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Subject-Centered Approach to Integrate Faith and Learning

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Subject-Centered Approach to Integrate Faith and Learning

Keywords

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Disciplines

Christianity | Educational Methods | Mathematics

Comments

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A Subject-Centered Approach to Integrate Faith and Learning



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Perspectives on Science and the Christian Faith



Practical Applications of an Integrally Christian Approach to Teaching Mathematics

Valorie Zonnefeld

Descriptions of various frameworks and approaches to integrating Christian faith in the mathematics classroom are explored, as well as examples and techniques. In particular, a subject-centered approach is advocated in contrast to the traditional teacher-centered approach or, more recently, the student-centered approach.

Introduction



- Teaching Christianly is a passion for me
- Can be difficult in math
- Beyond treatment of students and classroom environment



The Purpose of Teaching Math



- An implicit goal to “get ahead” or “make money”
- Reclaim math education for Christ
- Palmer¹ -guide “students on an inner journey toward more truthful ways of seeing and being in the world”
- What does this look like in a math classroom?



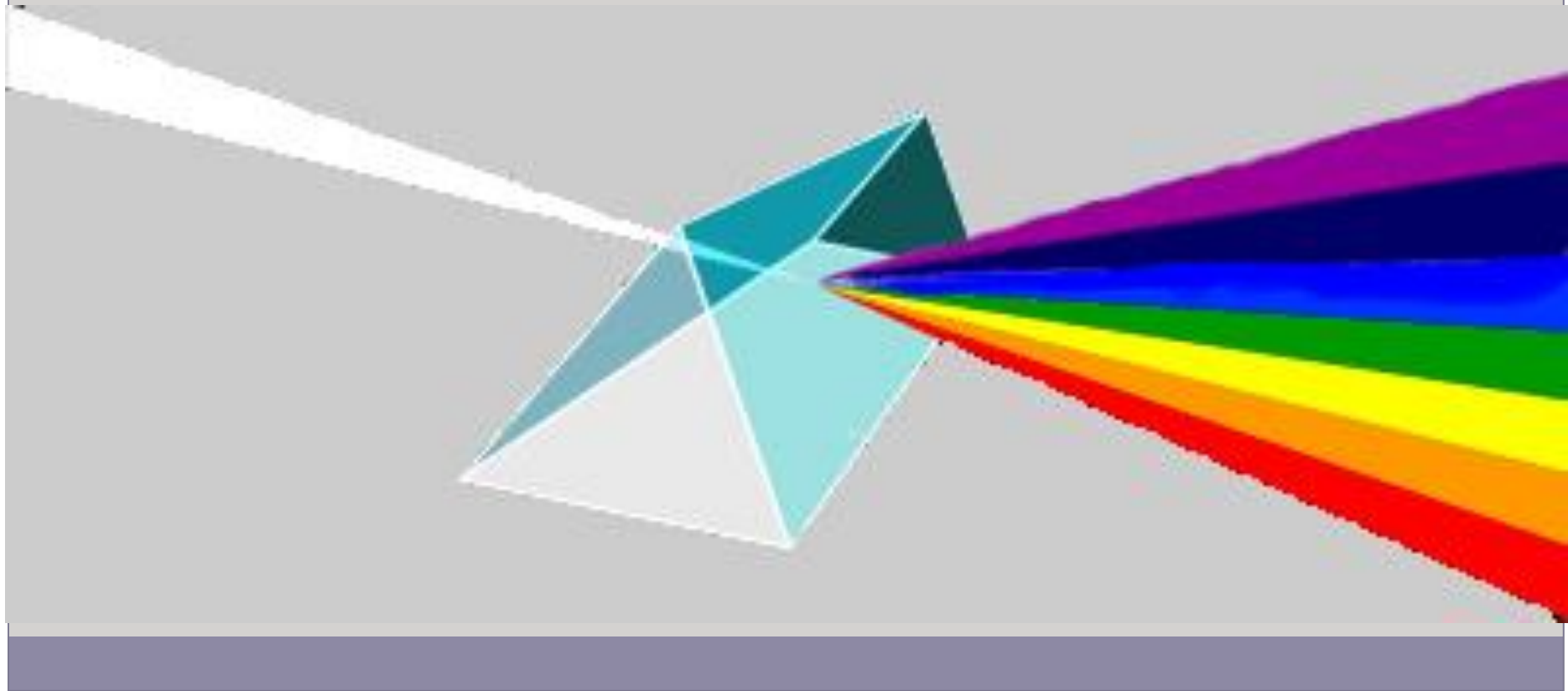
Goals for my Math Classroom



- A community of learners striving to learn more about the mysteries, beauty, and usefulness that God has interwoven in the spatial, physical, and logical dimensions of reality
- “Lord, what would you have me do with this knowledge?”



Spectrums of Integration Smith²



Fragmented vs. Coherent

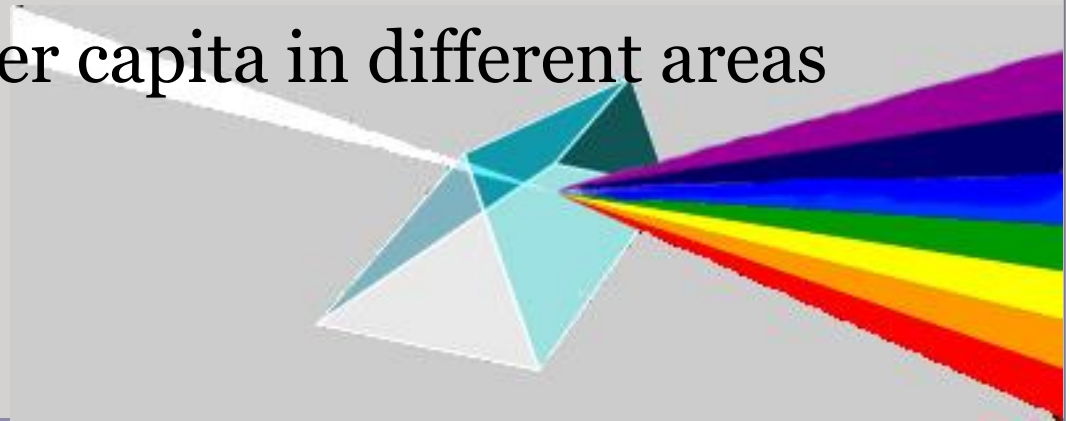


Fragmented

- Scripture does not change the heart
- Include a spiritual reference or verse and move along with class as usual

Coherent

- Integral use to enlighten learning
- Examining doctors per capita in different areas



Spiritualized vs. Grounded



Spiritualized

- Faith issues are introduced, but drift from math with no real connection
- The discriminant in the quadratic formula

Grounded

- Justice, stewardship, the spread of diseases, and human behaviors offer depth and vital connections



Decorative vs. Authentic

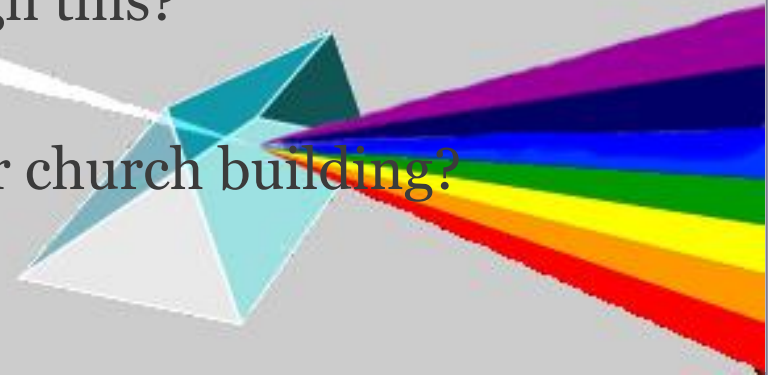


Decorative

- The Bible is stripped of authority
- Geometry using instructions for building the temple in I Kings.

Authentic

- I Kings may be used, but would not stop short
 - What is God communicating through this?
 - How does God view worship?
 - Does this change how you view your church building?



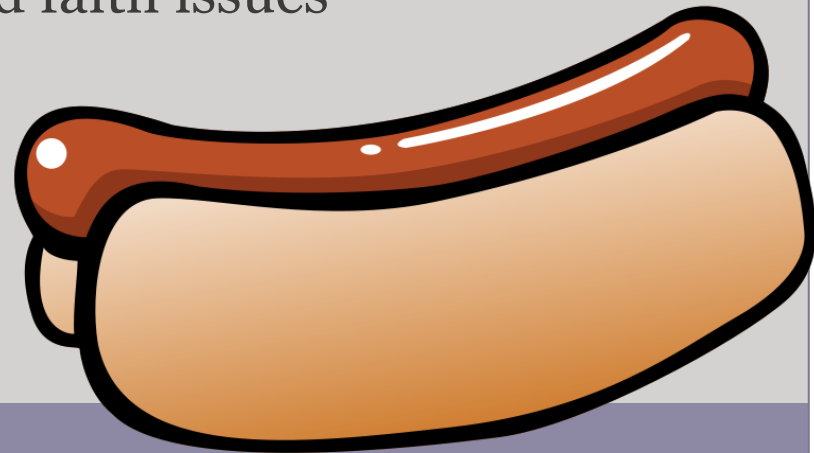
Integration or Integral?



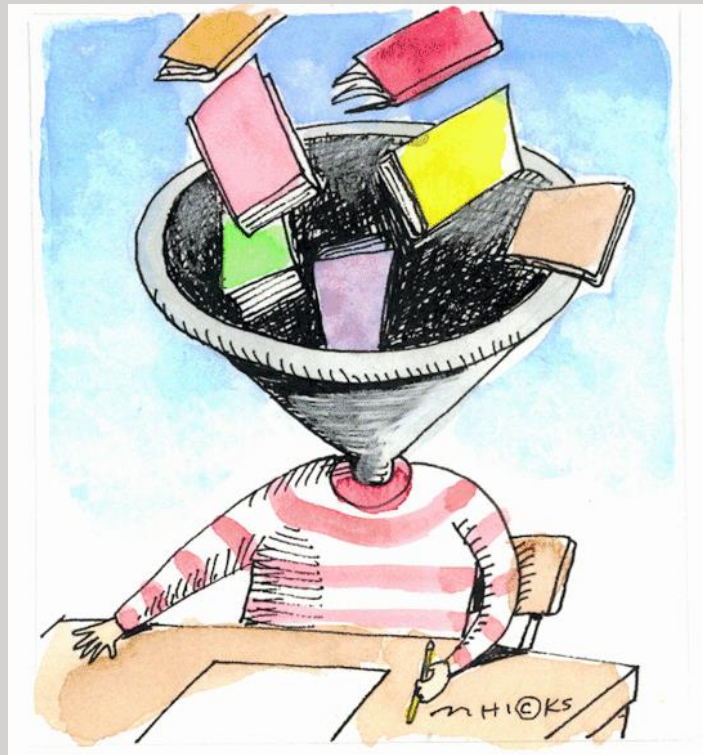
Integration or Integral? Zuidema³



- Integrate implies connecting two things that are separate
 - Hot dog and bun
- Faith is integral to math
 - Skim milk -the fat (or faith) has been removed
- Too often math is taught in isolation
 - Losing connections to reality... and faith issues



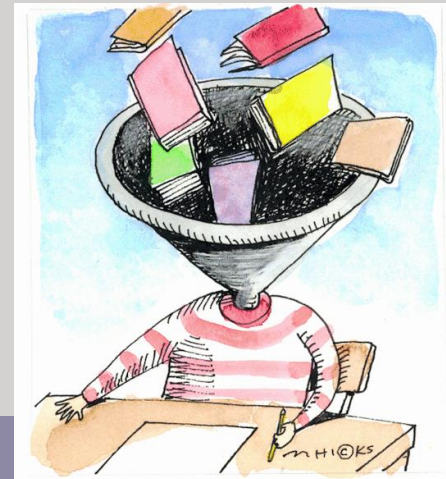
Approaches to Teaching



A Teacher-Centered Approach



- The traditional approach to teaching math
- Teaching by telling
- “assumes that the teacher has all the knowledge and the students have little or none” Palmer⁴
- Increased criticism from educators and researchers
 - Students learn math by doing math



A Student-Centered Approach



- “Guide on the side”
- Many constructivist pedagogies are used
- Students are deeply involved in their learning
- I attempted this for nearly a decade
 - More effective and respectful of students as image bearers
 - Students internalize their learning with greater retention



Concerns with a Student-Centered Approach



- **Fosters individualism**
 - Self-serving, self-promoting students
- **Philosophical Foundation of Constructivism**
 - At an extreme, allows student to decide that $2 + 2 = 5$
 - A step towards social constructivism
 - Inconsistent with Christian beliefs of absolute truth



False Dichotomy between Teacher and Student



- Weimer⁵ “the best teaching is not one or the other, but a combination of both”
- Palmer⁶ suggests a subject-centered classroom



Subject-Centered



- God's truth takes center stage in the subject
- Students and teacher are both actively involved
 - Neither overemphasized
- A focus on the created, helps students learn more about the Creator
- Teachers orchestrate the best learning experiences with the subject



Subject-Centered



- Cognitive dissonance draw students in
- “Can you think of any 4 odd numbers that add up to 19?” Ball⁷
- Curiosity puts math at the center
- Students have direct access to math
- Math is especially suitable because of its structure

Teacher and Student Roles



- Roles of teachers and students are important and take time to establish
- Ultimately maintain identity roles, as they gather around the subject to learn

Students

- Motivated learners
- Ask questions



The Teacher's Role



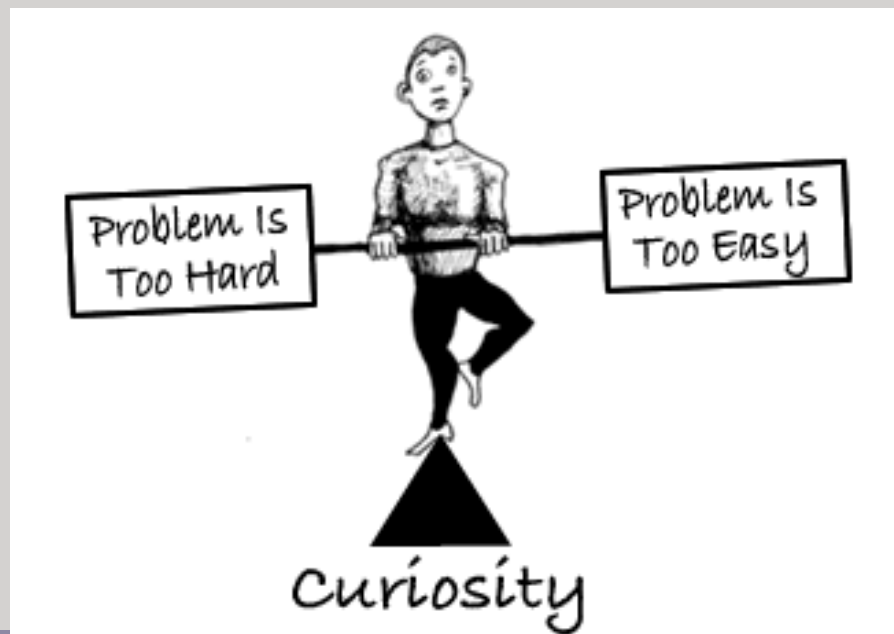
- Orchestrate opportunities for students to engage the subject
- An expert who guides students to further their learning



The Teacher's Role



- Monitoring cognitive demand
- Diagnosing misconceptions and guiding each student to where they can make connections
- Helping students less, often results in more learning



Cognitive Demand



- Cognitive dissonance pushes students to organize their learning and seek answers
- Similar to playing Catch Phrase®
- The imagery of a team working together to win a game is an apt description of my ideal classroom



Classroom Environment



- Learners can be more comfortable since the teacher no longer grants access to math
 - Technology supplies more access to math than before
 - Competition is not emphasized
- Doesn't force students to enter the teacher's domain or teachers to enter the students' domain
 - All are seeking to deepen their knowledge of math



Classroom Environment



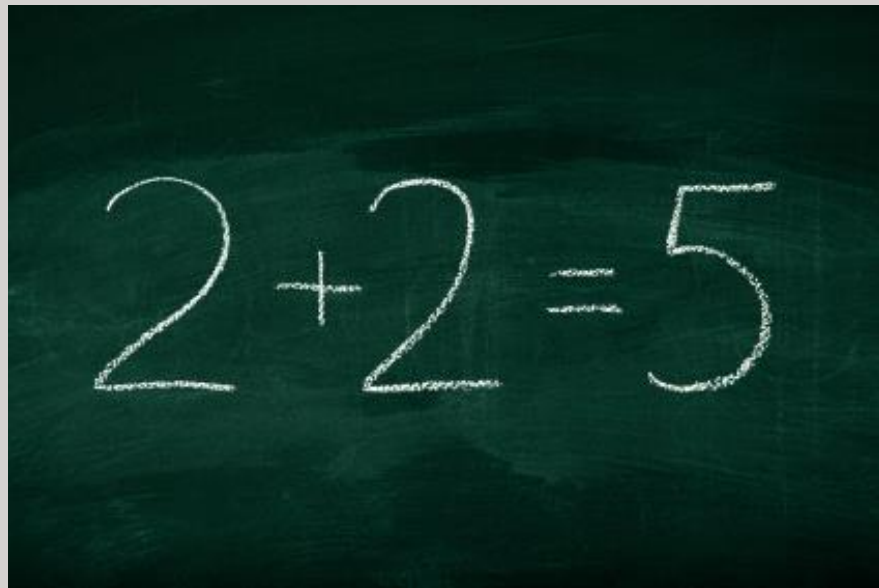
- More comfortable for teachers
 - Not a performer
 - The teacher is an expert...and a life-long learner
 - Mistakes aren't failures, but opportunities to learn
- Palmer⁸ “getting caught in contradiction can signify success: now I know that the great thing has such a vivid presence among us that any student who pays attention to it can check and correct me”

A small image of a chalkboard with the equation $2+2=5$ written on it in white chalk. The chalkboard is dark green and the equation is written in a simple, hand-drawn style.
$$2+2=5$$

Classroom Environment



- Presenting already-worked, error-free material leaves many students with the notion that those who understood math never make mistakes



Conceptual Teaching



- Supports a subject-centered approach
- Teaching not only how a concept works, but why
- Palmer⁹ suggests instead of disseminating facts, teachers need to bring students into the circle of practitioners
 - “we do not abandon the ethic that drives us to cover the field – we honor it more deeply”
- Huizenga¹¹ -shallow learning gives only human descriptors of math
 - “When we insist (by the very way that we structure lessons and assignments) that students attain and display a measure of real understanding of mathematical relationships, we bring them into contact with divine truth and beauty”

A Caveat about a Subject-Centered Approach



- The student-centered push gave lecture a bad rap
 - Somewhat warranted given the over-dependence math has had
- Lectures may be used
 - Recognize when its most effective Weimer¹²
 - Can be made more effective and engaging
- The teacher selects learning experiences that most effectively unfold the subject
 - Pedagogies that most faithfully allow the truth of math to be seen

Questioning



Essential Questions



- Overarching questions that guide and often integrate perspective

Course-wide

- Is math created or discovered?
- What does God reveal to us in math?
- What role do we have as image bearers of God in math?

Unit-based

- How can algebra describe creational phenomena?
- What laws of probability has God built into creation?
- How can I use statistics to honor or dishonor my creator?

Significant Questions



- A curriculum that gives opportunities for spiritual growth
- Squirrels and trees –Smith¹³
- Curricula that allow affordances for spiritual growth
 - An interesting and motivating way to teach.
- Schools present a fragmented reality in 50-minute segments
- Math is often disconnected from reality

Endnotes



1. Palmer, *The Courage to Teach: Exploring the Inner Landscape of a Teacher's Life*. (San Francisco: Jossey-Bass, 1998), 6.
2. Smith, "The Bible in the Classroom." Lecture, Heartland Christian Educators Conference at Dordt College, Sioux Center, Iowa, 2008.
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8. Palmer, *The Courage to Teach: Exploring the Inner Landscape of a Teacher's Life*, 118.
9. Ibid., 122.
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11. Weimer, "Teacher-Centered, Learner-Centered, or All of the Above," 2.
12. Smith, "Bible in the Classroom".