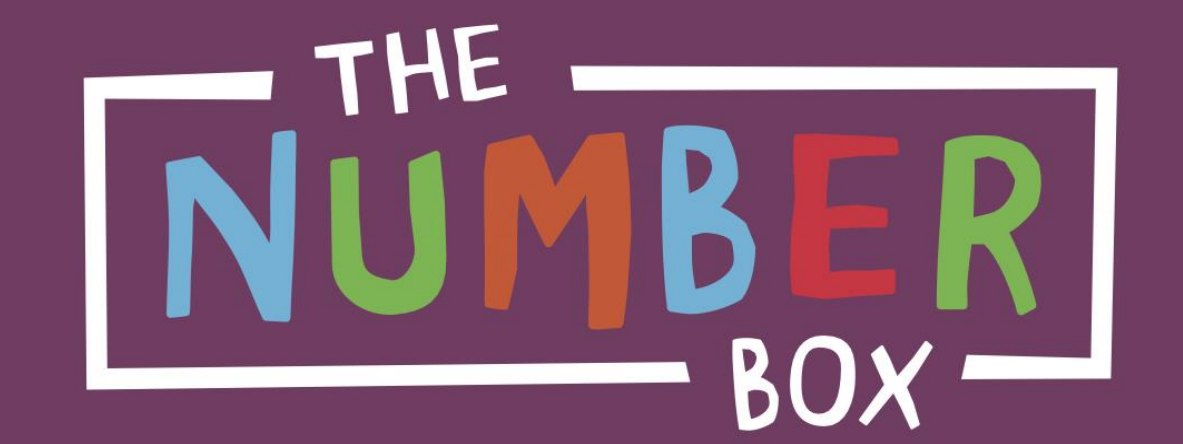


# Implementation of an Early Numeracy Intervention: Lessons from Practice

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WESLEYAN PRESCHOOL MATH GAMES

## Background

- Early numeracy skills predict later academic achievement, but not all children get the early numeracy support that they need.<sup>1, 2</sup>
- Guided play may be a useful tool to support numeracy skills in early childhood.<sup>3</sup> Guided play encompasses a wide spectrum of activities, filling the gap between free play and direct instruction.
- Wesleyan Preschool Math Games is a play-based intervention (comprised of a set of 11 games) for preschool children to promote early numeracy.

## Research Questions

- What are the most promising implementation strategies for the math games?
- Is a guided-play implementation of an early numeracy curriculum more effective than standard preschool curricula?

## Measures

### For students:

- 5 early numeracy assessments administered at pretest and post-test:
  - Which has X
  - Magnitude Comparison
  - Numeral Identification
  - Preschool Early Numeracy Scale (PENS)
  - Give-A-Number

### For teachers:

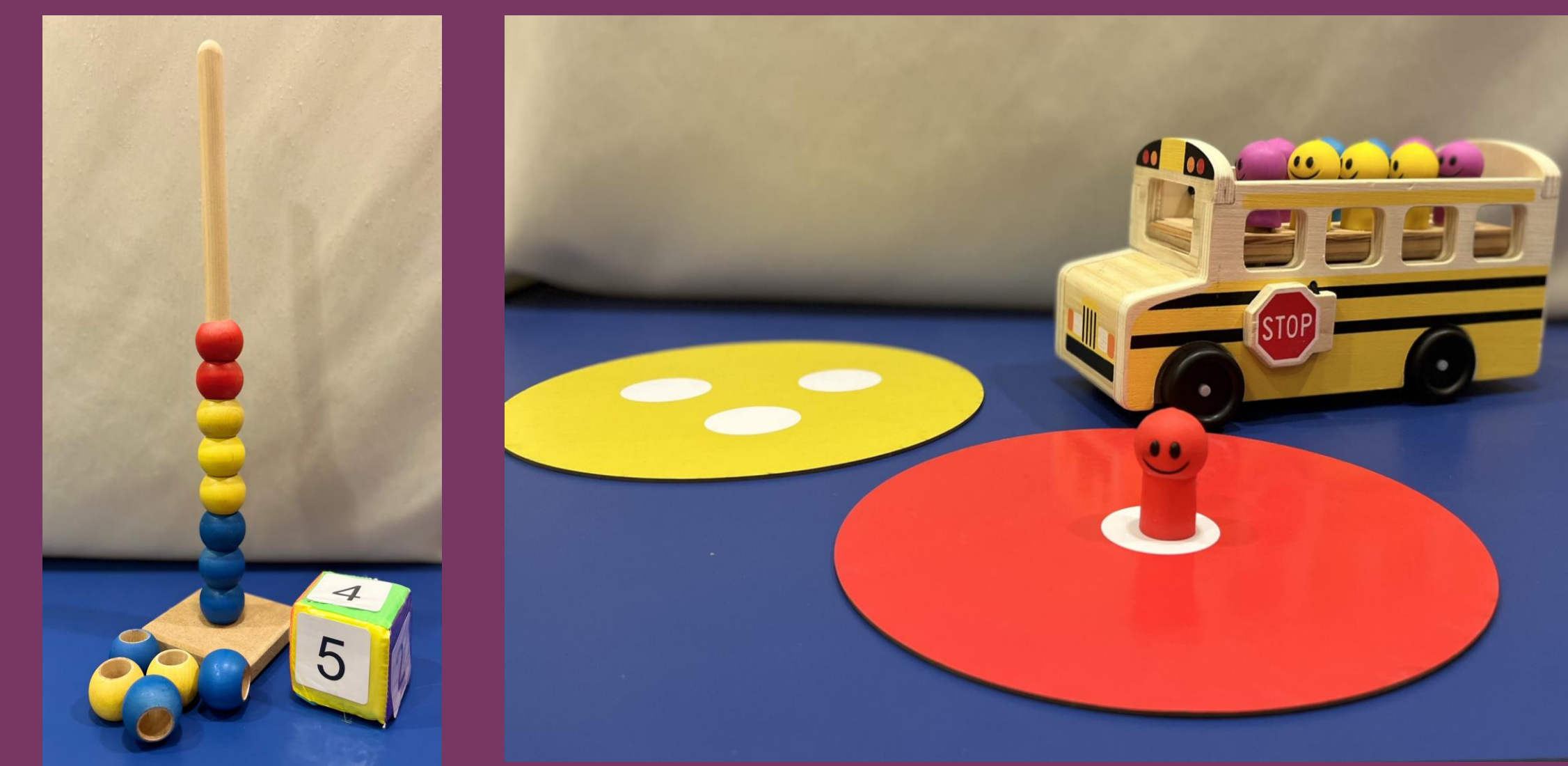
- **Guided Play Beliefs survey** (measure created for the study) to assess teachers' preexisting beliefs about play as a pedagogical tool.
- Knowledge of Mathematical Development and Beliefs Survey (KMD)
- Math Teaching Efficacy Beliefs Instrument
- Math Anxiety Scale for Teachers (MAST)
- Single Item Math Teaching Anxiety

### Qualitative analysis:

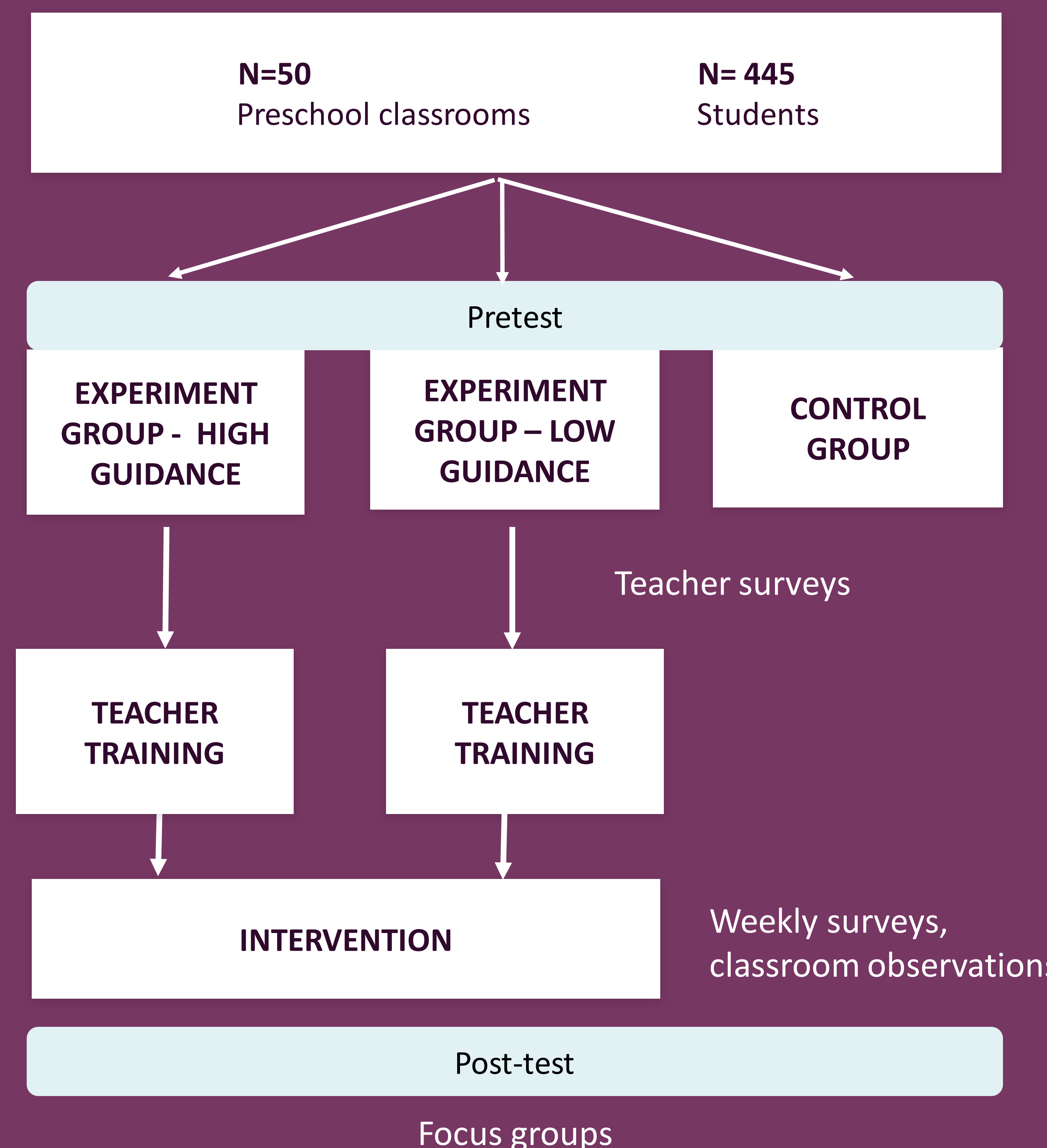
- **Focus groups** to gain a deeper understanding of teachers' experiences in implementing the intervention, specifically for different demographic groups.
- **5-minute weekly surveys and classroom observations** designed to measure the quality of instructional methods, how participants engaged with the intervention, the presence of crucial unique intervention features.

## Disclaimer

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## Methods



## Results

The intervention groups **did not** improve relative to controls between pre- to post-test. Qualitative data from the teachers help explain why there was no intervention effect:

1. Math was removed from games in most observations.



The math-focused interactions were brief and rarely sustained as teachers had to attend to other children.

2. Teachers believed that the games were too easy, Baseline (and posttest) data show that, on average, students still had room to grow.

Measure	Ceiling	Pretest		Posttest	
		Mean	SD	Mean	SD
Highest Count	30	13.5	12.0	18.4	15.1
WHX%	1.00	0.8	0.2	0.8	0.1
WHX level	7	4	3.0	5.5	3.5
Magnitude Comparison	10	7.1	2.2	7.6	2.2
PENS%	100	55.2	21.1	63.2	19.6
PENS level	25	11.3	6.6	14.8	7.1
Give-N level	7	4.6	2.6	5.6	2.3

3. "Boys were more interested than girls."

Focus groups revealed teachers' beliefs about gender.

"[Boys] seemed more interested, not that the girls were not interested, but the boys seemed more engaged and more interested in the [games]." However, observations revealed that the effects of gender were complicated by self-segregation by children.

4. Challenges with fidelity of implementation

We saw mixed results on fidelity

- Many teachers did not achieve the 30 minute/week target, but all achieved 15-30 minutes/week
- Teachers tried out all games (except Give-N)
- High response rate on weekly surveys
- Teachers did not differentiate high vs low guidance conditions - Assigned condition may have interacted/conflicted with preferred style.

## Future Directions

- Using undergraduate volunteers as implementors of the intervention, who can devote time to scaffold numeracy that teachers can't.
- Undergraduates may implement our specific guided play strategies with more fidelity.

## References

- 1 Duncan et al. (2007). School Readiness and later achievement
- 2 Piasta et al. (2014). Mathematics and Science Learning Opportunities in Preschool Classrooms.
- 3 Fisher, K., Hirsh-Pasek, K., Newcombe, N., & Golinkoff, R. (2013) Taking Shape: Supporting Preschoolers' Acquisition of Geometric Knowledge Through Guided Play