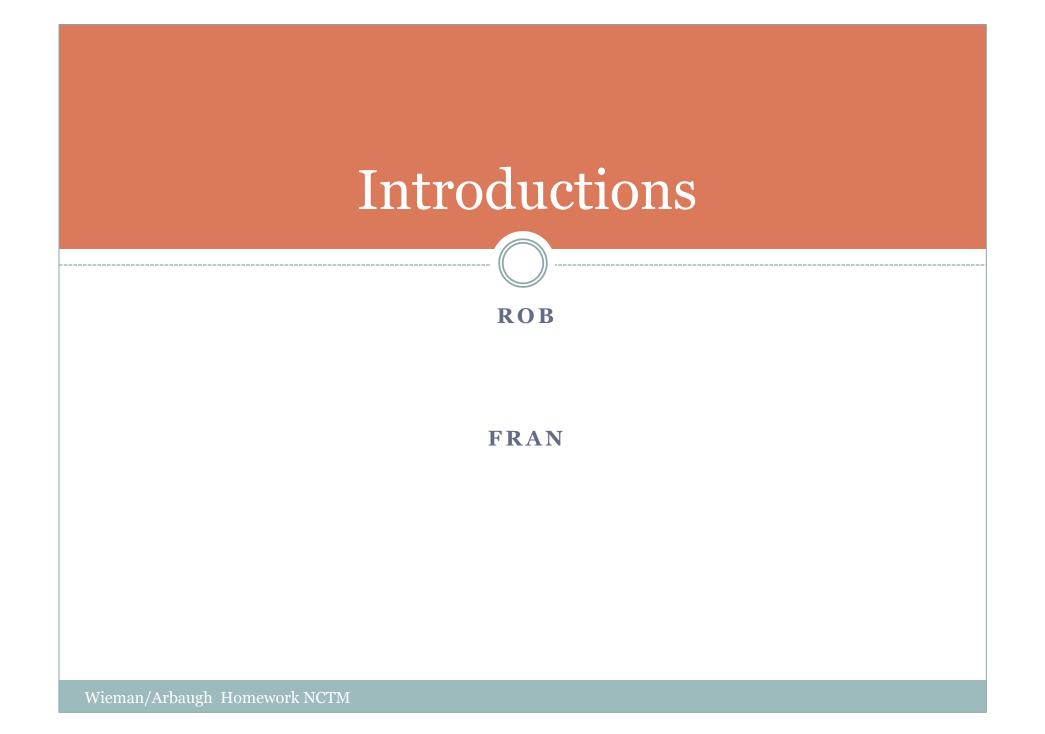# Getting the Most out of Homework: Strategies for Success

ROB WIEMAN

FRAN ARBAUGH

2013 NCTM ANNUAL MEETING

DENVER, COLORADO

Introductions

ROB

FRAN

How We Came to Be Here: Presenting on Homework

SUCCESS FROM THE START:

YOUR FIRST YEARS TEACHING SECONDARY MATHEMATICS

A Cautionary Tale

***

THE MODEL HOMEWORK GUY

How can we make homework:

- The source of positive interactions around mathematics?
- Aligned with our goals for
  - Learning?
  - Relationships with students?

- What specific things can we DO?

Talk with a neighbor

- What purpose (or purposes) does homework serve in your classroom?

- What do you feel goes well with the way that you implement homework?

- What challenges do you face with homework?

Some Successes with Homework

- Provides information about students

- Good practice

- Reward for effort

- Meets parents' expectations and provides information for parents

Some Common Concerns

- I spend too much time "going over" homework
- I spend too much time grading homework/I can't grade it all
- It is hard to differentiate; too easy for some, too hard for others
- I can't really assess what kids know
- I can't control the environment where they do HW
- Kids don't do their homework

Our Goals for this Session

- To identify two big ideas that guide our thinking about homework

- To share some specific strategies that connect to these big ideas

Two Guiding Principles

- Homework should give students opportunities to **think** about **mathematics**

- Teachers need to be clear about goals and expectations for homework

Homework should give students opportunities to **think** about **mathematics**

- Children learn mathematics by thinking mathematically

- Homework should provide students with opportunities to learn; so they need to think while doing homework

- Other goals can get in the way of thinking

Teachers need to be clear about goals and expectations for homework

- Students may not know our goals or share them

- If we are not clear about our goals, our homework may not align with what we want

An Example

MS. VELAZQUEZ

Talk with a neighbor

- Do your students engage in the kind of thinking you want while doing their homework? How do you know? Why do you think they do, or do not?

- What are your goals for homework? Do your students know and share those goals? How do you make your goals clear to your students?

Homework Habits of Practice: What to DO

- Create assignments that require thinking

- Encourage metacognition

- Teach explicit strategies for success

- Create structures and routines

HoP #1: Create Assignments that Require Thinking

- Give students example answers to critique

- Have students create problems with particular features

Give Students Example Answers to Critique

- Here is how Johnny solved the first problem.

- Johnny made a mistake. What was his mistake?

$2x + 3y = 30$

$-(\,5x - 3y = 12\,)$

$\dfrac{-3x}{-3} = \dfrac{18}{-3}$

$x = -6$

$2(-6) + 3y = 30$

$\dfrac{3y}{3} = \dfrac{42}{3}$

$y = 14$

Answer: $(-6, 14)$

Have students create problems with certain features

- Create a system that can be easily solved with substitution, but would be harder with elimination (and vice versa)

- Create a system of equations that has no solutions, or infinite solutions

- Create a problem that can be solved using the tangent ratio

HoP #2: Encourage Metacognition

- Metacognition
  - Thinking about your own thinking
  - Monitoring your progress
  - Evaluating your reasoning
- Research tells us that when people are metacognitive, they learn more effectively

HoP #2: Encourage Metacognition

- Have students evaluate their performance/ indicate problem difficulty
- Have students explain what strategy they used when they got stuck
- Give students choice based on self-evaluation

Student Self-evaluation

- For each problem have students decide whether they got it correct or not

- You can also make this part of tests and quizzes. If they assess their answers correctly, they get extra points.

Solve these systems of equations

_____ 1. $2x + 3y = 30$
$5x - 3y = 12$

_____ 2. $y = 3x - 8$
$2y - 5x = -8$

_____ 3. $3x + 2y = 14$
$5x + 7y = 16$

Go back, for each problem rank how confident you are that you got the answer correct
1. Sure it is correct
2. Think it is correct
3. Not sure
4. Think it is incorrect
5. Sure it is incorrect

Student Self-evaluation II

- For each problem have students rank how difficult they think the problem is .

Solve these systems of equations

_____ 1. $2x + 3y = 30$

$5x - 3y = 12$

_____ 2. $y = 3x - 8$

$2y - 5x = -8$

_____ 3. $3x + 2y = 14$

$5x + 7y = 16$

Go back, for each problem rank how confident you are that you got the answer correct

1. Easy
2. Medium
3. Difficult

Give Students Choice

- Sort problems into sections (Easy, Medium, Hard)
- Tell students to choose which section to begin in, based on their own self-assessment
- If they are finding the problems too easy, go to the next section, if they are finding the problems too hard go to the previous section.
- Work for a set amount of time, or do a set amount of problems.

HoP #3: Teach Explicit Strategies for Success

- **Teach successful HW strategies**
  - Use examples from notes or the textbook when you are confused or stuck
  - Try a problem, leave it and come back later
  - Identify exactly what you are confused about and make a question
  - Get help from others
- **Model HW strategies**
- **Give students time to practice strategies in class**
- **Assign HW buddies**

Successful Homework Strategies = Successful Classroom Strategies

MAKE A POSTER FOR YOUR CLASSROOM

REFER TO THE POSTER OFTEN

HoP #4: Create Structures and Routines that Support Engagement and Success

- Choosing what homework to discuss

- Responding to student questions

Choosing what Homework to Discuss

- Pick one or two important problems from the assignment

- Look at student work on those problems

- Use that to decide whether/how to discuss homework

Responding to student questions

- Groups discuss homework
  - Come to agreement on solutions
  - Ask and answer any questions you may have

Some Disclaimers

- None of these strategies are miracle cures

- None of these strategies are independent of the class culture

- Try some, not all at once

Two Guiding Principles

- Homework should give students opportunities to **think** about **mathematics**

- Teachers need to be clear about goals and expectations for homework

Questions?

Thank You

ROB WIEMAN   GOMATHMAN@YAHOO.COM

FRAN ARBAUGH   ARBAUGH@PSU.EDU