

Study Protocol and Statistical Analysis Plan

The Effect of Phonotactic Probability and Orthography on Vocabulary Learning

NCT 06935851

May 4, 2026

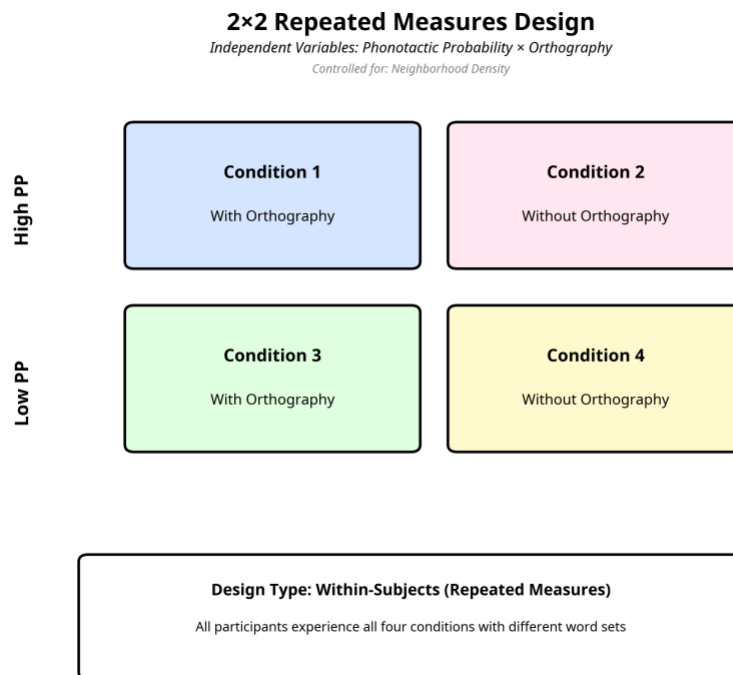
## Purpose

The purpose of this study was to determine whether phonotactic probability (PP) or the presence of orthography had an effect on children's vocabulary learning as measured by comprehension, recognition, production, and spelling.

## Design

This study employs a 2 x 2 within-subjects factorial design where every participant serves as their own control. The independent variables are phonotactic probability (PP) (high, low) and orthography (present, not present). There are four conditions: (1) high PP/with orthography; (2) high PP/no orthography; (3) Low PP/ with orthography; (4) low PP/no orthography.

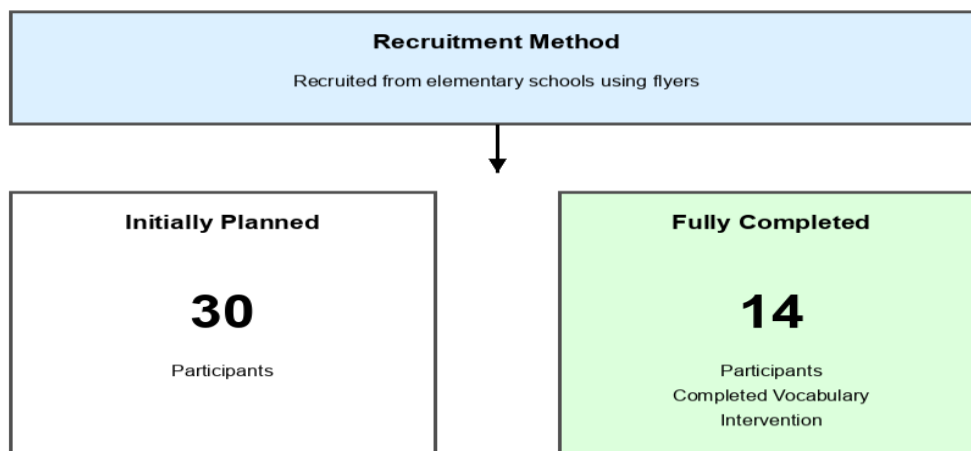
Figure 1.



## Participants

Participants were third-grade students recruited from elementary schools in Phoenix, Arizona.

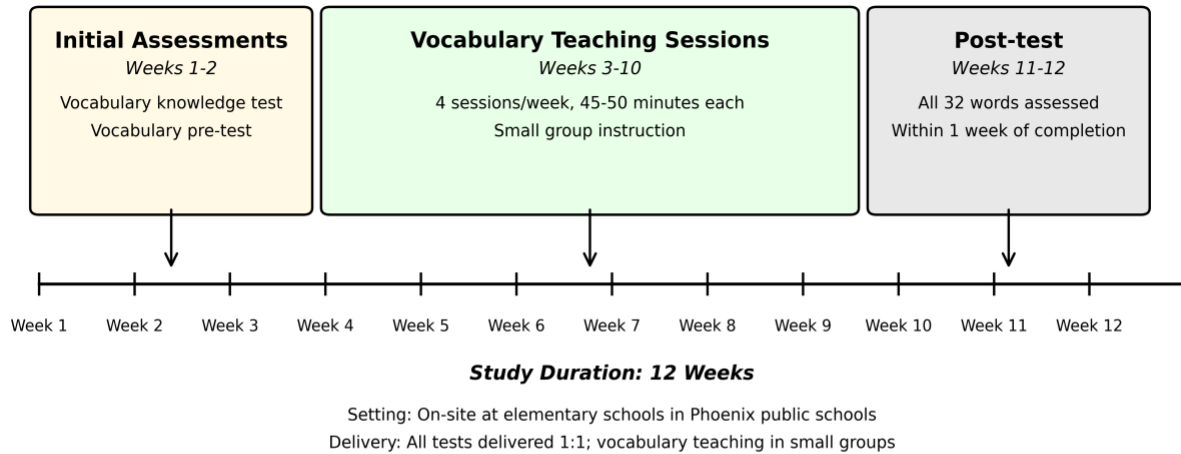
Figure 2.



## Procedures

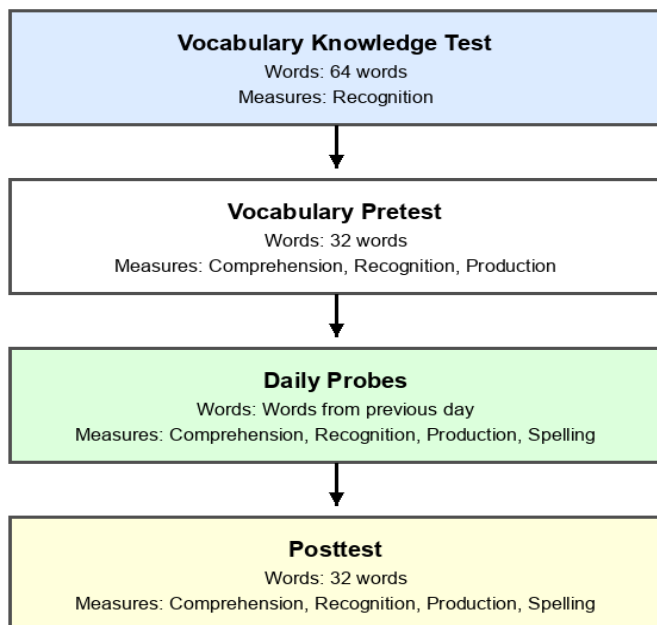
The study was conducted over 12 weeks and included three phases: pretesting, intervention, and posttesting. Vocabulary instruction occurred four times per week for eight weeks in small groups. Sessions followed a structured six-step instructional framework.

Figure 3.



## Outcome Measures

Primary outcomes included vocabulary comprehension, recognition, production, and spelling. These were assessed at baseline, during daily probes, and post-intervention.



## Statistical Analyses

Descriptive statistics were used to summarize performance. Due to the small sample size, inferential statistical analyses were limited.

The planned analysis included a within-subjects repeated-measures ANOVA comparing pretest and posttest performance. As assumptions of normality were not met, nonparametric analyses were conducted. A Friedman test was used to assess within-subject differences across conditions, with posttest performance serving as the primary outcome measure of learning. When significant, post hoc pairwise comparisons were performed using Wilcoxon signed-rank tests with appropriate adjustment for multiple comparisons.

In addition, to capture learning over the intervention days, we calculated **learning slopes**.

## Ethics

The study was approved by the Arizona State University Institutional Review Board. Informed consent was obtained from parents prior to participation.