Mc Graw Hill Smarty Ants®

PROGRAM RESEARCH BASE

WHITE PAPER

Smarty Ants® is an Early Literacy Solution That's Backed by the Science of Reading

Expectation of Reading Success

Literacy is a strong form of currency in our society. It affords economic and social access, as well as personal satisfaction. Today's information-centered economy places rising literacy demands on students, many of whom are struggling to meet these demands. The National Assessment of Educational Progress (NAEP) estimates that two thirds of fourth graders are below the proficient level in reading tasks. Research by the National Institute of Child Health and Human Development (NICHD) indicates that approximately 20 percent of students encounter significant difficulties in learning to read. Reading disorders are the most common cause of underachievement and academic failure in the United States. According to the former Chief of the Child Development and Behavior Branch of NICHD, "The educational and public health consequences of this level of reading failure are dire" (Lyon, 2003).

Research has shown that the most effective way to address this problem is early intervention for all readers—in the areas of phonemic awareness, phonological awareness, phonics, vocabulary, high frequency words, fluency, and reading comprehension. The comprehensive Smarty Ants® program by Achieve3000® addresses all of these areas in its eighteen-level curriculum that includes learning letter names and letter sounds, word building, identifying rhyming words, word recognition, vocabulary building, story building and reading comprehension.

Smarty Ants targets the needs of struggling readers through its comprehensive curriculum based upon the findings of landmark reading intervention studies. Whether used as a preventive measure for at-risk students, as an intervention for students who have fallen behind their peers in reading development, or as a way of reinforcing strong reading skills, Smarty Ants offers students a successful path to literacy and its attendant rewards.

> **"The educational and public health consequences of this level of reading failure are dire."**
>
> **Dr. G. Reid Lyon**

Systematic, Spiraling Instruction

The landmark publication Preventing Reading Difficulties in Young Children (Snow, Burns, & Griffin, 1998) emphasizes that phonics activities and whole-language activities should be integrated in the literacy classroom in order to reach all students. From literacy research, we know that the most effective approach for addressing gaps in proficiency must focus on bolstering students' knowledge of these five components of reading: phonemic awareness, phonics, vocabulary, fluency, and reading comprehension.

Smarty Ants addresses these components in light of each student's "zone of proximal development"—the term coined by pioneering psychologist Lev Vygotsky (1978) and that refers to the space between those tasks a child can do by herself and those she may need help completing. In Smarty Ants, students begin with the simplest foundational skills and strategies (e.g., phonological awareness, letter names) and progress to more complex concepts (e.g., blending sounds to decode words, spelling conventions, affixes, multisyllabic words).

Later concepts are built on earlier ones, and students have many opportunities to use the knowledge they have accumulated. At its instructional core, the Smarty Ants program offers:

- ✓ Vocabulary words taught progressively by phoneme, syllable, and whole word
- ✓ Phonics reading stories that progress in complexity
- ✓ Orderly, cumulative, and explicit instruction through a personal "coach"
- ✓ Scaffolding and support for each new concept

The "Coach" carefully explains every concept and strategy, each one building on the next as many times as needed for successful progress through the levels. The lessons and games offer consistent feedback that encourages the student at his or her demonstrated level.

Smarty Ants tracks each student's progress and adapts the pace and learning support based on that student's needs. This ensures that the student succeeds every step of the way, which instills confidence and a joy for reading. For students with advanced reading skills or who quickly grasp new reading concepts, the program accelerates to keep these students engaged and challenged. For students who are struggling, the system slows the pace and increases the educational support and scaffolding.

This combination of foundational skills, cumulative instruction, and culminating activities ensures that Smarty Ants is a comprehensive program of systematic instruction.

> **ALPHABETIC PRINCIPLE**
>
> **"The two best predictors of early reading success are alphabet recognition and phonemic awareness."**
>
> ***Marilyn Jager Adams***

Knowing the names of the letters in the English alphabet and the sounds they represent are essential prerequisites for learning to read. Until names and sounds are associated with a series of abstract symbols, they have no meaning. Adams (1990) has stated that children who can recognize letters with accuracy and speed have an easier time learning about the sounds associated with letters.

Many young children can say the names of the letters of the alphabet. This is not the same as "knowing" the letters, though. For children to learn to read, they must also learn the printed forms of the letters, in and out of sequence, and the most common sounds associated with them.

According to leading reading researcher Joe Torgesen (2004), most struggling readers fall into two broad groups: those who have an underlying deficit in phonological processing and those who display weaknesses in both oral language development and the phonological skills necessary for effective reading.

Whereas students in the first group may have adequate oral language development, they are less sensitive to the sounds in language and have difficulty understanding the alphabetic principle: the fact that symbols in print can represent sounds in language.

In Smarty Ants, students begin with the simplest foundational skills and strategies to strengthen alphabet recognition and the alphabetic principle. Levels 1 and 2 of the program teach students the names of uppercase and lowercase letters, and the sounds those letters represent.

Students are taught the difference between vowels (shown in red) and consonants (shown in blue). Interactive Teaching Videos guide students in writing each letter. Students master the uppercase and lowercase letters by playing skill-building games. In a Learning Cloud, they "pump and pop" each phoneme sound into vowels and consonants. At the end of each level, they complete a downloadable alphabet book of uppercase letters and a book of lowercase letters. The books are then transformed into musical DVDs.

Phonemic Awareness

Phonemic awareness refers to the understanding that a word is made up of sounds. It includes the ability to manipulate sounds in spoken words. For phonics instruction to be effective, students must understand that words they may already know, such as sit and run, can be broken into smaller units and sounded out. Snow et al. (1998) assert that isolating sounds in particular words is an essential reading skill that is typically learned only in a classroom environment.

Smarty Ants provides students with systematic instruction in phonemic awareness. In skill-building games such as Four Square, students identify letters. Then they view the letters' relationship to a word, with each phoneme segmented aurally and visually. In visual blending, students see a word bubble that expands as the phoneme segments are blended gradually and finally pronounced as a word.

This technique corresponds to the popular "sound boxes" instructional strategy that emphasizes individual phonemes and then the blending of the sounds in words. Preliminary research has shown that the systematic use of phonemic segmentation has positive effects on developing phonemic awareness (McCarthy, 2008; Yeh & Connell, 2008).
Another way that phonemic awareness is explicitly taught in Smarty Ants is through the use of rhymes. Traditional rhyming games require an understanding of how to manipulate sounds in words and can be effective in teaching simple manipulation of phonemes. As they progress through each lesson, students learn the rime families for the lesson target words and build rhyming words as they play the skill-building games.

Phonics

Phonics is the relationship between sounds and their spellings. Phonics teaching involves conveying to a young reader how sounds relate to words in systematic ways. According to Anderson, Hiebert, Scott, and Wilkinson (1985), "English is an alphabetic language in which there are consistent, though not entirely predictable, relationships between letters and sounds. When children learn these relationships well, most of the words in their spoken language become accessible to them when they see them in print. When this happens, children are said to have 'broken the code.'"

Smarty Ants offers a comprehensive program of systematic phonics instruction. Through 114 lessons that span 18 reading levels, the program teaches the most important phonics skills needed for effective reading.

As students progress through the program, the phonics component continually reinforces and builds upon what they have learned about the alphabetic principle and about basic phonemic awareness. Through the skill-building activities, students are offered ample practice in relating sounds to spellings and thereby learning to decode words. If they play all the skill-building games within a lesson, students encounter decodable words multiple times. Teaching videos and "word bubbles" strengthen the sound- spelling cues that students are mastering in skill-building games such as Treadmill and Climbing Wall.

Once the phonics skills for a particular lesson are taught and mastered, students use what they have learned to build engaging and amusing decodable stories, which they can print out and read at home. In addition, over 470 learning songs throughout the program support instruction and facilitate memory of the letter-sound correspondences and other phonics skills.

Vocabulary Development

Important studies such as those by Hart and Risley (1995) conclude that early deficits in word knowledge become compounded over time, leaving children far behind their higher-achieving peers. In addition to this, Beck, McKeown, and Kucan (2002) assert that developing a robust vocabulary includes learning the most common words early on while also learning uncommon or academic words.

Smarty Ants significantly enriches students' vocabulary. Through skill-building games and activities, students are taught how to build and read approximately 2,800 words.

In Smarty Ants, when students master a word by identifying it correctly at least three times, they receive an award. The word is added to students' wall of mastered words in the Reward Room. When students visit the Reward Room, they can click on one or more words on the word wall to hear the words segmented and pronounced.

The completion of a phonics-based story is the culminating activity of each lesson. Each engaging, illustrated book contains the words introduced and mastered in the lesson. By the time students build the book, they have systematically explored each word "from the ground up"—beginning with mastery of the letter names (at the early levels) to the sound-spelling relationships within each word and then blending of the sounds to build the word. Words that may be unfamiliar to students have been defined. Visual clues reinforce the words' meanings. The vocabulary words are further strengthened by production of musical DVDs from the stories.

A large proportion of the words presented in the program are decodable, based on the sound-spelling relationships students have cumulatively mastered in the lessons. This strategic, scaffolded instruction— leading to production of contextual phonics-based books—helps develop and expand a robust vocabulary.

Through the Smarty Ants program, students experience a direct link between the skills they have mastered and actual reading.

Sight Words

"Sight words" are the most frequently used and repeated words in the English language. For example, any, find, once, these, and what are considered sight words. Several researchers, including Adams (1990), have determined that 100 words account for approximately 50% of the English words in print. According to Johns (1980), the following 13 words account for more than 25% of the words in print: *a, and, for, he, is, in, it, of, that, the, to, was, you.*

Mastering sight words is important for reading fluency. Many of these words do not follow the common sound-spelling relationships, though. They contain letters or letter groups that produce sounds that are inconsistent with the most common phonetic rules. For example, the word "gives" has a long vowel-silent e pairing, but the i retains its short vowel sound. Ehri (1992) points out that when students encounter an "irregular" sight word, they must pay attention to each letter and letter pattern in the word and associate them with the sounds they represent, just as they do when reading a "regular" word. Vocabulary in Smarty Ants includes many sight words that do not follow a pattern that students have yet learned in the curriculum or that lack a common pattern. These words are taught with explicit instruction throughout the program. Sound bubbles to alert students to unusual sounds in these sight words. Students see phoneme bubbles in which each letter or letter group is sounded out. For a word such as "gives," for example, when the i bubble jiggles, Coach says, "In this word, this letter makes the sound /i/."

Fluency

Reading fluency was formerly defined as smooth and expressive oral reading. This definition has been refined in the last few decades to include accurate and fast word recognition. Reports from Kuhn and Stahl (2000) and Rasinski and Hoffman (2003) tell us that reading fluency is an important predictor of reading comprehension skills in students.

Fluency consists of these three components: automaticity (automatic decoding), pacing, and prosody—that is, students who have appropriate reading fluency are able to read text at their level, at the correct speed, and with the correct emotion and intonation. Students who read with automaticity are able to devote more of their attention toward understanding what they are reading and less attention to the task of decoding, according to Chard, Vaughn, and Tyler (2002) and Rasinski (1989).

As students build stories in Smarty Ants, they hear short sentences or phrases spoken aloud. At the same time, they see images with encapsulated words on the Storybot or Dogtop computer. These words float around the screen or appear on the keys, out of correct order. Students click on the words to put them in correct order for each phrase and sentence called for.

This "chunking" of phrases moves students from word calling to reading with a natural pace and rhythm. As a student's ability to correctly select words increases, so too does the length of the phrase that is built. To keep pace with story building, a student is eased into reading and recognizing longer phrases and sentences, much like a fluency coach might support a student in the classroom.

Comprehension

When students develop automatic word recognition skills, they can then devote their attention to comprehension, or understanding what they read. This understanding comes about through a complex set of cognitive processes and through fluency with a variety of reading-related cognitive tasks. According to Snow et al. (1998), early steps in teaching reading comprehension include emphasis on the skills of recalling, sequencing, predicting, and summarizing.

In the Smarty Ants program, the Story Game Show is the main site for exploring and building these early reading comprehension skills. The Story Game Show is accessible to students after they complete a variety of skill-building games on the Learning Game Board. In Levels 1 and 2, the Story Game Show is a required activity in 6 of the lessons, and in Levels 3-11, it is required at the end of every 3-4 lessons. The Story Game Show is accessible to students after they complete a variety of learning games from the Activity Board.

First, students hear a story read aloud in the Story Game Show. While listening to the story, students view the text and illustrations on each page, which reinforces their understanding of the story. Then, in the format of a television game show, students are asked questions about the story. Metacognitive thinking strategies are modeled for students during the activity by the game show host and students' ant friends, who are fellow contestants, a strategy recommended by Harvey and Goudvis (2007).

Students have other opportunities in Smarty Ants to strengthen comprehension skills. In word-building activities, students see pictures of the objects that are represented by words they are building. This is particularly helpful for English Language Learners, according to Garcia (2009). "In order to make the content more comprehensible," Garcia writes, "teachers can use a variety of scaffolding techniques, [including] visual supports, such as objects, pictures, [and] video images…" As students build their personalized phonics-based books, the words and phrases in the story are accompanied by vivid and entertaining illustrations to reinforce comprehension.

Authentic Literary Experiences

In a classroom setting, learning to read must be meaningful for students. It must have real-life, authentic purposes in order for students to be motivated and engaged. Those purposes can include reading for entertainment or reading to learn how to make or do something. This is what is meant by "authentic literary experiences." By hearing and reading authentic literature in Smarty Ants—and responding to it in a variety of ways— students strengthen comprehension skills and other critical thinking skills. Through the Story Game Show, Smarty Ants offers authentic literary experiences of decodable texts and language-rich stories from leading children's book publisher Candlewick Press.

The story reader in the Story Game Show models fluent reading, enhances sensitivity to story structure, and guides students toward making predictions and inferences—all of which are important strategies that build reading comprehension, according to Perfetti, Landi, and Oakhill (2005).

The classic and award-winning books in the Story Game Show contain text that is decodable based on students' knowledge of sound-spelling relationships they have mastered in earlier lessons. The books also feature predictable and patterned text, in which the vocabulary is based on repeated text patterns, familiar concepts, rhymes, alliteration, or familiar sequences.

These authentic literary experiences help increase students' vocabularies and general knowledge. While students experience the joy of a character they can relate to, a clever turn of phrase, or a poignant story, they learn valuable comprehension strategies, develop a deeper vocabulary, and become sensitive to text structure and plot development. In this way, students are reinforcing skills they will use in reading outside of the classroom.

Meeting Individual Needs

The range of reading abilities in many classrooms is broad. Some students learn to read with relative ease; others struggle with reading for a variety of reasons. Meeting individual needs is one of the greatest challenges teachers face. According to Stahl (1997), "Part of teaching children with reading problems is convincing them that they can learn to read, despite their experience to the contrary."

Smarty Ants presents a unique opportunity to remediate early reading deficits through scaffolded, responsive instruction. The use of a computer program tailored to the specific learning needs of a student is an unobtrusive, nonjudgmental, and potentially high-impact way of providing individualized reading instruction. Dehaene (2009) has suggested that computer programs are an ideal platform for differentiated instruction because they are able to generate thousands of training situations that can adapt to each student.

From the start, the Smarty Ants program addresses individual needs in an interactive assessment at the Pool. This assures that students begin the program at their appropriate learning levels.

In Smarty Ants, students have a personal Coach who stays with them throughout all the activities, explicitly giving instruction and encouragement in an engaging way and corrective feedback in a kind, supportive way. The Coach carefully explains every concept and strategy, each building on the next as many times as needed for a student to successfully progress through the reading levels.

Students get multisensory support in the immersive Smarty Ants environment. For example, they get oral teaching, directions, and encouragement from their Coach. They get visual support through pictures and video images as they play a variety of learning games and build phonics- based books. Sounds, words, and texts are presented multiple times. The sense of touch is incorporated through the use of a computer mouse or tablet interface.

English Language Learners

According to the National Center for Education Statistics (2011), "the number of school-age children who spoke a language other than English at home rose from 4.7 to 11.2 million between 1980 and 2009." For students who speak and read English with difficulty, a short window of opportunity exists for early intervention during childhood to prevent later language and reading delays, according to Verhoeven (2011). The scaffolded, responsive, and engaging instruction of Smarty Ants can remediate difficulties that English language learners face when in the classroom for the first time. Education research consistently supports this type of instruction for English language learners, as noted by Gersten and Geva (2003) and Goldenberg (2008).

By offering individualized practice for English language learners, Smarty Ants accommodates a variety of learning styles in task-based and problem-solving activities. Instruction is adjusted to meet each student's needs at different language proficiency levels as they develop phonemic awareness, sound-symbol correspondence, word-recognition, and comprehension skills. The instructions have been translated into multiple languages including Spanish and Bhasa. Smarty Ants provides multisensory support, which enriches second-language learning. The program offers numerous learning opportunities and activities in which students can engage their visual, auditory, and tactile senses. All the Smarty Ants vocabulary words are presented with visual cues.

Computerized instruction has the advantage of providing English language learners with immediate feedback. The Smarty Ants program is student-centered and promotes student autonomy. Differentiated instruction means that students work at their own pace on lessons adapted to their performance and with continuous assessment. Scaffolding techniques include repetition of key points and frequent checks for understanding.

The program offers English language learners a nonthreatening environment in which to practice their skills. Students can correct errors on their own, without anxiety or embarrassment. Using Smarty Ants technology with English language learners is highly motivating because it makes learning engaging and fun.

The Learning Continuum

A strong program of early reading instruction such as Smarty Ants nurtures students through the learning process and provides them with skills for success. The program offers explicit, guided instruction appropriate to each student's developmental level, along with individualized monitoring and tracking.

The curriculum and instruction within Smarty Ants proceeds in an orderly, logical manner. At each level of learning, students have a sense of what they are doing, why they are doing it, and how they are progressing.

The goal of Smarty Ants is to help students learn the skills necessary to read for information and for enjoyment. According to Stahl (1992), "The purpose of phonics instruction is not that children learn to sound out words. The purpose is that they learn to recognize words quickly and automatically, so that they can turn their attention to comprehension of text."

As students progress through Smarty Ants, they receive systematic instruction in phonemic awareness, phonics, fluency, vocabulary, and reading comprehension. Each lesson is paced with one or more target skills. The program takes students from the earliest recognition of letters and letter sounds, to early inference in reading comprehension. This models suggestions in a report of the National Institute of Child Health and Human Development (2000): to target first the phonemes and phonics in a literacy- rich environment while introducing salient vocabulary and basic reading comprehension throughout the program. Smarty Ants provides the following progression of exposure and mastery:

Phonemic awareness

Instruction is contextualized in reading passages. The sequence is largely based on ease of learning and on the usefulness of the phonemes, as suggested by Nettles (2006). Sounds such as /m/, /s/, /h/ are taught before sounds such as /j/, /z/, /qu/. Vowels are taught in conjunction with CVC words with similar ending patterns and, because of their difficulty, are included in at least four lessons alongside other skills. Smarty Ants targets the full range of phonemic-awareness components, including isolation, identity, categorization, blending, and segmentation and substitution. Students learn to identify letters with the sounds they make in isolation and to blend and segment those sounds in words. Through activities such as Rhyme Time, they substitute phonemes to create new rhyming words.

Phonics

Smarty Ants teaches phonics in relationship to decodable stories created and read in each lesson. Components of the reading necessary for each story are learned both in isolation from and in conjunction with the text, with practice always keyed to the text. The general goal of phonics instruction is to teach students a strategy for determining unknown words in text. With this goal in mind, Smarty Ants focuses on having students read words and connected text, rather than having them learn rules or perform tasks that have little relationship to reading.

As Nettles (2006) has indicated, using rimes in early literacy instruction improves decoding accuracy. The Smarty Ants program builds on the importance of using rimes in the lessons.

Research has shown that highly decodable text should not be the only type of text used with young children (Cunningham & Cunningham, 2002). Smarty Ants also uses a combination of highly decodable texts and more difficult texts during the Story Game Show activity.

Vocabulary and Reading Comprehension

Smarty Ants incorporates sight word vocabulary and basic reading comprehension skills throughout the lessons. The first 25 words students learn compose about a third of all printed material; the first 100 about half of all printed material; and the first 300 about two thirds. When students have finished reading all the stories they create in the Smarty Ants program, they will have learned many of the sight words and commonly used words needed to read most printed texts.

In the Story Game Show activity, students practice answering questions that at first require recall and identification of story facts and that later focus on sequence and some aspects of characterization.

English as a Foreign Language

When young children learn English as a foreign language, they "crack the code" of the new language in much the same way they do when learning a first language—that is, by learning the sounds that compose words, by internalizing vocabulary and grammar, and by learning orthography so that they can read the language (Verhoeven, 2011).

Acquiring the basic concepts and skills of English literacy can be an especially daunting task for young students who may not have yet mastered reading in their primary language. Added to this are cultural differences that may affect students' ability to glean meaning from what they are learning (Snow et al., 1998). The fun and engaging activities in the Smarty Ants program motivate and inspire students and reduce self-consciousness and anxiety over the difficult task of learning a foreign language.

Through research-based, carefully selected modes of teaching, the Smarty Ants program promotes success in listening, speaking, reading, and writing English that meets the diverse needs of students learning English as a foreign language. Smarty Ants offers a variety of research-based methods for providing reading instruction for students who are learning English. The program targets the essential components of reading—phonemic awareness, phonics, vocabulary, fluency, and reading comprehension—through several types of learning games, teaching videos, and other motivational activities.

Students who are learning English as a foreign language may enter school with diverse cultural backgrounds and differing banks of prior knowledge of English, which presents special challenges for teachers who are developing a tiered classroom curriculum for these learners. Smarty Ants addresses these challenges by offering teachers a high-impact program tailored to the needs and abilities of individual students.

Research has shown that computer-based programs offer a highly effective means of encouraging success for students who are at various levels in the mastery of the English language (McGee & Ukrainetz, 2009). In Smarty Ants, students can control the pace of play and instruction in a friendly, non-threatening setting. Students can work individually, in pairs, or in small groups.

The activities in Smarty Ants follow a systematic, task-based approach to teaching English as a foreign language. The program guides students through each task, pre-teaches necessary components to promote success in the task, and adjusts instruction based on students' performance. When needed, students can take advantage of additional practice.

Pugh, Sandak, Frost, Moore, and Mencl (2006) define phonemic awareness as "the metalinguistic understanding that spoken words can be decomposed into phonological primitives, which in turn can be represented by alphabetic characters." As students move through Smarty Ants, they have several opportunities to learn sound-symbol relationships, for individual letter sounds, as well as sounds produced by digraphs, diphthongs, and blends.

Students also learn phonemic awareness in Smarty Ants through the use of rhymes—a technique supported by teachers of English language learners (Díaz-Rico & Weed, 2010). Because traditional rhyming games require an understanding of how to manipulate sounds in words, the rhyming activities in Smarty Ants help students learn to manipulate phonemes in the English language.

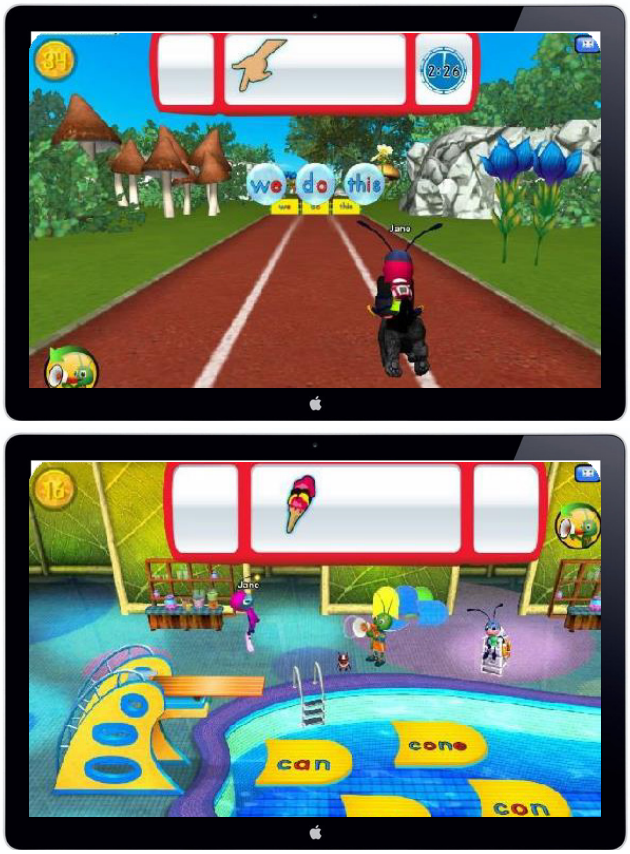
In Smarty Ants, students have multiple opportunities to strengthen phonemic awareness and phonics skills by hearing letter sounds, words, and sentences spoken or sung. Through interactive teaching videos, students hear and see English words segmented into individual phonemes. They learn to connect letters and letter combinations with the sounds of spoken words and written words. Through rhyming games, they hear words spoken aloud and learn to identify words that have the same middle and ending sounds.

According to Hart and Risley (1995), "Native English speakers typically know at least 5,000–7,000 English words before kindergarten—a huge vocabulary as anyone who has struggled to learn a second language knows." To keep pace with peers who may be native English speakers or otherwise fluent in English, students must acquire a similar number of English words.

To develop rich and authentic vocabularies, students learning English as a foreign language must learn word meanings in context. In addition to learning activities in Smarty Ants, students encounter illustrations; spoken sounds, words, and sentences; read-aloud stories; and phonics-based books that they create. These help students build a vocabulary of English words in context. In fact, Smarty Ants prepares students to develop a vocabulary of at least 2,500 English words through exposure to authentic contexts.

In the version of Smarty Ants developed for students learning English as a foreign language, students are introduced to new vocabulary words before the words are encountered in the learning games. First, a new word is introduced in the student's primary or home language. The word is accompanied by an illustration that reinforces its meaning. Next, the word is introduced in English. Students complete a puzzle activity to deepen their understanding of the word's meaning. Then the word is used in the context of a sentence. By pre-teaching vocabulary words in this way, Smarty Ants provides students with the necessary scaffolding for success as they build their English vocabulary.

After the introductory activity, students are directed to the Dog Park Race. In this learning game, students practice recognizing the new vocabulary words in English. Coach explains that he will say a word in students' primary language and the students will jump over the hurdle that shows the word in English. As students play the game, they reinforce their recognition of vocabulary words in English. Díaz-Rico and Weed (2010) affirm that this type of reinforcement is an important component of instruction for students learning English as a foreign language.



When students have demonstrated their ability to recognize the new English vocabulary words in the Dog Park Race or other modules, they are ready to play the remaining learning games in Smarty Ants. Students learning English as a foreign language need frequent assessment to track their progress. The Smarty Ants program has included this essential component of instruction. Twice during each lesson, students complete an assessment. Before students build each half of their phonics-based book, they are directed to the Pool to demonstrate mastery of the English vocabulary words in the lesson. The two assessments per lesson allow for students' progress to be closely monitored to ensure success in learning to recognize and read English words.

Multisensory Instruction

Multisensory instructional strategies provide students with more than one way to make connections and learn concepts, while engaging more than one sense at a time. Specifically, multisensory learning integrates visual, auditory, and kinesthetic-tactile learning activities. Shams and Seitz (2008) suggest that multisensory-learning approaches can be more effective than unisensory approaches because they better approximate natural settings. Multi-sensory strategies can be beneficial to all students, especially those with attention or learning disabilities, those who are struggling readers, students who are English language learners, and students with dyslexia. The specific definition of multisensory instruction, as outlined by the International Dyslexia Association states: "Multisensory learning involves the use of visual, auditory, and kinesthetic-tactile pathways simultaneously to enhance memory and learning of written language." (International Dyslexia Association, 2019). Many reading programs for struggling readers utilize multisensory teaching methods, including Orton Gillingham, Wilson Reading System, and Barton Reading Program. Studies from the National Institute of Child Health and Human Development have shown that, for children with difficulties in learning to read, a multisensory teaching method is the most effective teaching method. In Smarty Ants, students receive multisensory support in the areas of visual, auditory, and kinesthetic-tactile activities as they complete games and activities in the immersive environment. When paired with the activities in the Teacher's Guide, multisensory learning can extend beyond the program. The following examples illustrate the variety of multisensory activities available in Smarty Ants.

Visual Pathway

Students receive visual support through pictures and video images as they interact in the Smarty Ants world. Each of the learning games provides an immersive, visually appealing environment rich in activity, color, and characters. Teachers can provide additional visual activities through the use of the lesson resources. For example, teachers can print out the letter cards linked to the lesson and have students visually identify each letter and build words using those cards. This activity can be used in small groups, with pairs of students, or with individual students.

Auditory Pathway

Auditory activities in the program include background music and reinforcement cues as well as oral teaching, directions, and encouragement from Coach, their in-program guide. Throughout the program, sound, words, and texts are presented multiple times to keep students engaged. When a student logs in, their daily newspaper, *The Daily Woof*, is read aloud to the student, with each word highlighted as it is read. The same interactions occur with each of the books created at the end of each lesson. Letter sounds that are included in the specific lesson are also reinforced and are always available to students using the on-screen icons. The Teacher's Guide provides additional activities to reinforce auditory tasks, such as the phonics-based books and Read Aloud lessons. Teachers can have students read the books to each other in pairs or use the Read Aloud Lessons to foster discussion before, during and after reading. These discussions are great for activating prior knowledge, comprehending meaning and building understanding of the text.

Kinesthetic-Tactile Pathway

As students work through their personalized lessons in Smarty Ants, they will also encounter a number of activities that engage their kinesthetic-tactile skills. As students are learning to recognize their letters, students trace the shapes of letters with their mouse to mimic painting the letter. Teachers can print out the resource cards, asking students to paint, trace, or copy the letters just like they did in the program. The Dance Studio is a fun way to get students up on their feet and moving. Students can participate on their own or teachers can project the Dance Studio on the board to celebrate the completion of a lesson or the learning of a new letter, sound or word.

Instructional Resources for Multisensory Learning

- ✓ In addition to the immersive, online environment of Smarty Ants, teachers are encouraged to directly engage students with a wide-range of hands-on, multisensory activities such as:
- ✓ Construction Time! Students form upper- and lowercase letters using items such as pencils, craft sticks, pipe cleaners, beads, and construction paper strips.
- ✓ Chalk it up! Students draw upper- and lowercase letters on the sidewalk with sidewalk chalk.
- ✓ Hop to it! Students play hopscotch with upper- and lowercase letters and name the letter when landed on. This can also be done with sight words.
- ✓ Get Messy! Students draw upper- and lowercase letters with finger paint, in shaving cream, or in damp sand.
- ✓ Block it! Students use letter blocks to spell out -at/-an/-it/ words.
- ✓ Word Builder! Students use magnetic letters on a white board to build sight words.
- ✓ Connect to it! Students build sight words with Lego blocks with consonants and vowels.
- ✓ Shape up! Students form the shapes of the upper- and lowercase letters with items that begin with that letter's sound – use small rocks for "Rr", peas for "Pp", etc.
- ✓ T is for Toss! Students stick letters to a wall and toss a small ball or beanbag at each letter while naming them. This can also be done with sight words.
- ✓ Sounds Like... Students play a rhyming game with picture cards and have student identify the two pictures that rhyme.

References

Adams, M. J. (1990). Beginning to reading: Thinking and learning about print. Cambridge, MA: MIT Press.

Anderson, R. C., Hiebert, E. H., Scott, J. A. & Wilkinson, I. G. (1985). Becoming a nation of readers: The report of the Commission on Reading. The National Institute of Education. Washington, DC: U.S. Department of Education.

Beck, I. L., McKeown, M. G., & Kucan, L. (2002). Bringing words to life: Robust vocabulary instruction. New York: Guilford Press.

Chard, D. J., Vaughn, S., & Tyler, B. J. (2002). A synthesis of research on effective interventions for building reading fluency with elementary students with learning disabilities. Journal of Learning Disabilities, 35(5), 386– 407. doi:10.1177/00222194020350050 101

Cunningham, P., & Cunningham, J. (2002). What we know about how to teach phonics. In A. E. Farstrup & S. J. Samuels (Eds.),

What research has to say about reading instruction (3rd ed.) (pp. 87–109). Newark, DE: International Reading Association. Dehaene, S. (2009). Reading in the brain. New York: Viking.

Díaz-Rico, L. T. & Weed, K. Z. (2010). The crosscultural, language, and academic development handbook: A complete K-12 reference guide. Boston, MA: Allyn & Bacon.

Ehri, L. C. (1992). Reconceptualizing the development of sight word reading and its relationship to recoding. In L. Gough, Ehri, & R. Treiman (Eds.). Reading acquisition (pp. 107–144). Hillsdale, JN: Erlbaum.

Garcia, P. (2009). Connecting research about English language learners to practice: An introductory guide for educators. Retrieved from http://www.learningpt.org/pdfs/ConnectResearchPractice_ELL_IntroGuide.pdf

Gersten, R., & Geva, E. (2003). Teaching reading to English language learners. Educational Leadership, 60(7), 44– 49. Goldenberg, C. (2008). Teaching English language learners: What the research does—and does not—say. American Educator, 32(2), 8–23; 42– 43.

Hart, B., & Risley, R. T. (1995). Meaningful differences in the everyday experience of young American children. Baltimore, MD: Brookes Publishing.

Harvey, S., & Goudvis, A. (2007). Strategies that work (2nd ed.) Markham, Ontario: Pembrooke. Johns, J. L. (1980). First graders' concepts about print. Reading Research Quarterly, 15, 529–549.

Kuhn, M. R., & Stahl, S. A. (2000). Fluency: a review of developmental and remedial practices (CIERA Rep. No. 2-008). Ann Arbor, MI: Center for the Improvement of Early Reading Achievement.

Lyon, G. R. (2003). Reading disabilities: Why do some children have difficulty learning to read? What can be done about it? The International Dyslexia Association's Perspectives, 29(2), 17–19.

McCarthy, P. A. (2008, December). Using sound boxes systematically to develop phonemic awareness. The Reading Teacher, 62(4), 346–349.

McGee, L. M., & Ukrainetz, T. A. (2009). Using scaffolding to teach phonemic awareness in preschool and kindergarten. The Reading Teacher, 62(7), 599-603.

National Center for Education Statistics (2011). The condition of education 2011 (NCES 2011– 033). U.S. Department of Education, Washington, D.C.

National Center for Education Statistics (2011). The nation's report card: Reading 2011 (NCES 2012– 457). U.S. Department of Education, Washington, D.C.

National Institute of Child Health and Human Development. (2000). Teaching children to read. Report of the National Reading Panel (NIH Publication No. 00-4754). Washington, DC: U.S. Government Printing Office.

Nettles, D. H. (2006). Comprehensive literacy instruction in today's classrooms: The whole, the parts, and the heart. Boston, MA: Allyn & Bacon.

References (continued)

Perfetti, C. A., Landi, N., & Oakhill, J. (2005). The acquisition of reading comprehension skill. In M. J. Snowling & C. Hulme (Eds.),

The science of reading: A handbook (pp. 227–247). Oxford UK: Basil Blackwell.

Pugh, K., Sandak, R., Frost, S., Moore, D., & Mencl, W. E. (2006). Neurobiological investigations of skilled and impaired reading. D.

K. Dickinson & S. B. Neuman (Eds.), Handbook of early literacy research, vol. 2. (pp. 64–74). New York: Guilford Press.

Rasinski, T. V. (1989). Fluency for everyone: Incorporating fluency instruction in the classroom. The Reading Teacher, 42(9), 690– 693.

Rasinski, T. V., & Hoffman, J. V. (2003). Theory and research into practice: Oral reading in the school literacy curriculum. Reading Research Quarterly, 38, 510–522.

Shams, L. & Seitz, A. R. Benefits of multisensory learning. Trends Cogn. Sci. 12, 411–417 (2008). International Dyslexia Association (2019, April 3). Multisensory Structured Language Teaching Fact Sheet. Retrieved from https://dyslexiaida.org/multisensory-structured-language-teaching-fact-sheet/.

Snow, C. E., Burns, M., & Griffin, P. (Eds.) (1998) Preventing reading difficulties in young children. National Research Council. Washington, DC: National Academy Press.

Stahl, S. (1992). Saying the "P" word: Nine guidelines for exemplary phonics instruction. The Reading Teacher, 45(8), 618–625.

Stahl, S. (1997). Teaching children with reading problems to recognize words. In L. Putnam (Ed.), Readings on language & literacy: Essays in honor of Jeanne S. Chall. Cambridge, MA: Brookline Books.

Torgesen, J. K. (2004). Learning disabilities: An historical and conceptual overview. In B. Y. L. Wong. (Ed.), Learning about learning disabilities (pp. 3– 40). San Diego, CA: Elsevier Academic Press.

Verhoeven, L. (2011). Second language reading acquisition. In M. L. Kamil, P. D. Pearson, E. B. Moje, & P. P. Afflerbach (Eds.). The handbook of reading research: volume IV. London: Routledge.

Vygotsky, L. S. (1978). Mind and society: The development of higher psychological processes. Cambridge, MA: Harvard University Press.

Yeh, S. S. & Connell, D. B. (2008). Effects of rhyming, vocabulary and phonemic awareness instruction on phoneme awareness.

Journal of Research in Reading, 31(2), 243-256.

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