UNIVERSITY-SCHOOL PD PARTNERSHIP

Conceptually Based Basic Skill Acquisition for All

NCTM 2018
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https://padlet.com/sararose_lynch/NCTM2018
Who we are...

... Who you are
<table>
<thead>
<tr>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-K</td>
</tr>
<tr>
<td>K</td>
</tr>
<tr>
<td>1st</td>
</tr>
<tr>
<td>2nd</td>
</tr>
<tr>
<td>Administration</td>
</tr>
<tr>
<td>Instructional coach</td>
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<tr>
<td>Other</td>
</tr>
</tbody>
</table>
What was your primary motivation for attending this session?

A. I want to learn strategies for basic skills assessment.
B. The session description sounded amazing!
C. I want to learn about number talks.
D. My principal is making me.
E. I want to learn some games for basic skill instruction.
F. I want to hide from [insert person] and this was the closest room.
G. I want to learn about Professional Learning Communities (PLCs).
H. This one is to see if my wife actually read the PPT before today.
I. I want to learn about whole-school contracts.
Agenda

■ Some context
■ *Intended* goals and format of the partnership
■ Guided math
■ Instructional activities/games
■ Number talks
■ Assessing student progress
■ Pre-service teacher involvement
■ Lessons learned
Some Context

- Rural Title 1 school
  - 40% free/reduced lunch
  - 20% receive services under IEP
  - Title services currently focus on reading interventions
  - One family math night a year hosted by preservice teachers

- One-to-one (iPads)

- Prior relationship
  - Conducted research in the school,
  - Embedded class
  - Practicum students/ student teachers
INTENDED GOALS & FORMAT
Goal and Objective

Based on our conversation in January 2017 regarding the mathematics professional development that you would like to provide for your teachers, our program will focus on the development of basic skills activities and related assessments for teachers in grades K – 4 as a replacement for “timed tests” for a grade. The goal of our professional develop series is to provide teachers with the tools and strategies to effectively and efficiently teach students of varying ability levels. By the end of the 2017–2018 school year, we want the teachers to be comfortable and proficient in teaching and assessing students’ ability to complete basic skills instruction fluently, including the use of problem-based tasks with discourse focused lessons.
Professional Development Format

- Summer Institute
- Beginning of the year professional development workshop (1/2 day)
- Monthly grade level meetings (~30 – 40 min. per meeting)
- Professional Learning Communities
- Mid-year PD (1/2 day)
- End of the year PD (1/2 day)
The What

- **Introduce**
  - Trajectory of basic skills acquisition
  - Number Talks,
  - Number Routines,
  - Strategies and activities/games that support the strategies,
  - Assessments

- **Whole School Contract**
  - Establishing a mathematics whole-school agreement by Karen S. Karp, Sarah B. Bush, and Barbara J. Dougherty

- **Grade level PLCs**
  - K aligning to upper grade expectations and observe number talk (ten frames and number line);
  - 1st guided math rotations, stop using timed test, how to assess during guided math;
  - 2nd guided math rotations, stop using timed tests, learn more about algorithms (other than traditional);
Computational fluency... the efficient, appropriate, and flexible application of single-digit and multi-digit calculation skills

Speed comes with fluency... but you cannot develop fluency with speed.

The less demand we place on our working memory, the more efficient our brain becomes. When we are fluent in something, we do not have to waste working memory doing it.

Direct recall of abstract facts, with no conceptual understand of those facts, places a lot of stress on our working memory.
The PLC Teaching-Assessing-Learning Cycle

Step One
Collaborative teams identify learning targets and design common unit tasks and assessment instruments.

Step Two
Teachers implement formative assessment classroom strategies.

Step Three
Students take action on in-class formative assessment feedback.

Step Four
Students use assessment instruments from step one for motivation, reflection, and action.

Step Five
Collaborative teams use ongoing assessment feedback to improve instruction.

Common Core Mathematics in a PLC at Work™, High School © 2012 Solution Tree Press
GUIDED MATH

Or rotational math... or math stations... or whatever you want to call it
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Everything... I'm an expert</td>
<td>I've used it, but I'm not so pretentious to call myself an expert</td>
<td>I've read about it</td>
<td>I've heard about it (through the Force)</td>
<td>I have no idea what you are talking about</td>
</tr>
</tbody>
</table>
What is Guided Math?

Textbook definition...

- A framework for structuring mathematics instruction
- Consisting of the following components:
  1. Morning work and number sense routines
  2. Whole group lessons following CRA or conceptually based format
  3. Small group time based on need, topic, and mixed ability levels

- Instructional strategies in all components:
  1. Vocabulary (common across school)
  2. Math journals
  3. Fact fluency
Rotation Model A

Number Sense Routine

Teacher Group
(A and B)

Independent Group (A)

Teacher Group (B)

Daily Closing

Opening routine aligned to number/computation concepts taught throughout the year (10 min)

Instructional Focus
(20 min for each group)

Stations for differentiated learning tasks
(20 min for each group)

Class debrief. Includes opportunity for journaling, class discussion, and possible assessment (10 min)
Rotation Model B

Number Sense Routine

Teacher Group (A)  Co-Teacher or Independent Group (B)

Co-Teacher or Independent Group (A)  Teacher Group (B)

Daily Closing

Opening routine aligned to number/computation concepts taught throughout the year (10 min)

Station rotations for differentiated learning tasks (20 min for each group)

Class debrief. Includes opportunity for journaling, class discussion, and possible assessment (10 min)
Rotation Model C

Opening routine aligned to number/computation concepts taught throughout the year (7-10 min)

Instructional Focus (15 min for each group)  

Stations for differentiated learning tasks (15 min for each group)

Independent Group (15 min for each Group)

Class debrief. Includes opportunity for class discussion, and possible assessment (7-10 min)
Collaborative Model • 60 Minutes

Opening routine or read aloud aligned to number/computational concepts taught throughout the year (7-10 minutes)

Intentional math task to apply content through cooperative/collaborative learning. Individual students can work with teachers for focused support, as needed. (30-40 minutes, as appropriate for student need)

Opportunity to debrief. Includes opportunity for class discussion and possible assessment (EPR, TPS, etc.) (10 minutes)
What is happening in your classroom during guided math?
ACTIVITIES/GAMES
Phases of Learning Basic Facts

1. Modeling and/or counting all or counting on to find the answer; for example, using fingers to help keep track of their counts to solve $5 + 7 = \ ?$

2. Deriving answers using reasoning strategies based on known facts, such as solving $5 + 7$ by thinking, “Five plus five equals ten, and two more will make twelve.”

3. Mastery or efficient production of answers. For example, when asked, “What is $5 + 7$?” a child might call out, “Twelve,” and explain, “I just knew it.”
Common Addition and Subtraction Strategies

+1/+2 ...These facts add (and subtract) 1 or 2.

+0/+10 ...These facts add (and subtract) 0 or 10.

Make 10... addition facts for sums of 10

Doubles... all the facts that have two addends that are the same quantity

Make ten and some more... These facts rely on making a ten and then adding the left over amount

Near doubles... derive facts from known doubles

Using a Make Ten Strategy... addition of two one digit numbers with a sum above ten
Games

Materials:
- Cards
- Dominos
- Dice
- Flash cards
- Number lines
- Strategy Templates
- Paper protector sleeves

Games:
- Top It (Double or more War)
- Salute
- I-Spy
- Making Ten Matching
  - Go Fish
  - Flip Ten
Games
Games
What instructional supports do you need to have in place before beginning any instructional activity/game?

When poll is active, respond at PollEv.com/jeremylynch267  
Text JEREMYLYNCH267 to 22333 once to join
NUMBER TALKS
What do you know about Number Talks?

- Everything... I already told you I'm an expert
- I've read about it
- I heard (about) it through the grapevine
- I talk about numbers all the time
Number Talks Grounded in Sherry Parrish’s Work
Number Talks

hand signals

Number Talks Hand Signals

I’m thinking.

I have an answer and a strategy!

I agree.

I have more than one strategy.
ASSESSMENTS

The useful kind
What type of assessments do you typically use to assess basic skill understanding?

When poll is active, respond at PollEv.com/jeremylynch267  📞 Text JEREMYLYNCH267 to 22333 once to join
Assessments

“They are more than timed tests, check my progress and end of the chapter tests”
- 1st grade teacher

- Check sheets (Accuracy Table) grounded in strategy acquisition
- Automaticity interviews
- Notecards used during games
- Strategy Identified Fact Fluency Quiz
- Reflex
Automaticity Interviews

Math Fact Automaticity Interview

Student: ___________________________ Date: ____________
Fact Set: Make Ten, Near Doubles, Count On, Derived Fact
Score: ____________

Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 9+7
Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 7+6
Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 8+6
Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 4+9
Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 9+6
Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 4+6
Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 7+8
Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 3+8
Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 9+8
Auto (2)___ Strategy (1)____ Unknown (0)___
Note:

Fact: 7+5

10 points: Student demonstrates automaticity of the fact set.
5 points: Student demonstrates some automaticity and strategies for finding facts. Further practice is needed.
0-4 points: Student demonstrates challenges with basic facts. Remediation and practice is needed.
## Accuracy and Strategy Tables

### Accuracy Table for Addition Facts

<table>
<thead>
<tr>
<th>Facts →</th>
<th>Within 6</th>
<th>Foundational facts</th>
<th>Within 10</th>
<th>Within 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Strategy Tracking Table: Addition Facts

<table>
<thead>
<tr>
<th>Addition fact strategies</th>
<th>Names</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 more/1 less</td>
</tr>
<tr>
<td></td>
<td>Doubles</td>
</tr>
<tr>
<td></td>
<td>Near doubles</td>
</tr>
<tr>
<td></td>
<td>Fact Families</td>
</tr>
<tr>
<td></td>
<td>Apply commutativity</td>
</tr>
</tbody>
</table>

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Note: The tables are for assessing basic fact fluency and tracking strategies for addition facts. The tables are used to evaluate and track student progress in mastering addition facts within different ranges (6, 10, 20) and using various strategies (1 more/1 less, doubles, near doubles, etc.).
Fact Fluency Quiz and Strategy Rubric

Multiplication Fact Fluency Quiz

Solve these problems and tell how you solved them.

4 x 5 = 20
Check one: I used this strategy.
I just know.

10 x 6 = 60
Check one: I used this strategy.
I just know.

6 x 2 = 12
Check one: I used this strategy.
I just know.

5 x 3 = 15
Check one: I used this strategy.
I just know.

2 x 9 = 18
Check one: I just know.

3 x 10 = 30
Check one: I used this strategy.
I just know.

5 x 7 = 35
Check one: I used this strategy.
I just know.

8 x 10 = 80
Check one: I used this strategy.
I just know.

Addition & Subtraction within 20 Strategy Rubric

<table>
<thead>
<tr>
<th>Category</th>
<th>Problem</th>
<th>Student Work/Notes</th>
<th>Rubric Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add within 10</td>
<td>3 + 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 1 or 2 more than a number</td>
<td>7 + 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtract 1 or less than a number</td>
<td>9 - 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 9 &amp; Subtract 9</td>
<td>16 + 0</td>
<td>17 - 0</td>
<td></td>
</tr>
<tr>
<td>Using 5 as a Benchmark</td>
<td>5 + 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create combinations that make 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 10 more than a given number within 20</td>
<td>16 + 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtract 10 from a given number within 20</td>
<td>18 - 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Double Facts</td>
<td>4 + 4</td>
<td>9 + 9</td>
<td>7 + 7</td>
</tr>
<tr>
<td>Add/Subtract with Doubles</td>
<td></td>
<td></td>
<td></td>
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iPads and Reflex Math
PRE-SERVICE TEACHER INVOLVEMENT
Co-teaching with us

Embedded course with number talks each semester

PSTs participated in PLC meetings

“Looping”

- Spring 2017 the teachers and PSTs were introduced to games that promote basic skill acquisition via math stations
- Spring 2018 the PSTs returned to the classroom where there cooperating teacher is now using guided math as the main mode of instruction.
LESSONS LEARNED
Our thoughts...

- Administrative support is **critical**
- Patience and persistence
- Trial and error
- Support... support... and more support

- In case you missed the previous information, we think support is pretty important for the success of just about anything you want to do/change in a school (or the world). Well maybe not the world because you can change the world on your own...

  Rosalind Franklin did.
Now from people who actually matter...
More from people who actually matter...

2nd grade teacher:

“I prefer working with small groups in math because my instruction is tailored to the students I am working with. My students feel less intimidated to explain their thinking in a small group and it’s helped to build confidence.”

1st grade teacher:

“I can not imagine teaching my class in other way now. It is a lot of work but it is what is best for me and the students.”
Book Resources

- Mastering Basic Math Skills by Bonnie Britt, NCTM

- Number Talks Sherry Parrish, Math Solutions

- Times Up on Timed Tests by Kristin Hilty and Eliza Sorte-Thomas, SDE Resources

- Number Sense Routines: Building Numerical Literacy Every day in grades K-3, Jessica Shumway, Stenhouse
149.1 Deepen the Fun! Engage Students in Number Games as They Communicate to Understand Number Concepts, Tutita Casa & Linda Sheffield Thursday 1:30-1:45

181 Number Talk: A Classroom Routine to Elicit Student Thinking and Build Procedural Fluency, Esther Billings & Kathryn Coffey, Thursday 3-4 PM

223 Five Fantastic Fluency Routines, Jennifer Bay-Williams, Thursday 3:15-4:30 PM

314 Crafting Powerful Number Talks in Elementary Classrooms, Thomas Hodges, George Roy, and Lindsay Head, Friday 9:30-10:30AM

336 Whole School Agreements: Avoiding Rules That Expire, Barb Dougherty, Karen Karp, and Sarah Bush, Friday 9:30-10:30 AM

352 Conceptual vs. Procedural Understanding: Empowering Students through Concept Development, Judy Rodgers & Shirley Fortenbaugh Friday 9:45-11 AM

377 Formative Assessment: Brought to You by the Number 5, Jon Wray, Friday 11AM-12PM
YOUR THOUGHTS

Questions and ideas for moving forward

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https://padlet.com/sararose_lynch/NCTM2018