Math Talk in Preschool Children's Play: Emerging Trends and Future Directions

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Abstract

Research indicates that math talk—informal teacher-child math conversations—is associated with math learning in preschool. We present findings from a series of five studies that identify specific features of naturalistic math talk during free play, their impact on preschoolers' math learning & offer recommendations from our fifth study on the linguistic features of effective math talk.

Study 1

Purpose:

To identify the types of teacher-child math interactions that occur naturally in children's play in preschool.

Method:

Analyzed video clips of naturalistic, math-related interactions by four preschool teachers over a two-month period.

Findings:

Teacher-child math interactions centered on distinct math standards of NCTM (2000)—Number, Geometry, Measurement, Problem solving, & Communication—and could both interrupt and support children's play.

*Study 2

Purpose:

To examine associations between specific types of math interactions in play and growth in math learning in preschool.

Method:

Coded video-data of teacher-child math interactions in play over an eight-month period. Math learning of 47 preschoolers measured using TEMA-3 (Ginsberg & Baroody, 2003)

Findings:

Three distinct teacher-child math interactions---Good-Fit, Number & Communication--contributed significantly to TEMA posttest performance.

Significant Variables	B	Std. Error	Beta
TEMA Pretest Scores	.88	.05	.89***
Good-Fit Interactions	16.71	5.89	.22**
Number Interactions	.29	.13	.22*
Communication	.63	.265	.19*

Study 3

Purpose:

To examine the effects of a math talk training program on the frequency of teacher math talk & on subsequent growth in math knowledge of children living in poverty.

Method:

Trained 13 preschool teachers & measured their use of math talk during play; measured 66 preschoolers' math ability with "snapshot" assessments (Levine et al., 2010).

Findings:

Training increased frequency of teachers' math talk across domains; increases in each domain of math talk was associated with growth in at least one measure of math learning.

Math Talk Category	Point to x (number)	Which shape is different? (Geometry)	Name the shape (Geometry)	Spatial knowledge task (Spatial Knowledge)	Ordering (Measurement)
Number	.34*	ns	ns	ns	ns
Geometry	ns	.34*	ns	ns	ns
Measurement	.32**	.51***	.35*	ns	.21*
Spatial Knowledge	ns	ns	.48***	.42*	.77**

*Study 5

Purpose:

To examine the relative contributions of math talk domains, syntactic structures, and discourse purposes to growth in math learning of preschool children.

Method:

Administered pre- and posttest measures of math learning using TEAM (Clements et al., 2013) to 44 preschool children; recorded, coded, and analyzed teachers' math talk utterances over a seven-month period. Conducted hierarchical multiple regression analysis to determine associations between math talk types and growth in math abilities.

Analysis:

Teachers' talk about abstract counting, cardinality, ordinality and shape attributes were significantly related to Math gains; as also open-ended questions (syntax), modeling and posing an open problem (purpose). Counting objects present was negatively related to children's Math gains.

Study 4

Purpose:

To identify syntactic features and pedagogical purposes of naturalistic math talk in play across domains.
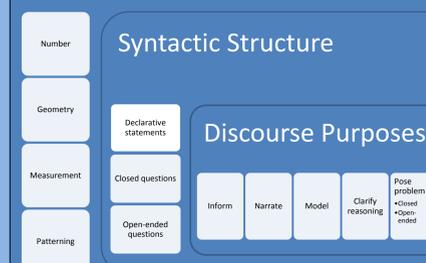
Method:

Analyzed 100 individual video clips of naturally-occurring math talk of 8 preschool teachers; constructed a taxonomy of math talk domains, syntactic features, and purposes.

Findings:

Math talk utterances could be categorized into math domains, syntactic structures, discourse purposes, and in regard to number of objects & presence of objects.

Math Domains

Number
Geometry
Measurement
Patterning

Syntactic Structure

Declarative statements
Closed questions
Open-ended questions

Discourse Purposes

Inform
Narrate
Model
Clarify reasoning
Pose problem
• Closed
• Open-ended

Research briefs, including videos, are available at www.easternct.edu/cece