What Children Know About Mathematics: Investigating Children's Numeric Reasoning

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Abstract

A total of 28 preschoolers participated in clinical interviews to investigate their understanding of numeric reasoning by measuring their rote courting, rational counting, concept of "zero," and quantitative comparisons.

Results revealed that at least 79% of the preschoolers know and understand rote counting, rational counting, and quantitative comparisons. However, only 64% know and understand the concept of "zero."

Aim of the Study

- **To investigate children's early numeric reasoning**
- **Focused on children's early numeric reasoning by measuring their rote (or verbal) counting, rational counting with cardinality rule, "zero" concept, and quantitative comparison (more or less concept).**

Research Questions

1. **Do children know the concepts of early numeric reasoning (rote counting, rational counting, zero concept, and quantitative comparison)?**
2. **Which early numeric reasoning concept (rote counting, rational counting, zero concept, or quantitative comparison) has significant scores?**

Research Studies

- **Clements & Sarama, 2010: Preschoolers developed understanding of math concepts**
- **Purpura, 2010; Purpura & Longin, 2013: Children numeracy skills (numbering, relations, and arithmetic operations)**
- **Baroody, 2009: Young children brought an impressive informal mathematical strengths and understanding of math language**

Sample

28 preschoolers

Gender	Quantity
Boy	18
Girl	10

Mean age 4.2 years old

Method – Clinical Interview Questions

1. **Can you count?**
2. **(5 blocks given to child) How many blocks do you have? How did you know?**
3. **Can you show me 5 blocks? Show me 9 blocks. How did you know?**
4. **(No blocks given to the child) How many blocks do you have? If the child says, "zero," the following question will be asked, "What do you mean by "zero"?**
5. **(5 blocks given to the child and 6 to the interviewer) Who has more blocks? How did you know?**
   (6 blocks given to the child and 5 to the interviewer) Who has more blocks? How did you know?

Research Question 1 Results

Numeric Reasoning Concept	Percent
Rote Counting	91
Rational Counting	79
Zero Concept	64
Quantitative Comparisons	81.5

Table 1: *Percentages of sample who correctly answered questions according to numeric reasoning concept*

Result 1: Rote / Verbal Counting

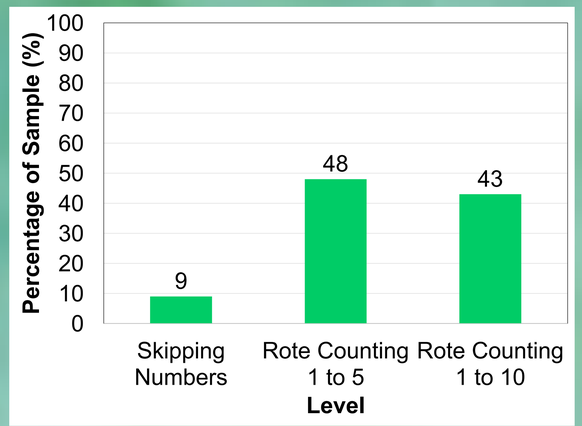

Figure 1: *Percentages of sample that demonstrated rote counting according to levels*

Result 2: Rational Counting

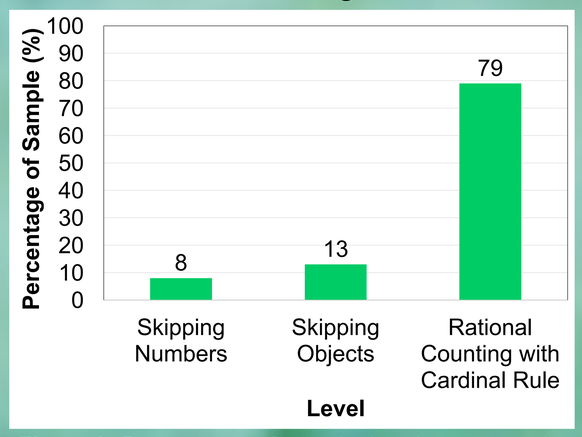

Figure 2: *Percentages of sample that demonstrated rational counting according to levels*

Research Question 1 Results (cont.)

Result 3: Concept of Zero

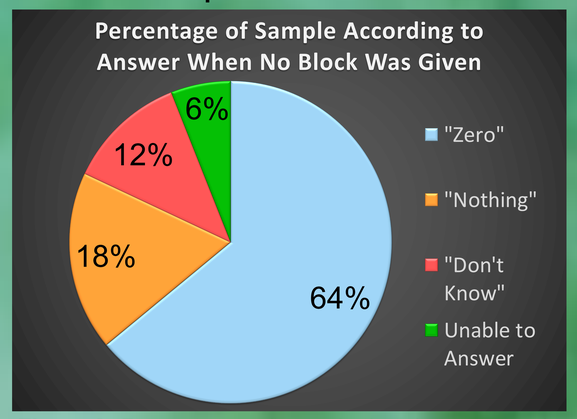

Figure 3: *Percentages of sample that demonstrated understanding of the concept of zero, according to the answer when no block was given and asked, "How many?"*

Result 4: Quantitative Comparison

Concept	Percentage
More	89
Less	74

Figure 4: *Percentages of sample that demonstrated understanding of the concept of "more" and the concept of "less"*

Research Question 2 Results

- **Rote counting has the highest percentage among the four numeric reasoning concepts.**
- **Knowledge of the concept of "zero" has the lowest percentage among the four numeric reasoning concepts.**

Reference List

Baroody, A., Lai, M., & Mix, S. (2009). The development of young children's early number and operation sense and its implications for early childhood education. In Spodek, Bernanrd, & O. Saracho, Olivia (Eds.), *Handbook of research on the education of young children* (Vol. 2). Mahwah, NJ: Erlbaum.

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