

## BIBLICAL WORLDVIEW INTEGRATION IN THE MATHEMATICS CLASSROOM

Dr. Debbie MacCullough  
Philadelphia Biblical University

## CHRISTIAN SCHOOL

- There should be something different!
- How does your understanding of mathematics impact your understanding of God and the world we live in?

## WHAT IS BIBLICAL WORLDVIEW INTEGRATION?

- NOT
  - A devotional
  - An analogy
  - A Scripture verse
  - A story of measurement from Scripture
- IS
  - More philosophical in nature
  - Answers to life's biggest questions!

## WHY BOTHER WITH BWVI?

- We are called to live integrated lives: "love the LORD your God with your whole heart, mind and soul."
- We are called to teach the "whole" child –
- We live in a "segmented" culture – religion is "private" and separate from "life"

## WHAT IS MEANT BY A "BIBLICAL WORLDVIEW"?

- *Viewing all of life and learning from God's perspective.*
- *Planning curricular activities that help the student think through subject matter and skill development in such a way as to develop the habit of connecting and contrasting all knowledge to their Christian worldview, the integrating core out of which an integrated Christian will think and act.*

*Note: These definitions come from Dr. Martha MacCullough's workshops and monograph on World view Integration*

## WHAT IS MATHEMATICS?

- A body of knowledge?
- A collection of rules?
- A set of relationships?
- Something unknowable?
- Something that exists only in our minds?
- The result of creative thinking concerning quantitative relationships?

## WHY DO WE TEACH MATHEMATICS?

Since your college days, have you thought about your educational philosophy?

- Educational Goals
- Spiritual Goals
- Community Goals

## WHAT IS THE PURPOSE OF INTEGRATION?

Planning curricular activities that help the student think through subject matter and skill development in such a way as to develop the habit of connecting and contrasting all knowledge to their Christian worldview, the integrating core out of which an integrated Christian will think and act.

## WHAT IS THE PURPOSE OF INTEGRATION?

- We want our students to live their lives in an integrated manner. Even mathematics and the study of mathematics allows us to better understand the world God created and placed us in and the character of God.
- It does, however, take planning at all levels of mathematics.

## HOW DO WE START INTEGRATING?

- Seven questions related to World view to consider (James Sire's *The Universe Next Door*)
  - What is really real? What is prime reality
  - What is the nature of external reality, the world around us?
  - What or who is a human being?
  - Is there life after death? What happens to a person at death?
  - How do we know? Why is it possible to know at all?
  - What is the basis for morality? How do we know what is right and wrong?
  - What is the meaning of human history?

## HOW DO WE START INTEGRATING?

- Develop an interactive lesson
  - Objective – include the world view question, what students should be able to do in order to show understanding
  - Motivation – activity that activates the mind, gets student's using prior knowledge/experiences
  - Concept/Skill Development – how students will get/develop new information or skills
  - Processing Activities – activities designed to allow students to organize old and new information/ skills.
  - Assessment – feedback on what students learned.

## HO DO WE START INTEGRATING?

- Processing Activities: Three Types
  - Correlation: What in the lesson *correlates* with some biblical answers to one of life's major questions?
  - Correction: What in the lesson needs to be evaluated in light of a biblical answer to one of life's major questions BECAUSE it appears to conflict with something we know clearly from God's Word.
  - Continued Study: What in the lesson brings up a question in which there is no immediate answer from either the subject area or the Bible? – Further study.

## EXAMPLE

- Kindergarten lesson on basic shapes
  - What worldview questions might be answered by this type of lesson?
  - What kind of activities can we do with kindergarteners to discover shapes?
  - What kind of activities can we then do to help them better understand the creator of those shapes?

## EXAMPLE

- Kindergarten lesson on basic shapes
  - The visible and invisible speak of God. His wisdom and glory are evident in mathematics and nature (see shapes in nature)
  - We are created in God's image – we have the ability to use shapes wisely (see shapes in man made structures)
  - This is correlation

## EXAMPLE

- 2<sup>nd</sup> Grade lesson on subtraction
  - What about subtraction allows us to know more about God and the world He has placed us in?
  - Belief: God exists and He has created a world of precision that allows calculations to be consistent!
  - Consider a worldview without God – why is 5-3 ALWAYS 2?

## SUBTRACTION LESSON

- Motivation: Story of a girl who keeps giving things away (whatever your theme is this month). How does she keep track of how many she has?
- Input: Have the students figure out how they can keep track during the story.
- Discuss ways they could find out at the very end.

## SUBTRACTION LESSON

- Input (con't): After the students are sure on subtraction as comparing how many they had at the beginning with how many they had at the end (ideas to find out how much she gave away during the entire story)... NOW integration
- Question: Will your method always give us the right answer? How do we know?

## SUBTRACTION LESSON

- Discussion with students as to how we know that it will not change... even 2<sup>nd</sup> graders can handle this bit of philosophical thinking.
  - Precision
  - Consistency in mathematics
  - These reflect the nature of God – He is consistent, precise
  - God created quantity – us with the ability to know – keeps it consistent!

## SUBTRACTION LESSON

- Processing/Assessment
  - Have the students write down in words how they would find out how many \_\_\_\_\_ were left after giving away \_\_\_\_\_ (use a new story) and explain WHY they know that number is correct and why it never could be anything else.
  - Write a poem/song thanking God that He has made our mathematics system consistent (or the same)

## RATIOS

- Fun activity when students are just learning the concept of ratio – one quantity in proportion to the other
- Have students take “body” measurements
- Website to help with this:  
<http://www.markwahl.com/golden-ratio.htm>

## A GOLDEN GREEK FACE

TOOLBOX: CALCULATOR, METRIC RULER (MEASURES TO MM)

Statues of human bodies considered most perfect by the Greeks had many Golden Ratios. It turns out that the “perfect” (to the Greeks) human face has a whole flock of Golden Ratios as well.

You’ll be measuring lengths on the face of a famous Greek statue (with a broken nose) by using the instructions on this page. Before you start, notice that near the face on the second page are names for either a location on the face or a length between two places on the face. Lines mark those lengths or locations exactly.

Using your cm/mm ruler and the face picture on the next page, find each measurement below to the nearest millimeter, that is tenth of a cm or .1cm (\_\_\_\_ cm). Remember, you are measuring the distance or length between the two locations mentioned. You can use the marking lines to place the ruler for your measurements. Fill in this table.

- a = Top-of-head to chin = \_\_\_\_ cm
- b = Top-of-head to pupil = \_\_\_\_ cm
- c = Pupil to nose tip = \_\_\_\_ cm
- d = Pupil to lip = \_\_\_\_ cm
- e = Width of nose = \_\_\_\_ cm
- f = Outside distance between eyes = \_\_\_\_ cm
- g = Width of head = \_\_\_\_ cm
- h = Hairline to pupil = \_\_\_\_ cm
- i = Nositip to chin = \_\_\_\_ cm
- j = Lips to chin = \_\_\_\_ cm
- k = Length of lips = \_\_\_\_ cm
- l = Nositip to lips = \_\_\_\_ cm

Now use these letters and go on to the next page to compute ratios with them with your calculator. Remember:

$$\frac{a}{g}$$

the first one, means find measurement a divided by measurement g as a rounded-off 3-decimal-place value.

### Finding the Gold

Now, find these ratios to three decimal places, using your calculator.

$\frac{a}{g} = \frac{\text{cm}}{\text{cm}} = \underline{\hspace{2cm}}$ $\frac{b}{d} = \frac{\text{cm}}{\text{cm}} = \underline{\hspace{2cm}}$ $\frac{i}{j} = \frac{\text{cm}}{\text{cm}} = \underline{\hspace{2cm}}$ $\frac{c}{e} = \frac{\text{cm}}{\text{cm}} = \underline{\hspace{2cm}}$ $\frac{f}{h} = \frac{\text{cm}}{\text{cm}} = \underline{\hspace{2cm}}$ $\frac{k}{l} = \frac{\text{cm}}{\text{cm}} = \underline{\hspace{2cm}}$	
--	--

Your answers to the above ratios should be near the Golden Ratio, 1.618. If you're very far off on any one of them, recheck both your measurements and your calculations.

## RATIOS

- After finding the number that these seem to all be close to – Golden ratio – ask questions of WHY we consider this beautiful.
- How do we decide on beauty?

## RATIOS

- Processing Activities: Have students research other areas that have the golden ratio as a basis (architecture, paintings...)
- After researching, students present and explain what a ratio is and how the golden ratio is evident in their researched area. Additionally, they need to write a defense for how this helps them better see God as our Creator.

## ANY HS MATH CLASS

- Assumptions we base mathematics upon (for the particular study)
- WHY do we choose these assumptions?
- HOW do we evaluate something as truth?
- What assumptions do we live from in our lives?
- Why is knowing assumptions important (inductive/deductive reasoning)?

## CALCULUS

- A study of infinity (both infinitely large and infinitesimally small)
- Mathematical definition of infinity (Dedekind): An infinite set is one that has a one-to-one correspondence with a proper subset of itself
- Example: Natural Numbers and a proper subset – the evens.
- What does it mean to say, “God is infinite”?

## GEOMETRY - FRACTALS

- How have subtle events in your life resulted in large differences in your current condition? How can you use awareness of this to impact your behaviors today?

Choose a minor event that could happen in your life today where choosing one option could result in one particular future and choosing the other option could result in a completely different future. Write the two stories

## STUDY OF PHI

- <http://www.youtube.com/watch?v=w19BTB5ino>
- Don't be afraid to ask the hard questions – what a safe place for it to happen!
- I use you tube clips often to get students to begin to critically analyze statements made by others.

## YOUR TURN!

- Think of topics/big ideas you teach your students.
- Brainstorm where you might develop a worldview integration lesson
- PBU sells a monograph by Dr. Marti MacCullough which you can purchase for \$9.

## SUGGESTION

- Pick ONE lesson this year to develop a Biblical Worldview lesson – take the one that seems to be the most natural.
- TEACH that lesson and then reflect on what went well and what did not go that well.
- Keep in mind, some students will find this “unusual” but it needs to become the norm.
- Next year, try another lesson. The more you do this, the easier it becomes.

QUESTIONS OR  
COMMENTS?