

WONDERPAGES

READING AND MATH FOR AGES 4 TO 8

The Research Basis for WonderPages: A Home Reading and Math Program for Children Ages 4 to 8

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Jeremy Rodriguez, MBA. Founder, Verntro Labs, LLC

Gregory Sweeney, M.Ed. Curriculum advisor, WonderPages

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Abstract

WonderPages is an iPhone and iPad app that teaches reading and math to children aged 4 to 8 through a short daily session with a grown-up, designed to take about five minutes. It has 30 reading lessons teaching 82 letter-sound spellings in a fixed order, and 30 math lessons covering 59 skills, from counting to three-digit sums. This paper sets out the research behind its design in seven areas: systematic phonics taught with sound awareness, practice text matched to what was taught, repeated reading, a planned and sequenced math program, an adult working with the child, practice spread over days, and a calm design that sends no data to the developer. For each area it summarizes the evidence, describes what WonderPages does, and states what that means for a child and family. It also describes how the program fits children in foster care. WonderPages has not yet been tested in a study of children's outcomes. Its research-based design corresponds to the federal "demonstrates a rationale" evidence level, and a pilot and an independent study are the planned next steps.

1. Introduction

WonderPages is an iPhone and iPad app for teaching reading and math to children aged 4 to 8. It is built as a short daily session with a grown-up, designed to take about five minutes. It has 30 reading lessons teaching 82 letter-sound spellings in a fixed order, and 30 math lessons covering 59 skills, from counting to three-digit sums.

Families and agencies should choose a program for what it is built on. WonderPages is built on six things the research supports.

- **Systematic phonics, with sound awareness taught alongside letters.** A federal practice guide rates sound awareness linked to letters, and decoding, as Strong (Foorman et al., 2016).
- **Practice text matched to what was taught.** Decodable text raises children's use of decoding and brings early gains in accuracy (Cheatham & Allor, 2012; Mesmer, 2005).
- **Repeated reading.** Reading a passage more than once raised fluency and comprehension for students with and without learning disabilities (Therrien, 2004).
- **A planned, sequenced math program.** A federal guide for ages 3 to 6 rates teaching number and operations along a developmental progression as Moderate (Frye et al., 2013).
- **An adult working with the child.** Parents tutoring with specific literacy activities produced larger effects than parents listening to their child read (Sénéchal & Young, 2008).
- **Practice spread over days.** Performance during practice often misleads about lasting learning, and in a study of children aged 5 to 7, spaced lessons led to better generalization (Soderstrom & Bjork, 2015; Vlach & Sandhofer, 2012).

WonderPages turns that research into features a family can see. Its practice text is checked lesson by lesson by automated tests. The child is asked to try most reading before hearing Pip, the app's on-screen guide. The adult gets coaching at each reading step. Math is judged across separate days, so one good day can never pass a lesson. There are no ads and no accounts, and the app sends no data to the developer.

For a family, that means a short routine, a clear job for the grown-up and a clear next step for the child. For an agency, it means a structured program a caregiver can run at home, with no accounts to manage and no child's records sent to the developer.

The rest of this paper is organized as follows. Section 2 describes a session. Section 3 gives the research behind each part of the design. Section 4 summarizes that research in one table. Section 5 covers children in foster care. Section 6 states where the evidence on WonderPages itself stands and the research we plan. Section 7 concludes.

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2. Program overview

2.1 The reading session

A reading session has a set order: one or two new sounds, a warm-up on four sound tiles, printed words to *blend* (say each sound and run them together), sentences, and up to two *heart words* (common words taught before their spelling can be sounded out, or whose spelling breaks the rules). Lessons 1 to 4 open with one oral sound game. From Lesson 5, Pip reads a short story that the child then reads twice. The adult rates each read.

2.2 The math session

A math session has 11 to 13 question rounds, plus up to four for extra teaching, and the child answers directly.

2.3 The grown-up's role

In reading, WonderPages is designed to work through a grown-up: a grown-up judges each read, and the app does not listen to the child. In math the child answers directly, and the grown-up's part comes around the rounds (Section 3.5).

We advise families to choose a time of day at least an hour before bed, and to keep the session out of the bedroom.

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3. Research foundations and design

Each part of this section gives the evidence, the design that follows from it, and what it means for a child and family.

How to read the numbers. A meta-analysis combines many studies. An effect size (d or g) states the gap between two groups in standard deviations, a measure of how spread out scores are. For scale, +0.31 would move an average child from the 50th to about the 62nd percentile (calculated assuming normally distributed scores).

3.1 Systematic phonics, with sound awareness taught alongside letters

Evidence. *Phonics* is teaching how letters stand for sounds. *Phonemic awareness* is hearing and working with the separate sounds in spoken words. The National Reading Panel (2000) found mean effects of d = 0.56 when phonics began in kindergarten, 0.54 in first grade and 0.27 in second through sixth grade. Its published meta-analysis reported d = 0.41 across 66 comparisons, and effects persisted after teaching ended (Ehri, Nunes, Stahl & Willows, 2001). Reanalyses differ on the size of the effect, while the direction is well supported (Camilli et al., 2003; Stuebing et al., 2008). The panel's tables report positive effects for low-income samples and for at-risk kindergartners and first graders (National Reading Panel, 2000).

Teaching phonemic awareness raised reading across 52 studies and worked better with letters than without (Ehri, Nunes, Willows et al., 2001; Bus & van IJzendoorn, 1999). In an intervention study, gains in letter-sound knowledge and phoneme awareness fully accounted for later gains in word reading (Hulme et al., 2012). A federal practice guide for kindergarten through third grade rates sound awareness linked to letters, and decoding, as Strong (Foorman et al., 2016).

Design. WonderPages teaches 82 letter-sound spellings in a fixed order across 30 lessons. Each new sound is met alone with a key word. Each reading session then warms up on four sound tiles and moves straight to blending printed words, so sounds and letters are taught together. The child slides a finger under the letters and says the sounds. The slider is silent by default, so the voice doing the work is the child's.

What it means for the child and family. From the first lesson, a child sounds out real words like *sat* and *tap*, and new sounds go straight into printed words. A grown-up does not have to plan what comes next, because the sequence is already laid out. The grown-ups' area shows what is planned for today and why, and a map of every sound: learned, in progress and still to come.

3.2 Practice text checked against what was taught

Evidence. Decodable text uses only spellings a child has been taught. Research supports it as a way to bring phonics into reading. It raises children's use of decoding and brings immediate gains, mainly in accuracy (Cheatham & Allor, 2012). After the same phonics teaching, first graders reading highly decodable text applied their letter-sound knowledge more and read more accurately than those reading less decodable text (Mesmer, 2005). A federal guide names reading decodable words in text as a step under its Strong-rated decoding recommendation (Foorman et al., 2016).

Design. Automated tests in the app's code check, lesson by lesson, that all 539 blending words use only spellings taught through that lesson. The same tests

check every word of its 102 sentences, 99 stories, 21 books and printed answer choices: each must be decodable at that lesson, a known heart word, or a familiar word such as a story character's name. A change that breaks this rule fails those tests. A word the rules cannot handle, such as "biscuit", stays out of practice.

Families can add their own words, such as a pet or a favorite food. When one uses spellings taught so far, it can join blending practice.

What it means for the child and family. When a child reads in WonderPages, the words on the screen are built from what the lessons have reached. We expect that to give a child a fair chance to use what was just taught. A grown-up can sit down knowing the words in front of the child were matched to that lesson and tested against it.

3.3 Repeated reading and heart words

Evidence. Reading a passage more than once raised fluency and comprehension for students with and without learning disabilities (Therrien, 2004). A listening preview or a fluent model helped students with reading or learning disabilities (Lee & Yoon, 2017; Stevens et al., 2017). A federal guide names teaching high-frequency words, regular and irregular, among the steps under its decoding recommendation (Foorman et al., 2016).

Design. From Lesson 5, each reading session includes a short story. Pip reads it first as a fluent model. The child then reads it twice, and the adult rates each read. Heart words are taught directly, at most two a session, with the irregular letters colored.

What it means for the child and family. A child hears a story read fluently, then practices the same words twice with a grown-up alongside. Common words that cannot yet be sounded out are named and taught, so a child is not left to guess at them.

3.4 A planned, sequenced early math program

Evidence. In six long-term datasets, math skills at school entry predicted later achievement, with greater predictive power than reading or attention (Duncan et al., 2007). A *learning trajectory* teaches skills in the order children's thinking develops. In a trial by its developers with 1,375 preschoolers, the Building Blocks curriculum, built on learning trajectories and taught by trained teachers, showed g = 0.72 (Clements et al., 2011). Among 291 kindergartners taught one-on-one, teaching one level above a child's thinking beat teaching three levels above (Clements et al., 2021). A federal guide for ages 3 to 6 rates number and operations along a developmental progression as Moderate (Frye et al., 2013).

Design. WonderPages moves through 59 skills in a fixed sequence across 30 lessons, covering counting, place value, adding, subtracting, clocks, money and graphs. Automated tests check that generated questions stay within what has been taught by that lesson.

A child's math lesson never moves back on its own. A skill shaky on three of its last four days gets extra teaching until two steady days in a row, and the grown-up gets a specific note. These rules and thresholds are design choices.

What it means for the child and family. A child meets each new skill after the skills it builds on. A child who wobbles on a skill gets more teaching on it, and a grown-up learns which skill it was, without a child ever being moved backward by the app.

3.5 An adult working with the child

Evidence. A review of GraphoGame, a much-studied phonics game, found an average effect on word reading of g = −0.02 across 19 studies, while studies with high adult interaction averaged g = 0.48 (McTigue et al., 2020). The authors frame this as a finding for classroom use, and it compares groups of studies rather than testing an adult's role directly. Its lesson for design is plain: build the adult in.

In 16 studies with 1,340 families, parents tutoring with specific literacy activities produced larger effects than parents listening to their child read (Sénéchal & Young, 2008). In math, a trial of 587 first graders found that short story problems in an iPad app, shared with parents, raised math across the year compared with a reading control, especially where parents were anxious about math (Berkowitz et al., 2015). An eight-month text-message program for parents raised child early literacy by about 0.11 standard deviations (York et al., 2019).

Design. In reading, WonderPages gives the adult a specific job.

- **The child tries before help.** On blending words, sentences and heart words, the screen puts the rating first and keeps Pip's help one tap away, so the design asks the child to try before hearing Pip. Stories are the exception, because Pip reads first as the model.
- **Coaching at each step.** Above each reading step the adult sees one line written for that lesson and screen, with the reason a tap away.
- **The adult's tap is the record.** After each read the adult taps Smooth, Some help or Tricky. "Smooth" means the child read it before hearing Pip.
- **Praise that stays true.** "You said every sound!" requires the finger to have passed through every sound, and no cheer follows a Tricky. Children should not be told untrue things.

Math is designed differently, because the child answers directly. Spoken story problems appear in Lessons 9 to 16, in half the rounds of the adding and subtracting blocks, with Pip saying the problem. The grown-up's part comes around the rounds: one tip per lesson in the grown-ups' area, and a note when a skill gets shaky.

What it means for the child and family. The child gets to read before being told. The grown-up has one clear thing to do at each reading step, and a reason for it a tap away.

3.6 Practice spread over days

Evidence. Performance during practice often misleads about lasting learning (Soderstrom & Bjork, 2015). Children aged 5 to 7 generalized better from spaced science lessons, in a study of 36 (Vlach & Sandhofer, 2012). A review of 317 experiments on verbal recall found that the ideal gap between practice sessions grows with the time until the test (Cepeda et al., 2006). In a small classroom study, Year 1 children taught phonics in three 2-minute sessions a day improved more over two weeks than those taught in one 6-minute session (Seabrook et al., 2005).

Design. Each new math skill needs at least four rounds at 75% or better, on at least two separate days, the latest steady, so one day can never pass a lesson. In reading, heart words return for review on a set schedule, at 0, 1, 2, 4 and 7 days. Sessions are designed to take about five minutes, so practice comes in short, regular sittings.

What it means for the child and family. A child's math progress is judged across days, not by one good evening. A passed math lesson reflects more than one day of practice.

3.7 A calm design, with no data sent to the developer

Evidence. Apps can teach early skills. Across 36 studies of apps for preschool to Grade 3, the mean effect was +0.31 standard deviations, larger for preschool, researcher-built tests and narrow skills (Kim et al., 2021). Design matters. In an analysis of 124 apps, quality was low throughout and lower in free apps because of distracting features (Meyer et al., 2021). Interactive extras in story apps distracted children, most of all disadvantaged children (Takacs et al., 2015).

The American Academy of Pediatrics' 2026 statement moves beyond screen limits toward content quality and design. It says certain educational apps may promote STEM and language, with effects strengthened by joint engagement

with a caregiver. It advises avoiding screens in the hour before bedtime and keeping devices out of bedrooms (Munzer et al., 2026).

Design. WonderPages has no ads and nothing to buy on the child's side. It has no accounts, streaks or lives, and a child cannot lose progress in play. Optional games, such as Star Hop, a board game played on a path from 1 to 10, sit outside the daily session. A Pal avatar and end-of-session celebrations sit outside the story text.

The app's own source contains no network code. Family records move only through Apple's iCloud sync, and purchases go through Apple, so those records stay on the family's devices and private iCloud, out of the developer's reach. Apple separately gives developers information such as purchase and download counts, none of which shows what a child did or learned. WonderPages supports large text sizes, Reduce Motion and VoiceOver.

What it means for the child and family. The design is meant to keep a child's attention on the words and the numbers. What a child does in the app stays with the family.

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4. Summary of design choices and research support

Research on these methods, in other programs, supports each of the choices below.

Design choice	Research support	What it does for the child
Systematic phonics in 30 fixed lessons	National Reading Panel, 2000; Ehri, Nunes, Stahl & Willows, 2001; Foorman et al., 2016	Teaches letter sounds in a planned order and puts them to use in printed words right away

Design choice	Research support	What it does for the child
Sound awareness taught with letters	Ehri, Nunes, Willows et al., 2001; Bus & van IJzendoorn, 1999; Hulme et al., 2012; Foorman et al., 2016	Links what a child hears to the letters on the screen
Practice text limited to taught spellings	Cheatham & Allor, 2012; Mesmer, 2005; Foorman et al., 2016	Gives the child text to decode with what was just taught
Repeated reading after a fluent model	Therrien, 2004; Lee & Yoon, 2017; Stevens et al., 2017	Gives repeated practice on the same story after hearing it read fluently
Math along a planned sequence	Clements et al., 2011; Clements et al., 2021; Frye et al., 2013	Builds each new skill on the ones before it
An adult working with the child in reading	McTigue et al., 2020; Sénéchal & Young, 2008	Puts a grown-up beside the child with a specific role
Practice spread across days	Soderstrom & Bjork, 2015; Vlach & Sandhofer, 2012; Cepeda et al., 2006	Judges math across days, not one good session
Practice delivered by an app	Kim et al., 2021	Offers short, structured practice on a phone or tablet

5. Children in foster care

Our goal is free access for every child in care ages 4 to 8, and we will work with agencies across the United States to reach it. We are seeking agency partners to begin that work.

Evidence. The need is documented. Around kindergarten entry, 63 children in foster care averaged between the 30th and 40th percentile in prereading (Pears et al., 2011). Among over 11,000 second graders in one urban district, children with a history of out-of-home placement were at higher risk of poor literacy and

science achievement after controlling for demographics and birth risks. Maltreatment and homelessness significantly mediated (helped explain) that link, so placement itself should not be read as the cause (Fantuzzo & Perlman, 2007).

Research also points to what is worth offering. Foster parents delivering structured tutoring to 77 children aged 6 to 13 produced significant gains in sentence comprehension (g = 0.38) and math computation (g = 0.46), though not in word reading or spelling (Flynn et al., 2012). A short, in-person summer program for 192 children in foster care before kindergarten raised early literacy and self-regulation right after the program (Pears et al., 2013). Giving books alone had no effect, and the authors suggest carers need support and direct involvement (Mooney et al., 2016). These were in-person programs, not apps, and they point to structure and an involved caregiver.

Design. WonderPages is closer to caregiver-led tutoring than to book gifting: structured lessons, a specific job for the grown-up, and coaching at each reading step. It runs on an iPhone or iPad with iOS 17 or later. Teaching and audio work offline once installed, though syncing needs iCloud, and a grown-up can delete a child's data from Settings.

Children in care move, and we are building for that. A feature that moves a child's learning progress to a new home, using a locked file with no server, is built and in testing and is coming with release. It is not yet available to families.

What it means for the child and family. A caregiver can choose the lesson a child starts at and follow the same short routine, with a line of coaching at each reading step. Nothing about the child is sent to the developer. We expect structure and an involved caregiver to matter for children in care, and we want to test that with agencies.

6. Evidence status and research plan

WonderPages' research-based design corresponds to the federal "demonstrates a rationale" evidence level, which pairs a rationale based on high-quality research with ongoing efforts to examine a program's effects (20 U.S.C. § 7801(21); 34 C.F.R. § 77.1; U.S. Department of Education, 2023). WonderPages has not yet been tested in a study of children's outcomes, so the benefits we expect come from research on these methods, not yet from WonderPages itself. A study is the next step, and we are committed to it.

The research plan has three stages.

1. **Pilot.** A small group of consenting families, timing real sessions and comparing grown-ups' taps with an independent scorer's ratings.
2. **Independent study.** A randomized trial run by an independent evaluator, with trained testers and standardized reading and math tests, registered in advance and published whatever it shows.
3. **Children in care.** A later stage designed with an agency, with consent settled before anyone enrolled.

7. Conclusion

WonderPages is built on methods the research supports: systematic phonics taught with sound awareness, practice text matched to what was taught, repeated reading, a planned and sequenced math program, an adult working with the child, and practice spread over days. It turns them into a short daily routine with a clear job for the grown-up and a clear next step for the child, with no ads, no accounts and no data sent to the developer. The benefits we expect rest on research on these methods, and a pilot and an independent study are the next steps. Our goal is free access for every child in care ages 4 to 8, and we are seeking agency partners to begin that work.

Author note and disclosures

Jeremy Rodriguez, MBA, is the founder of Verntro Labs, LLC, which makes WonderPages and plans to sell it. Gregory Sweeney, M.Ed., is an unpaid advisor on the WonderPages curriculum. This paper has not been peer reviewed.

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