

# The Science Behind the Square Panda™ Literacy System

According to the 2019 National Assessment of Educational Progress (NAEP), 65% of 4th graders performed below proficiency level in reading. The Square Panda™ Literacy System helps students across skillsets and populations connect letters and sounds to meaning in text.

## Neuroscience Literacy Principles

Studies show that students benefit most from explicit and systematic instruction that helps them:

- Become aware of the sound structure of syllables (phonology)
- Isolate the units (phonemes) within syllables
- Identify which letters go with which phonemes
- Blend letter sounds together into words
- Use multisensory cues during learning



The benefits multiply when these skills are taught early in students' reading development.

A key skill for learning to read is to understand and master the code that links visual letters with the speech sounds of language (phonemes). This understanding poses a challenge to the developing brain because there is no natural correspondence between the sounds of the spoken parts within a syllable (phonemes) and the arbitrary units of print.

To become proficient readers, students must reimagine spoken language as elemental phonemes and combine those phonemes with their corresponding letters to form words. Students' brain networks for seeing shapes and hearing speech must be profoundly reorganized. (Schlagger & McCandliss, 2009).

New functional connections between visual and language networks need to be formed within the constraints of neural networks that have naturally developed for seeing shapes and hearing words (Dehaene, & Cohen, 2007).

Square Panda is a student-centered tool for enhancing early literacy skills among beginning readers and readers who need additional support in grades PreK-3.



## Research Findings



### **Phonics and phonological awareness are the most crucial elements of literacy instruction.**

Systematic phonics instruction is much more effective in grades PreK-1 than in later grades and leads to higher achievement in reading, spelling, word recognition, and comprehension (National Reading Panel, 2000).

### **Multisensory perception supports optimal learning, especially for struggling students.**

Studies show that specialized brain regions integrate each letter with its speech sound and are especially active when a letter and its sound are presented in a multisensory fashion (Van Attevelde et al., 2004; Blau et al., 2009; Blau et al., 2010). For struggling students, multisensory cues may provide complementary perceptual information that helps overcome difficulties (Montessori, 1967; Birsh, 1999; Reid, 2013).

### **High-poverty students benefit the most.**

For low socioeconomic students, reading-related experiences—including degree of early print exposure, quality of early schooling, and home literacy environment—interact with phonological awareness to influence reading ability (Hecht et al., 2000; Noble, Farah, McCandliss, 2006; Bowey, 1995).

### **Second-language learners need additional reading support.**

Instruction covering key components of reading, including phonemic awareness and phonics, has a clear benefit for language-minority students (NICHD, 2000). Instructional adjustments for non-English speaking students should include work with phonemes and phoneme combinations that do not exist in their home languages (National Literacy Panel, 2006).

✓ The Square Panda Literacy System was developed to support core early reading skills, including phonological awareness, rhyming, blending, segmentation, letter-sound associations, decoding, and encoding, to be used early in the learning process. Focusing on multiple skill areas helps engage diverse students in grades PreK-3.

✓ The Square Panda playset turns tablets into phonics learning stations that leverage sight, sound, AND touch, providing extensive practice in combining letters and sounds along with a tactile component that may enhance memory and learning. A multisensory approach benefits all children as they progress through exploratory play, but is particularly helpful in advancing low performing students' foundational skills.

✓ The Square Panda Literacy System enriches both in-school and at-home learning environments by helping to solidify early reading foundations which have been shown to be critical to success in other academic endeavors.

✓ The Square Panda Literacy System can help English language learners by providing additional exposure to phonemic awareness and phonics in English.