Strategies for Integrating Faith in Mathematics

By John Wesley Taylor V, Loella Lapat, and Frederick Oberholster

Philosophical Basis

God, the Master Mathematician, designed and created a universe filled with system and precision. It is governed by laws that can be understood, at least in part, through mathematical principles. At the same time, God as Sustainer and Redeemer is interested and actively involved in the experiences of His creatures. Through each encounter of life, He desires to reveal Himself, His character, and His truth.

The study of mathematics can provide insights into God's character and His works. Numerical and geometric patterns in nature, for example, can inspire appreciation for the order, consistency, and beauty throughout creation. Mathematical relationships and processes can illustrate spiritual concepts.

The Christian mathematics teacher will seek to help each student:

- Recognize mathematics as an integral part of God's creation;
- Discern spiritual truth in mathematical principles, relationships, and processes;
- Appreciate the contributions of mathematicians who were devout Christians;
- Adopt personal habits of order, accuracy, precision, and balance; and
- Understand that mathematics plays an essential role in the Christian's life.

As they learn to think in mathematical terms, students can perceive new dimensions of the infinite wisdom and creative power of God and can grow into a closer faith relationship with their Creator and Redeemer.

CONTEXTUAL CLUSTER

Tactical Strategies

- Tell the students that you intend to integrate faith in the mathematics course. As you develop your lesson plan, decide how to do this most effectively.
- Discuss periodically with the class your desire to be a committed Christian, particularly as this relates to your profession.

Ornamental Strategies

- Display in the classroom pertinent Bible passages or inspirational quotations, such as: "The Lord abhors dishonest scales, but accurate weights are his delight" (Proverbs 11:1, NIV); "The infinite value of the sacrifice required for our redemption reveals the fact that sin is a tremendous evil" (*The Ministry of Healing*, p. 451); or "Let the child and the youth be taught that every mistake, every fault, every difficulty conquered, becomes a stepping-stone to better and higher things. It is through such experiences that all who have ever made life worth the living have achieved success" (*Education*, p. 296).
- Prepare bulletin boards with a Christian focus (e.g., displays of statistics showing denominational growth or life expectancy around the world).

Environmental Strategies

- Treat all students with respect, caring, understanding, and impartiality.
- Take an active role in building positive student/student relationships, as well as favorable attitudes toward the subject area.

ILLUSTRATIVE CLUSTER

Analogous Strategies

Many analogies can be made between mathematics and the spiritual dimensions of life. Here are some examples:

- Absolute value: Whether a point is to the left or right of the origin, its absolute value remains positive. Whatever our situation, we always have a positive value to God.
- Angle: The closer the points in the lines of an angle get to the vertex, the closer they are to each other. The closer people get to God, the closer they become to each other.
- Binomial theorem: The theorem applies to all binomial expressions, but the result of the expansion depends on the value of the variables. Likewise, God's plan of salvation applies to all humans. Salvation, however, depends on one's personal acceptance of Christ—an indication of the value that we place on His sacrifice.
- Conic sections: Each section (e.g., circle, ellipse, hyperbola, parabola) is the intersection of a right circular cone and a plane. We form our impressions of God based on our encounter with Him. Yet we can also learn about God from other people. Discuss why we have multiple pictures of God in the Bible (e.g., the four Gospels).
- Constant: Although many things in life are subject to change, God always loves us. He also wants us to be constant in our commitment to Him.
- Conversion: A measure can be converted to a whole new unit, just as a person can be converted to a whole new life.
- Graph: The linear graph consists of two axes, x and y. Axis x represents our horizontal relationship to others; Axis y is our vertical relationship with God. Both dimensions are important in plotting the course of our lives (Matthew 22:37-39).
- Irrational numbers: Pi and the square root of 2 are irrational numbers (i.e., they are non-repeating, non-terminating decimals). We can never fully grasp them. Similarly, God is endless and beyond our finite comprehension.
- Point: One point seems insignificant, but all figures are made up of points. We may feel unimportant, but God valued us enough to send His Son to die for us.
- Positive/negative numbers: Adding a positive number to a graph shifts it upward; adding a negative number shifts it downward. Our lives can be affected by positive and negative spiritual influences.
- Real number line: A real number line extends in both directions indefinitely. Thus, it is represented with an arrow on each end. Likewise, God's existence is without beginning or end.

- Similarity: Two polygons may not be the same size (congruent), but they still can be similar in shape. We may not be as big as some Bible heroes, but we can be "like Jesus" as they were.
- Vertex: When drawing an angle, a slight inaccuracy near the vertex will result in an immense error farther away. So in one's spiritual life, small mistakes not corrected can lead one far from the truth.
- Utilize mathematics-related allegories such as *Flatland* by E. A. Abbott (Princeton, N.J.: Princeton University Press, 1991).

Narrative Strategies

At appropriate moments, you might share:

- Incidents from the lives of mathematicians of faith (e.g., Nicholas of Cusa, Johannes Kepler, Blaise Pascal, Leonhard Euler, Augustin Cauchy, and George Boole, among others).
- Anecdotes, perhaps from personal experience, emphasizing how small things can make a big difference.
- Any story of divine providence, in the context of probability.
- Illustrations from nature (e.g., geometric design of the honeycomb; occurrences of the Fibonacci numbers and the golden ratio). Emphasize the Mastermind behind these marvelous patterns.
- Stories from the Bible relating to specific topics.

Exemplary Strategies

- As a teacher, your life should model habits of order, accuracy, precision, and balance.
- Your love of learning and desire to understand all things—including mathematics—from a Christian perspective will set a good example for your students.

CONCEPTUAL CLUSTER

Textual Strategies

- Accuracy/honesty: Leviticus 19:36; Proverbs 11:1; 16:11; 20:23; Amos 8:5; Hosea 12:7; Luke 16:10
- Addition of negative numbers: Romans 12:17, 19; 1 Corinthians 6:7-8; 1 Thessalonians 5:15; 1 Peter 3:9
- Addition of opposite signs: Matthew 5:38-44; Romans 12:21
- Application—census/statistics: Exodus 38:26; Numbers 1:1-4
- Application—engineering: Genesis 6:15-16; Joshua 18:9; Job 28:9-11
- Constant: Exodus 13:21-22; Psalm 45:6; Malachi 3:6
- Contradiction: John 14:15; 1 John 1:6
- Conversion of units: Ezekiel 45:11-12
- Counting money: Luke 15:8; Acts 19:19; 1 Corinthians 4:1-2
- Division: Ezekiel 5:1; Matthew 25:31-33
- Equation/equality: Job 31:6, 15; Psalm 33:13-15; Proverbs 22:2; Matthew 23:8; Acts 10:28; Galatians 3:28
- Error: Isaiah 53:6; Daniel 5:27; Romans 3:23
- Infinity: Psalm 90:2; 136:1-26; 147:5; Isaiah 40:12,15; Ephesians 3:20; 1 Peter 1:25
- Measurement: Deuteronomy 3:11; Job 38:4-5; Isaiah 40:12; Ezekiel 40:5; 43:13; Revelation 21:17
- Measuring time: Psalm 90:12; Ecclesiastes 3:1; Matthew 24:36, 42
- Multiplication: Matthew 18:21-22; 25:15-30
- Prediction: Daniel 8:14; 9:24; Matthew 16:3
- Probability: Matthew 18:27; 20:26; Hebrews 6:18
- Ratio/proportion: Exodus 20:8-11; Malachi 3:10
- Real numbers: Genesis 15:5; Hebrews 11:12; Revelation 5:11
- Symbols: Revelation 1:8

Thematic Strategies

Themes in mathematics that can contribute to an integrational approach include the following:

- Assumption: In mathematical logic, the premises accepted determine the conclusions reached. Emphasize the need for caution in making assumptions.
- Equality/inequality: All human beings are equal before God. We are not, however, on a same level with the animals or with God.
- Pattern: God is our Pattern. We can also become examples to those around us, modeling God's character in our lives.
- Prediction: God's faithfulness and dependability are illustrated in the constancy and predictability of mathematical rules.
- Problem/solution: We all face difficulties, but no problem is too big for God to resolve.
- Process: As in the moral realm, rules and procedures are needed to avoid confusion and achieve the correct results
- Substitution: Jesus died in our place so that we might be saved.
- Symbol: Symbols represent important concepts or entities, both in mathematics and in the religious realm.

Valuative Strategies

Controversial issues in mathematics that lend themselves to valuative strategies include the following:

- Calculators: When should calculators be used in a mathematics class? Some say that technology is a result of God-given wisdom and should be maximized. Others argue that students should engage in critical thinking and not be excessively dependent on technology.
- Certainty: Mathematics is built upon certainty and predictability. Many times, however, life seems uncertain and unpredictable. How do we reconcile this apparent discrepancy? Discuss the implications of Psalm 37:3-5.

- Distortion: Note the results of changing the unit of measure, limiting the range in a graph, or selectively presenting statistics. Discuss clarity and deception.
- Gender equity: If both man and woman were formed in God's image (Genesis 1:27), why do relatively few women enter the field of mathematics? What might be done to rectify this inequity?
- Miracles: Are miracles defined in terms of probability or divine intervention? Or in some combination of the two?
- Plagiarism/honesty: Discuss the Newton-Leibniz controversy or Cardan's "theft" of the cubic solution method from Tartaglia, as well as individual accountability in cooperative assignments.
- Purpose: What is the purpose of studying mathematics? Why should students take advanced mathematics courses? Discuss how mathematics relates to the Christian life.
- Quantity vs. quality: In many disciplines, there is an ongoing controversy between the proponents of quantity and quality (e.g., quantitative versus qualitative research, profit versus customer satisfaction in business). Discuss the rationale presented by the advocates of each view.
- Incorporate personal and/or academic values, such as the following, in discussing controversial issues:
  Accuracy, affirmation, balance, beauty, confidence, cooperation, creativity, critical analysis, curiosity, dependability, economy, fairness, flexibility, honesty, humility, imagination, ingenuity, initiative, inquiry, insight, intuition, logical thought and expression, meaningfulness, neatness, objectivity, order, originality, patience, persistence, precision, reliability, self-motivation, sense of worth, significance, structure, symmetry, trustworthiness, truthfulness, unity.

EXPERIENTIAL CLUSTER

Personal Strategies

Include basic integrational strategies such as these:

- Have students keep a journal of personal reflections and spiritual insights gained during mathematics class.
- Pray with students and encourage them to pray whenever grappling with a concept or problem, and to praise God for success.
- When considering a mathematics unit or topic, have students respond to the question: "What does this have to do with me?"
  Personal strategies that integrate faith and learning may also be developed in relation to specific topics:
- Coefficients: To what would you compare the positive and negative coefficients in your life? Write in your journal an example or two of how positive influences have improved your spiritual life or how negative influences could reduce the quality of your spiritual life.
- Number line: There are an infinite number of points between zero and one, yet each of them can be represented by a real number. Imagine all the people who have ever existed, yet each is unique and special. Reflect: Who am I to God? To others? To myself?
- Percentage: Have students estimate the time they spend on faith-building activities as compared to other types of activities. Portray the results graphically.
- Probability: What was the probability that among all the people your parents met and among all the genetic combinations, you were produced? Trace your ancestors and reflect on the odds of becoming you. Doesn't this show a special reason for your existence?
- Ratio: Compare the ratio of Christians and non-Christians in various parts of the world. What might be some of the reasons for these differences? How might these ratios be modified?

Interrelational Strategies

- Engage students in collaborative projects such as working together in small groups to create a slogan or artwork that depicts a theme in math. Or perhaps set a day for students to help the lower grades with their math.
- Encourage students to volunteer for short periods as apprentices in math-related offices, such as engineering, public works, sanitation, weather bureau, surveying, accounting, statistics, and census taking.
- Engage students in a service-oriented activity that uses mathematical skills.

Declarative Strategies

- Publish or display student collaborative projects that reveal Christian and mathematical values/themes.
- Have students create crossword puzzles and trivia quizzes with math applications to share with elderly individuals who enjoy such activities, submit them to local newspapers, or share them with other classrooms.
- Choose a values-or attitude-related math motto or an imaginative geometric design that the students have created, and print it on T-shirts.
- Have students prepare and share talks or articles on lifestyle-related statistics, such as the relation of longevity to vegetarianism or smoking.
- Invite guest speakers and students to share personal spiritual insights related to mathematics. Discuss these in class.

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