

*Using Research Findings to
Make an IMPACT in the Classroom:
Preparing Future K-8 Teachers*

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AMATYC Webinar
May 23, 2018

Overview

- Introductions and goals
- Educational research and design cycle
- An illustrative example: preparing to teach future K-8 teachers
 - Example A: Step 1 in the design cycle
 - Example B: Moving from Step 1 to Step 2 in the design cycle

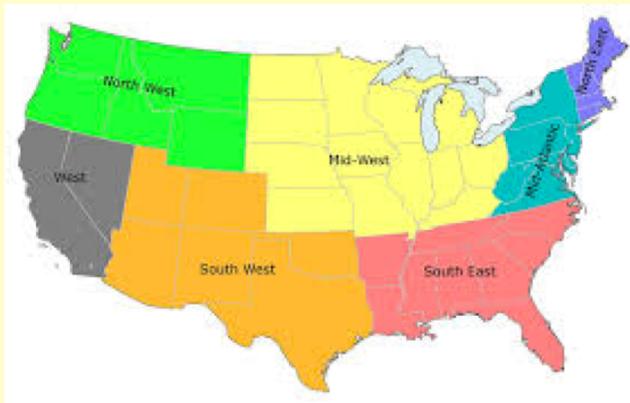
Introductions

Ann

Shandy

Poll: Where Are We?

- Northeast*
- Mid-Atlantic*
- Southeast*
- Midwest*
- Southwest*
- Northwest*
- West*



Poll: Experience

What is your experience teaching mathematics courses for pre-service K-8 teachers?

Lots

A bit

I'll be teaching the course for the first time next year

No experience

Goal

Connect research to practice:

- Finding useful research
- Interpreting research
- Using results to design instruction
- Reflecting on and evaluating the result

Monitoring Progress (preview)

Success for this webinar will be measured by responses to these three prompts:

1. One thing I learned today was...
2. I want to read/know more about ...
3. Level of agreement with the statement: As a result of this webinar, I have a better idea how to find resources to think about/plan for/offer/reflect on math instruction for future K-8 teachers.

Research in Math Ed

What comes to mind when you hear someone say “I do research in mathematics education”?

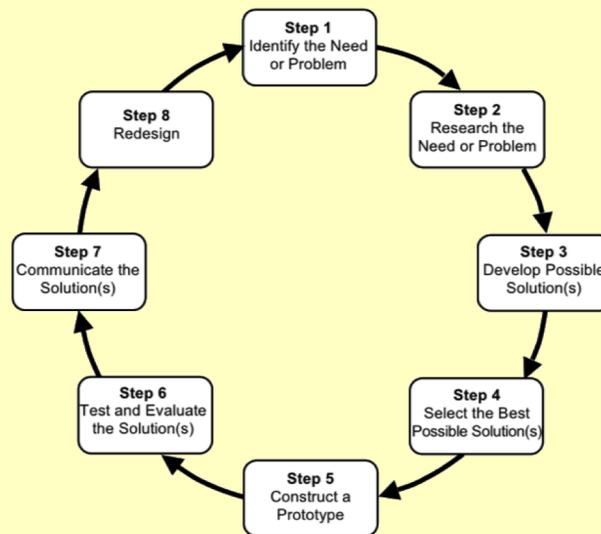
[Type your answer in the Chat Box]

Definition for Today

Research in Math Education is a systematic, deep dive, into a particular aspect of teaching and/or learning mathematics.

Poll: The above statement is consistent with what I tend to think of as research in mathematics education.

Design Cycle



Example design cycle (Massachusetts Department of Education, 2006)

Design Cycle Focus Today

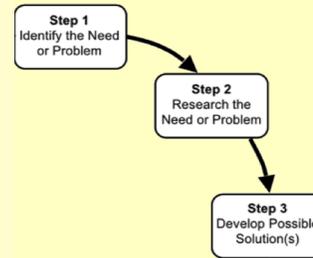
Step 1: Identify a need

Leaving Step 1: Identify where to look for what others have done

Step 2: Find out what others have said/done related to the need

Leaving Step 2: Interpret what others have done in preparation for developing instruction

Step 3. Design some instructional options



Step 1 - Identify the need

Instructional need

Make course relevant to pre-service elementary teachers

My learning need

Understand the work that my students will do when they become teachers in K-8 classrooms

Your Turn: Identify a Need

Take a minute to identify a need you have for a course you will be teaching next fall.

In the CHAT box share:

- the name of the course and
- a professional challenge that is an opportunity for you to learn something (to deal with it).

Step 2 - Research the Need(s)

Examples of practice:
teachingchannel.org



Reports on research-informed practice from the National Council of Teachers of Mathematics:



*Teaching
Children
Mathematics*



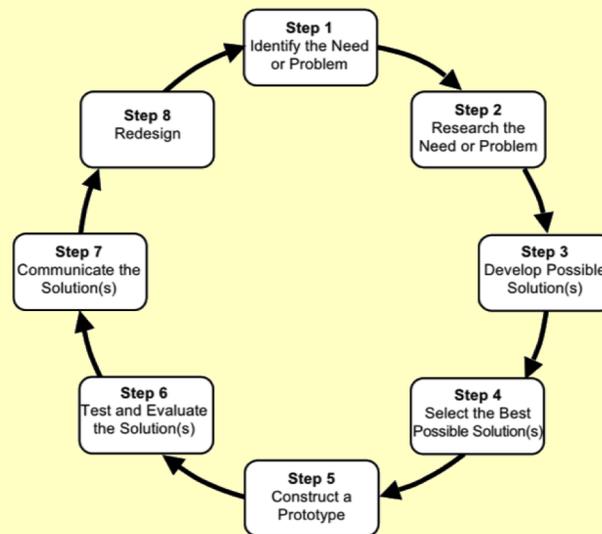
*Mathematics
Teaching in the
Middle School*

Example A - Research Resources

- Policy: State and national standards
- Research about teaching and learning among current and future K-8 teachers:
Journal of Mathematics Teacher Education (JMTE),
Mathematics Teacher Educator (MTE),
International Journal of Research in Undergraduate Mathematics Education (IJRUME), *Journal for Research in Mathematics Education (JRME)*, *PRIMUS*



Design Cycle



Example design cycle (Massachusetts Department of Education, 2006)

Example B - Step 1 to Step 2

Instructional need

What content is needed BEYOND how to do elementary math?

My learning need

Understand the mathematics my students need to know and how they need to know it in order to teach it.

Example B - Where I Started

Found a study about pre-service K-8 teachers!

Willingham, J. C., Strayer, J. F., Barlow, A. T., & Lischka, A. E. (2018). Examining Mistakes to Shift Student Thinking. *Mathematics Teaching in the Middle School*, 23(6), 324-332.

During a lesson on ratios involving percentages of paint, four research-based criteria are used to evaluate students' mistakes. The takeaway is that painting all mistakes with the same brush can also be a blunder.



James C. Willingham, Jeremy F. Strayer, Angela T. Barlow, and Alyson E. Lischka

Example B - What I Learned

Some types of student mistakes are more likely to support the development of students' understanding of a lesson's goal than other types of mistakes.

Example B - What I Learned

The Purple Paint problem (abbreviated)

Pink paint is made from one part red paint and one part white paint.

Powder blue paint is made from three parts blue paint and one part white paint.

Purple paint is made with equal parts of pink and powder blue paint.

How many quarts of each color of paint should be purchased if two gallons of purple paint are needed?

Example B - Apply What I Learned

I and my students will benefit from developing a mathematical understanding of different types of mistakes and how to use a mistake to support learning

Example B - Follow the Thread

Follow a thread from the article to find another article to read about Mathematical Knowledge for Teaching

Barlow, A. T., Lischka, A. E., Willingham, J. C., & Hartland, K. S. (2017). Backing Up and Moving Forward in Fractional Understanding. *Teaching Children Mathematics*, 23(5), 284-291.

Example B - Apply New Learning

Moving forward and backwards means my students will need to understand what it means for one problem to be simpler or more complex than another to support their future students' learning where they are

Example B - Apply New Learning

A problem asks students to determine how to measure out $2\frac{1}{2}$ cups of sugar, using a $\frac{1}{3}$ cup scoop.

FIGURE 1 Students had not been instructed on interpreting remainders. Nevertheless, some met lesson expectations, exceeding what the authors anticipated.

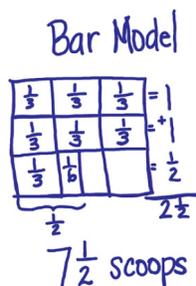
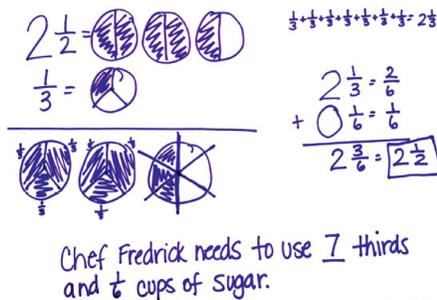


FIGURE 2 Although this work shows students' alternative interpretation of remainder and their readiness to interpret remainders, failure to attend to the problem context and the unit being counted show a lack of evidence of meeting expectations of the standard.



Example B - Connect Ideas

Identified instructional need: *What content is needed BEYOND how to DO elementary math?*

My learning need: *understand the the mathematics my students need to know and how they need to know it*

- There is a connection between my students' mathematical knowledge and the instructional decisions they will make as teachers

Your Example - Research the Need

Step 2 Activity!

Look at the table of contents for one of these resources and identify something of interest.

- Reports on practice
 - MAA Instructional Practices Guide
 - MathAMATYC Educator
- Research
 - JMTE
 - IJRUME

Your Example - Research the Need

What resource did you explore? What title caught your interest and how might it help you Research your Need?

[Type your answer in the Chat Box]

Your Example - Research the Need

Poll: How easy was it to find something of interest?

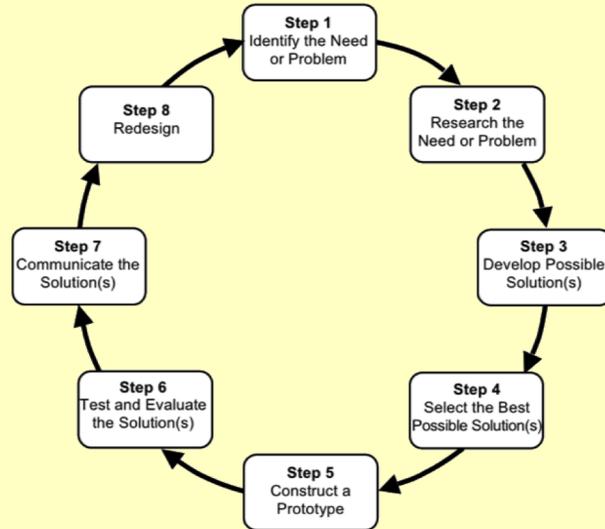
Wow, so easy and in just 5 minutes!

Easy, found a few possible things.

Not easy, did not find much of interest

Impossible, nothing seems relevant

Back to the Design Cycle



Example design cycle (Massachusetts Department of Education, 2006)

Monitoring Progress

Thank You!

Last things...

Contact Info

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Remember: Fall 2018 project for those teaching pre-service teacher K-8 math - contact Shandy!

Julie will wrap up and provide link to our survey