Active Learning - Implementation

The Good and the ~~Bad~~ Better

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Active Learning - Implementation

Plan for today:

- Open group problems (& Whole class discussion)
- Skeleton notes (& Worksheets)
- Clickers
- Learning Objectives (casual conversation at end)

Things to keep in mind:

- A lot of this will be my opinion and my experience (math)
- We'll play some with case studies and artifacts
- In the back of our minds: how to do this in a **bigger** class

Open Group Problems

Case study 1:

- Instructor writes $\frac{d}{dx}\int_1^{e^x} t^2 + \sin t \; dt$ and says "now solve it"
- Instructor walks around the class for 8 minutes stopping to talk 1on1 with the students sitting in the isles
- Instructor returns to the front of the class and solves the problem
- Instructor asks if there are any questions

What's good about this implementation?

Open Group Problems

Case study 1:

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What's good about this implementation?

- Students get to try the problem on their own first
- Some students talk 1on1 with instructor (feedback)
- Students see the solution and can ask questions

Open Group Problems: Case study 1

What could be better about this implementation?

Open Group Problems: Case study 1

What could be better about this implementation?

- Have the students tell you how they started the problem
- Move through the class faster
  - Encourage group work!
  - "Try the next step and I'll come back"
- Once the class has (or is stuck on) the first step
  - re-collect at the front of the class
  - have them tell you what to do (or where they are stuck)
  - write it out and ask for questions
  - tell them to continue
- More explicit instructions

Open Group Problems: Case study 2

Case study 2:

- Instructor produces some lemons, pipe cleaner, ruler, knife
- Asks: "compute the volume of lemon using these tools ... discuss with a neighbour"
- Students work in groups for 2min
- Asks for a: "strategy to share"
- Class is silent for 30sec
- A student responds and describes their method for 1min
- Instructor: "Ok. I heard another strategy over here"
- Student at front: suggests strategy (not audible at back)
- Inst: "Next class volumes and how to slice the lemon"

What is good? What could be better?

Open Group Problems: Case study 2

Good

- Using student input in class
- The theory coming in the next class will be well framed
- Invention activity!

Open Group Problems: Case study 2

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Better

- More specific line of questioning
  - What would you use the knife for?
- Repeat/summarize student suggestions
- Turn the response into a conversation
  - "ah, so you'll do this" *prof draws for everyone to see*
  - "and what would you do next?"

Matt's Discussion Strategies

- Turn questions back to the class
- Could they do this? Why are you telling them then?
- Class can respond in chorus (with training)
- Ask specific questions
  - A couple open/philosophical questions per term
- Don't take responses right away
  - Water bottle trick
  - combine w/ clicker or GW or think/pair/share
- Repeat/rephrase/summarize questions
- Efficiency is a higher level goal

Skeleton Notes & Worksheets

Handout!

Skeleton Notes & Worksheets

Handout! A few other examples?

Skeleton Notes & Worksheets

Handout! A few other examples?

Tips to keep in mind:

- Leave enough space for students to write
- Explicit instructions about when we are/aren't using the worksheet
- Avoid it becoming a handout (just post that online)
- Have them fill it out and then tell you what to write
- Worksheet will make it easier to ask a specific question
- Encourage group work

Clickers!

The Clicker "song and dance"

Clickers!

The Clicker "song and dance"

- Display or write the question (don't read it aloud)
- "Take 1 minute to think about this on your own"
  - or "feel free to discuss with your neighbour"
- *Instructor can walk around, listens to conversations, facilitates as desired*
- "Ok, click in, I'm going to close the poll"
- Respond

Clickers!

The Clicker "song and dance"

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Handout!

Clickers

A few response strategies

- Validate the correct answer. Brief justification. Move on.
- Validate correct answer. Ask students for an explanation.
- Show results. Narrow the options. "Find a different opinion and come to a consensus"
- "Can I hear an argument from B"
- Exclude an answer: "Lots of B's ... that's not the answer"
- "Can I hear an argument for why not C?"

Thanks for participating!

Instructor: "I believe active learning is better for the students, but the students don't like it."

~~Me: "That's because you're doing it wrong!"~~

Me: "How could we improve your implementation?"

Clickers

Other things we could talk about

- Makes it really easy to ask as specific question to start a conversation: "do you like A or B?"
- Great for diagnosing or treating a misconception
- Just for participation (or not for marks at all)
- Talk with your students about why you are using clickers
- Culture: E always means "I have no idea"
- Conceptual vs Computational clicker questions

Clickers: Some Examples

Clicker Q: Can a function cross its horizontal asymptote?

A) Yes

B) No

Clickers: Some Examples

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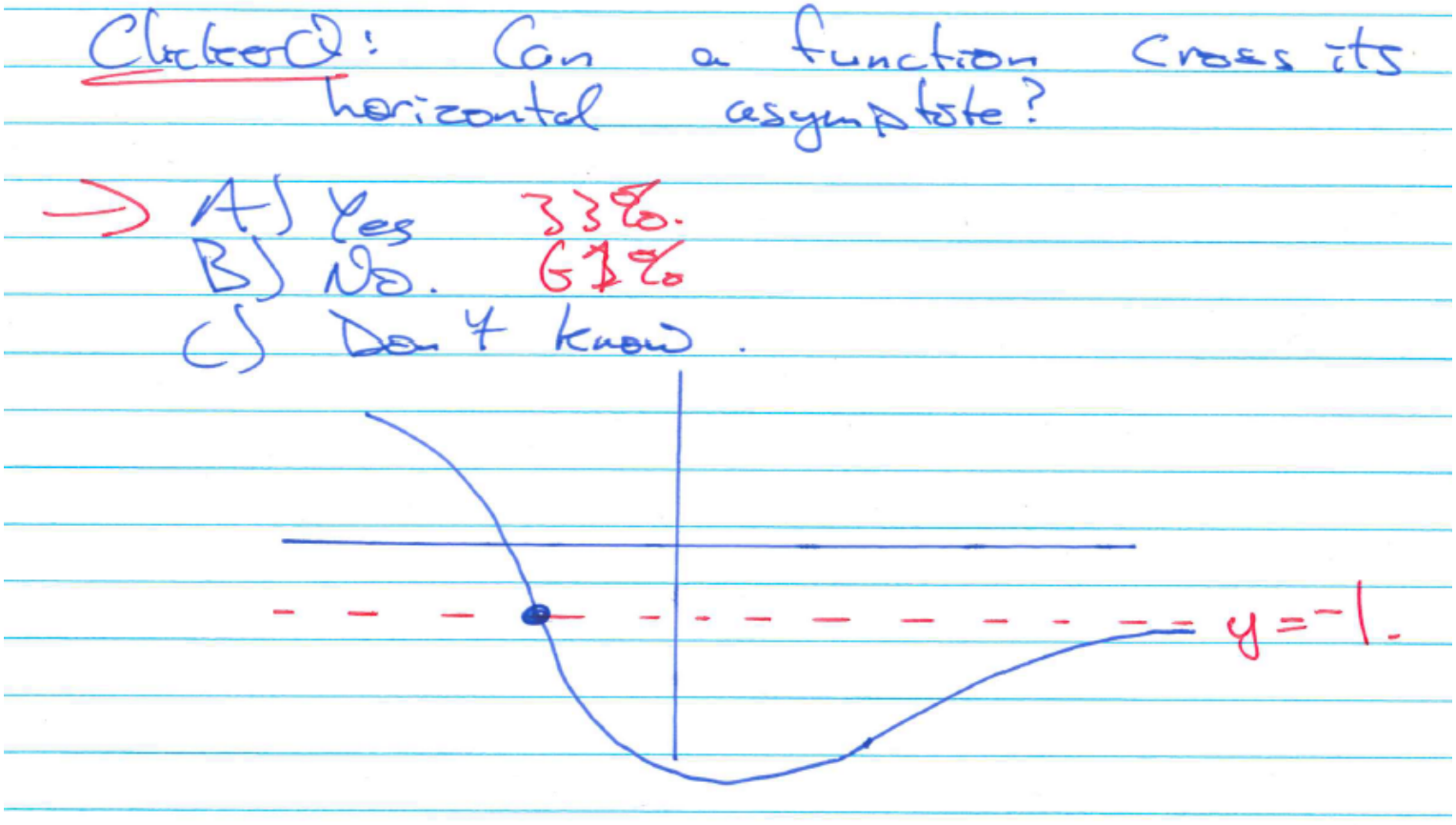
B) No



Clicker Practice

Clicker Q: How many times can a function cross its horizontal asymptote?

A) 1
B) 2
C) a few times (finitely many times)
D) infinitely many times

Clickers: Some Examples