Teaching Mathematics with Technology: Activities and Ideas for Your Classroom

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The Charge

• Technology Principle: “Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning” (NCTM, 2000).
Challenges

- Technology is rapidly changing
- Teachers may not be familiar with new technologies or the variety of tools students bring to class
- Teachers may not have support to implement technology in their classrooms
- It is difficult to find technology-based activities and tasks aligned to standards teachers are expected to teach
MOOC-Ed: Quick Preview

• Provide educators with general constructs so that they can become more knowledgeable curators of technology resources to use in their classroom
• Use open-access tools and resources
• Foster deeper learning
  – Technology MOOC opens February 5
  – Two Statistics MOOCs open September 11
  – Micro-credentials can be completed anytime for CEUs

Coming Soon: Fall MOOC-Eds!
We're currently readying another series of MOOC-Eds for the fall semester, so stay tuned for more information about registration and course details.
Sign Up for MOOC-Ed Updates

http://place.fi.ncsu.edu
Overview of Units

• Unit 1: Affordances of Technology
• Unit 2: Capitalizing on the Power of Technology
• Unit 3: Interacting with Engaging Mathematical Tasks
• Unit 4: Using Multiple-Linked Representations
• Unit 5: Analyzing Students’ Mathematical Thinking
Framework
Hear from Experts

• Multiple voices
  – Teachers
  – Teacher Educators
  – Researchers

• Emphasize the importance of mathematical goals, tasks, and questions
  – Expert Panel
  – Dan Meyer
Technology Allows Teachers to Ask Good Questions

– that couldn’t be asked without it
– to engage students in exploration
– that allow opportunities for students to pose their own questions
– that require students to consider assumptions
Hear from Experts

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Factors to Consider When Designing a Technology-Based Task

• What is the work that students are doing?
  – Are students arguing, estimating, abstracting?

• How can put students in a place where the tool I want them to develop gives them more power to do something more efficiently
Teacher Dashboard allows you to see student work in real time!!

**Anonymize:** Swap out students’ names with the names of real mathematicians OR hide inappropriate student names/comments

**Pacing:** Control pacing or snap to specific location in the activity (student paces by default)

**Pause:** Get students’ attention - once activated, students can see their current screen but not interact with it

Go to Desmos to see more details about the features of the Dashboard designed for classroom teachers: [http://learn.desmos.com/classroomconversation](http://learn.desmos.com/classroomconversation)
Example 1: Desmos

- Example 1 with Desmos
  - How long to charge my cell phone?
  - Click the link above or type in the address https://student.desmos.com/?prepopulateCode=sm4wu
  https://student.desmos.com/?prepopulateCode=e394rs

Consider the following question:
What is technology enabling me to do as a teacher or learner?
Example 2: GeoGebra Function Machines

- **Try out these Function Machines**
  
  https://www.geogebra.org/m/wcuPt43b

  - Which function machines do you think students will struggle with?
  
  - Which *definition* would you select to discuss and why?

- **Watch a videorecording of middle school students’ work on the function machines**
  
  https://www.youtube.com/watch?v=-tJGzpiVPCg&feature=youtu.be

- **More Function Machines**
  
  https://www.geogebra.org/m/LdtLR0ex
Middle school students’ written responses

Student Response 1:
An input that always has the same output.

Student Response 2:
A function is when you have a number, or the input, and you apply a rule. (y = x+4) when you apply the rule you get the same output every time.

Student Response 3:
The input is what you select and the output is what you get out. The input is always consistent with the output in a function.

Student Response 4:
The output follows a pattern no matter what the input is.

Student Response 5:
A specific input has a specific output. The rule doesn’t vary. If it’s a function the data will follow the rule.
Example 3: Web Sketchpad

• Explore these Dynagraphs and write a description of each.

• Does each dynagraph represent a function? Explain.

• What is technology enabling me to do as a teacher or learner?
Questions to Consider

• What is the work that students are doing?
  – Are students arguing, estimating, abstracting?
• Were students “put in a place where the tool I want them to develop gives them more power to do something more efficiently.”
• Did the task allow teachers to ask good questions
  – that couldn’t be asked without it
  – to engage students in exploration
  – that allow opportunities for students to pose their own questions
  – that require students to consider assumptions
• Thank you!

• Questions?