



Teaching Mathematics in Early Childhood Classrooms: Exploring Teachers' Beliefs About What Works Best



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Abstract

This study examined elementary school teachers' perceptions on how their beliefs about teaching mathematics influence their teaching practices. K-3 teachers in Central Illinois were surveyed, using the Earnest Teacher Mathematics Beliefs Scale (1998). Results, analyzed descriptively, revealed that beliefs about teaching mathematics vary by grade level. Most teachers agreed that their beliefs about teaching mathematics influence their teaching practices.

Methods

Instrument: The Earnest Teacher Mathematics Beliefs Scale (1989)

- Used to measure early elementary school teachers' beliefs about teaching mathematics
- Consisted of 54 items from four subcategories:
 - beliefs about mathematics
 - beliefs about learning mathematics
 - beliefs about teaching mathematics
 - additional questions regarding demographics

Data Collection and Analysis:

- Survey questionnaire was distributed to the participants at school.
- Data was analyzed using descriptive analysis.

Sample

Kindergarten through 3rd grade teachers in Central Illinois

Grade Level/Teacher (%)	Gender	Age (%)	Degree (%)	# Math Course in High School (%)	# Math Course in College (%)	Math Grade in High School (%)	Math Grade in College (%)
K = 13	F	20-25=0	BA=80	1-2=80	1-2=87	A=20	A=13
1=20	F	26-30=0	MA=20	3-4=20	3-4=13	B=47	B=53
2=33	F	31-35=47	Ph.D=0	>=5=0	>5=0	C=33	C=33
3=34	F	36-40=47					

Purpose

The purpose of the study is to explore teachers' beliefs on effective teaching practice for teaching mathematics to young children in Central Illinois.

The study served two major purposes:

- To examine teachers' beliefs about which teaching strategies work best for young children
- To determine if there are differences in beliefs between teachers of kindergarten, first, second and third grade on what teaching strategies work best for young children.

Research Questions

Two research questions were utilized to examine the topic:

- Do teachers' beliefs influence their math teaching practice?
- Do teachers in kindergarten, first, second, and third grade have different beliefs about teaching mathematics?

Hypothesis

This study hypothesizes that teachers' beliefs about the nature and features of mathematics influence their practice in teaching mathematics across kindergarten, first, second, and third grade classrooms.

Theoretical Framework

The study is based on three theoretical frameworks:

- The Earnest Teacher Mathematics Beliefs Scale (1998)
- National Council of Teaching Mathematics learning standards (2000)
- National Association of Education for Young Children position statements on mathematics teaching and learning (2010)

Survey Results

Do teachers' beliefs influence their math teaching practice?

Subcategory	Strongly Agree (%)	Agree (%)	Disagree (%)	Strongly Disagree (%)
Beliefs about Mathematics	10.66	56.84	32.50	0.00
Beliefs about Learning Mathematics	30.00	46.66	23.33	0.00
Beliefs about Teaching Mathematics	27.84	45.23	23.57	1.9

Do teachers in kindergarten, first, second, and third grade have different beliefs about teaching mathematics?

Grade Level	%	Belief about Math Agree = 66.50 Disagree = 32.50				Belief about Learning Math Agree = 46.66 Disagree = 23.33				Belief about Teaching Math Agree = 73.07 Disagree = 27.47			
		SA	A	D	SD	SA	A	D	SD	SA	A	D	SD
K	13	1.6	2.2	1.8	0.0	1.0	1.0	1.8	0.0	1.7	5.5	2.1	0.0
1	20	3.5	7.5	6.9	1.0	2.3	6.7	2.2	0.0	7.5	9.2	4.1	0.8
2	33	7.2	16.7	9.6	1.2	7.8	9.5	7.2	1.5	9.8	12.5	6.7	3.0
3	34	9.5	18.3	10.5	1.5	8.5	10.5	8.2	2.5	9.6	15.4	8.2	2.5

Observation Results

- 73.07% of teachers surveyed agreed or strongly agreed that beliefs about teaching mathematics influence their math teaching practices
- 25.47% disagreed (23.57%) or strongly disagreed (1.9%)

Teaching Strategies

The following teaching strategies were rated as *most effective* by the participants:

- Student engagements and interactions should include group activities and student collaboration.
- Developing students' confidence for learning math by building upon their prior knowledge is important.
- Teacher should understand the needs of his/her students in teaching mathematics.
- Use materials as a guide to determine what topics to teach and how to sequence them, but adapt the materials to fit my strategies and approaches to teaching.
- Pose questions designed to facilitate student's finding their own solutions but not answer student's questions.

The following teaching strategies were rated as *least effective* by the participants:

- Teaching students that correct answers are more important than the reasoning process.
- Teaching students that memorization comes before understanding in learning math.
- Utilizing the textbook as a key instrument to effectively teach math.
- Encouraging students to use calculators to check work.
- Encouraging students to memorize information as means of understanding the concepts in math

Conclusions

- Teachers in kindergarten, first, second, and third grade DO have different beliefs about teaching mathematics.
- 13% of the participants are Kindergarten teachers and believe that mathematics is a knowledge and sense of numbers.
- 20% of the participants are first grade teachers and believe memorization comes after understanding in learning math.
- 33% of the participants are second grade teachers and believe memorization is a means of understanding the concepts of math.
- 34% of the participants are third grade teachers and believe that posing questions designed to facilitate student's finding their own solutions but not answer the student's questions is an effective way to teach math.

References:

- Ernest, P. (1998). *Social constructivism as a philosophy of mathematics*. SUNY Press.
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- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics: An overview*. NCTM.