NUTS AND BOLTS OF PLANNING A “FLIPPED” CLASSROOM IN HIGHER EDUCATION

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November 23, 2013
Lilly Conference, Dayton Ohio

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AGENDA

- Background
- Begin With The End in Mind...
- What is a Flipped Classroom?
- What Does the Planning Phase Involve?
- Critical Learning Questions Group Activity
- Questions
Our College...
- Established in 2006
- Open-access, 4-year institution
- Rapid growth
- Core principles
  + Student engagement
  + Technology focused
  + Educational innovation
- This Project
  + STEM INITIATIVE 2
BEGIN WITH THE END IN MIND... OUR VISION
WHAT IS A FLIPPED CLASSROOM?
Instructor/Course Policies:

Class format
Prior to class, you need to complete any pre-work assigned. At the beginning of class, we will go over any questions you may have, and then learn the new material using multiple techniques, and work problems either individually or in groups. The class atmosphere will be an open one where you are free to ask questions at any time. Participation will be strongly encouraged, and group work will be required.

Since you are responsible for your own understanding, it is up to you to tell me when and where things are not clear. I am happy to spend a small amount of class time answering questions from previous homework assignments, but I will not fully work the homework problems in class as it is crucial to your understanding that you resolve your homework issues rather than simply copying what is written on the board.

Each student is required to maintain two blue books. One for in class exams and the other for in
INNOVATIVE TECHNOLOGY – STUDENT RESPONSE SYSTEMS
MORE STUDENT ENGAGEMENT ACTIVITIES

- Math Jeopardy!
- Exponential and Logarithms BINGO!
T.R.D. – TEAM. RESEARCH. DISCUSS.
Course Outcome Goals:

After successfully completing this course, students will be prepared for success in calculus by being able to:

- Express and analyze relationships using functions in multiple ways (graphically, numerically, symbolically, and verbally).
- Model situations using appropriate functions (linear, quadratic, higher-degree polynomial, exponential, logarithmic, rational, and trigonometric).
- Demonstrate mathematical creativity and critical thinking in applying appropriate functions to solve a variety of mathematical problems.
- Manipulate mathematical information and concepts to solve problems using multiple representations of polynomial, exponential, logarithmic, rational, and trigonometric functions.
- Demonstrate advanced algebraic manipulation skills.
- Interpret and use precise mathematical language appropriately.
- Use appropriate technology in the evaluation, analysis, and synthesis of information in problem-solving situations.
The Main Components of Our Flipped Course:

- **Pre-Work Questions**
  - Guided questions in preparation for class and lab activities
- **Video Lectures (Find on the Web)**
  - www.khanacademy.org/
  - www.ted.com/talks
  - www.biology.arizona.edu
- **Video Lectures (Or Make Your Own)**
  - www.educreations.com
  - echo360.com/
  - www.techsmith.com/screenchomp.html
  - http://www.einstruction.com/workspace-overview
- **Lab Activities**
  - Applied problems based on material covered
DEVELOP CRITICAL LEARNING QUESTIONS

The objective of the Critical Learning Questions is to engage the students through questioning rather than through lecturing.

Things to consider when developing these Critical Learning Questions…

- Objectives for the lesson
- Objectives of the Pre-Work
- Common issues faced by students understanding a concept
- Conceptual take away ideas at the end of the day’s lesson.
CRITICAL LEARNING QUESTIONS ACTIVITY
OBJECTIVE OF TODAY’S CRITICAL LEARNING QUESTIONS ACTIVITY

- To help students get a deeper understanding of the concept of slope.
- To make connections between the terminology slope and rate of change and problems associated with this.
- To help students understand the concept of linear function.
What do you remember about linear equations and slope?

Remember:

- Straight line on a graph
- $Ax + By = C$
- $y = mx + b$
Whole Group Discussion

What do you remember about linear equations and slope?

Remember….

- Recall the slope = \( \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} \)
- Example: Given two points: (4, 5) and (2,1). Calculate slope.

\[
m = \frac{5 - 1}{4 - 2} = \frac{4}{2} = \frac{2}{1} = 2
\]

Therefore, \( m = 2 \).

We can also say that the rate of change is also 2.
QUESTION ONE

Describe the behavior of the line considering slope of

3x + 4y = 12. It is,

A. increasing
B. Decreasing
C. Constant
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3x + 4y = 12. It is,
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Method 1: Use the formula
\[ m = \frac{A}{B} = \frac{3}{4} \]

Method 2: Re-write the equation from standard form to slope intercept form
\[ y = mx + b. \]
\[ y = \frac{3}{4}x + 3 \]
Write the rates of change in order from least to greatest.

A. B A C
B. A B C
C. C A B
D. C B A
Write the rates of change in order from least to greatest.

A. B A C
B. A B C
C. C A B
D. C B A *
QUESTION THREE

How many of these equations represent linear functions?

A. $3x + 4y = 7$
B. $y = 7$
C. $x = 5$
D. $4x^2 + 5y = 2$
QUESTION THREE - ANSWER

How many of these equations represent linear functions?

A. $3x + 4y = 7 \implies \text{Choices A and B represent functions because when graphed, they each pass the vertical line test.}$

B. $y = 7$

C. $x = 5$

D. $4x^2 + 5y = 2$
CORE IDEAS OF CRITICAL LEARNING QUESTIONS

- All students commit to a preliminary answer
- All students talk to each other
- Learning takes place through peer instruction
- Instructor guides subsequent discussion, helps students to get take-away(s) for the class lesson
Thank you for your time and attention!!

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