Embedded Pictograph Mnemonics and the Science of Reading

Orthographic Mapping Theory

In order to learn to read and write, all students must first learn the names, sounds, and formations for the 26 lower and upper case alphabet letters, and form associations between the shapes and sounds. This lower level knowledge is foundational to the development of automatic word reading (Ehri & Roberts, 2006). Acquiring this knowledge is challenging for regular education students and especially so for English Learners (Roberts, Vadasy & Sanders, 2018). Yet beginning alphabet learning has long been considered a low level skill that preschool age children accomplish easily, informally and naturally.

Conventions in Teaching the ABCs

Pervasive constructivist-based beliefs in the necessity of teaching alphabet knowledge in meaningful language contexts such as stories, poems, and/or children's names have driven the conventions and methods incorporated in preschool curriculums and supplemental handwriting programs. These beliefs are also evident in early childhood standards and pre-K assessments. As a result, most children generally do not learn more than a handful or two of letter names at preschool.

Emerging Evidence: Letter Learning Instruction

Until recently, few high quality design research studies had investigated the key instructional elements involved in letter learning (e.g., letter order, teaching names versus sounds first, teaching letters in various contexts, associating images with letters, or the rate of instruction); provided conceptual frameworks for the procedures studied; or, investigated potentially demotivating effects of instruction despite widespread aversion to the idea of making preschool instruction overly "academic".

In an academic paper (Roberts, 2021) published in one of two Reading Research Quarterly special issues on the Science of Reading in 2020/21, Dr. Theresa Roberts summarized the findings from four Randomized Control Trial studies published between 2017–2020 and co-authored with Dr. Patricia Vadasy, Dr. Elizabeth Sanders, Dr. Carol Sadler.

The experiments were all highly controlled, 10–12 week long implementations conducted with preschool age children selected for having very little prior alphabet knowledge, with instruction delivered by graduate assistants.

Key Research Questions

1. Which alphabet content optimizes learning (names, sounds, both)?
2. Is teaching letter names before sounds, or vice versa, advantageous?
3. Which Cognitive Learning Processes (CLPs) optimize learning?
   - Paired Associated Learning (PAL)
   - Articulation Referencing
   - Orthographic Learning (forming letters)
4. Is teaching letters in the context of meaningful language advantageous?
5. Can direct alphabet instruction be demotivating?

Research Results

Results of the four studies contradicted the widely held belief that letter learning has to be taught in the context of language. Explicit, letter-focused PAL instruction (with ample opportunities for practice and memory retrieval activities) produced superior outcomes to the other approaches tested—and with no evidence of demotivation.

Implications for Practice

The researchers did not determine a single clear, simple answer as to the best content approach but they did report that learning letter sounds (LS) was not dependent on first learning the letter names (LN). The authors were surprised to find that children could learn the LS and LN together in the same lessons. They found no effect teaching LN before LS (or vice versa) but teaching LS first produced greater letter sound learning for the groups receiving the most PAL instruction and practice.

Key Research Findings

- No difference in LN learning between PAL and contextualized instruction
- PAL produced the most LS learning, transfer to PA, and engagement
- Instruction may best start with Letter Sounds (LS)
- Embedded Pictograph Mnemonics (EPM), rapid recall, practice made the biggest differences in letter learning
- EPM superior (2X) for teaching LS, blending, and identifying initial consonant phonemes (Roberts & Sadler, 2018)

Embedded Pictographs vs. Anchor Pictures

Alphabet materials typically display letters with pictures whose names begin with the letter's sound but whose shape is unrelated to the letter. Embedded pictograph mnemonics (Ehri, 2020) resemble the letter shapes. The name of each picture begins with the sound of the letter, and the pictured object helps secure the letter-sound association in memory.

The Sunform™ Alphabet System

EPM, explicit PAL instruction, and ample opportunities for review and practice are all key Sunform instructional elements consistent with this latest evidence. Daily 10–15 minute lessons are developmentally appropriate for preschoolers. EPM facilitates accurate lower case letter formation, which taught with LS has been shown to develop brain connections that support later reading (Golestanirad, Das, Schweizer, & Graham, 2015).

Conclusions

Practitioners, policy-makers, administrators and research funders need to consider alphabet learning from a science of reading perspective. Preschool age children are capable of learning far more LN/LS knowledge than the current Head Start Early Learning Outcomes 60 month indicators (18 capital letter names, 15 lower case letter names, and several letter sounds) which are currently reflected in curriculums and assessments. This newest evidence has profound implications for improving literacy outcomes for children living in poverty and English Learners.

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