Teaching Math for Elementary Teachers in a Virtual Environment

Luanne Benson-Lender
Instructor
University of Indianapolis
Presentation Outline

1. Introduction
2. Class demo
3. Course details
4. Lessons learned
Background

Hybrid Pilot
Summer 2019
Planning
Fall 2019

Online Pilot
Spring 2020
(1st 8w!)
Refined
4+ semesters
Course Format

- Ivy Tech Community College in Bloomington, Indiana
- Number theory topics
- 4-credit, 8-week course
- 25-50% synchronous online video, remainder asynchronous online
- 2-hour video meetings
Grading

10% Polls and group activities (completed in synchronous session with make-ups available)
15% Reading quizzes and unit quizzes
10% Homework
30% Midterm exam
35% Final exam
Class Demo
How do you feel about math?

- I hate it! — 1: 251229 (3 votes)
- Neutral — 3: 251230 (4 votes)
- I love it! — 5: 251243 (4 votes)

For help, visit pollev.com/app
Numeration Systems

**Numerals:**
Written symbols for numbers

**Numeration system:**
An organized collection of numerals
Base-ten numeration:

- Grouping by tens
- Place values: 1, 10, 10×10, 10×10×10, ...
- Base pieces: unit, long, flat, long-flat
If we group our units by fives instead of tens, how many total units will be in a flat?

" 25 "
" 25 "
" 25 "
" 25 "
" 25 "
If we group our units by fives instead of tens, how many total units will be in a long-flat?

“343”

“125”

“125”
Base-five numeration:

- Grouping by fives
- Place values: 1, 5, 5x5, 5x5x5, ...
- Base pieces: unit, long, flat, long-flat
Example 1: The names for the first four base pieces (in any base) are unit, long, flat, and long-flat. How many total units are present in each collection?

a. Base ten: 3 flats, 4 longs, 3 units
Example 1: The names for the first four base pieces (in any base) are unit, long, flat, and long-flat. How many total units are present in each collection?

b. Base five: 3 flats, 4 longs, 3 units

\(343_{\text{five}}\)
Determine the total number of units present in a base five collection of 3 flats, 4 longs, and 3 units.

“ 98 ”

“ 98 ”

“ 98 total units ”

“ 98 ”
Example 2: Make a sketch of base five pieces for 108 units and write the corresponding base five numeral.
How many base five flats can we make from 108 units?

"4"
"4"
"4"
"4"
<table>
<thead>
<tr>
<th>Question 1</th>
<th>0 pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icebreaker: What grade level would you most like to teach in Elementary School?</td>
<td></td>
</tr>
<tr>
<td>Tell your partner(s) your answer, and write down their answer(s) here.</td>
<td></td>
</tr>
<tr>
<td>Question 2</td>
<td>10 pts</td>
</tr>
<tr>
<td>How many total units are represented by the numeral $1031_{five}$?</td>
<td></td>
</tr>
</tbody>
</table>
Synchronous Session Format

- Interactive lecture with 10 polls
- Outlines the week’s material and highlights the difficult concepts
- Group activity in breakout rooms
- Auto-graded with $\infty$ attempts
- Instructor visits groups to help
- Students may leave when done
Suggested Weekly Student Workflow

1. Reading quizzes (∞ attempts)
2. Synchronous session
   i. Polls
   ii. Group activity
3. Homework (∞ attempts)
4. Unit quizzes (2 attempts)
Additional Resources

- Lectures notes, with blanks and filled in (covering all course topics)
- Help videos for selected homework problems
- Auto-graded sample exams
- Synchronous session PDFs and recordings, make-up polls/activity
Exams

- Midterm and final proctored online via video using a locked browser
- Most questions randomized
- Show-your-work section: 25-30%
- Students must enter final answer in exam within time limit, upload work within 30 minutes
Find the values of A and B which complete the fraction subtraction problem illustrated below, using the comparison concept.

\[
\frac{5}{6} - \frac{1}{A} = \frac{B}{6}
\]

A = 

B = 
The equal differences method is shown below to make the difference easier to compute. Fill in the blank with the missing value.

12 – 7.7 = ____ – 10
Question 41

Use the standard paper-and-pencil decimal division algorithm to compute $84.475 \div 2.5$ (2 points)

Show your work. (8 points)
Lessons Learned

- Students love the in-class polling
- Most students chose attendance over recordings/make-ups
- A few students chose 0s over doing low stakes group work
- Calculator use issue on exams – assign fewer points to arithmetic
Questions?

BensonLenderL@uindy.edu

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