

NAC 2016

Skills Sequences in Mathematics for Students with Autism

Jared Campbell

Willow Hozella

Educational Consultants, PaTTAN Harrisburg



Pennsylvania Training and Technical Assistance Network

PaTTAN on twitter

Jared Campbell

@campbell_PaTTAN

PaTTAN

@pattanupdates



#ptnmath



PaTTAN's Mission

The mission of the Pennsylvania Training and Technical Assistance Network (PaTTAN) is to support the efforts and initiatives of the Bureau of Special Education, and to build the capacity of local educational agencies to serve students who receive special education services.

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PDE's Commitment to Least Restrictive Environment (LRE)

Our goal for each child is to ensure Individualized Education Program (IEP) teams begin with the general education setting with the use of Supplementary Aids and Services before considering a more restrictive environment.

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Session Outline

Mathematics learning is an intricate **web** of connected logical **ideas**. Accessing new content requires the ability to identify and verify the needed **prerequisite skills** and instruct students accordingly so there are no gaps in knowledge. In this session, participants will examine mathematical content, the necessary prerequisites, and determine how to access content contained with the PA Math Standards.

Objectives

- Participants will be able to apply the concept of task analysis to structure verbal prompts and analyze error patterns
- Participants will understand the need to identify prerequisite skills for math topics
- Participants will be able to design an instruction sequence

Session Outline

1. ABA stuff
2. Instructional Sequencing
3. Teaching Counting (me)
4. Teaching Early Computation (we)
5. Create your own Sequence! (you)

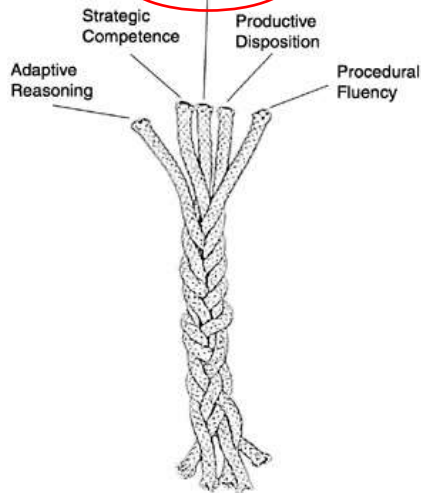
ABA Background



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5 Strands of Mathematical Proficiency

Prerequisites ← **Conceptual Understanding** → **Math Topic**



(NRC, 2001)

What is **conceptual understanding**?

Extended Tacts

- Generalization must occur
 - Can apply to novel items without explicit teaching
 - Across...
 1. People
 2. Places
 3. Materials
 4. Instructions
 5. Time
- Feature/Function/Class
 - Tacting critical features may facilitate concept acquisition
- The tact is involved in the process of joint control which assists students in effective verbal recall and effective listener responding

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What is **conceptual understanding**?

Atomic Repertoires

- New combination of skills applied to new behaviors
- Most of our spoken language is a result of ARs

What are the prerequisite skills needed for the atomic repertoires for the math content?

- Imitation
- Echoic
- Tacts
- Textual Behavior (reading texts/symbols)
- Transcriptive Behavior (copying text/symbols)
- Etc...

We must identify the skills and outline in a matrix!

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Textual Behavior...

It is important for students to be able to “read” mathematics.

However, textual behavior is only relevant when students understand the meaning of the words.

OR

Interpreting math symbols is only relevant when they understand their meaning.

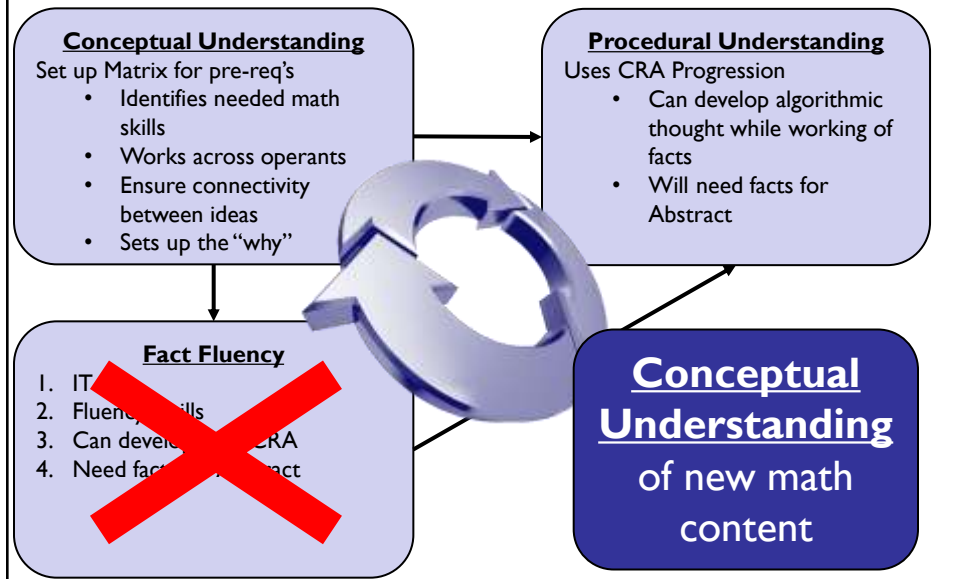
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From this point on...

I am going to simplify the ABA Vocabulary so we can focus on the math.

You can still make connection/improvements if you have that level of background.

Outlining Instruction



Process

- What math procedure?
 - Diagram the procedures
 - List the prerequisites
- What are the prerequisites?
 - Build a Concept Matrix
 - Teach/Assess all of the matrix
- Teach procedures
 - Work towards fluency in all areas
 - Work towards generalization

Counting



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Let's Teach Counting

- 3 **One-to-one** – Counting one “thing” at a time; transfer from uncounted group to counted group (**1: 1 Correspondance**)
 - 2 **Cardinal** – The last count represent the quantity in the counted group (**Cardinality**)
 - 1 **Stable-order** – Establishes consistent sequence
-
- Abstraction** – applying counting to like objects, actions, sounds, etc...
- 4/5 **Order-irrelevance** – Can count in any order

Prerequisites

Say the number name

Know the quantity

Know the words

Identify the symbol/digit

Write the symbol/digit

Conceptual

5. Inter-relationships (Matrix)

1. Number Speech

2. Number Quantity

3. Number Symbols

4. Number Words

The Counting Progression

Procedural

6. Cardinality



7. Stable Order

8. 1:1 Correspondence

9. Abstraction

10. Order Irrelevance

“Concept Matrix”

		<u>Student (behavior)</u>				
		digit	verbal	text	dice	10-frame
<u>Teacher (antecedent)</u>	digit	MtS <i>(Trans.)</i>	Tact	MtS <i>(Trans.)</i>	MtS	MtS
	verbal	Tact	Echoic	Tact	Tact	Tact
	text	MtS	Tact <i>(Textual)</i>	MtS	MtS	MtS
	dice	MtS	Tact	MtS	MtS	
	10-frame	MtS	Tact	MtS		MtS

check-in

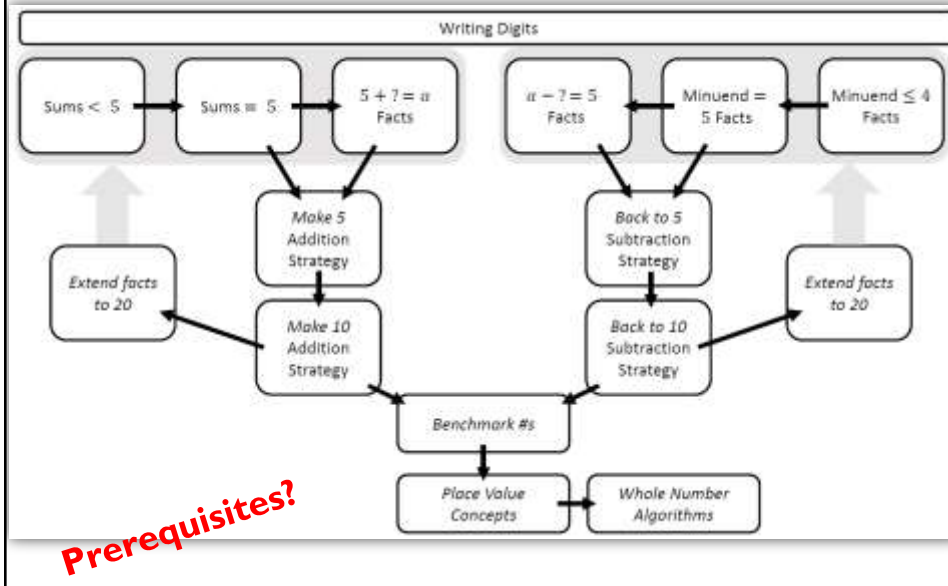


Early Computation



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Early Computation



Prerequisites

examples

“Concept Matrix”

Tact
X

Student (behavior)

Teacher (antecedent)

	?	?	?	?	?
?					
?					
?					
?					
?					

check-in



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Our plan...

In teams....

- Outline procedures
- List Prerequisites
- **Share/Feedback**
- Refine
- Develop Matrix

Gallery Walk...

- 3-5 minutes
- Add sticky notes with questions/suggestions
- Snap a picture

Each group will address sticky notes.

The Content

Place Value Concepts

Number Lines

Addition Algorithm

Subtracting Single-Digit #'s

Subtraction Algorithm

Multiplying Single-Digit #'s

Dividing Single-Digit #'s

Understanding Fractions as Numbers

Adding Fractions

Dealer's Choice!

Contact Information

www.pattan.net

Educational Consultants

Jared Campbell jcampbell@pattan.net

Willow Hozella whozella@pattan.net



Commonwealth of Pennsylvania

Tom Wolf, Governor