About Me

- 5th grade teacher on Maui
- University of Hawai‘i at Manoa LTEC Masters candidate
- Interested in innovative teaching methods
Do you remember learning about fractions using the traditional lecture model?

A. Yes
B. No
C. I don't remember.
Agenda

Background

Project Development

Discussion + Conclusion
Rationale

• Operations involving fractions a consistent concern
• Low class average
• Lack of student engagement and low retention of skills
• Critical concept beyond 5th grade
Rationale
• Action Research:
  - Iterative process
  - Identify problem
  - Technology-related intervention
Solution

• **Constructivist Theory:**
  - Create+make use of knowledge
  - Relies on collaboration
  - Relevancy to real life
  - Enriched by technology
To evaluate the impact of a flipped classroom model using the Interactive Video Learning Platform (IVLP), PlayPosit, on engagement and retention of skills on fifth grade students’ unit of study on multiplying fractions at a public elementary school in Maui, Hawai‘i.
Research Questions

• Impact of a flipped classroom on ability to learn math content?

• How engaged are students when using interactive videos?

• How engaged are students when collaborating on problem solving tasks in class compared to traditional learning?
What is the flipped classroom?
Traditional Model

School → Lectures
Traditional Model

SCHOOL

Lectures
Traditional Model

- Lectures
- Homework activities
Traditional Model

Lectures, Homework activities
Flipped Model
Flipped Model

Online lectures
Flipped Model

Online lectures

Class activities
Benefits

- Focus is on the student
- Learner-generated environment
- Differentiation instruction
Content

- Common Core State Standards
- Origo Stepping Stones
Concepts

• multiply whole numbers by common fractions and mixed numbers
### Concepts

- Multiply whole numbers by common fractions and mixed numbers
- Multiply fractions by fractions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>a.</strong> $\frac{3}{5} \times \frac{1}{4} = $</td>
<td></td>
</tr>
<tr>
<td><strong>b.</strong> $1 \frac{1}{5} \times \frac{1}{2} = $</td>
<td></td>
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<tr>
<td><strong>c.</strong> $1 \frac{2}{5} \times 1 \frac{3}{4} = $</td>
<td></td>
</tr>
<tr>
<td><strong>d.</strong> $1 \frac{3}{5} \times 2 \frac{3}{4} = $</td>
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Concepts

• multiply whole numbers by common fractions and mixed numbers

• multiply fractions by fractions

• represent multiplication of fractions through visual models
Concepts

- multiply whole numbers by common fractions and mixed numbers
- multiply fractions by fractions
- represent multiplication of fractions through visual models
- solve word problems involving mixed numbers

b. This picture shows the outside dimensions of a frame. The width of the frame is $\frac{1}{4}$ ft. What is the area of the picture inside the frame?

Width: $1 \frac{3}{4}$ ft

Height: $2 \frac{1}{2}$ ft

Area = $1 \frac{3}{4} \times 2 \frac{1}{2}$ ft$^2$
Design Elements

Part 1: Curriculum

Part 2: TECHNOLOGY

Part 3
• Readily available original videos
• 9 total lessons
• Assigned as nightly homework
Tech Tools: Video Creation + Recording
Eva works at a framing store. She works with fractions and mixed numbers in many different ways. This diagram shows the dimensions of a mirror that she needs to frame. What is the total length of wood Eva needs to build the frame?

Eva will need a total of _______ ft of wood to build the frame.

Short sides of the frame:
1 ¼ x 2
= 2 2/4 ft or
2 ½ ft

Long sides of the frame:
2 ¾ x 2
= 4 4/3 ft or
5 ⅓ ft

\[2 \frac{1}{2} + 5 \frac{1}{3} = 7 \frac{5}{6} \text{ ft}\]

4. Correctly compute and solve the problem.
Eva works at a framing store. She works with fractions and mixed numbers in many different ways. This diagram shows the dimensions of a mirror that she needs to frame. What is the total length of wood Eva needs to build the frame? Eva will need a total of ______ ft of wood to build the frame.

Short sides of the frame:
1 \( \frac{1}{4} \) x 2
= 2 \( \frac{1}{2} \) ft or
2 \( \frac{1}{2} \) ft

Long sides of the frame:
2 \( \frac{3}{4} \) x 2
= 4 \( \frac{1}{2} \) ft or
5 \( \frac{1}{2} \) ft

\[ 2 \frac{1}{2} + 5 \frac{1}{3} = 7 \frac{5}{6} \text{ ft} \]

4. Correctly compute and solve the problem.
Eva works at a framing store. She works with fractions and mixed numbers in many different ways. This diagram shows the dimensions of a mirror that she needs to frame. What is the total length of wood Eva needs to build the frame?

Eva will need a total of ______ ft of wood to build the frame.

Short sides of the frame:
1 \(\frac{1}{4}\) x 2
= 2 \(\frac{2}{4}\) ft or
2 \(\frac{1}{2}\) ft

Long sides of the frame:
2 \(\frac{3}{8}\) x 2
= 4 \(\frac{4}{3}\) ft or
5 \(\frac{1}{3}\) ft

\[2 \frac{1}{2} + 5 \frac{1}{3} = 7 \frac{5}{6} \text{ ft}\]

4. Correctly compute and solve the problem.
$$\frac{4}{3} \times \frac{5}{4}$$

**Double Shaded**
Tech Tools: Interactive Video Learning Platform
Link to an existing video or upload your own.

9.2: Multiplying Whole Numbers, Common Fractions and Mixed Numbers

Multiply fractions using area models

5 \times 3 \frac{1}{2} = 5 \text{ groups of } 3 \frac{1}{2} =

5 \text{ units}

What would be a reasonable estimate for 5 \times 3 \frac{1}{2}?

A. Exactly 15.
   Incorrect. 5 \times 3 \text{ alone is equal to 15.}
B. A little less than 15.
   Incorrect. 5 \times 3 \text{ is already equal to 15.}
C. A little more than 15.
   Correct! Since 3 \frac{1}{2} \text{ is a little more than 3, } 5 \times 3 \frac{1}{2} \text{ will be a little more than 15.}
D. 1 \frac{1}{2}
   Incorrect. This is a multiplication problem.

Stop and think. Can you see 3 \frac{1}{2} \text{ as the width in the area model?}

Who or what is this number story about? (Answer sentence.)

Is the area model below appropriate to use for this problem?
Link to an existing video or upload your own.

Add questions as specific timed intervals.
Link to an existing video or upload your own.

Add questions as specific timed intervals.

Insert a multiple choice question.
Link to an existing video or upload your own.

Add questions as specific timed intervals.

Insert a multiple choice question.

Insert a free response question.
5. What will be the Least Common Denominator of 3, 2, and 6?

- 6.
- 15.
- 12.

Incorrect Feedback:
Incorrect. While 12 is a multiple of all three denominators, it is not the least common.
5. What will be the Least Common Denominator of 3, 2, and 6?

- Correct Feedback: Correct! 6 is a multiple of all three denominators.

- Options: 15, 12, 8

Core Lesson:

\[
\begin{align*}
1 \times 1 &= 1 \\
\frac{1}{3} \times 1 &= \frac{1}{3} \\
1 \times \frac{1}{2} &= \frac{1}{2} \\
\frac{1}{3} \times \frac{1}{2} &= \frac{1}{6} \\
\end{align*}
\]

\[
1 + \frac{1}{3} + \frac{1}{2} + \frac{1}{6} = 1 \\
1 \times 1 = 1 \\
\]
9.8: Solving Problems Involving Fractions and Mixed Numbers
(Problem Solving Task)

Brooke is remodeling her bathroom. She plans to cover the bathroom floor with tiles that are each 1 square foot. Her bathroom is 5 \(\frac{1}{4}\) feet wide and 8 \(\frac{1}{4}\) feet long.

a) How many tiles will she need to cover the floor? Use an equation to calculate an exact answer that includes the fractions of a tile she will need.

b) Each unit square in the figure below has been broken into sixteenths to allow precise measurements. Use the figure to illustrate your answer a 2nd way.
Class Activities

- Zero lectures
- Student-led
- Dynamic learning
Design Elements

Part 1: Curriculum

Part 2: Technology

Part 3: DATA COLLECTION
Data

- Formative data
### Data

- Formative data
Data

● Formative data
1. Complete each equation.
   a. \( \frac{1}{3} \) of 18 = _____
   b. \( \frac{2}{5} \) of 20 = _____
   c. \( \frac{3}{4} \) of 36 = _____

3. Color the box beside the equation that matches the picture.
   a. \( \frac{1}{4} \times \frac{2}{3} = \frac{2}{12} \)
   \( \frac{2}{3} \times \frac{1}{4} = \frac{2}{12} \)
   \( \frac{2}{4} \times \frac{1}{3} = \frac{2}{12} \)
   b. \( \frac{1}{3} \times \frac{2}{5} = \frac{7}{15} \)
   \( \frac{1}{3} \times \frac{2}{5} = \frac{24}{15} \)
   \( \frac{1}{3} \times \frac{2}{5} = \frac{2}{15} \)

4. There are 1 \( \frac{2}{3} \) packets of rice crackers in the pantry. Each packet holds 18 crackers. How many crackers are there in total? Show your thinking.

_____ crackers
Data

- Formative data
- Observation protocol
**Data**

- Formative data
- Observation protocol

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### Observation Protocol

**Teacher:**  
**Date:**  
**Observation Focus:** Student Engagement  
**Time of Observation:** to

<table>
<thead>
<tr>
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<th>Student Names</th>
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<tbody>
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- **Engaged Behaviors: (on-task)**
  - B1: Listening attentively
  - B2: Contributing to discussions
  - B3: Working collaboratively w/ others
  - B4: Asking questions
  - B5: Completing tasks
  - B6: Uses technology effectively

- **Unengaged Behaviors: (off-task)**
  - F1: Not listening/passive
  - F2: Not contributing to discussions
  - F3: Not working collaboratively
  - F4: Not asking questions
  - F5: Distracted/not completing tasks
  - F6: Uses technology ineffectively

- **Teacher Observations:**
Data

- Formative data
- Observation protocol
### Data

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### Observation Protocol

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Data

- Formative data
- Observation protocol

![Observation Protocol]

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**Teacher Observations:**
Data

- Formative data
- Observation protocol
- Post-module questionnaire

Select the best response to the statements about the instructional videos below. *

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I watched the instructional videos for homework each night they were assigned.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>I liked watching the videos.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I enjoyed the interactive feature of answering questions in the videos.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The videos helped me learn how to multiply fractions.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I was focused and engaged while watching the videos.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>If I didn't understand, I rewound or watched it again to help me.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I understood how to multiply fractions through watching the videos.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>I liked watching the videos at my own pace.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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Discussion + Conclusion
Lessons Learned

- Test technology early
- Include more examples
- Valuable experience in Web 2.0 tools
Pointers

• Start small
• Use a script
• Experiment freely
• Welcome feedback and adjust accordingly
Future Plans

- Create more original content
- Upgrade to a premium version of PlayPosit
- Apply concept across other modules and content areas
Thank You!

- Critical Friends: Jami, Robin, and Marie
- LTEC ‘Ohana:
  - Dr. Lin, Dr. Ho, and Dr. Fulford
  - Lei, Pam, and Angela
- My support system: family and friends
Questions?

Contact Me: kpdeleon@hawaii.edu
Flipping for Fractions: An Action Research Study

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University of Hawai‘i at Manoa
Learning Design & Technology
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