

# New and Preservice Teacher Workshop

David Barnes  
dbarnes@nctm.org

NCTM Regional Conference  
Indianapolis



1

# Welcome!

- Info cards - Fill out Front & Back
- NCTM is interested in knowing what new teachers and those in training want.
- Prizes will be drawn using info cards!
- Slides emailed to participants.



2

# New and Preservice Teacher Workshop

David Barnes  
dbarnes@nctm.org

NCTM Regional Conference  
Indianapolis



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

3

## Session Overview

- Share and Learn
- Tips and Resources
- Prizes and Giveaways



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

4

## Want Free Money?

- No, seriously.
- Learn more at [www.nctm.org/met](http://www.nctm.org/met)



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

5

## Share and Learn

- Share an idea that has worked well for you with a colleague.
- Get an idea from another colleague that has worked for them. Fill it in.



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

6

## Take Away #1

### What teachers say matters

The job of an educator is to teach students to see the vitality in themselves.

Joseph Campbell

You'll go far.

Mrs. Atterbury



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

7

## Princess and Tigger



## Resources



### Tips from NCTM's *Empowering the Beginning Teacher of Mathematics Series*

- *Empowering the Beginning Teacher of Mathematics: Elementary School*
- *Empowering the Beginning Teacher of Mathematics: Middle School*
- *Empowering the Beginning Teacher of Mathematics: High School*



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

9

## Discussion Topics

- [Planning](#)
- [Instruction](#)
- [Assessment](#)
- [Classroom Organization](#)
- [Classroom Management](#)
- [Managing Homework](#)
- [Questioning Techniques](#)
- [Using Technology](#)
- [Motivating Students](#)
- [Problem Solving](#)
- [Group Work](#)
- [Parents and Family](#)
- [Keeping Your Sanity](#)



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

10

## Three Questions

- What is the problem?
- What would it look like if the problem was solved?
- What is one thing you could do to move toward a solution?



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

11

## Planning

- Questions to ask:
  - What do I want? – Be Specific!
  - Do you have a hook?
  - How do you engage?
  - Is there another way?



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

12

## Planning

- Write it Down!
  - Jot down ideas/notes in your book
  - Recalling a good teaching suggestion from a previous year may be difficult
- Ask, Listen, Decide!



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



13

## Instruction

- Door Problems!
  - Quick problem when they hit the door
  - Always have an assignment
- Know your content
- Know your audience
- Strategies for learning



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

14

## Instruction

- If a lesson is going badly

### –STOP

- Regroup with a new approach, or Do something else
- Examine what went wrong
- Make plans for the next day



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



15

## Assessment

- Help students learn to explain their reasoning
- Ask “Why?” and questions such as:
  - What did you do first?
  - How could I show that?
  - Then what did you do? Why?
  - I don’t understand how you did that. Can you tell me more?



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

16



## Assessment - Scoring

- Valuing the Process and the Answer
  - Avoid all-or-nothing grading schemes
  - Insist on detailed explanations
  - Reward reasonable efforts and different approaches
  - Use “+2 out of 4” instead of “-2 out of 4”



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



17

## Classroom Organization

- Help students (and parents) to track their own progress
  - Create assignment sheet for students' notebooks
  - Make class folders where absent students find missed assignments/handouts.



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



18

# Classroom Management



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

19

# Classroom Management



<http://www.seaforhbaps.org.au/FamiliesandKids>



<http://www.si.edu/Visit/VisitInfoGroups>

## managing people and



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

20

# Classroom Management



<http://www.seaforthbaps.org.au/FamiliesandKids>



## managing people and processes



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

21

# Classroom Management

- What do students want?



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



22

## Classroom Management

- What do students want?
  - Valued
  - Respected
  - Recognized and Appreciated
  - Be Truly Successful at Challenging Tasks



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



23

## Classroom Management

- What does it look like in action?



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

24

## Classroom Management

- What does it look like in action?
  - Order
  - Respect
  - Engagement
  - Ownership

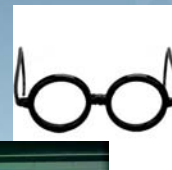


NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

25

## Classroom Management

- Model and teach what you want from day 1. Including processes!
- Learn everyone's name. Smile!
- Voice, whisper, the look!
- Everyone wants to be the best. Create your challenges.
- How do you feel in your room? Our room?



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



26

## Classroom Management

- Buck (2011) - Watch it.
- *“Your horse is a mirror to your soul, and sometimes you may not like what you see. Sometimes, you will.”*



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



27

## Homework



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

28

## Homework

- How much homework to assign?
  - What do you expect from the assignment?
  - What information will it provide you?
  - How many problems to assign? Will 5 work?
  - How long did it take you?
- Homework quizzes



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



29



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

30

## Questioning Techniques

- Use class-centered prompts  
“Think about how you would ...?”
- No yes/no or single number questions.
- “Explain to us how you found your solution”
- What would you say if you did know the answer.
- Ask “Why?” a lot!



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



31

## Which Gray Matter?

- Hexagonal Prism?
- Hard?
- Soft?



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

32



## Which Gray Matter? Quiz



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

33

## Which Gray Matter? Quiz

- $(14.26 * 2.7 * 4.5 * 0) + 27 = ?$



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

34

## Which Gray Matter? Quiz

- $(14.26 * 2.7 * 4.5 * 0) + 27 = ?$
- $1/3 + 3/8 + 2/10 = ?$



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

35

## Which Gray Matter? Quiz

- $(14.26 * 2.7 * 4.5 * 0) + 27 = ?$
- $1/3 + 3/8 + 2/10 = ?$
- Square Root of  $27 = ?$



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

36

## Using Technology

- Technology is not **the** answer
- Use technology as a tool to make the learning of mathematics richer and better
- Scaffold an investigation with a handout of specific questions versus “Explore”
- Resist having students work individually



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

37

## Online Resources

- The NCTM Web site—[www.nctm.org](http://www.nctm.org)
  - Organized by elementary, middle, and high school
- NCTM Member’s Only—[www.nctm.org/members](http://www.nctm.org/members)
  - Access to current and archived journals, On-Math, Student Math Notes, and more
- NCTM Standards—[standards.nctm.org](http://standards.nctm.org)
  - Full text of *Principles and Standards for School Mathematics*, electronic examples for each grade band



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

38

# Online Resources

- Illuminations Web site—[illuminations.nctm.org](http://illuminations.nctm.org)
  - Lesson plans for teachers, interactive applets for students, reviewed Web resources
- Reflections Web site—[www.nctm.org/reflections](http://www.nctm.org/reflections)
  - Reflect on instructional practices through video clips, lesson plans, and student work
- Figure This! Web site—[www.figurethis.org](http://www.figurethis.org)
  - Math challenges for middle school students, information to help families get involved



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

39

The screenshot shows the NCTM website homepage with the following elements:

- Header:** NCTM logo and "NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS". A search bar is located in the top right.
- Navigation Menu:** About NCTM, Math Standards, Membership, Conferences, Professional Development, Articles & Journals, Lessons & Resources, Research, Issues & News, Shop Online.
- Main Content Area:**
  - Left Column:** "NCTM IS WORKING FOR YOU" with a list of audience groups: ELEMENTARY SCHOOL, MIDDLE SCHOOL, HIGH SCHOOL, HIGHER ED LEADERS, FAMILIES.
  - Center:** A banner for "With NCTM's online workshops I stay up to date." featuring a man and a woman at a computer, with a "JOIN TODAY" button.
  - Right Column:** "ACCESS Member Resources" and "Professional Development Focus of the Year 2006-2007 Show Me the Math: Learning Through Representation".
- Resource Catalog:** A vertical sidebar on the right titled "Resources from NCTM" showing book covers for "Curriculum Focal Points", "Learning to Teach Mathematics in the Middle School and High School", and "A Research Companion to the Principles and Standards for School Mathematics".
- Footer:** A "Check out" button with the text "ON Math".

**NCTM** NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

Search

[About NCTM](#) | [Math Standards](#) | [Membership](#) | [Conferences](#) | [Professional Development](#) | [Articles & Journals](#) | [Lessons & Resources](#) | [Research, Issues & News](#) | [Shop Online](#)

Home Print Page | E-Mail Page

**Research, Issues, and News**

- Research
  - Research Clips and Briefs
  - Legislation
  - Be an Advocate
  - News Bulletin
  - Research Clips and Briefs
  - Press Releases
  - NCTM at a Glance
  - NCTM in the News
  - Online Media Kit
  - The NCTM Standards

## Research Clips and Briefs

NCTM's research clips and briefs distill math education research, making it easier for teachers to link what they do in the classroom to research findings. Find out what the latest research tells us.

Research clips are concise, research-backed statements.  
Research briefs summarize a body of research.

### Effective Instruction

**Features of effective instruction for developing students' skill and conceptual understanding of number**

[Research clip](#) (PDF, 38KB)  
[Research brief](#) (PDF, 83KB)

### Students with Difficulties

**Effective strategies for teaching students with difficulties in math**

[Research clip](#) (PDF, 35KB)  
[Research brief](#) (PDF, 78KB)

**Characteristics of students with learning difficulties in math**

[Research clip](#) (PDF, 35KB)

Advanced Search MEMBERS ONLY | MY ACCOUNT | HELP | HOME | NCTM

**MATHEMATICS TEACHER**

[Home](#)  
[Current Issue](#)  
[Back Issues](#)  
[Calendar Problems](#)  
[Submission Info](#)  
[About MT](#)

**Calendar Problems from *Mathematics Teacher***

**Select Number of Problems**

5   
  10   
  15   
  20   
  31

**Select Topics**

<input checked="" type="checkbox"/> Algebra (339)	<input checked="" type="checkbox"/> Number/Computation (251)
<input type="checkbox"/> Calculus/Precalculus (30)	<input type="checkbox"/> Number System (23)
<input type="checkbox"/> Connections/Applications (6)	<input type="checkbox"/> Number Theory (115)
<input type="checkbox"/> Discrete Mathematics (38)	<input type="checkbox"/> Patterns (53)
<input type="checkbox"/> Combinatorics (41)	<input type="checkbox"/> Probability (60)
<input type="checkbox"/> Functions (28)	<input type="checkbox"/> Problem Solving/Reasoning (185)
<input type="checkbox"/> Geometry/Measurement (248)	<input type="checkbox"/> Representation (2)
<input type="checkbox"/> Spatial Sense (35)	<input type="checkbox"/> Statistics/Data Analysis (26)
<input type="checkbox"/> Modeling (16)	<input type="checkbox"/> Trigonometry (14)

Submit

**Problems:**

1	During a basketball game, Jenny made 60 percent of her free throws and Ellen made 75 percent of her free throws. If,
---	--



# Who's on first today?

Figure This!  
Math Challenges for Families



### Figure This!

In May 1999, two National League baseball players, Joe McEwing of the St. Louis Cardinals and Mike Lieberthal of the Philadelphia Phillies, each had the batting averages shown below.

Player	Bats	Hits	Batting Average
M. Lieberthal	132	45	.341
J. McEwing	132	45	.341

Suppose McEwing then batted .800 (4 hits in 5 at bats), and Lieberthal was perfect (3 hits in 3 at bats). Which player now has the higher batting average? Are you surprised?

## Hint?

An average is a tool for helping us understand and compare sets of numbers. Sports, medicine, and insurance are three of the many fields that use averages.



Figure This!  
Math Challenges for Families

### Answer:

**McEwing** has the higher batting average.



### Complete Solution:

Both players had 45 hits in 132 at bats. Then, with the statistics from the next at bats, **McEwing's average is  $49 \div 137$ , or about .358** while **Lieberthal's batting average is  $48 \div 135$ , or about .356**.

One way to make sense of this unexpected result is to imagine that McEwing gets 3 hits in his first 3 at bats while Lieberthal also gets 3 hits in 3 at bats. Then the pair is still tied. During McEwing's last 2 at bats, he gets 1 hit. This average of 1 for 2, or .500 is better than his current average, so his batting average goes up.

Player	At Bats	Hits	Batting Average	Next At Bats	Next Hits	New Average
M. Lieberthal	132	45	$45 \div 132 = .341$	3	3	$48 \div 135 = .356$
J. McEwing	132	45	$45 \div 132 = .341$	5	4	$49 \div 137 = .358$

## Motivating Students



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



45

## Motivating Students

- Simpler is not more engaging (more boring) – find the sweet spot.
- Start with what is important! – Day 1
- Find the magic in your students!
- Value Hard Work! Value Insights!  
Value Creativity! Value Persistence.



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



46

## Problem Solving

- Don't make Problem Solving the first thing to go
- Give time to struggle
- Give specific hints
- Celebrate elegant and unique solutions
- Engage Parents! – Parent – Teacher Night – Weekly problems to work on



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

47

## Problem Solving

### Non-problem solving mode

1.  $14 + 29$
2.  $8 + 35$
3.  $15 + 29$

### Problem-solving mode

1. Find two consecutive numbers whose sum is 43.
2. Find two counting numbers whose sum is 43 and whose ones digit differs by 3.
3. Find two numbers whose sum is 44 and one of whose addends is 14 more than the other.



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



48



## Group Work

- Find the right task – Complex enough to need working together
- Identify and teach roles to students
- Hold all students accountable for the work of the group
- Watch, listen and then interact with groups as they work



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



49

## Parents and Families

- Build Parents as Allies
  - Brag to parents within the first 4 weeks.
  - Ask them to work with you
  - Keep in touch



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

50

## Parents and Families

- Parents can learn!  
Don't just tell parents, show them!
  - Help students to engage their parents
  - Family math night where parents and students work on math together
  - Give parents ways to help their children



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



51

## Keeping Your Sanity

- Do not work alone – communicate with colleagues, interact with others online, attend meetings
- Find a mentor
- Learn to say “No”
- Make a mistake?
  - Apologize if you need to. Move on.
  - Don't beat yourself up.



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

52

## Keeping Your Sanity

# Laugh & Enjoy



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

53

## 11Q – Q

- Thank you for attending the session and for all you'll do as a teacher.
- This is the best job on earth!
- Stand up straight!  
Hold your head high!  
Look people in the eye and announce proudly,  
**“I am a teacher!”**



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

54

David Barnes  
dbarnes@nctm.org



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

