Early Childhood Research
What is it and why does it matter?

Dr. Emily Slusser
Child & Adolescent Development
The development of early math and number skills.

Dr. Maria Fusaro
Child & Adolescent Development
Question asking skills in early childhood.

Dr. Andy Golloher
Special Education
Evidence based practice in shared reading.

Language: the Root to STEM Education

Emily Slusser, PhD
April 26, 2018
Large Approximate Number

Improves with age, instruction, and practice.

panamath.org

Halberda & Feigenson, 2008; Piazza et al., 2013; Halberda et al., 2013; Starr et al., 2014
Small Exact Number aka ‘subitizing’

- Reaction Time (msec)
  - 0
  - 500
  - 1000
  - 1500
  - 2000
  - 2500
  - 3000
  - 3500

- Number of Items
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8
  - 9

(subitizing)
Natural Number Concepts

= seven

“one, two, three, four, five, six, seven, …”

pre - knower level
Natural Number Concepts

one - knower level

“one, two, three, four, five, six, seven, …”

Natural Number Concepts

two - knower level

“one, two, three, four, five, six, seven, …”
Natural Number Concepts

“one, two, three, four, five, six, seven, ...”

three – knower level

Natural Number Concepts

“one, two, three, four, five, six, seven, ...”
Natural Number Concepts

four + 1 = five

Cardinal Principle (CP) knowers
Give-a-Number Task

"Can you give Peter three bananas?"

Le Corre & Carey, 2007; Le Corre, et. al., 2006; Samecka & Gelman, 2004; Samecka & Lee, 2009; Schaeffer et al., 1974; Slusser & Samecka, 2011; Wynn, 1990; 1992
Natural Number Concepts

The Role of Language

The language system is largely responsible for the ability to represent large exact number.

Children who experience significant language barriers (e.g., children born deaf to hearing parents) show delays in number word acquisition and later math achievement.
Early Math Achievement
The Role of Language
Number language is linked to ANS acuity.

ANS Acuity  →  Number Language

Shusterman, Stuss, Halberda, & Odic, 2016

Early Math Achievement
The Role of Language
ANS acuity is linked to later math achievement.

ANS Acuity  →  Math Achievement

Libertus, Feigenson, & Halberda, 2011
Early Math Achievement
The Role of Language
General vocabulary is linked to number language.

Vocabulary  Number Language

Negen & Samecka, 2012

Early Math Achievement
The Role of Language
SES is linked to vocabulary and math achievement.

 SES
parent education
occupation
income

Vocabulary

Math Achievement

Hart & Risley, 2003; Gunderson & Levine, 2011; Dowker, 2008
Number Language

Vocabulary

Parent Education

Slusser, Ribner, & Shusterman, under review
Parent Education

Math Achievement

5.31* (1.39)

Parent Education

Math Achievement

5.31* (1.39)

Slusser, Ribner, & Shusterman, under review

Parent Education

Math Achievement

2.13 (1.28)

Slusser, Ribner, & Shusterman, under review
Math Achievement

ANS Acuity

0.43* (.39)

Slusser, Ribner, & Shusterman, under review

Number Language

ANS Acuity

0.43* (.39)
0.25 (.13)

Math Achievement

Slusser, Ribner, & Shusterman, under review
Language: the Root to STEM Education

- Talk to infants and children!
  (e.g., 30 Million Words; First Five)

- Include number words in these conversations.
  (Berkowitz, et al., 2015; Cheng, Sandhofer, & Brown, 2011; Ramani & Siegler, 2011)

Thank you!
Question-Asking Skills in Early Childhood

Maria Fusaro, Ed.D.
April 26, 2018
San Jose State University

“What’s that?”
How do children learn?  
Do preschoolers believe whatever you tell them?

Trust based on Non-verbal Cues  
Fusaro & Harris (2008)
Mean number of labels accepted (max.=4), by bystander reaction (N=24).

Children figured out the consensus view


Why do we ask questions?

- To fill knowledge gaps
  - Actively seek information

- Jean Piaget
  - Disequilibrium

(Chouinard, 2007; Frazier, Gelman, & Wellman, 2009; Jirout & Klahr, 2012; Legere & Harris, 2016; Piaget, 1954)
A clown checks her makeup in a hotel hallway before competing at the World Clown Association's annual convention in Northbrook, Illinois.

A Yorkshire terrier gets prepared for a competition during a pedigree dog exhibition in Schoenfeld, Germany.
A rugby fan adjusts his latex mask at the Hong Kong Sevens tournament

Why do we ask questions?

- To fill knowledge gaps
  - Actively seek information
- To resolve discrepancies (disequilibrium)
  - Ambiguous information
- Because we are curious: Eagerness to resolve ambiguities in our experiences.

(Chouinard, 2007; Frazier, Gelman, & Wellman, 2009; Jirout & Klahr, 2012; Legere & Harris, 2016; Piaget, 1954)
How can we study children’s questions and inquiry skills?

Questions in parent-child interaction

Typical developmental sequence:

1. What?
2. Where?
3. [Yes/No]
   - Is that mine?
4. Who?
5. Why?

(Ninio & Snow, 1996)
Questions in parent-child interaction

Individual differences:  
(Chouinard, 2007)

<table>
<thead>
<tr>
<th>Child age</th>
<th>Sex</th>
<th>Avg. Qs per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 - 4</td>
<td>Boy</td>
<td>47</td>
</tr>
<tr>
<td>2 - 5</td>
<td>Girl</td>
<td>56</td>
</tr>
<tr>
<td>1 - 4.5</td>
<td>Girl</td>
<td>58</td>
</tr>
<tr>
<td>2 - 5</td>
<td>Boy</td>
<td>153</td>
</tr>
</tbody>
</table>

Questions in parent-child interaction

- Emergence of questions in the toddler years: Non-verbal questions
  “What's this?”

(Chouinard, 2007)
Questions and Preschool STEAM

(Fusaro & Smith, 2018)

New Study on Early Questions

- Describe the emergence of Verbal and Non-verbal questions over time
  - 14, 24, & 64 months

- How do differences in early mother- and child-communication shape development?
  - Scoring videos of parent-child interactions
Questions in ECE Settings

- What makes children curious?
  - How does this vary across children?

- How can teachers encourage and support inquisitiveness?
  - “Interesting” experiences
  - Conversational style
  - Responses to questions
RESEARCH IN EARLY CHILDHOOD SPECIAL EDUCATION:
ESTABLISHING EVIDENCE-BASED PRACTICE

ANDREA GOLLOHER

EVIDENCE-BASED PRACTICE

- 2005: Special issue of Exceptional Children outlined first set of guidelines to establish evidence-based practice

- Step 1: Complete high-quality research

- Step 2: Need multiple studies on the practice
ESTABLISHING EVIDENCE-BASED PRACTICE

• Special Education uses single case research design more than randomized control studies

• Clearly defined quality indicators (Horner et al., 2005; Kratochwill et al., 2010)

• Replicate:
  • 5 studies
  • 2 different research teams
  • 20 participants total
  • With “meaningful” effect size

EVIDENCE-BASED PRACTICE

• Establishing EBPs requires a LOT OF REPLICATION
  • Lurking questions
    • How much
    • For whom
    • Under what conditions
  • To answer these questions, need to replicate AND EXTEND
EXAMPLE: ADAPTED SHARED READING

- From ECE:
  - Shared reading occurs when a reader and listener interact about a text (e.g., dialogic reading)
  - Wealth of evidence on value for language development in ECE

(Adams, 1990; Browder et al., 2009; Gunn, Simmons, & Kameenui, 1998; NELP, 2008)

ENTER SPECIAL EDUCATION: PATHWAYS TO LITERACY
(MIMS, LEE, & BROWDER, 2011)

- Shared reading program
- No prerequisite skills
- Includes tools to adapt reading sessions using Universal Design for Learning (UDL)

- Previous research:
  - Elementary-aged students
  - In special education classrooms
  - Three studies by one research team (Browder et al., 2008; Browder, Lee, & Mims, 2011; Mims et al., 2009; Muchetti, 2013)
RESEARCH QUESTIONS

• Does Pathways to Literacy increase:
  • shared reading engagement
  • listening comprehension, and
  • communicating a response
  for children with severe intellectual disabilities in inclusive early childhood classrooms?

RESEARCH QUESTIONS

• Do the preschoolers generalize these skills (reading engagement, listening comprehension and communication) to new adapted books?
  • No existing research on this
PROCEDURES

• Multiple baseline across participants
  • Measured independence with a task analysis (see handouts)

• Participants:
  • 3 Preschoolers, 4 years old at start of study
  • Diagnosed with autism, visual impairments, and/or speech language delays

EFFICACY AND GENERALIZATION
DISCUSSION

• 5th study, establishes adapted shared reading as effective, generalizable, and acceptable

• Questions remain:
  • Did communication gains in reading sessions generalize to other settings?
  • Would it be possible to adapt the reading program to address other genres (expository texts)?
  • Could similar strategies be developed for large group reading (common ECE practice)?

QUESTIONS?

• About Early Childhood Research
  • Emily Slusser, Child and Adolescent Development
  • Maria Fusaro, Child and Adolescent Development
  • Andy Golloher, Special Education
NEXT STEPS…

• Interested in being a research assistant?
  • Fill out the form!
  ![https://tinyurl.com/ECISJSU](https://tinyurl.com/ECISJSU)

• Interested in learning more about the Early Childhood Initiative?
  • Sign the sign in sheet!

• Want to learn more about a specific topic?
  • Fill out the evaluation form!

Early Childhood Initiative
Supporting the whole child, from the start.

Recognizing the potential each and every child brings into the world and the value of community partnerships, we aim to bridge the research-to-practice gap by advancing applied developmental research, developing evidence-based practices, and advocating for professionals, young children, and their families.

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