Flip Your Class (or even one session) Without Flipping Out
Virtual Session 4B

Dr. Kim Granger, St. Louis CC – Wildwood
Friday, November 5, 2021
AMATYC 2021 in Phoenix, AZ
Dr. Kim Granger is a mathematics professor at St. Louis Community College, where she’s been since 2008. Prior to moving to St. Louis, Kim was a member of the mathematics department at Santiago Canyon College in Southern California. Kim earned a BA in Mathematics & English from Milligan College in Tennessee. She has a master’s degree in Mathematics from California State University Fullerton and a doctorate in Higher Educational Leadership from the University of Southern California.
Agenda

- **What** is Flipped Teaching
- **NSF iFLIP** Grant
- **Benefits** of Flipped Teaching
- **Class Flow**
- **Challenges** of Flipped Teaching
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What is Flipped Teaching?

A teaching method where:

→ The first contact with new concepts occurs outside of class time

→ And the application of content occurs through active and collaborative activity during class time
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Innovative Flipped Learning Instructional Project (IFLIP)

The NSF funded research project aimed at advancing flipped teaching in STEM education

NSF GRANT #1821664
Participating Institutions

- Southern Illinois University Edwardsville (SIUE): a **public university** located in Edwardsville, IL (4-YI)

- St. Louis Community College (STLCC): a **community college** system with four campuses across the St. Louis metropolitan area, MO (2-YI)
Pre-COVID iFLIP Study
Summary of Pre-COVID Faculty Data

- Flipped teaching is beneficial but require an adjustment period that may delay a full successful implementation
- The perceived barriers decreased after repeated implementations
- Participants were more comfortable implementing flipped teaching after repeated use
- Feedback grew increasingly positive after repeated implementation
Student Transition to Online Learning during COVID
iFlip Conclusions

• Flipped Teaching provided effective preparation for faculty and students for online instruction at both institutions.

• Flipped Teaching can be effectively adapted to online instruction preserving some aspects of active learning.
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• **Benefits** of Flipped Teaching
  • Class Flow
  • Challenges of Flipped Teaching
Flipped Teaching Benefits Student Learning

• Allows for self-paced learning
• Prevents cognitive overload
• Promotes student engagement with peers
• Promotes student engagement with the instructor
• Allows for active & collaborative activity
Benefits of Flipping…

Community College Center for Student Engagement

**Five Benchmarks for Student Engagement:**

- Active & Collaborative Learning
- Student Effort
- Academic Challenge
- Student-Faculty Interaction
- Support for Learners
Flipped Teaching Benefits Student Learning

- Allows for self-paced learning
- Prevents cognitive overload
- Promotes student engagement with peers
- Promotes student engagement with the instructor
- Allows for active & collaborative activity
Flipped Teaching Benefits Instructors

• Promotes student engagement with the instructor
• Every Class is Energetic and Active!
Agenda

- **What** is Flipped Teaching
- **NSF iFLIP Grant**
- **Benefits** of Flipped Teaching

**Class Flow**

- **Challenges** of Flipped Teaching
Before:  
• Pre-class assignment (video, reading, activity)

There must be a grade that is connected to the pre-class assignments, such as a graded activity or an in-class assessment.
Flipped Teaching Flow

**Before:**
- Pre-class assignment (video, reading, activity)

**During:**
- Assessment of pre-class assignment
- Mini Lecture
- Collaborative activities
Flipped Teaching Flow

**Before:**
- Pre-class assignment (video, reading, activity)

**During:**
- Assessment of pre-class assignment
- Mini Lecture
- Collaborative activities

**After:**
- Post-class practice
FLIPPED LEARNING

EXCITING CLASSROOM OPPORTUNITIES
TO INFINITY AND BEYOND!
Agenda

- **What** is Flipped Teaching
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- **Benefits** of Flipped Teaching
- **Class Flow**

- **Challenges of Flipped Teaching**
Flipped Teaching Challenges

- Preparation of class materials
- Student perception
- Student effort
YOU DIDN'T WATCH THE VIDEO?
I CAN'T WAIT TO HEAR YOUR EXCUSE.
Bonus Content:
Creating the Class Activities for a Flipped Course

The use of Collaborative Learning Activities makes class fun and promotes deeper learning. The presenter has been using collaborative learning for 25 years and will share an easy process that you can implement as early as next week to create and facilitate effective collaborative activities.

S074: Slides and Handout available on the App
Creating the Activity is as easy as 1, 2, 3!

Start with the problem set, then…

1. Provide Clear Directions, including how the activity will be graded.
2. Provide the possible answers.
3. Create an answer page that will be collected and graded.
Directions

“Possible Answers” Box

Answer Page to Collect

4. (HW 2.1 #27-32, select problems) Use the definition of a derivative to find \( f'(a) \).

\[
f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}
\]

<table>
<thead>
<tr>
<th>( f(x) = x^{-2} )</th>
<th>( f'(a) = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{-2}{a^3} )</td>
<td>( a - 3 )</td>
</tr>
<tr>
<td>( \sqrt{1 - 2a} )</td>
<td>( \frac{1}{3} )</td>
</tr>
<tr>
<td>6.28</td>
<td>-10</td>
</tr>
<tr>
<td>4.9</td>
<td>10 - 3.72a</td>
</tr>
</tbody>
</table>
Sample Activity: Available on App!

**MTH 210**

**Section 2.8: Implicit Differentiation Class Activity**

Class Activity Instructions: Work together to ensure everyone in the group is following along and understanding every problem. Each student should show all work on their own line paper with the same guidelines as the written homework. Write the agreed-upon answers on the answer sheet to turn in.

### Implicit Differentiation

Differentiate both sides of the equation with respect to x and then solve the resulting equation for y'.

Don’t forget to apply the Chain Rule!

<table>
<thead>
<tr>
<th>The Function</th>
<th>Implicit Differentiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = e^y )</td>
<td>( \frac{dy}{dx} = e^y )</td>
</tr>
<tr>
<td>( x = ) ( x = 1 )</td>
<td>( \frac{dx}{dx} = 1 )</td>
</tr>
<tr>
<td>( 3x^2 )</td>
<td>( \frac{d}{dx} 3x^2 = 6x )</td>
</tr>
<tr>
<td>( 3y^2 )</td>
<td>( \frac{d}{dy} 3y^2 = 6y )</td>
</tr>
</tbody>
</table>

### Directions: Find \( y' \) by implicit differentiation

1. \( 4y^2 + 3 = 2x^2 \)
2. \( 5 = 2x^2 + 2y^2 \)
3. \( 6 = 4x + 6y^2 + y^2 \)
4. \( x + 4y^2 = 4 \)
5. \( 4x = -4x^2 - 2x^3y^2 + 2 \)
6. \( (4y)^2 = 4y^2 \)
7. \( \sec(y^2) = 5y^2 + 2 \)
8. \( x^2 + 3 = \cos(3y^2) \)

### Possible Answers

| \( \frac{8x}{3y^2} - \frac{8y}{3y} - 1 \) | \( \frac{3x^2}{3y^2} \) | \( \frac{2y^3 + 3x^4 y^2 + 2}{6x^2 - 3x^3 y} \) | \( \frac{10x^5}{2x^2 y^2 (y^2 + y^3)} \) |
| \( -\frac{12x^4 y^3}{12x^7 y^3 + 3x} \) | \( -\frac{4x}{6y^2 + y} \) | \( -\frac{2x^4}{3y^2 / (y^2 + y^3)} \) | \( \frac{100y^3 + 100y}{100y^3 + 100y} \)

### Group Answers: Write the matching problem number in the correct box.

| \( \frac{8x}{3y^2} - \frac{8y}{3y} - 1 \) | \( \frac{3x^2}{3y^2} \) | \( \frac{2y^3 + 3x^4 y^2 + 2}{6x^2 - 3x^3 y} \) | \( \frac{10x^5}{2x^2 y^2 (y^2 + y^3)} \) |
| \( -\frac{12x^4 y^3}{12x^7 y^3 + 3x} \) | \( -\frac{4x}{6y^2 + y} \) | \( -\frac{2x^4}{3y^2 / (y^2 + y^3)} \) | \( \frac{100y^3 + 100y}{100y^3 + 100y} \)

**Bonus #1:**

**Bonus #2:**
Half Answer Sheet

Unit 2 Quiz Review Activity

Group Members: ____________________

1. ____________________

### Directions: Show your work neatly.

1. State each of the following formulas

<table>
<thead>
<tr>
<th>Formula</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(A \cap B)$</td>
<td>Intersection of events $A$ and $B$</td>
</tr>
<tr>
<td>$P(A \cup B)$</td>
<td>Union of events $A$ and $B$</td>
</tr>
<tr>
<td>$P(A)$</td>
<td>Probability of event $A$</td>
</tr>
<tr>
<td>Counting Principle</td>
<td>Expected Value when there are 3 outcomes</td>
</tr>
</tbody>
</table>

2. Explain each of the following terms in your own words. When applicable, be able to give an example.

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law of Large Numbers</td>
<td>Expected Value Replacement</td>
</tr>
<tr>
<td>Fair Game, Fair Price</td>
<td>Theoretical Probability Expected Probability</td>
</tr>
<tr>
<td>Equally Likely Events</td>
<td>Mutually Exclusive Events</td>
</tr>
<tr>
<td>Independent Events</td>
<td></td>
</tr>
</tbody>
</table>

### Directions: Show your work completely.

3. If you charge $3.14 to play a particular game of chance and the expected value is $0, then what is the fair price?

4. If you charge $3.14 to play a particular game of chance and the expected value is $2.14, then what is the fair price?

5. Find the expected value of the spinner if each of the four outcomes is equally likely. Win $20, Lose $10, Lose $5, or Lose $0.

6. Each of the numbers 1 – 11 is written on a sheet of paper and the 11 sheets of paper are placed in a hat. If one sheet of paper is selected at random from the hat, determine the probability that the number selected is:
   - a. greater than 7
   - b. not odd
   - c. Even or greater than 4

7. One colored card (Red or White or Blue) is selected at random, and a coin is tossed:
   - a. Use the Counting Principle to determine the number of sample points in the sample space.
   - b. Construct a tree diagram illustrating all the possible outcomes and list the sample space.
   - c. Use the sample space from the tree diagram to determine the probability of obtaining each of the following outcomes: Red and Heads, Red or Heads, Red or White or Heads.

8. There are 5 possible outcomes in a game of chance. Joey has calculated the probabilities of the first four outcomes. Find the probability of the remaining outcome.

9. There are 75 members of a club. The club is going to select a president, vice president, and treasurer of random. How many different ways can they make this selection? Show your work as if you only had a basic calculator that could multiply.

10. How many different ways can you arrange the numbers 1, 2, 3?

11. Simplify the following. Show your work as if you did not have access to a calculator.

   a. $\frac{a}{2}$
   b. $2^3$
   c. $\sqrt{32}$
   d. $\sqrt{27}$
   e. $\sqrt{64}$
   f. $\sqrt{100}$
   g. $\sqrt{12}$
   h. $\sqrt{32}$
   i. $\sqrt{50}$
   j. $\sqrt{64}$
Tips for Creating Engagement

→ The magic word…. Quiz
→ The half/half answer sheet
→ Post-activity Assessment
→ Bonus: Write the name and an interesting fact about a classmate
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