge is interpreted and how lessons are presented to students.

Many practitioners of both natural science and Christian theology (what used to be called the queen of the sciences) are concerned with truth, that is, making assertions that accord with reality. The Christian worldview, in its quest for truth, embraces both sciences. In his book The Pattern of God’s Truth, author Frank Gaebelein builds upon his premise that all truth is God’s truth, stating that “Christian education has a holy obligation to stand for and honor the truth wherever it is found” (p. 23). So both biblical revelation and scientific discovery may be embraced as God’s truth, though human understanding of the former may need to be revised with improvements in biblical scholarship and the latter adjusted as new scientific discoveries are made. The point is that the Christian worldview is concerned with teaching all subjects, including math and science, in light of, or integrated with, the truth of God.

Richard Dawkins gives an excellent definition of science as “the systematic method by which we apprehend what is true about the real world in which we live” (Dawkins, 2003, p. xiv). But what is the real world? The naturalist worldview holds that the universe is a closed system, made up of only matter and energy – that which can be observed and scientifically analyzed. Carl Sagan famously stated that “the cosmos is all that is or ever was or ever will be” (Sagan, 2013, p. 1). The Christian worldview, however, is an open system, asserting that the real world includes a spiritual dimension that exists beyond the normal detection of our five senses and the scrutiny of scientific instruments; that is, beyond the space-time continuum.

It must be understood of course that empirical science needs to focus on the study of the natural world through observation and experiment with the presumed result of discovering natural explanations. But, as C. John Collins, Professor of Old Testament at Covenant Theological Seminary and Fellow at the Discovery Institute, notes:

Why can’t we just say that “science” is “the disciplined and critical study of the world
around us”? If we insist that, for some particular historical event, only natural-process-based explanations will count as science, the only way that can be rational is if we already know beforehand that natural factors are the only things involved. But what if we don’t know that? (Collins, 2003, p. 122)

While there are many scientists who hold to the Christian worldview belief that the supernatural at times provides the inference to the best explanation, there are many staunch atheists who hold such colleagues in derision.

NATURALISM AND THEISM: THE WIDENING TENSION

Naturalism (atheism) has been gaining in popularity for well over a century, and its increasing popularity has spawned a number of social and cultural consequences. Indeed, while mentioning God used to be not only accepted but expected from political leaders, it is now increasingly taboo among liberals, and even some conservatives. Public schools and secular universities discourage talk of God in their classrooms, therefore impressing upon the student not merely that belief in God has a neutral effect on what they are studying, but that belief in God is irrelevant or even harmful to what they are studying. The latter perspective is gaining amongst those who consider themselves intellectuals. Rather than a search for the truth (scientia means knowledge) about nature – based on evidence, systematic study, and the like – science becomes applied naturalism: the conviction that the material world is all there is, and that chance and impersonal natural law alone explain, indeed must explain, its existence. (Gonzalez & Richards, 2004, p. 224)

This applied naturalism, where empirical science is king and no other voice is even listened to, is often referred to as scientism. Such unyielding devotion lifts up science as its own god, and as such, has faith in itself, that is, in science as the only source of authoritative truth. And this naturalistic worldview leads to the inevitable loss of a moral foundation, a trend that seems to be accelerating in our modern world.

It is perhaps this loss of a moral foundation that is the most problematic indirect consequence of the naturalist position. In his book Technopoly: The Surrender of Culture to Technology, author Neil Postman makes this perceptive statement about our times: “Undeniably, fewer and fewer people are bound in any serious way to Biblical or other religious traditions as a source of compelling attention and authority, the result of which is that they make no moral decisions, only practical ones” (p. 79). This moving away from morality and toward pragmatism is due both to our affluent society and to the rise of naturalism as a worldview, not a sign that humans are naturally evolving. Societies throughout history have gone through similar cycles.

Even in a naturalistic system, though, moral principles seem to be intuited and universalized. Although, for instance, more people may be engaging in adultery due to the modern climate of permissiveness, they nonetheless recognize the immorality of unfaithfulness to one’s spouse. People uniformly recognize that there are objective moral truths, even if they are tempted for various reasons not to live by them. But naturalism as a worldview does not easily explain moral principles; how they might be derived is unclear. How, for example, are universal human rights derived from any observation of history or natural processes? In the event, though people recognize moral truths, they have no framework for making them anything more than a personal choice, from a naturalist worldview.

COMPELLING ARGUMENTS FOR THEISM

The universal acceptance of objective moral truths is the groundwork for the moral argument, one of the most compelling cases for the existence of God. Without a moral standard people would be like animals, which simply respond to stimuli and have no problem killing each other over domain, food and mate selection. As C.S. Lewis points out, “The moment you say that one set of moral ideas can be better than another, you are, in fact, measuring them both by a standard, saying that one
of them conforms to that standard more nearly than the other” (Lewis, 1952/2001, p. 13). The standard of morality is God himself – his character – and since humanity has been created in his image all people have his character stamped upon their consciences, stained though they may be by sin. And along with this, God has given humanity laws to live by, first in the Old Testament and summarized in the Ten Commandments, then later reinforced and expanded by the teachings of Jesus Christ.

These [commands] provide the basis for moral duties. For example, God’s essential attribute of love is expressed in his command to “Love your neighbor as yourself” (Luke 10:27). This command provides a foundation upon which we can affirm the objective goodness of generosity, self-sacrifice, and equality. And we can condemn as objectively evil greed, abuse, and discrimination (Dr. Craig Videos, 2015).

Apologist Dr. William Lane Craig has produced an informative set of short videos that present the moral argument mentioned above, as well as the cosmological and teleological arguments for the existence of God. The cosmological argument is philosophical in nature, stating that there must be a first cause. Someone or something must be eternal; and since the universe had a beginning, then it cannot be eternal. Although the cosmological argument may not satisfactorily prove the existence of God for everyone, it at least demonstrates that “in fact, it is quite reasonable to believe that God does exist” (Dr. Craig Videos, 2013). The teleological argument takes a more scientific approach, focusing on evidence for design.

Recognition of God’s clear design in nature has been making a comeback in recent years with the movement among some scientists known as Intelligent Design, the view that some features of the universe and of living things bear signs of design and are therefore best explained by an intelligent cause rather than by the undirected process of evolution. The top resource for Intelligent Design is the Discovery Institute and their Center for Science and Culture, easily accessible at Discovery.org, where one may find articles by some of their prolific scientific writers such as Stephen Meyer, Michael Behe, David Berlinski, William Dembski, Nancy Pearcey, and Jonathan Wells. Those who do research and write on intelligent design at the Discovery Institute do so from a scientific perspective, not religious. Among the contributors are Jews, Protestants, Catholics, and agnostics.

God’s handiwork or design of nature, called general revelation by theologians, is spoken of in Scripture, but may be most appreciated when one takes the time to observe, experience, and enjoy God’s creative work in nature. Throughout the Psalms David makes mention of and gives praise for God’s design recognized in the vastness of space (8:3-4) and in his own body (139:13-14):

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\begin{align*}
&\text{When I look at your heavens, the work of your fingers, the moon and the stars, which you have set in place,} \\
&\text{What is man that you are mindful of him…} \\
&\text{For you formed my inward parts; you knitted me together in my mother’s womb.} \\
&\text{I praise you, for I am fearfully and wonderfully made;} \\
&\text{Wonderful are your works; my soul knows it very well.}
\end{align*}
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Nancy Pearcey, in her book *Total Truth*, states that scientists consider Darwinian theory to be “the interplay between chance (randomness) and necessity (law). Intelligent Design theory adopts the same simplified schema but adds a third category: design” (2004, p. 192). Therefore, all things come about either by random processes (chance), predictable processes (laws of nature), ordered processes (design), or combinations of these. Evidence for design may be found in the very large world of cosmology as well as in the very small world of microbiology.

**DESIGN EVIDENCE IN THE VERY LARGE:**

**Cosmology**

The science of cosmology (the study of the origin and development of the universe) reveals that Earth is a Goldilocks (just right) planet that has been fine-tuned for life (this concept is also called the anthropic principle). This fine-tuning begins with the four fundamental forces in nature: gravitational, electromagnetic, strong nuclear, and weak nuclear. These and many other universal constants have been set to the very narrow parameters required to facilitate life on a planet. Craig lists 11 such constants in his teleological video The Fine Tuning
of the Universe, among which are the speed of light and the cosmological constant (the density of energy in the vacuum of space). Dr. Hugh Ross lists 154 such “parameters of a planet, its planetary companions, its moon, its star, and its galaxy” (2004), each of which must have values within a very narrow range to allow physical life of any kind to exist on the planet.

Even the expansion rate of the Big Bang was critical. If it were faster, the matter “would have become so diffuse that gravity could never have gathered it into stars and galaxies” (biologos.org). If it were less, gravity itself would have pulled all matter back into a black hole. Alternative cosmological explanations for these many statistical variations are usually come down to asserting that there must be a nearly infinite ensemble of universes known as a multiverse, where “the laws of physics and the values of physical parameters like dark energy would be different in each universe, each the outcome of some random pull on the cosmic slot machine” (Ananthaswamy, 2012).

In addition to these constants of the universe, the earth is just the right size, has just the right moon at just the right distance, has just the right tilt, has just the right atmosphere, has just the right size of star, and is located in just the right position within this solar system and within this galaxy to support complex life.

The rare conditions required for habitability also provide excellent overall conditions for discovering the universe around us. At some point, this pattern should lead us to not only re-evaluate certain entrenched assumptions about the universe but even to reconsider our very purpose on this tiny speck orbiting a seemingly inconsequential star between the spiral arms of one ordinary galaxy among billions. (Gonzalez & Richards, 2004, p. 218)

The study of chemistry reveals how unique carbon is to form the myriad of organic compounds necessary for life, and how perfect oxygen is for metabolism to produce energy. Even grade school science students learn how well-balanced Earth is, with plants and algae using the process of photosynthesis to convert sunlight and carbon dioxide into energy while releasing oxygen into the air; concurrently, humans and all animals use that oxygen for energy through aerobic respiration while releasing carbon dioxide into the air.

Surely the most amazing compound is water, for it is perfect to perform the many functions necessary to sustain life. A few of its properties include that it is an ideal solvent, having low viscosity and a high capacity to absorb heat, making it perfect for the human body’s need of evaporative cooling.

According to physicist Paul Davies, “There is for me powerful evidence that there is something going on behind it all... It seems as though somebody has fine-tuned nature’s numbers to make the universe... The impression of design is overwhelming” (1989, p. 203). As science progresses, the importance of these many properties and constants is becoming more firmly established, strengthening the teleological argument all the more.

DESIGN EVIDENCE IN THE VERY SMALL: Microbiology

With the help of the electron microscope and other advances in molecular biology our understanding of the living cell has progressed from seeing it as a simple blob of protoplasm (as in Darwin’s day) to that of a highly organized and complex factory, filled with hundreds of different molecular machines, each carrying out specific functions with precision to keep the cell alive and the organism growing. Even the cellular membrane (outer surface) has an array of gates, sensors, and pumps to regulate the movement of materials in and out of the cell.

In 1998 Michael Behe published the first edition of his classic book, Darwin’s Black Box: the Biochemical Challenge to Evolution, in which he focuses on the evidence of irreducible complexity within living cells. He addresses molecular machines such as the bacterial flagellum and cilium, illustrating how hundreds of very specific proteins assembled in precise order are necessary for these to function. Then he moves on to the highly sophisticated blood coagulation cascade. All of these and many more point not to unguided processes over millions of years, but rather seem to bear the mark of intelligent design. Though there are scientists critical of his work, Behe’s assertions remain substantial. His papers addressing the ongoing research are readily available online at the Discovery Institute.

There is a mind-boggling amount of detailed
and well organized information found in the nucleus of every living cell, which, for many, appears to provide specific evidence of God’s intervention in biological processes. But there are others who somehow are convinced that it all came about by chance. The well-known evolutionary biologist Richard Dawkins has admitted that “the machine code of the genes is uncannily computer-like” (1995, p. 17). Yet although in his book The Selfish Gene (1989, p. 47) he also presents a wonderful analogy of human DNA being comparable to a 46-volume set of complex architectural plans. He then adds, “Incidentally, there is of course no ‘architect.’” For Dawkins and other naturalists, design is only apparent, that is, merely ostensible.

When the DNA molecule was discovered in the mid-1950s it quickly became evident that scientists were delving into the instruction book of life. This is now referred to as the genetic code, the encoded set of rules built into every living cell that gives detailed instructions for the building of proteins to create and sustain living organisms.

The complexity is compounded when one learns that the thousands of different proteins found in a living cell are all constructed of elaborate chains of amino acids. The 20 amino acids are like words combined into long meaningful sentences; when amino acids are combined in long meaningful sequences, they are able to perform specific functions for the cell. The naturalistic explanation of how proteins were first constructed is known as biochemical evolution, basically slow-motion spontaneous generation.

This view posits that the chemistry of life is simply a part of the makeup of the universe, or laws of nature. Therefore, when conditions are right, life begins automatically. Dean H. Kenyon, who co-authored a book, Biochemical Predestination, which was widely respected on the subject some 40 years ago, later admitted that tests of the theory failed, and has since become a proponent of intelligent design (Kenyon, 2012). There are a number of helpful short videos appropriate for classroom use available at discovery.org/id, such as Privileged Species, The Workhorse of the Cell: Kinesin, and How to Build a Worm (based on the embryological development of the C. Elegans roundworm).

OTHER COMPPELLING EVIDENCES FOR THEISM

Throughout history the veracity of the Bible has consistently held up under intense examination by comparison with outside historical accounts (such as the works of Josephus and Tacitus) and archaeological findings. The recent discovery of the seal of King Hezekiah in Jerusalem is but one of many hundreds of such discoveries. The internal evidence is also considerable, especially considering the extensive numbers of fulfilled prophecies. The Book of Isaiah, found among the Dead Sea Scrolls in the late 1940s, is dated hundreds of years before Christ, and the Messianic prophecies therein are numerous, with chapter 53 alone containing more than a dozen fulfilled by Jesus. And beyond these evidences are the testimonies of countless Christians down through the ages who have experienced God’s presence and witnessed miracles that are inexplicable.

Some of the greatest scientists of all time were strong Christians, and their faith actually spurred them on to greater discoveries because they believed that God was a God of order and that creation was just waiting to unveil its mysteries. A short list would include Leonardo da Vinci, Johann Kepler, Francis Bacon, Blaise Pascal, Robert Boyle, Galileo, Nicholas Copernicus, Isaac Newton, Carolus Linnaeus, William Herschel, Leibnitz, Michael Faraday, Lord Kelvin, Joseph Maxwell, John Fleming, George Washington Carver, and Wernher von Braun. Such great scientists and others like them “may not always belong to any completely orthodox religious tradition, but they very often show an awareness of a vast intelligence underlying the universe, and a reverence before the mystery of existence” (Ward, 1996, p. 11).

TEACHING WITH THE CHRISTIAN WORLDVIEW PERSPECTIVE

All of these scientists knew very well that while math and science provide the necessary tools for discovery and study of our world and how it works, God, through his Word, the Bible, provides the necessary perspective for interpreting and understanding those discoveries in light of the larger questions of life.

Mathematics and science, since they deal with accepted facts, are two disciplines that one might think can be studied with no need of referencing a
particular worldview, and indeed at a basic level this is true. But according to the Christian worldview, God is as relevant to the understanding of science as math is to the doing of science.

Without God it is as if one is enabled to see and understand the trees but not recognize and appreciate the forest. Or, turning to the arts, it is like examining a painting with no regard to who painted it or why, or listening to a symphony with no knowledge of what inspired the composer. While one might enjoy Beethoven’s sixth symphony as pure music, being informed that it is the composer’s “Pastoral Symphony,” inspired by his love of nature, suddenly the listener finds him- or herself sauntering along a brook, listening to birds singing, and later shaking from peals of thunder.

Likewise, having a knowledge of God and his revelation to humanity in the Bible provides people with a sense of meaning and purpose, that in the midst of seeming chaos is a fair amount of order and goodness, and a supreme being who is infinite, eternal and omnipotent – in control and sovereign over all things. Such profound inspiration may be conveyed through the teaching of science, as well as mathematics, and integrated with the subjects in numerous ways.

**GENERAL INTEGRATION APPROACHES**

Fundamental to all integration is the need for the instructor to be transparent about the worldview he or she holds, so that students have some sense of where the instructor is coming from. A secular, naturalistic worldview is apparent in most science textbooks, and those instructors who hold to that worldview are usually quite open about it. Just as students can readily tell if the instructor has an interest in science, so they should also be able to tell if he or she has an interest in God. But this should also be in accordance with the instructor’s comfort level, knowledge of the Christian faith, and personality.

Instructors should address matters about faith with the understanding that non-Christians are listening. As Peter says to speak with gentleness and respect, so Paul says in Colossians 4:5-6, “Walk in wisdom toward outsiders, making the best use of the time. Let your speech always be gracious, seasoned with salt, so that you may know how you ought to answer each person.” In whatever ways the Christian worldview is brought into the lesson, it must be natural and not contrived. It is much better to have only a few effective integration points throughout the course, rather than have many that are obviously forced.

The first and most important goal for all instructors, Christian or otherwise, is that the subject must be taught well. Knowledge of the discipline is important, as is currency with the latest disciplinary thought. The instructor also must be aware of best practices in pedagogy, using good techniques and illustrations. If there is little excellence in the teaching, there will likely be more disintegration than integration of faith.

Science and mathematics are considered inseparable twins. Seldom can someone really understand science without a knowledge of mathematics. Likewise, seldom is anyone motivated to learn mathematics without some application of science. Mathematics is the tool most necessary for progressing in science. Without these twins humanity would be deficient in its capacity to appreciate the grandeur of the universe and our world. Science reveals the extensive complexity found in living things at the microscopic level, and the wondrous simplicity found in the laws that govern the universe. Mathematics is the language by which these things are communicated. It describes reality and allows one to appreciate the magnitude and precision with which all things are ordered. Even beyond this, mathematics points even higher, opening the door for understanding more about the Creator.

If, as we affirm, the capacity to do mathematics is a good gift of God, it reveals something about his nature, for example, his subtlety, order, beauty, and variety. When people respond to these qualities of mathematics with awe and joy and turn to God with reverence and thankfulness, they are fulfilling this purpose. (Howell & Bradley, 2001, p. 5)

Mathematics reflects the glory of God because it has many of the same characteristics. Math is reasonable, trustworthy, orderly, and yet abstract. It reveals truth, and (when done correctly) never lies. Math is beautiful and can be used for design and creativity. It is infinite in scope and powerful in what it can accomplish.
Science also may reflect the glory of God and reflect his characteristics, but not so consistently, because it deals with the observation of an imperfect universe, stained by sin and because it includes theoretical assumptions and speculations that later may be proven not to be true. Some of these speculations deal with events that came about millions of years ago, beyond the reach of direct human observation and the application of the scientific method.

It is important to remember that the work of science always requires assumptions, and scientific findings change from time to time as science achieves more precise measurements, or measures in a different way. Scientists use a combination of faith and reason as everyone does, the difference being the object of their faith. Nobel-prize-winning physicist Richard Feynman (1999) admitted the following in his book *The Pleasure of Finding Things Out*:

Science alone of all the subjects contains within itself the lesson of the danger of belief in the infallibility of the greatest teachers in the preceding generation …As a matter of fact, I can also define science another way: Science is the belief in the ignorance of experts. (pp. 187-188)

Einstein perhaps provided us with the best perspective when he spoke about our knowledge of the universe in an interview with Chaim Tschernowitz:

[Einstein] looked upward at the clear skies, and said: ‘We know nothing about it at all. All our knowledge is but the knowledge of school children. ‘Do you think,’ I asked, ‘that we shall ever probe the secret?’ ‘Possibly,’ he said with a movement of his shoulders, ‘we shall know a little more than we do now. But the real nature of things, that we shall never know, never.’ (Clark, 1995, p. 242)

This humble attitude agrees with what is found in Scripture, that God “has made everything beautiful in its time. Also, he has put eternity into man’s heart, yet so that he cannot find out what God has done from the beginning to the end” (Ecclesiastes 3:11, English Standard Version). Such mystery concerning God’s activities throughout time has led to much disagreement on the topic of origins

**COMMON CREATION VIEWS HELD BY CHRISTIANS**

One of the few points of agreement between naturalism and theism is that the universe had a beginning. Beyond this, atheistic scientists do not trust theologians and many theologians do not trust scientists. Dr. Wernher von Braun (2007) captured this disparity well when he said: “I find it as difficult to understand a scientist who does not acknowledge the presence of a superior rationality behind the existence of the universe as it is to comprehend a theologian who would deny the advances of science” (von Braun & Powell-Willhite, 2007, p. 89). As one might expect, the three main views of creation held by Christians vary according to their trust in science and their interpretation of the biblical account.

The Young Earth view, often simply referred to as creationism, believes the universe and all life were created by God in six 24-hour days and that the earth is between 6,000 and 10,000 years old. Those who hold this view are very critical of all radiometric dating methods and do not trust the fossil record. The variation in life forms, in this view, has come about through adaptation to the environment but within the original created kinds (Genesis 1:24-25). The ministry Answers in Genesis (answersingenesis.org), along with its founder Ken Ham, are among the major proponents.

The Old Earth or Day-Age view believes the days of Genesis 1 should be understood as ages extended over very long periods of time. Support for the contention that God (and his creation week) is outside of time comes from Bible passages such as 2 Peter 3:8, which states “that with the Lord one day is as a thousand years, and a thousand years as one day.” This view agrees with mainstream science as to the age of the earth and universe, accepts the fossil record as being reasonably accurate, but asserts that life was created in stages and then expanded into new species through microevolution, adaptation to the environment, but remaining within the limitations of the DNA. A major proponent is the Reasons to Believe ministry (reasons.org) and its founder Dr. Hugh Ross, an astronomer.

The Theistic Evolution view also agrees with the radiometric dating and other methods for the age of the earth and universe, and accepts that life evolved much as mainstream scientists say
(accepting both micro- and macroevolution), except that it was empowered and directed by God. Some theistic evolutionists believe Adam and Eve were historical figures, others understand them as non-historical. The ministry Biologos (biologos.org) is the major proponent of this view, along with its founder Dr. Francis Collins, a physician-geneticist.

It is very important to note that although Christians at times have bitter disagreements over these views, there are actually many points they all agree on. Here are 10 of them, derived from Scripture:

1. God created the universe and the world in which people live (Gen. 1-2; Is. 42:5).
2. God created by an act of his will and command (Psalm 33:6-9; Rev. 4:11).
3. God created all matter from nothing, that which cannot be seen (Heb. 11:3).
4. God created everything for his glory (Rev. 4:11).
5. God created everything with great wisdom (Psalm 104:24; Jer. 10:12).
6. God created everything very good (Gen. 1:31).
7. God created all things through Christ and for Christ (Col. 1:15-17).
8. God created people in his image to reflect his glory (Gen. 1:27; Acts 17:24-28).
9. God’s creation shows his design and reveals his character (Rom. 1:20; Is. 40:12-31).
10. God’s days of creation and rest were given as a pattern for our own days of work and rest (Gen. 2:1-3; Ex. 20:9-11).

The analogy of God’s days of work and rest to ours is significant regardless of the length of time attributed to God’s days of creation. Appreciating these many common beliefs shared by those who hold very different views on the timing of God’s creative work should help Christians to have respect for those who hold opposing opinions on creation. The instructor needs to set the example, regardless of his or her worldview, in showing respect to students who differ. This is especially true for Christian instructors, as they are held to a higher standard, and rightfully so.

INTEGRATION AND THE CULTURAL MANDATE

Just after the creation of humanity, the so called cultural mandate given to the first humans provides an ever-rich source for meaning and purpose, and thus, integration. This is where science, technology and ethics intersect. Scientists with a naturalistic perspective may be left scratching their heads, but the desire for a foundational point to life resonates with most people.

Humanity may not fully understand its proper role in the natural world, except with the realization of its God-given responsibility to rule over and care for the earth. The command is given in Genesis 1:28 and followed by an assignment in 2:15. Then God blessed them, and God said to them, “Be fruitful and multiply; fill the earth and subdue it; have dominion over the fish of the sea, over the birds of the air, and over every living thing that moves on the earth… Then the Lord God took the man and put him in the garden of Eden to work it and keep it.

In this original Prime Directive, humanity was entrusted with guarding, caring for, and ruling over all of creation. So likewise, from this perspective, science needs to be concerned with the proper care of animals and people, keeping the environment clean, not wasting resources, and seeking to preserve habitats for future generations. Stemming from this are the various concerns of bioethics, such as abortion, euthanasia, medical technology, reproductive technology, and genetically modified foods.

Humans have been made the earth’s custodians precisely because they were created in the image of their Creator, and thereby are equipped to bear that responsibility. Humans resemble God in many of his characteristics. Like God, people are able to love as a matter of the will – to sacrifice and care for even those who are very difficult. Like God, humans can create, not merely for practical purposes, but for beauty. Like God, they can reason on a high level, explore the universe, and delve into the abstract questions of truth, morality, and justice. And like God who communicated through his prophets, the apostles, and his Son, people may communicate with him through worship and prayer. Such centering on God connects people to his will and enhances their ability to deal with the increasingly difficult issues that are a part of life in a fallen world.

Management of the world’s resources to provide energy, building materials, and industrial chemicals, while maintaining a clean environment is an ever-
increasing concern. Engineers are educated in applying math and science to solve the world’s many problems. They design vehicles, roads and bridges for transportation, dams for water and electricity, buildings for housing and business, machinery for factories, and computers to enhance production.

Mathematics and science not only provide humanity with a much deeper sense of the wonder of God’s creation, but they also better equip people to take care of this world. Humankind’s primary God-given task is to care for the earth and work the land to provide food, clothing, and shelter for people. God next assigned Adam the job of naming the animals. It seems clear that God expected people to grow in their knowledge, and in their capacity to work and keep the gardens of the world to provide for everyone. Farmers and horticulturalists are needed to stave off famines and provide year round food supplies. Engineers of all types are needed to build roads and bridges, tunnels and dams, buildings and factories, communication and transportation systems. Biologists are needed to provide the understandings necessary for preserving biological systems and species.

Mathematics and science combine to be the chief means of gaining knowledge of the physical world. Research and development in health care, housing, safety, food production and distribution, wildlife preservation, land management, and many more areas provide innovations that improve living conditions for people around the world.

INTEGRATION AND GENERAL REVELATION

The entire created order may be understood to be communicating God’s general revelation to humanity, in contrast to his special revelation given in his Word, the Bible, and in the person of his Son Jesus Christ. As people study the natural world and the universe, new wonders are revealed in the design that are increasingly amazing in scope and magnitude, showing incredible detail and ingenuity. And with the continuing progress of math and science people are enabled to discover more and more about creation and its Creator.

Romans 1:20 is a key passage that conveys how God reveals something of his character through nature: *For since the creation of the world His invisible attributes, His eternal power and divine nature, have been clearly seen, being understood through what has been made…* Perhaps the main point of integration in the teaching of math and science is to show how these disciplines reveal the universe as awesome in beauty, complexity, infinity and order, and that these findings also reflect the character of God. Math and science, together with humanity’s God-given intellect and reasoning ability, provide an openness to behold wonders that the senses alone could never detect. These tools are helpful for unlocking the mysteries of the universe, enabling people to embrace nature and appreciate its beauty, giving new depth of meaning to passages such as Psalm 19:1-4.

*The heavens declare the glory of God, and the sky above proclaims his handiwork. Day to day pours out speech, and night to night reveals knowledge. There is no speech, nor are there words, whose voice is not heard. Their voice goes out through all the earth, and their words to the end of the world.*

Here, David, the psalmist, reflects on what to him seems obvious about God’s creation, that “the sky above proclaims his handiwork,” and the entire cosmos communicates day and night with voice, speech, and words, if people will but have ears to hear and eyes to behold the awesome order and splendor that ever shines for all to see.

John Polkinghorne (former Professor of Mathematical Physics at Cambridge University) left the field of science to study theology. His thoughts on science and theology are compelling: “One of the fascinating things about the physical world is that its fundamental structure seems always to be expressed in beautiful mathematics. To me that suggests that there is a Mind behind the structure of the world, and that our minds are somehow attuned to that Mind” (Polkinghorne, 2000).

In the mid-20th century, evidence mounted confirming that the Big Bang theory is the best explanation for the ever-expanding universe. Science came to the conclusion that the Bible is correct in stating that the universe indeed had a beginning at a point in the far distant past. Before that, in 1905 Einstein’s special theory of relativity stated that there is a direct and simple relationship between matter and energy that can be expressed as E=mc², which means that energy (E) can be converted to mass (m) or matter, and vice versa. The formula states
that Energy = mass x speed of light (c) squared. It is interesting that according to the Bible, “God is light” (1 John 1:5) and is all-powerful (Gen. 17:1 - God Almighty, El Shaddai), having infinite energy. Therefore, it is reasonable that this all-powerful God of light could say the word and by an act of His will create the universe. This was the big bang, though not in a literal sense—it was actually a silent explosion of energy, since there was no gaseous atmosphere to transmit sound waves.

The beauty of mathematics may be observed by all who study mathematics, especially at higher levels. Examples would include the Pythagorean Theorem and its simple geometric precision, Pascal’s Triangle generating the Fibonacci Sequence with its beautiful appearance in flower petal arrangements, Phi and the generation of the golden rectangle, elegant shapes, and Euler’s identity:

$$e^{i\pi} + 1 = 0$$

This amazing formula is comprised of the five most fundamental mathematical constants: 0, 1, e, \(\pi\), and i. To step it up a level to the theory of relativity, this is what Paul Dirac (1939), a top theoretical physicist from the last century, had to say:

What makes the theory of relativity so acceptable to physicists in spite of its going against the principle of simplicity is its great mathematical beauty. This is a quality which cannot be defined, any more than beauty in art can be defined, but which people who study mathematics usually have no difficulty in appreciating. The theory of relativity introduced mathematical beauty to an unprecedented extent into the description of Nature.

The concepts of infinity and eternity, which are fundamental attributes of God (Job 11:7-9; Psalm 90:2), may be illustrated easily from a simple number line, to geometry and calculus, where it is used most frequently. The hyperbola, graphed as the reciprocal function \(y = 1/x\), is a good example, how it extends to become infinitely large in the y direction, while simultaneously in the x direction, the distance to the asymptote becomes infinitely small.

Beauty in science is found often in simplicity and proportions. Vern Poythress (2006, p. 299) noted especially the beauty and proportionality in Newton’s Laws. The second law of motion may be summarized with the simple formula \(F = ma\), where \(F\) is the external force on an object, \(m\) is the mass of the object, and \(a\) the acceleration of the object. So, if acceleration is held constant, then when the mass is increased, the force must be increased proportionally. This explains why a heavy truck uses more gasoline (\(F\)) than an automobile.

Newton’s Law of Gravitation also reveals the amazing proportionality found in nature: \(F = GMm/r^2\). Here the force of gravity (\(F\)) is proportional to the mass of the large body (\(M\)) such as earth, proportional to the mass of the object (\(m\)), and inversely proportional to the square of the distance (\(r\)) between the two centers of gravity. The gravitational constant (\(G\)) is the same throughout the universe.

One may readily see that for objects dropped from the same height, \(M\) (the mass of the earth) and \(r\) (the distance dropped) will be constant, and therefore \(F/m = GM/r^2\) will likewise be constant. And using the same proportion from the first \(F = ma\) yields \(F/m = a\). Therefore, \(a = GM/r^2\), meaning the acceleration is constant. The gravitational acceleration on the surface of the earth is a constant 9.8 m/sec\(^2\) or 32 ft/sec\(^2\), and the mass of the object, whether a marble or a bowling ball, has no effect on this. Before Isaac Newton put the math on it, Galileo supposedly proved this by dropping different objects from the Tower of Pisa and noticing that they fell (accelerated) at the same rate, hitting the ground at the same time. And several hundred years later in 1971, Apollo 15 Commander David Scott demonstrated the same thing on the moon in the vacuum of space with the famous hammer and feather drop (MoonInGoogleEarth, 2009).

Incidentally, mass does have an effect on and is proportional to the gravitational force (\(F\)), which is one’s weight measured when standing on a scale, also calculated using \(F = ma\). These examples are just a few of the many that instructors may use to illustrate to students the beautiful simplicity and proportionality found in science with the help of mathematics. And this in turn points to the beauty and order God has designed into the universe, a universe that reflects his glory.

**INTEGRATION AND GOD’S SOVEREIGNTY**

The sovereignty of God, his supreme authority
and absolute power over creation, is one of the major themes in the Bible, and therefore a major theme in the Christian worldview. One aspect of God’s sovereignty is providence, God’s continuing active control, guidance, and care of all things. As God’s image-bearers, humans experience life at the highest level among all creatures. Learning to recognize God’s hand in the details of life provides great security that he is in control, sustaining humans and all of life according to his will. Psalm 147:8-9 refers to God’s active role in caring for the earth:

He covers the heavens with clouds;  
he prepares rain for the earth;  
he makes grass grow on the hills.  
He gives to the beasts their food,  
and to the young ravens that cry.

Colossians 1:17 and Hebrews 1:3 speak of Christ’s personal care of all things:

He (Christ) is before all things,  
and in Him all things hold together.  
He is the radiance of the glory of God  
and the exact imprint of his nature,  
and he upholds the universe by  
the word of his power.

A fairly recent illustration made popular by Pastor Louie Giglio in a video (2008) uses laminin, the family of proteins which “provide structural support, and promote cell growth and regeneration” (laminin). The actual diagram of the molecule resembles a cross, and this is used to amplify the point of Colossians 1:17. But what is most important is not the cross shape, which is very common, but that God through Christ does hold all things together both spiritually and physically – by his sovereign power and by the design he has built into nature.

God’s providential care of the earth is also found in the poetic language of the Old Testament. Psalms 93:1; 96:10; 104:5 are examples. Psalm 93:1-2 provides a specific example:

The Lord reigns; he is robed in majesty;  
The Lord is robed:  
he has put on strength as his belt.  
Yes, the world is established;  
It shall never be moved.

Your throne is established from of old;  
You are from everlasting.

One can easily see here from the metaphors used that the point is not that the earth is physically immovable, but that God is immovable, that he reigns over the earth, and that it is immovable from his sovereign rule. The earth is firmly established due to God’s strength to maintain and protect it. Poetic language in the scriptures is evocative and illuminating, but can be misinterpreted. These misinterpretations can cause misconceptions about scriptural passages, which are often used to discredit the Bible.

BIBLICAL MISCONCEPTIONS

It is important to make clear that the Bible is not a scientific book. That is, it was not written in genres that were intended to convey precision. This makes interpretation a challenge, since many different genres are used by many different authors over a span of many years. For evangelical scholars, most of whom believe in the inerrancy of the Bible, “the historical-grammatical method is the established method” (Sexton, 2011, p. 158) of biblical interpretation (hermeneutics). This method seeks to determine the meaning of a passage by taking into account the historical setting, the social and cultural context, the literary genre, as well as the grammatical and syntactical uses of the words at the time they were written. Using this accepted method of interpretation it is found that most misconceptions may be explained due to the poetic genre used, or due to the perspective of the writer.

The misconception of an immovable earth mentioned above, is also found in other poetic passages, with other metaphors being used, such as “the foundations of the earth” (Psalm 82:5; Is. 51:13), and “the pillars of the earth” (Job 9:6). It may also be the case that the writer is referring to the integrity and massiveness of the earth from the perspective of a dweller on earth. For that very reason buildings are anchored into the earth’s bedrock, so that their foundations will be immovable. Since the Bible was written long before Foucault’s Pendulum and other means of determining earth’s motion, this interpretation is most likely. Incidentally, Job 26:7 accurately states that God “hangs the earth on nothing.”

In the sixteenth century such passages led the
Christian church leaders to hold to the Geocentric (Earth centered) view of the universe as supported by the first century astronomer Ptolemy, despite new evidence by Copernicus for a Heliocentric (Sun centered) view. But the church eventually (some 200 years after Copernicus) saw the need to interpret Scripture differently, realizing the overwhelming evidence for the earth revolving around the Sun.

The most easily explained reference to a supposed immovable earth is found in passages that speak of the rising and setting of the sun (Eccl. 1:5; Ps. 19:4-6). From the perspective of an observer on earth these statements are true, and that same figure of speech is still used today. No one accuses the television meteorologist of being ignorant when he or she reports on the times of sunrise and sunset. In the same way Job 38:31-32 speaks of the Pleiades, Orion, and other constellations moving across the sky. Again, from a perspective on earth, people observe the same thing. Even telescopes are designed to track the apparent movement of the heavenly bodies.

A similar misconception found in the poetic literature of the Bible is when the heavens are described as a canopy over the earth. Two passages use this imagery: “stretching out the heavens like a tent” (Psalm 104:2; Is. 40:22), and at least eight times, simply, “stretching out the heavens” (e.g. Job 9:8; Jer. 51:15; Zech. 12:1). But again, from the perspective of a dweller on earth, the sky with all the stars in the Milky Way spread across from horizon to horizon, does appear to envelop the globe like a canopy. The intent is not to provide a scientific description of the galaxy.

Another misconception is that the Bible speaks of the earth as being flat due to several references to “the four corners of the earth” (Is. 11:12; Rev. 7:1; 20:7-8) and some 32 occurrences of “the ends of the earth” (e.g. Job 28:24; Ps. 2:8; Is. 52:10). These also are clearly metaphors used in poetry and apocalyptic literature. The metaphor “to the ends of the earth” is still common today, and no one gets accused of being a flat-earther. The other supposed flat-earth references are to Daniel 4:11, which was a vision, and Matthew 4:8 where Satan takes Jesus up “a very high mountain and showed him all the kingdoms of the world and their glory.” Yes, if taken literally this would be impossible, but the use of the superlative “all” was used to refer to his earthly kingdom being over all the earth. It wasn’t necessary for Jesus to actually see all of them, though this is clearly a supernatural confrontation, so anything is possible. Also, perhaps taking him up a high mountain was to intensify the temptation.

Again, the Bible should not be used as a science textbook. So although occasionally appropriate, instructors need to resist using Bible verses as proof texts for scientific truths. Most such passages when taken in context were not intended to teach science. God has equipped humanity with all it needs to discover truths about the natural world. The Bible, when properly interpreted, supports truths that science discovers. Though the Bible will always attract the scorn of some, it has stood the test of time and remains solid in all that it teaches.

CONCLUSION

Presented here are some ideas of ways the Christian faith may be effectively integrated into the teaching of math and science. For Christians in education there is an obvious question: If Scripture tells us, “The fear of the Lord is the beginning of knowledge” (Proverbs 1:7, ESV), how can students rightly learn anything with God conspicuously absent?

Mathematics to Kepler enabled him analogously to “think God’s thought after Him.” Since God’s thoughts are higher than man’s thoughts (Is. 55:8-9), mathematical thought must always be seen as a tool in understanding, developing, and using God’s creation; a tool that is always open to further refinement. (Nickel, 2001, pp. 144-145)

In 1946, one year after surrendering to the Americans at the end of WWII, Wernher von Braun, the man who designed the V-2 rocket for Nazi Germany, became a Christian and went on to work for NASA, where he designed the Saturn V rocket that eventually took men to the moon. Near the end of his life he made the following statement in a short essay:

Although I know of no reference to Christ ever commenting on scientific work, I do know that He said, “Ye shall know the truth, and the truth shall make you free.” Thus I am certain that, were He among us today, Christ would encourage scientific research as modern man’s most noble striving to comprehend and admire His Father’s handiwork. The universe as revealed through scientific inquiry is the living witness that God has indeed been at
work. (von Braun, 1976)

The rise of naturalism over the past century and a half has had a great negative impact on Christianity, and there is every reason to expect the trend to continue as professors at secular universities with the momentum on their side become more emboldened to convey their worldview at every opportunity. It is therefore incumbent upon instructors at Christian schools, even and especially those who teach math and science, to be open enough with their faith to allow students to see God in all of life, and to appreciate the beauty He has designed into creation for us to enjoy.

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