

Preschoolers' opportunities to learn numeracy and patterning at school

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Introduction

- Previous research indicates that some numeracy and patterning skills are unique predictors of preschoolers' later math achievement (e.g., Fyfe et al., 2019).
- However, little is known about how often preschool teachers provide instruction about specific numeracy concepts relative to specific patterning concepts (e.g. Rudd et al., 2008).
- Additionally, previous research indicates that instructional materials play an important role in children's learning (National Research Council et al., 2001).

Questions

- How frequently do preschool teachers provide instruction on specific numeracy and patterning concepts in their classroom?
- How often do preschool teachers provide instruction on advanced compared to foundational math concepts?
- What are the sources of the materials that teachers use for numeracy and patterning instruction?

Participants

- Participants were 44 pre-K teachers from five public (n = 24) and seven private (n = 20) schools.
- Across schools, teachers varied in experience level with 11 years as average number of years spent teaching pre-k ($SD = 8.50$), and 2.4 years as average number of years teaching other grades ($SD = 5.04$).

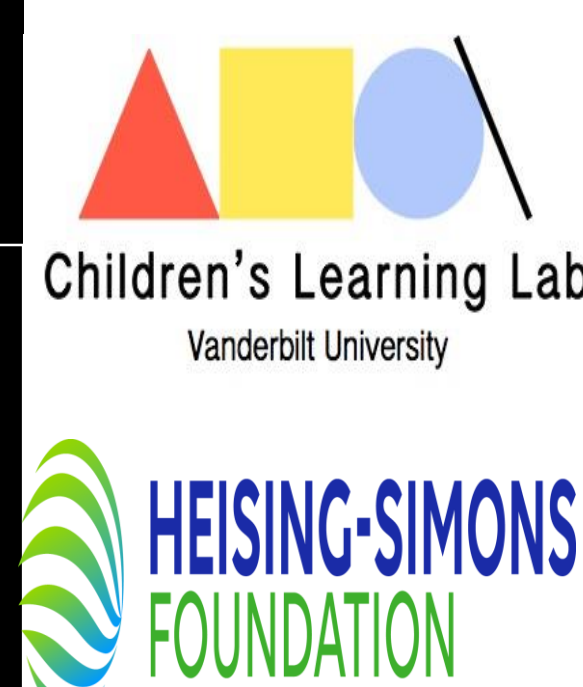
Method

- Teachers were asked to report on their numeracy and patterning instruction via a 17-item survey.
- Reported number of school days in the past month that they provided instruction or activities in their classroom on each item. The scale was from 0-20 days.
- Six items were on patterning and nine items were on numeracy (see Table 1). Two items about shape are not discussed.
- Teachers were asked to report where they obtained materials for their classroom (see Figure 2 for breakdown).

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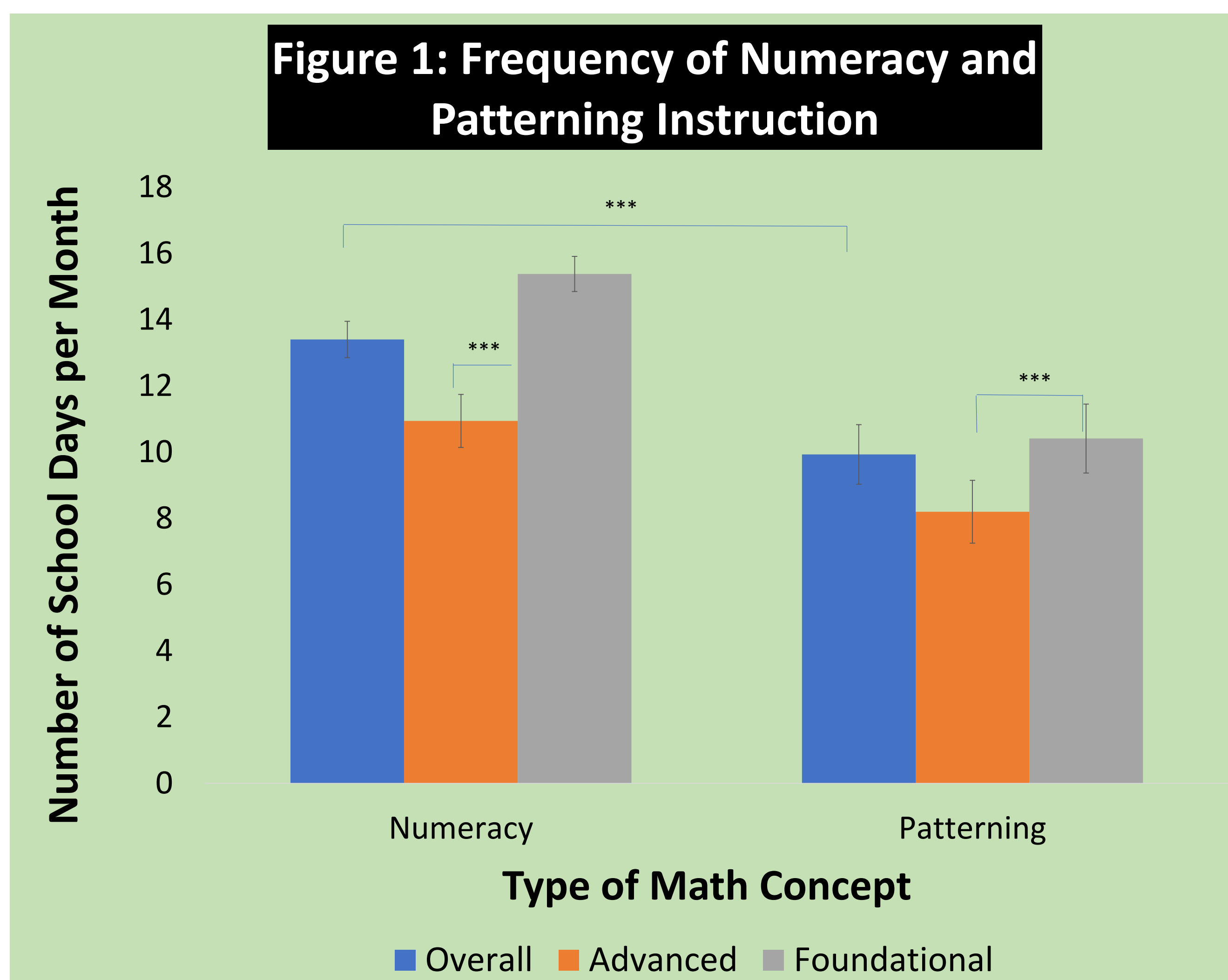


Results

Table 1: Frequency of Numeracy and Patterning Instruction

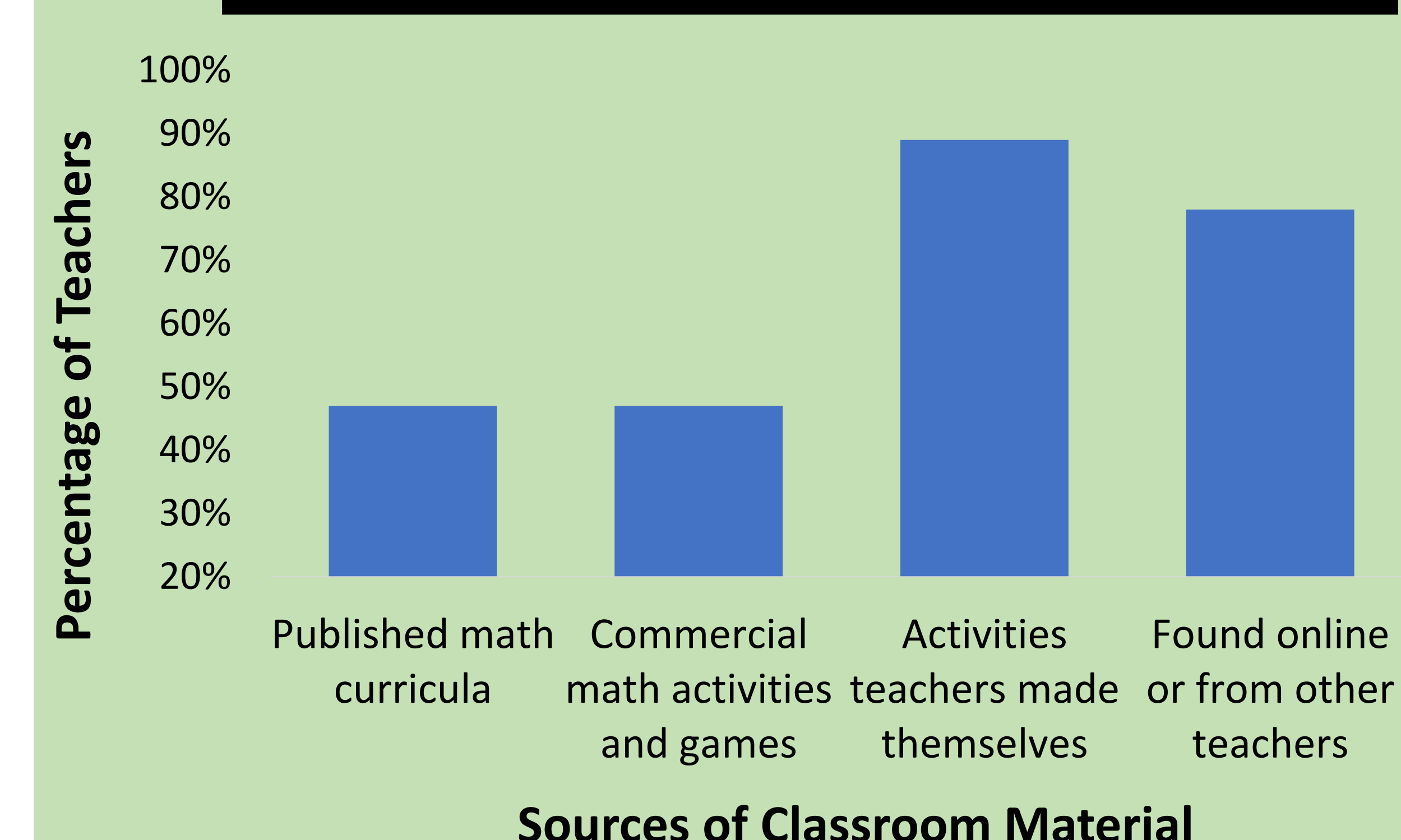
Math Concept	M (SD)
<u>Numeracy</u>	
Advanced	10.80(5.34)
Compare quantities	12.93(6.34)
Add simple sums or talk about number facts without objects	8.21(8.44)
Simple adding & subtracting with objects	11.97(6.99)
Count backward	10.07(7.82)
Foundational	15.38(3.51)
Count items	19.39(1.90)
Count out loud above 10	17.16(5.39)
Match number names to appropriate set of objects	13.70(7.12)
Talk about what number comes before or after another	13.42(7.42)
Name written numerals	12.74(7.72)
<u>Patterning</u>	
Advanced	8.20(6.37)
Describe patterns in words	9.36(7.34)
Copy a pattern with different materials	6.79(7.54)
Identify the part that repeats in patterns	8.46(7.58)
Foundational	10.41(7.01)
Figure out what comes next in pattern	10.02(7.11)
Make or copy pattern with objects or sounds	10.80(7.63)

Notes. One patterning item ("Discuss patterns in days of week, months in year, or seasons"; $M = 15.18$, $SD = 7.38$) could not be classified as advanced versus foundational.



Results

Figure 2: Sources of Materials used by Teachers in Math Instruction



Results and Discussion

- Results indicate that patterning is a focus of preschool math instruction, although less than numeracy, suggesting that teachers consider both patterning and numeracy to be important parts of preschool education.
- The numeracy and patterning concepts teachers taught most often were object counting and identifying patterns, while the least frequent were arithmetic and abstracting patterns (see Table 1).
- Teachers primarily taught foundational compared to advanced math concepts (see Figure 1). This converges with previous findings that there is a mismatch between math content coverage and preschoolers' existing math knowledge (Engel et al., 2016) suggesting that teachers may benefit from guidance on tailoring instruction to the developmental progression of children's math proficiency (Clements & Sarama, 2008).
- Results also indicate that teachers primarily used activities they made themselves or sourced online or from other teachers in their math instruction (see Figure 2). This suggests that there is a need for teacher-friendly, research-based instructional materials (Clements & Sarama, 2008; National Research Council et al., 2001).

References

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