

Essential Math Skills

Pre-K to Grade 3

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Do You Know Someone?

Do you know someone who is capable of having learned mathematical thinking but developed an aversion to mathematics because of poor instruction?

How does that happen?



Today's learning objectives:

- **Understand how to use a competency based learning model for early childhood math.**
- **Identify the essential Pre-K to Grade 3 mathematical concepts and skills children need.**
- **Learn to help far more students develop competency for the essential early math skills**

Our Challenges

- **Too much**
- **Too fast**
- **One size fits all instruction**



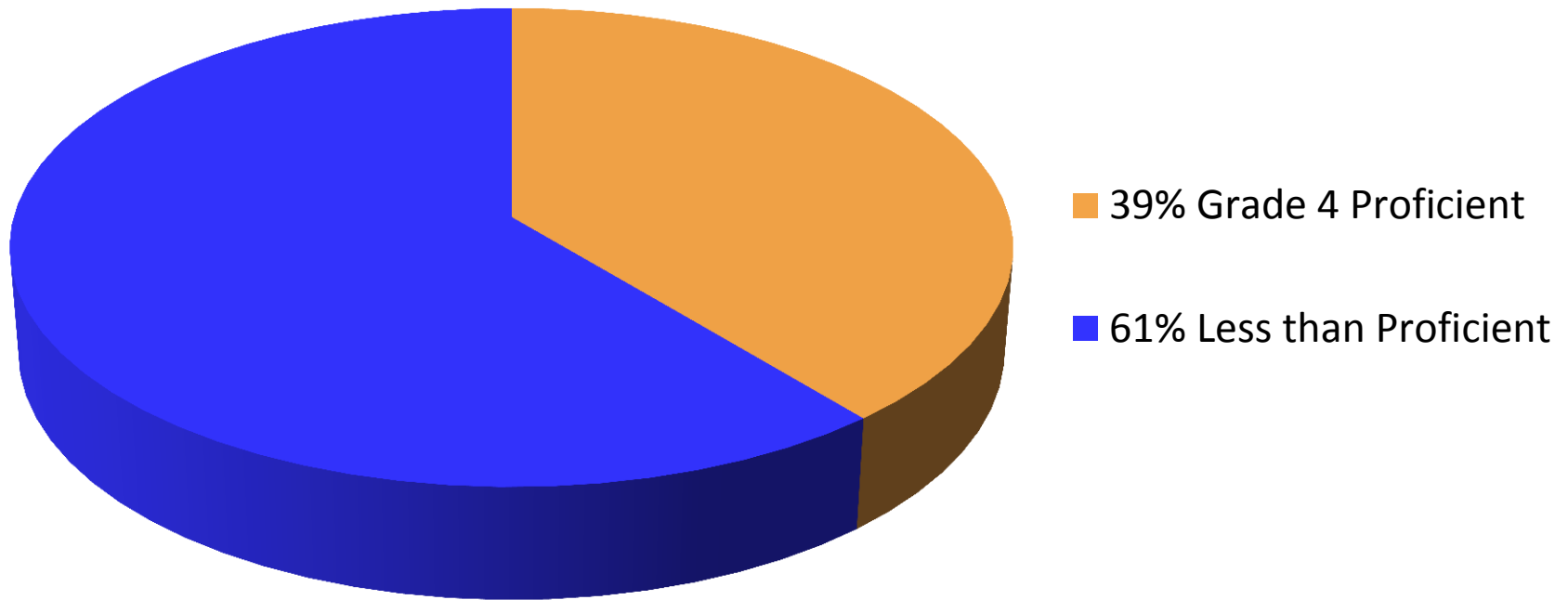
In the US Today

Over three million skilled technical jobs which cannot be filled

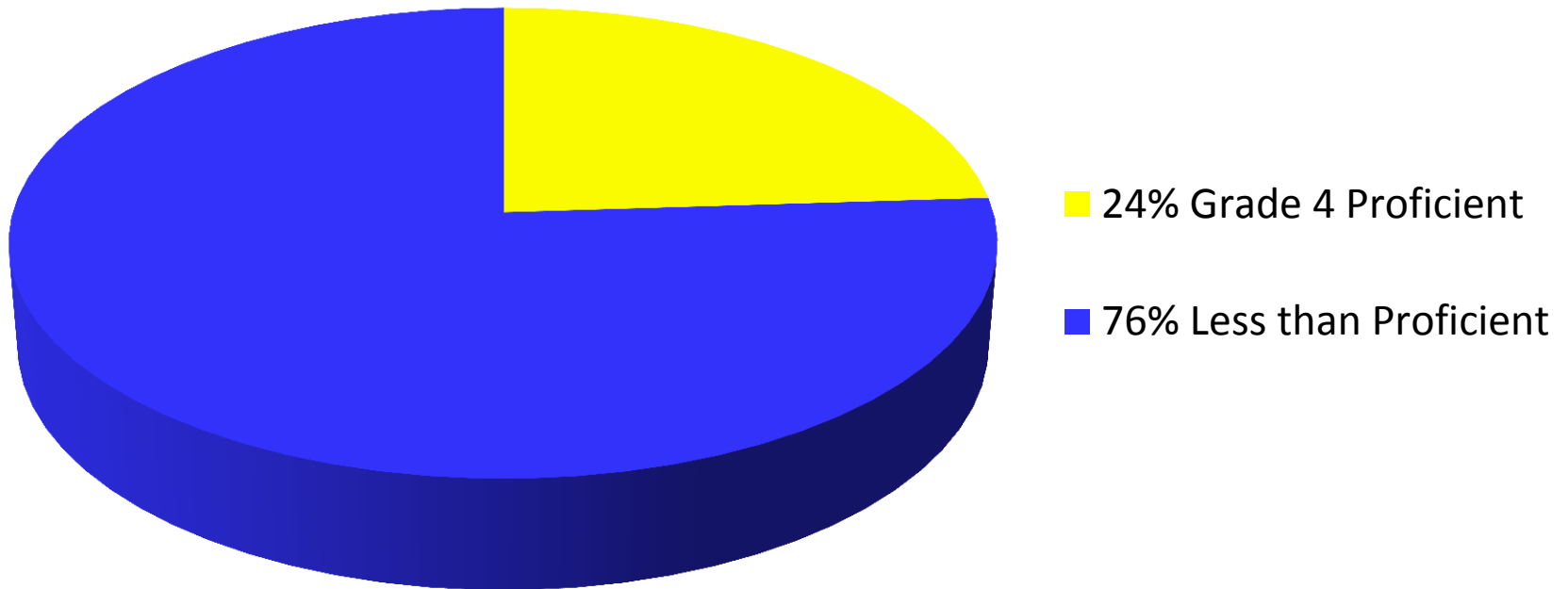
More than half of college graduates cannot find employment in their area of study

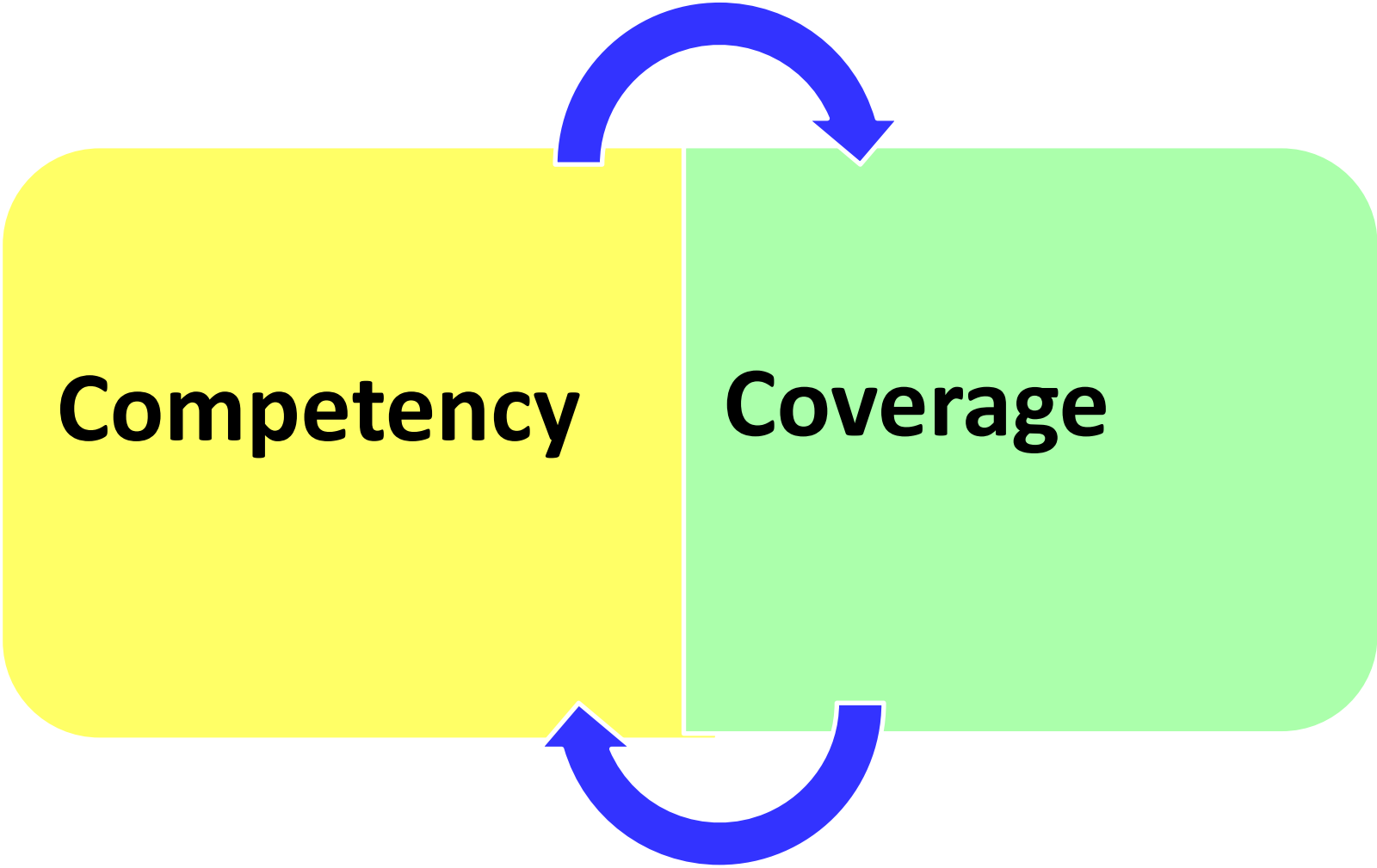


NAEP Math Proficiency (Grade 4), 2011



NAEP Math Proficiency (Grade 12), 2009

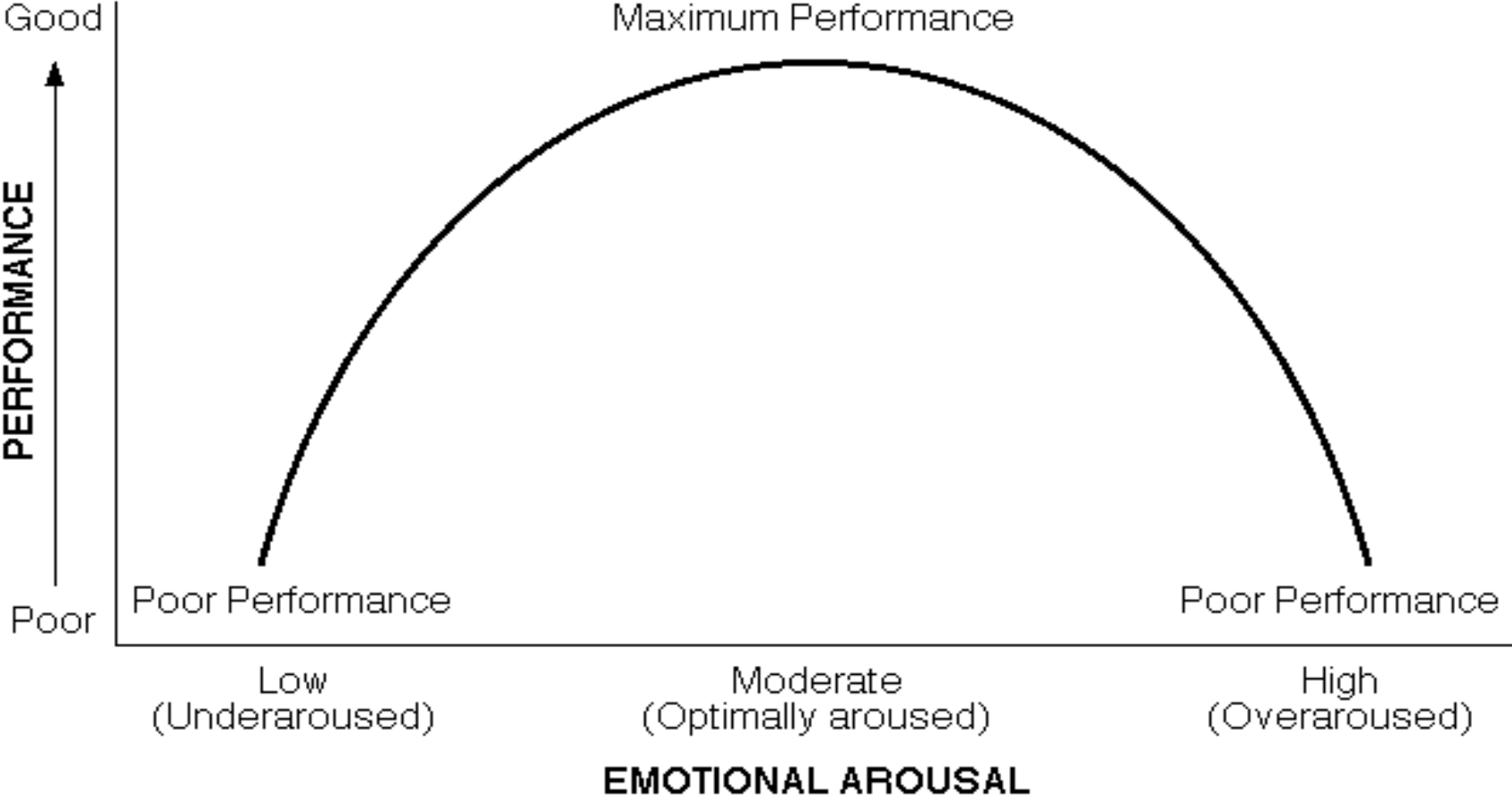




Competency

Coverage

The Inverted U



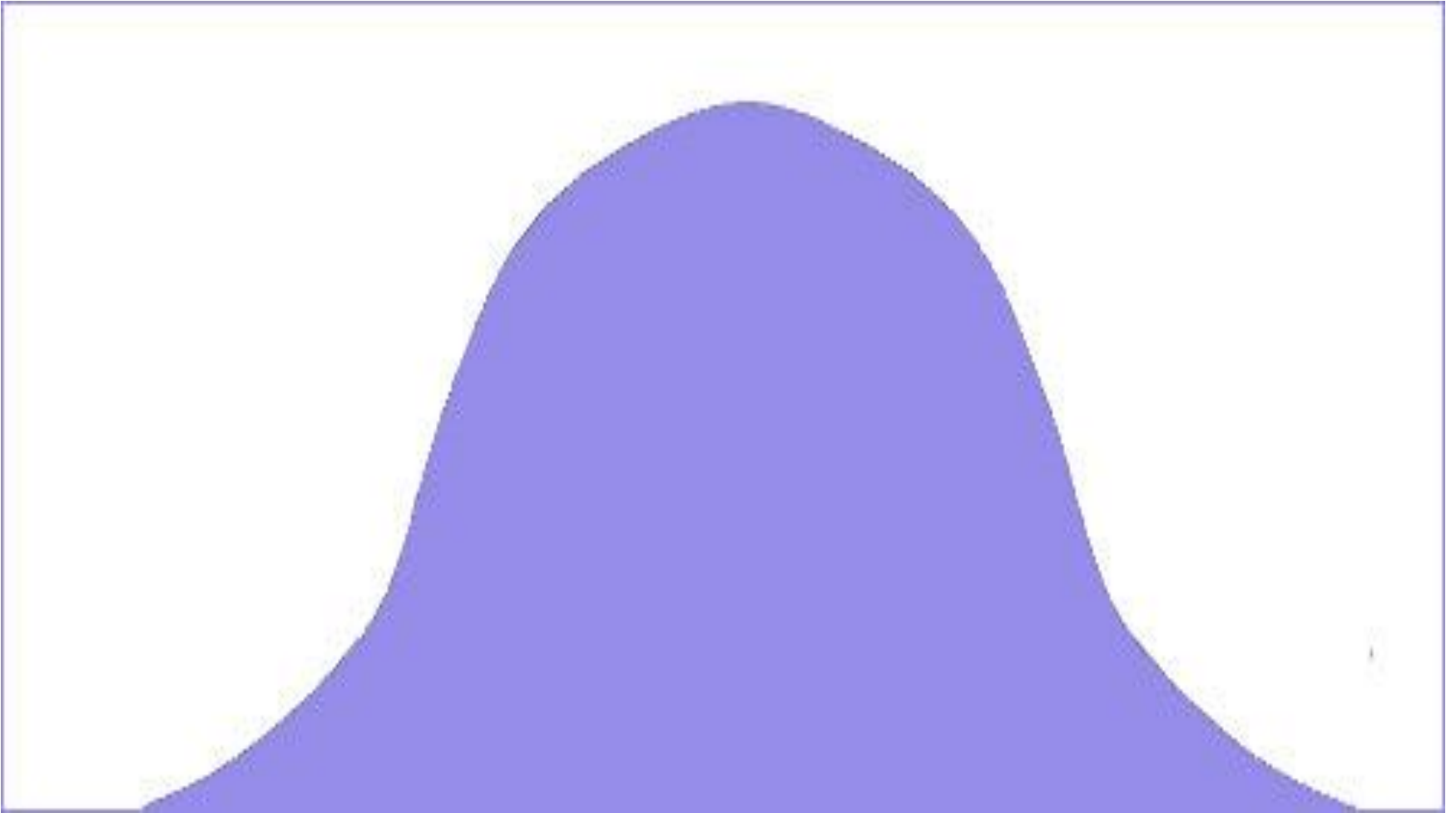
The Inverted U

Food and Health

Fertilizer and Fertility

Quantity of Content and Learning

More is better?



Less is More

The National Council of Teachers of Mathematics recommends that math curriculum should include fewer topics, spending enough time to make sure each is learned in enough depth that it need not be revisited in later grades. That is the approach used in most top-performing nations.

- National Mathematics Advisory Panel, 2008

The research is clear

Children who excel in math learn to develop "number sense," which is much different from the memorization that is often stressed in school.

- Jo Boaler, Stanford University



Competency



Using the Pre-K to Grade 3 Math Skills Inventory



Number Concepts, Preschool

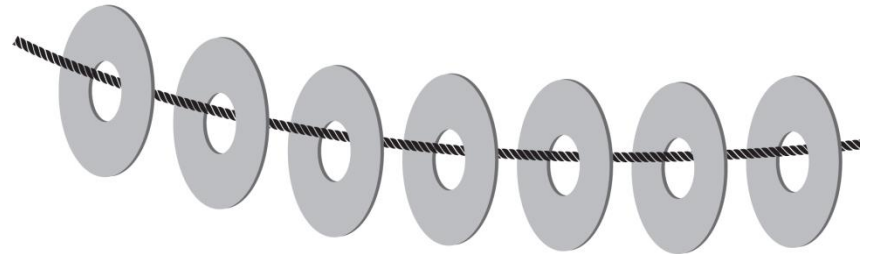
(Pre-K) Demonstrates one-to-one correspondence for numbers 1-10, with steps

(Pre-K) Demonstrates one-to-one correspondence for numbers 1-10, with manipulatives

(Pre-K) Adds on using numbers 1-10, with steps

(Pre-K) Adds on using numbers 1-10, with manipulatives

Preschool Activities



Number Concepts, Kindergarten

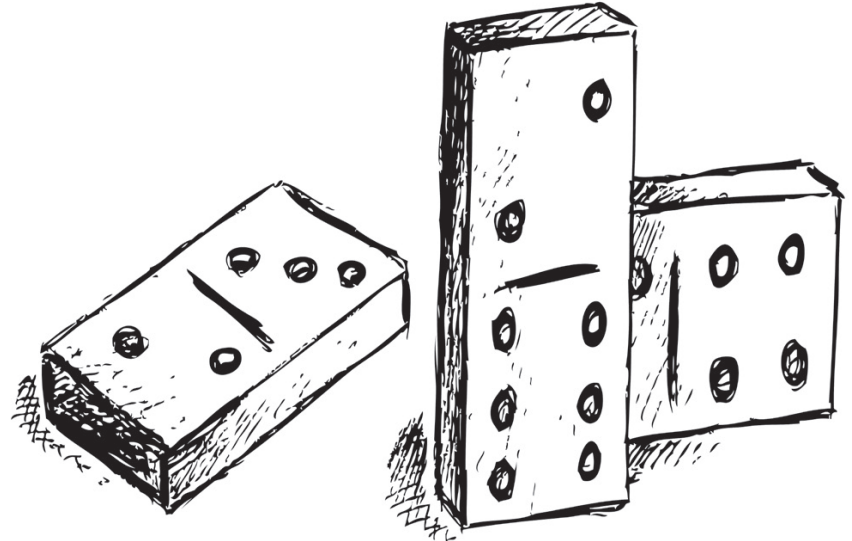
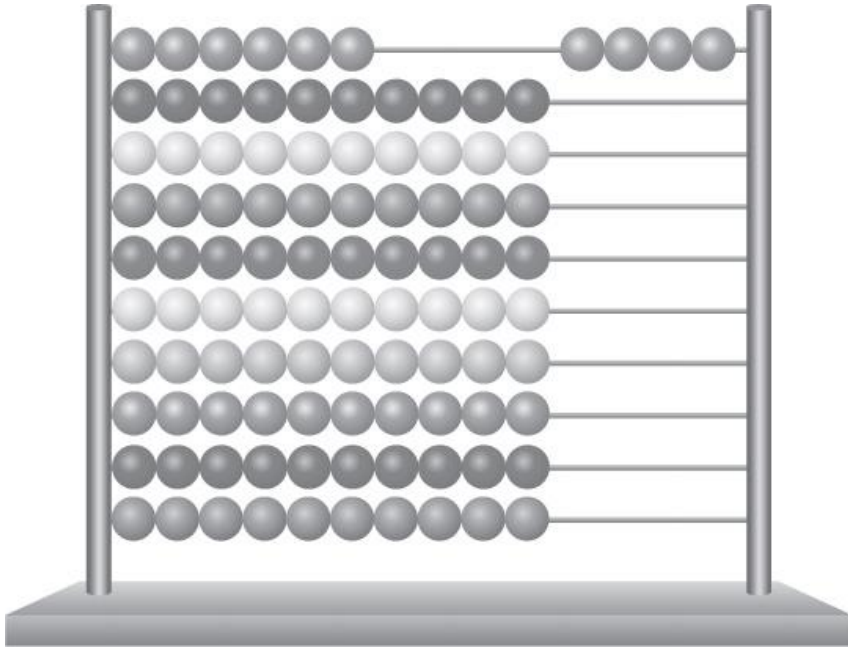
(K) Demonstrates counting to 100

(K) Has one-to-one correspondence for numbers 1-30

(K) Understands combinations (to 10)

(K) Recognizes number groups without counting (2-10)

Kindergarten Activities



Using the Pre-K to 3 Math Skills Inventory

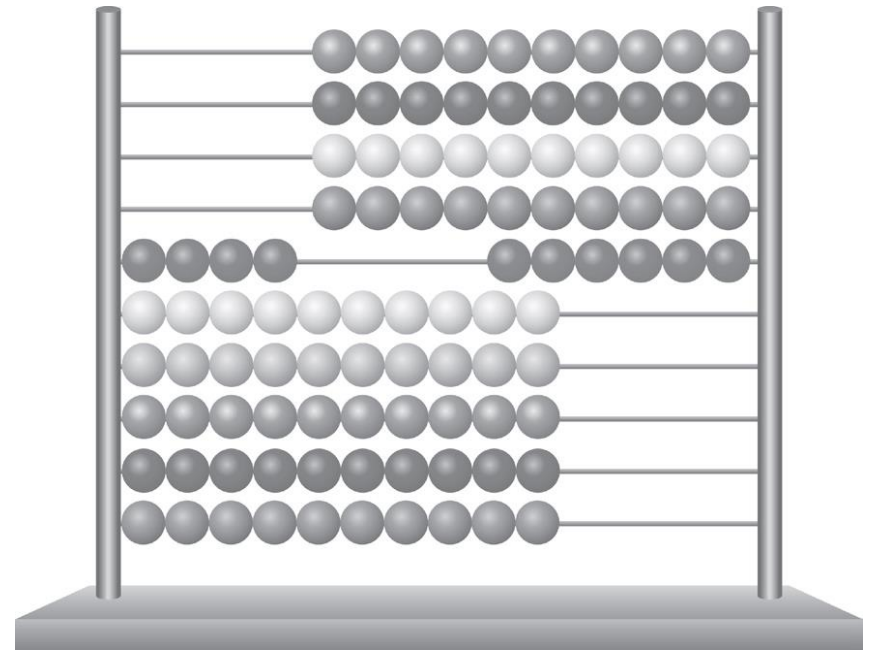
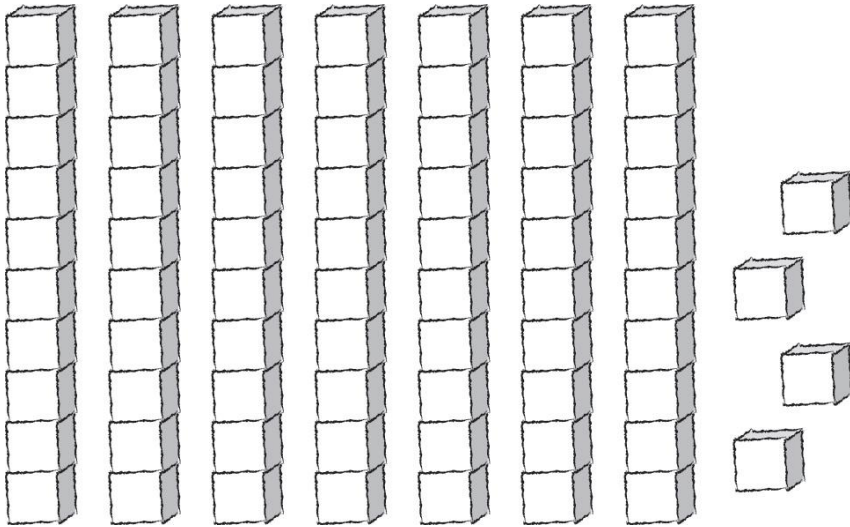
Video Analysis



Number Concepts, First Grade

- (1) Counts objects with accuracy to 100
- (1) Replicates visual or movement patterns
- (1) Recognizes number groups without counting (2-10)
- (1) Understands concepts of add on or take away (up to 30)
- (1) Can add or subtract single digit problems on paper
- (1) Shows a group of objects by number (to 100)

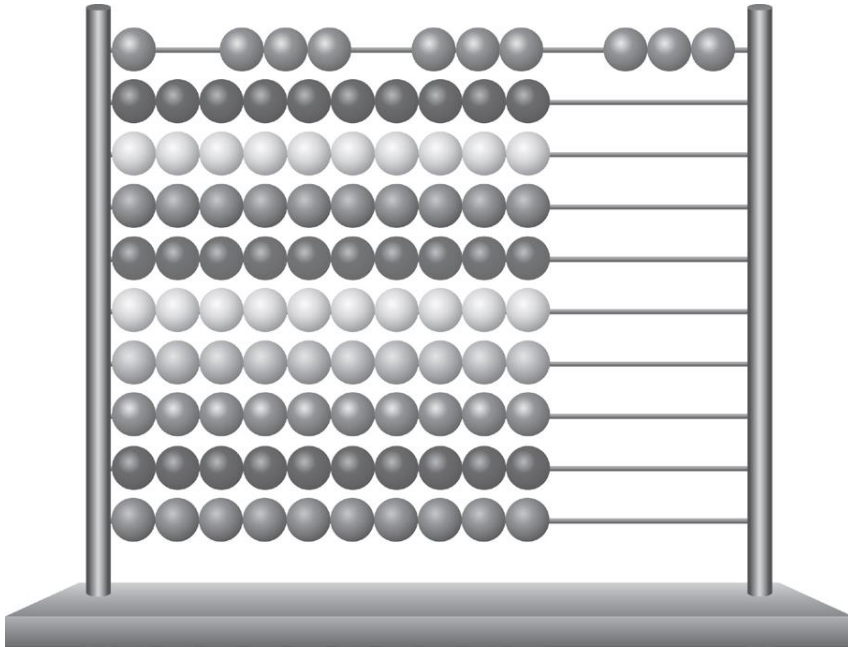
First Grade Activities



Number Concepts, Second Grade

- (2) Quickly recognizes number groups (to 100)
- (2) Can add-on or take-away from a group of objects (to 100)
- (2) Can add or subtract double digit problems on paper
- (2) Counts by 2, 3, 4, and 5 using manipulatives
- (2) Solves written and oral story problems using the correct operations
- (2) Understands/identifies place value to 1,000

Second Grade Activities



Number Concepts, Third Grade

(3) Reads and writes numbers to 10,000 in words and numerals

(3) Uses common units of measurement:

-Length

-Weight

-Time

-Money

-Temperature

(3) Can add or subtract three digit problems on paper with regrouping

(3) Can round numbers to the 10s

(3) Can round numbers to the 100s

(3) Add and subtract 2 digit numbers mentally

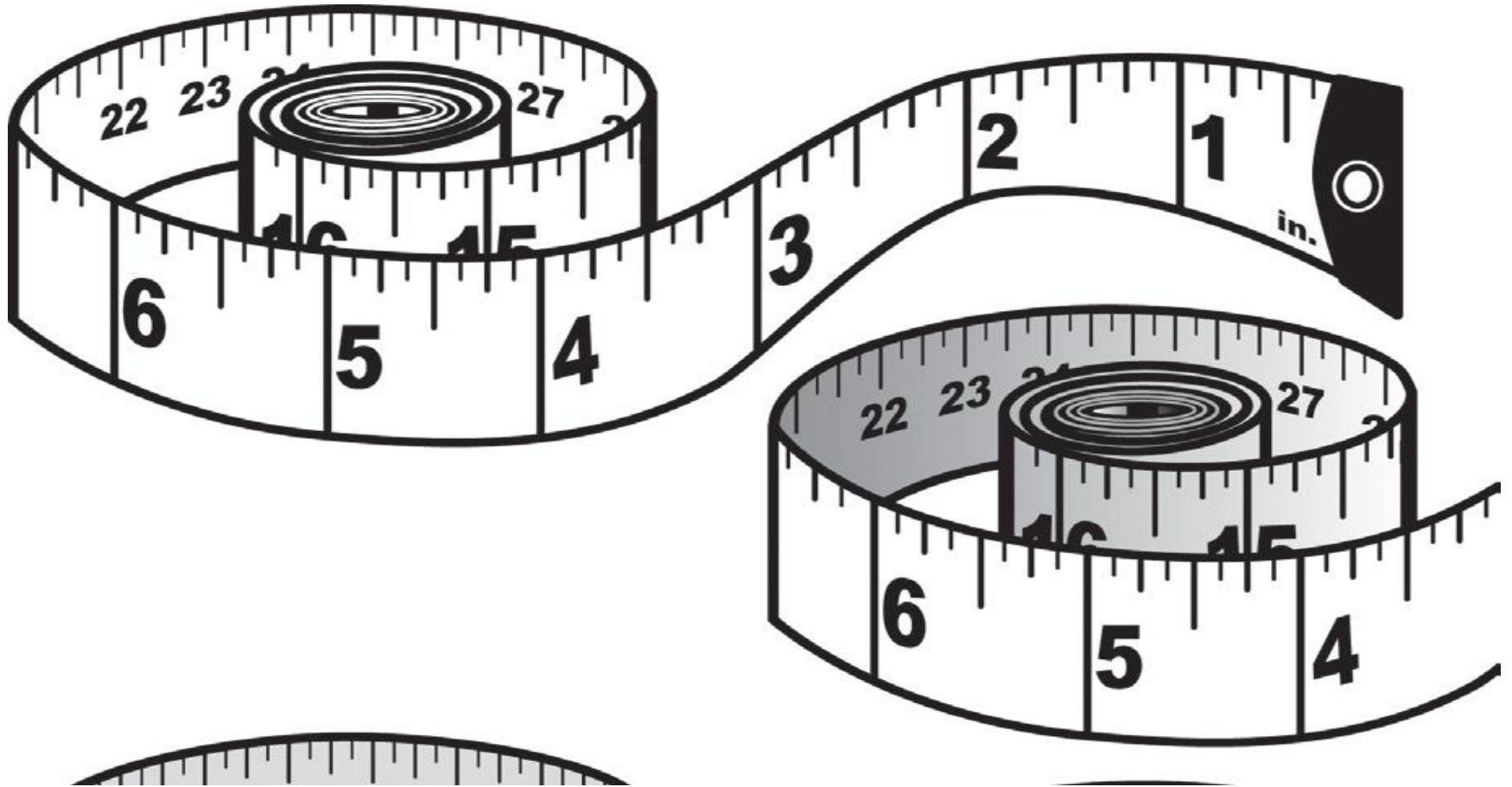
(3) Counts by 5,6,7,8,9,10 using manipulatives

(3) Uses arrays to visually depict multiplication

(3) Recognizes basic fractions

(3) Solves written and oral story problems using the correct operation

Third Grade Activities



Our Goal

Our goal is to help at least 90-95% of our Pre-K to Grade 3 students achieve proficiency in every one of the essential skills by the end of the school year.



Competency Based Learning

1. Clearly identify crucial learning outcomes
2. Assess student learning skills and readiness
3. Offer instruction at the student's readiness level
4. Monitor progress and adjust instruction until these skills/objectives are deeply understood (competency)
5. Allow students to move on to more advanced learning as soon as they are ready

Using the Inventories



- 1. Assess student learning skills and readiness**
- 2. Offer instruction at the student's readiness level**
- 3. Monitor progress consistently**
- 4. Adjust instruction until these skills/objectives are deeply understood (competency)**
- 5. Allow students to move on to more advanced learning as soon as they are ready**

Using the Essential Math Skills Inventory

- (Pre-K) Demonstrates one-to-one correspondence for numbers 1-10, with steps
- (Pre-K) Demonstrates one-to-one correspondence for numbers 1-10, with manipulatives
- (Pre-K) Adds on using numbers 1-10, with steps
- (Pre-K) Adds on using numbers 1-10, with manipulatives
- (K) Demonstrates counting to 100
- (K) Has one-to-one correspondence for numbers 1-30
- (K) Understands combinations (to 10)
- (K) Recognizes number groups without counting (2-10)
- (1) Counts objects with accuracy to 100
- (1) Replicates visual or movement patterns
- (1) Recognizes number groups without counting (2-10)
- (1) Understands concepts of add on or take away (up to 30)
- (1) Can add or subtract single digit problems on paper
- (1) Shows a group of objects by number (to 100)
- (2) Quickly recognizes number groups (to 100)
- (2) Can add-on or take-away from a group of objects (to 100)
- (2) Can add or subtract double digit problems on paper
- (2) Counts by 2, 3, 4, and 5 using manipulatives
- (2) Solves written and oral story problems using the correct operations
- (2) Understands/identifies place value to 1,000
- (3) Reads and writes numbers to 10,000 in words and numerals
- (3) Uses common units of measurement:
 - Length
 - Weight
 - Time
 - Money
 - Temperature
- (3) Can add or subtract three digit problems on paper with regrouping
- (3) Can round numbers to the 10s
- (3) Can round numbers to the 100s
- (3) Add and subtract 2 digit numbers mentally
- (3) Counts by 5,6,7,8,9,10 using manipulatives
- (3) Uses arrays to visually depict multiplication
- (3) Recognizes basic fractions
- (3) Solves written and oral story problems using the correct operation

The Kindergarten Essential Math Skills Classroom Inventory

District/School: _____ Teacher: _____ School/Year: _____

Student Name	Demonstrates one-to-one correspondence for numbers 1-10, with steps	Demonstrates one-to-one correspondence for numbers 1-10, with manipulatives	Adds on using numbers 1-10, with steps	Adds on/takes away using numbers 1-10, with manipulatives	Demonstrates counting to 100	Has one-to-one correspondence for numbers 1-30	Understands combinations (to 10)	Recognizes number groups without counting (2-10)	Counts objects with accuracy to 100	Replicates visual or movement patterns	Understands concepts of add on or take away (to 30)	Adds/subtracts single digit problems on paper	Shows a group of objects by number (to 100)

Systematic Measurement of Progress Essential Math Skills

Individual Essential Math Skills Inventory

- **RTI, Title1, Special Ed, Home School**

Classroom Essential Math Skills Inventory

- **Most classroom instruction**

Essential Skill Inventories (Pre-K, 1, 2, 3)

- **Whole class competency based learning in all the domains of early childhood**

Getting to Competency

Identify Essential Learning Outcomes

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graph TD; A[Identify Essential Learning Outcomes] --> B[Assess Student Learning Readiness/Needs]; B --> C[Informed Instruction/ Instructional Match]; C --> D[Ongoing Systematic Measurement of Progress]; D --> E[Competency];
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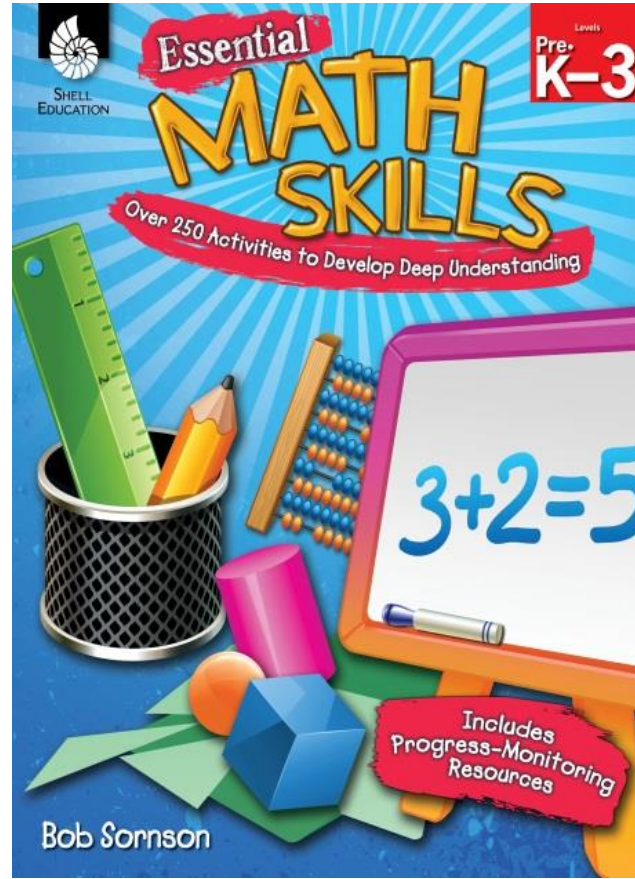
Assess Student Learning Readiness/Needs

**Informed Instruction/
Instructional Match**

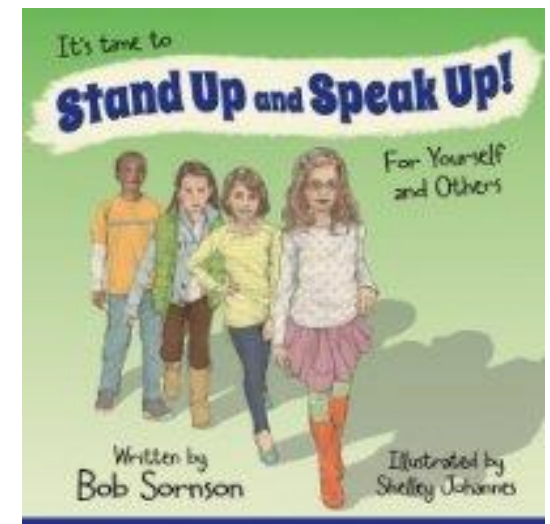
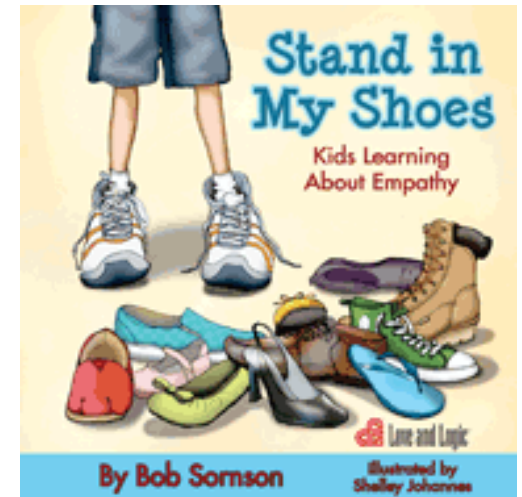
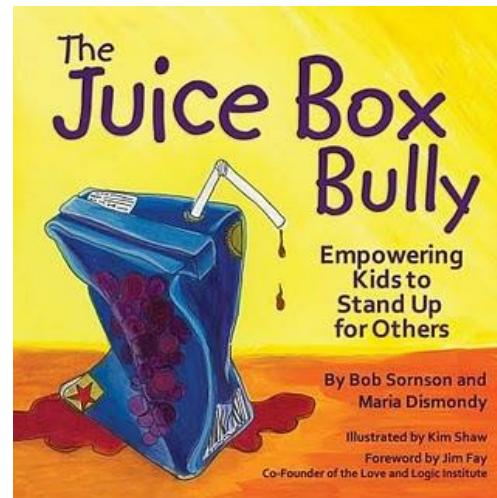
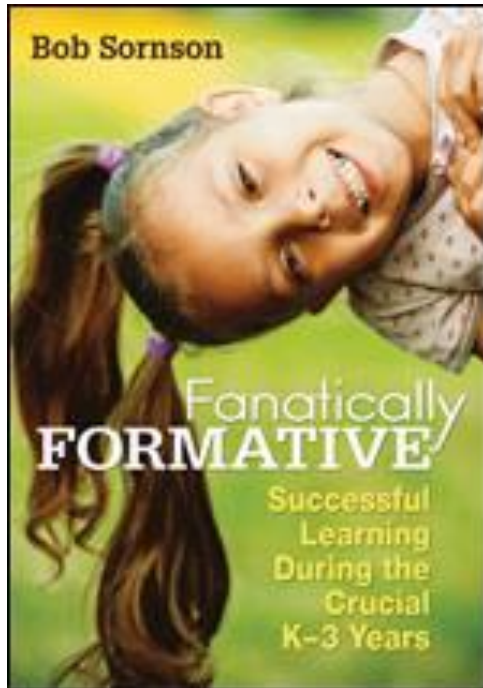
**Ongoing Systematic
Measurement of Progress**

Competency

Competency Based Learning



Want to Learn More?



The Essential Skill Inventories

Preschool and K-3

License to use the ESI is without cost for schools
with a training and data collection plan



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Earlylearningfoundation.com