White Paper:
Amira is Science of Reading

Table of Contents

Overview

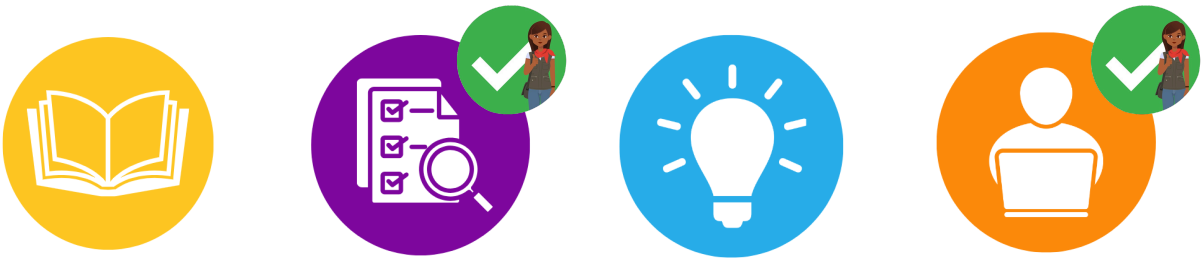
Amira was created for one purpose – to couple the Science Of Reading with AI, giving every child a pathway to the power of reading. Amira was born in academia, is delivering accelerated growth by reflecting the guidance of leading Reading Scientists, and is rapidly evolving to reflect every key element of Science of Reading Research. This White Paper documents Amira's approach to embodying Science Of Reading principles.

The Approach To Documenting Amira's Adherence To The Science of Reading:
There are no stone tablets that lay down the Ten Commandments of the Science of Reading. There is no government agency or even private certifier that stamps offerings with "certified SoR."

> *"The body of work referred to as the "science of reading" is not an ideology, a philosophy, a political agenda, a one-size-fits-all approach, a program of instruction, nor a specific component of instruction. It is the emerging consensus from many related disciplines, based on literally thousands of studies, supported by hundreds of millions of research dollars, conducted across the world in many languages. These studies have revealed a great deal about how we learn to read, what goes wrong when students don't learn, and what kind of instruction is most likely to work the best for the most students."*
>
> *- Dr. Louisa Moats*

But, given that the best definition of the Science of Reading is conformance to the consensus of research, Amira believes there is a de facto set of SoR criteria applicable to early literacy assessment and practice. In this document, we enumerate 20 principles that establish a comprehensive framework for judging Amira's conformance to the research consensus, as that consensus relates to Amira's mission and scope.

Judging Amira For What Amira Is:
Districts need to meld 4 ingredients together to make the Science of Reading work:



A Structured Literacy Core Curriculum

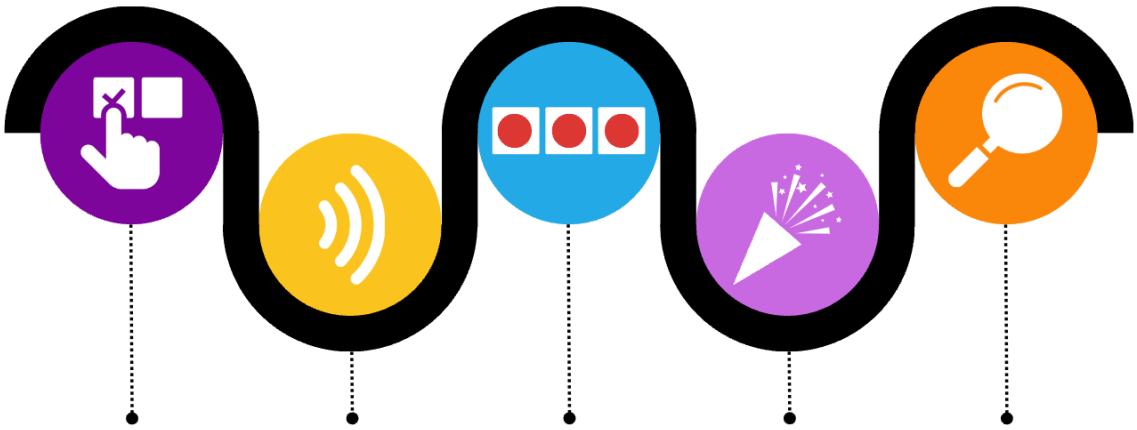
Assessment Designed To Support SoR

Professional Development For Teachers

Science Of Reading Based Practice & Tutoring

Amira delivers 2 of these 4 pivotal elements; **assessment and practice**. Amira is *not* a core curriculum and does not provide the basis for systematic and explicit whole group instruction. Amira is *not* PD nor is it a direct component of teacher-delivered instruction – districts need to adopt programs like Orton-Gillingham, LETRS, Wilson, or Heggerty to give teachers the training and tools to enable effective teacher-delivered SoR instruction.

Amira is the world's first intelligent reading assistant. With Amira, students:



PICK A STORY

Students choose from several appropriately difficult and engaging texts to read

READ OUT LOUD

Students read out loud to Amira as she "listens" and assesses their reading

ACCESS TUTORING

When students struggle, Amira provides an intervention based in the Science of Reading

CELEBRATE GROWTH

When they finish a story, Amira lets students know how they did and celebrates growth

PROVIDE DATA

Teachers and parents get detailed reports and resources tailored to support each student

While new strategies for reading instruction have been introduced every 10-15 years, the fundamental need for diagnostic assessments that provide clear insights into student skill gaps paired with high dosage practice remains constant.

Amira's job is to bring SoR-based assessment and SoR-powered practice to every classroom and every student.

Click Here or scan to see Amira in action:

Built By Scientists. Used by Science of Reading Districts.

Amira conforms to the SoR Principles because Amira was created and shaped by scientists. Born at Carnegie Mellon, the software has been the subject of more than 120 published papers. Every aspect of Amira is a product of research.

Carnegie Mellon University

UTHealth McGovern Medical School — The University of Texas Health Science Center at Houston

Johns Hopkins University

Advisors including many of the world's leading reading scientists

Intelligent Tutoring	Dyslexia Screening	Children's Speech Recognition	60+ Micro-Interventions

Today, Amira is advised by many of the world's leading reading scientists, neuroscientists, and psychometricians. A representative sample is shown below.

Dr. Katherine Pace-Miles

Assistant Professor at Brooklyn College and a colleague of Linnae Ehri, designed many of Amira's micro-interventions.

Dr. Nell K. Duke

Professor of Education and Psychology at the University of Michigan, aided in the development of micro-interventions and features focused on comprehension.

Dr. Elena Izquierdo

Professor at UTEP and noted author of Bilingual literacy programs, aided the development of Amira for Spanish.

Dr. Doris Baker

Professor at University of Texas and the author of Bilingual Education, helped create Amira for Spanish.

Dr. David Franics

Professor at University of Houston, renowned researcher and Director of TIME, is Amira's consulting psychometrician.

Dr. Jack Fletcher

Professor at University of Houston and leading dyslexia expert, works with Amira on the dyslexia screener.

Dr. Molly Branson-Thayer

Director of The Teaching Lab and formerly at the University of Washington, shaped Amira's features for enabling teacher listening.

Dr. Mabel Rice

Professor at Kansas University and a leading researcher on vocabulary acquisition, has worked with Amira on teacher reporting features.

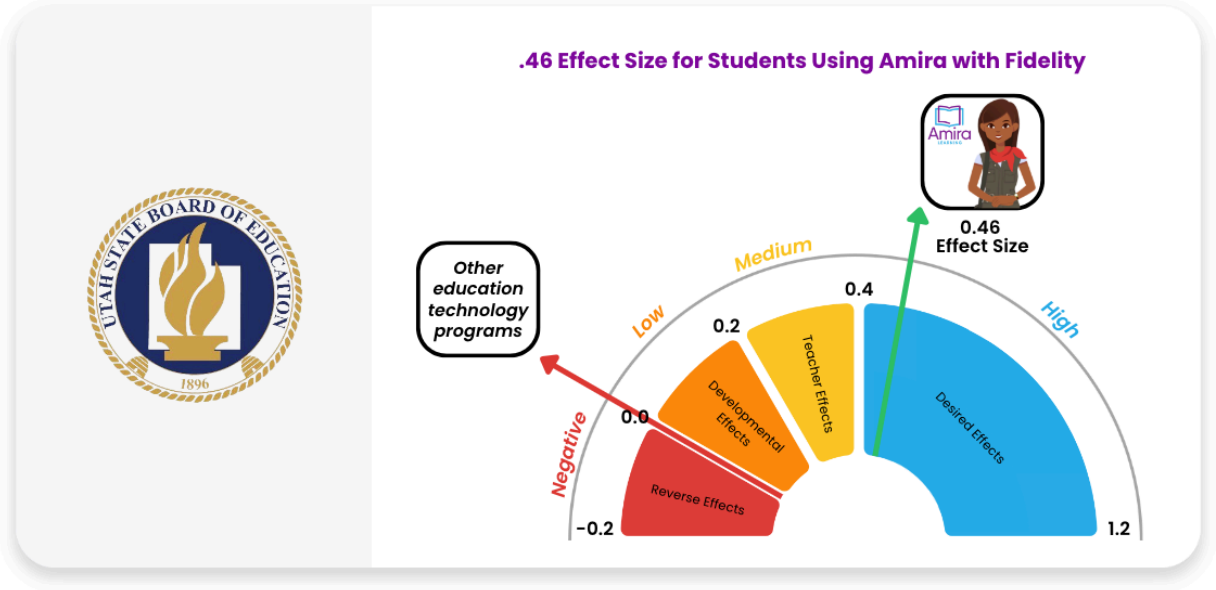
Dr. Patricia Edwards

Professor at Michigan State and author of New Ways To Engage Parents, advises Amira on parental reporting.

As Amira has spread across the country, the software is increasingly shaped by Science of Reading School Districts. These Districts are driving the Amira roadmap, making the software not just Science of Reading, but chiseled to support Science of Reading classrooms.

Technology Based on Decades of Research

Amira was born more than 30 years ago, at Carnegie Mellon University. Dr. Jack Mostow led dozens of AI scientists and engineers to publish more than 100 studies and field trials. The initiative proved that an intelligent reading tutor could dramatically impact reading outcomes. Since then, research from many leading universities has demonstrated that Amira is the first AI-powered solution to produce "Desirable Effects". **Johns Hopkins Evidence For ESSA site shows Amira's Effect size at .64**, topping most human-delivered interventions. In fact, controlled trials have consistently found that Amira accelerates growth to an even greater degree than high dosage human tutoring. A recently released **study by the Utah State DOE showed that Amira has an effect size greater than .4** in moving the state's test scores, the first time Utah had seen such meaningful gains attributable to edtech.



20 Key Principles Of The Science Of Reading

This paper aims to demonstrate that Amira instantiates and exemplifies the Science of Reading. To do so, we're focusing on 20 principles relevant to assessment and practice. But, these 20 criteria are not meant to be the "extent" of Amira's adherence to reading science. We welcome inquiries about any and all areas of the relevant research and how Amira reflects and incorporates the findings.

Where Did These 20 Principles Come From?

There are reading scientists, neuroscientists, and psychometricians publishing thousands of studies every year. Where can we go to find the "emerging consensus" for reading instruction backed by evidence?

This document relies on the published work of three respected organizations as the best expressions of scientific consensus:

1. **The Institute of Multi-Sensory Education (IMSE)** – IMSE sponsors Orton-Gillingham and publishes well-researched summaries of SoR.

2. **International Dyslexia Association (IDA)** – the leading advocacy organization for families impacted by dyslexia, IDA has pushed for SoR policies around the world.

3. **The Reading League (TRL)** – with a mission to advance the awareness and use of evidence-aligned reading instruction, the League sponsors the most important conferences facilitating Science of Reading consensus.

The 20 Principles - Overview

Principles 1-5: Applying The Foundational Ideas

	IMSE/IDA/TRL Science of Reading Criteria	Amira's Conformance
1	Grounded in Scarborough's Reading Rope Scarborough, H. S. (2001). Connecting early language and literacy to later reading (dis)abilities: Evidence, theory, and practice. In S. Neuman & D. Dickinson (Eds.), *Handbook for research in early literacy,* (pp. 97-110). Guilford.	Amira is designed around the Reading Rope (Scarborough, 2001). Amira selects interventions based on building skills across the Rope, and Amira's reporting is explicitly organized based on the Rope to help teachers use SoR concepts in their daily instructional decision-making.
2	The Simple View is the right view: WR x LC = Mastery	Amira employs 26 micro-interventions spanning the Language Comprehension threads of the Reading Rope (Scarborough, 2001) and 35 micro-interventions covering Word Recognition. Students reading below 20 WCPM are aided with Decoding and phonemic awareness scaffolds about 80% of the time. Students reading above 100 WCPM are mostly aided with Language Comprehension. In other words, Amira delivers the mix of Comprehension and Word Recognition instruction each student needs.
3	Students need sufficient practice	Amira is designed to give every student at least 30 minutes of "time on text" weekly. The software ensures that students do the hard work of actually reading. This is a unique value proposition, separating Amira from every other literacy program.
4	Work with decodable text	Amira's library of content includes hundreds of decodable passages.
5	Help with the 5 essential components	Amira is a uniquely powerful tool for building fluency. The software's capacity to encourage oral reading and to strengthen automaticity are unmatched. But, Amira's micro- interventions accelerate growth in all 5 of the essential components of reading mastery.

Principles 6-9: Leveraging Assessments To Drive Instruction

	IMSE/IDA/TRL Science of Reading Criteria	Amira's Conformance
6	Dyslexia screening covers all recommended tasks	Amira's dyslexia screener has been reviewed and approved by most State Education Agencies. The screening process covers each and every approach recommended by the International Dyslexia Association for reliable identification of dyslexia risk.
7	Help differentiate with assessment	One of Amira's most important value propositions is delivering actionable insight to teachers all the time. The software's ability to pinpoint granular, addressable skills gaps allows teachers to tailor their instruction to specific student needs.
8	Instruction is assessment driven	Amira puts specific instructional resources into teachers' line of sight, enabling them to make assessment-driven decisions.
9	Requires continuous progress monitoring	Amira enables psychometrically valid progress monitoring across all grades.

Principles 10-17: Sequencing Skills

	IMSE/IDA/TRL Science of Reading Criteria	Amira's Conformance
10	Early emphasis on phonic decoding	With early readers, Amira provides a steady diet of phonic decoding. The software offers an Early Reader Skills Scaffold to work on foundational phonics skills with beginning readers, and employs coaching techniques like Elkonin Sound Boxes and Change One Sound to build phonemic awareness and decoding skills.
11	Sounds first: have initial focus on letter sounds	With the Early Reader Skills Scaffold for readers still building to connected text, Amira helps develop letter naming and letter sound fluency.
12	Phonics is an important part of instruction	Amira uses more than a dozen techniques to build phonics skills. In a typical session, students reading less than 30 WCPM receive 4 micro-interventions that aid phonics development.
13	Build blending automaticity	Micro-interventions like Up & Down help students to move from phoneme-based sound outs to blending. In this intervention, the student sounds out each phoneme to move a character up a ladder and then blends to help the character slide down.
14	Support for orthographic mapping	Reading out loud builds a student's support for orthographic mapping. Amira additionally helps map automaticity for high frequency words.
15	Encoding is a key developmental process	Amira's interventions encompass spelling and encoding.
16	Understand morphology	Amira utilizes three distinct interventions to aid students in gaining an understanding of prefixes, suffixes, and roots.
17	Phonemic awareness is first among equals	Amira's Early Reader Skills Scaffold builds strong phonemic awareness skills for beginning readers. Amira also employs several interventions based in phonemic awareness, including the Elkonin Sound Box.

Principles 18-20: Brain-Based How To's

	IMSE/IDA/TRL Science of Reading Criteria	Amira's Conformance
18	Regular dictation builds skills	The recommended dosage of 30 minutes per week with Amira translates into a motivating and powerful program for building dictation skills.
19	Use multi-sensory approaches	Leading reading scientists have designed the micro-interventions to use many senses, usually simultaneously. The interventions incorporate sound, touch, and sight.
20	No cueing	Amira adheres to the research around pictures in text – images that are used are specifically curated to not offer cueing with the text, and the option to turn off all images is available to school and district leaders. Images will appear in some micro-interventions aimed at improving comprehension and providing background knowledge.

The Most Important Takeaway:

Amira is Science of Reading. Amira delivers assessment and tutoring 100% consistent with the principles of SoR. But, the important idea is that Amira is *vital* to Science of Reading programs. Absent an intelligent reading assistant such as Amira, SoR will fail to deliver on its promise to ensure every child has the chance to become a reader. The science couldn't be clearer – reading instruction is not intuitive. Learning to read is hard; it needs to happen in large doses, depends on sophisticated and continual assessment, and works best when delivered 1:1. This White Paper makes a first-order case that Amira is a Science of Reading tool.

Amira is a Science of Reading Assistant for Teachers.
And, Science of Reading teachers need an assistant like Amira.

Principles 1-5: Applying The Foundational Ideas

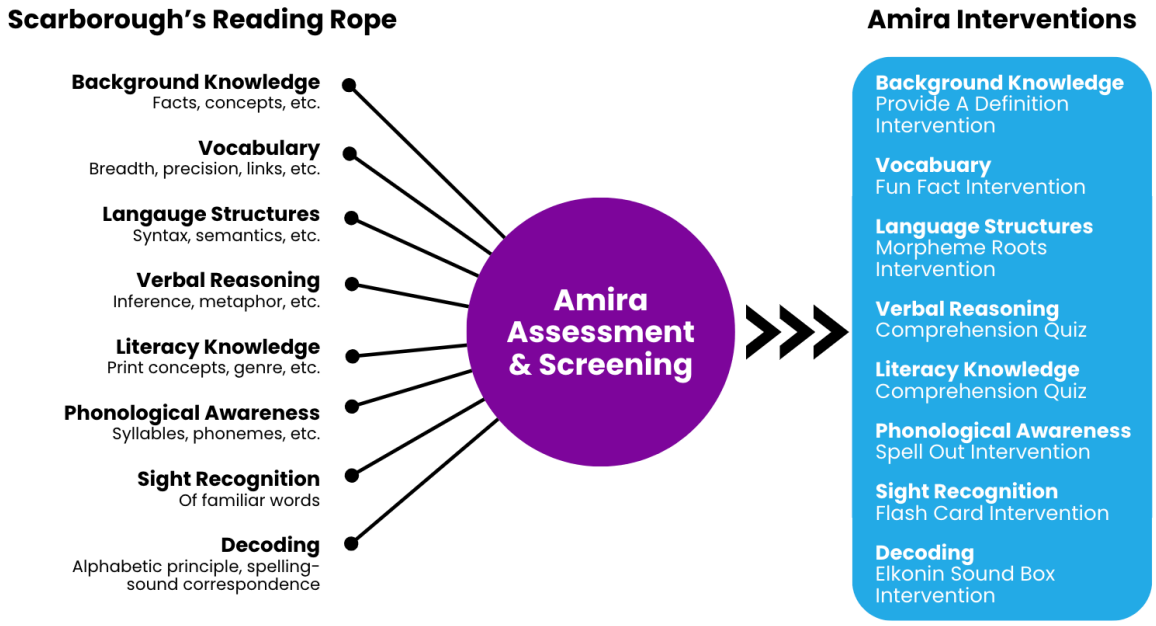
Like all sciences, the Science of Reading is constructed around a core set of models and equations. Together, these comprise the foundational theories that define and distinguish the approach. Amira adheres to the **5 Big Truths** that comprise the heart and soul of the SoR Revolution.

Applying The Foundational Ideas	**Principle 1: Grounded in Scarborough's Reading Rope** (Scarborough, 2001)

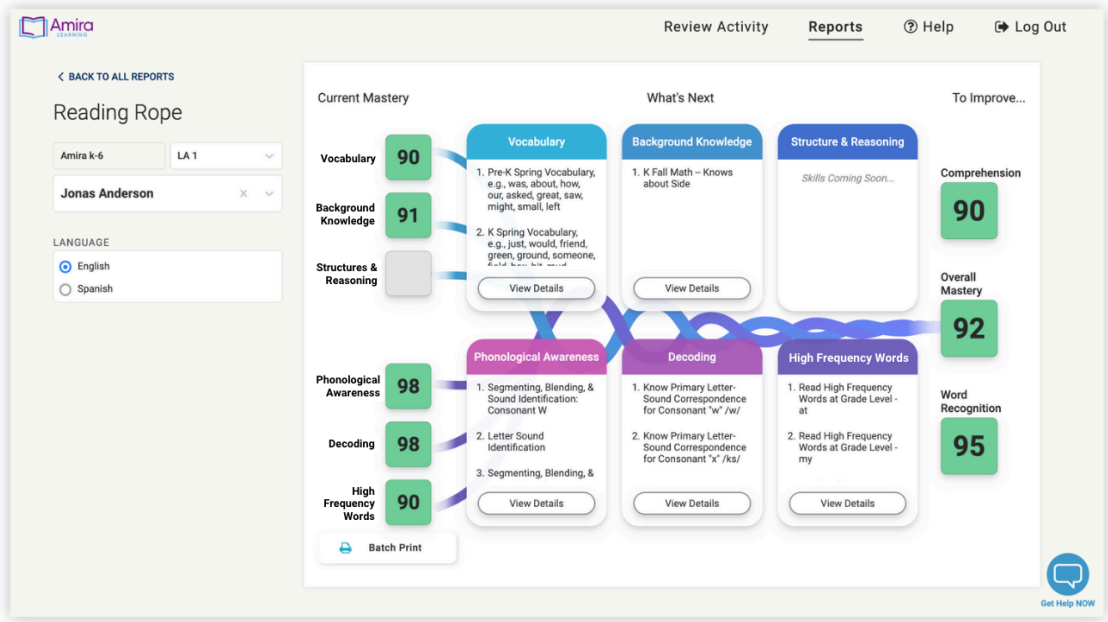
IDA: *"For many children, learning to read is a challenging undertaking. The Reading Rope, created by Dr. Hollis Scarborough, captures the essence of this task. One of the first and best infographics in the field, the Reading Rope is brilliant in its simplicity, but profound in its instructional implications."*

IMSE: *"The Theoretical Models of Reading (Gough and Tunmer's Simple View of Reading, Hollis Scarborough's The Reading Rope, Linnea Ehri's The Four Phases of Word Reading, and Seidenberg and McClelland's The Four Part Processing Model for Word Recognition) are the backbone of our training programs."*

Amira is designed around the Reading Rope model (Scarborough, 2001). Amira's tutoring decisions are driven by the Simple View of Reading (SVR)/Reading Rope (RR) framework. Amira uses AI to ascribe observed struggle to likely gaps in one of the Reading Rope threads. This root cause analysis then informs Amira's micro-intervention selection. All of Amira's tutoring techniques are mapped to the Reading Rope framework.



Similarly, Amira's reporting is delivered to teachers via the Instructional Recommendations Report, as shown below. Amira's foundational approach to understanding a student's reading ability is based on the Reading Rope (Scarborough, 2001).

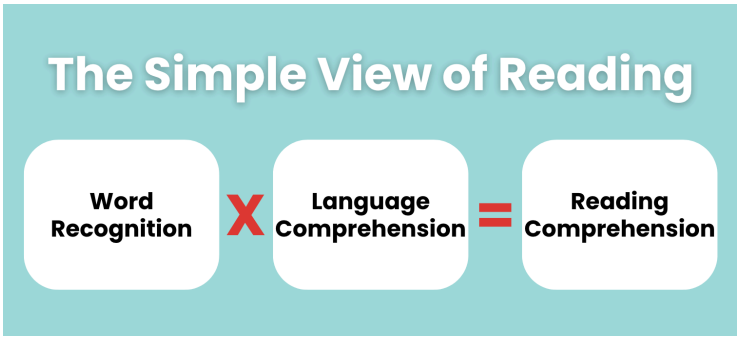


Applying The Foundational Ideas	Principle 2: The Simple View Is The Right View

IMSE: *"The Simple View of Reading is a well-established framework that explains that reading comprehension is the product of decoding and language comprehension. The ability to read words accurately and fluently, which is known as word recognition, is the foundation for comprehension. It is critical for students to develop strong word recognition skills so they can easily read and comprehend what they are reading."*

TRL: *"The Simple View of Reading reminds us that reading involves two critical components: language comprehension and word recognition… Teachers must provide explicit, systematic, and cumulative instruction in phonological awareness, phonics, and fluency to develop strong word recognition skills that will enable students to access and comprehend text." (From the 'Our Philosophy' section of The Reading League's website.)*

The Science of Reading places a strong emphasis on word recognition skills. Research shows that intense, explicit, and systematic work on phonemic awareness is the most important ingredient in the recipe for reading success. However, the research also shows that comprehension is vital as well. The foundational equation of SoR, (the equivalent of $E = mc^2$ in physics), is Word Recognition (WR) x Language Comprehension (LC) = Reading Mastery (RM). The Simple View Framework, supported by extensive research, focuses on the synergistic relationship between word recognition skills and language comprehension.



The Simple View of Reading (Gough & Tunmer, 1986)

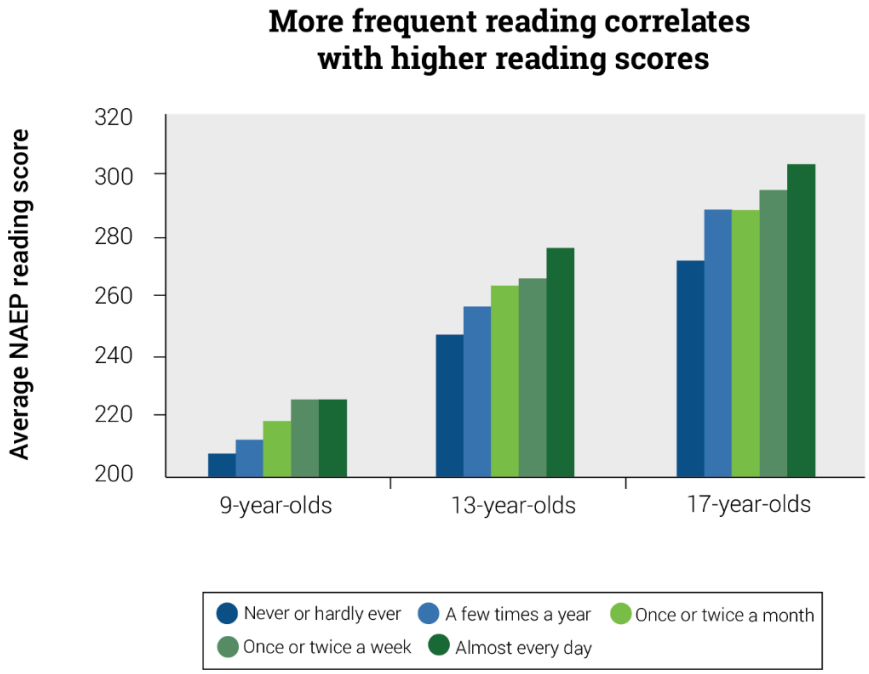
As previously mentioned, Amira provides a comprehensive range of interventions that cover the Reading Rope (Scarborough, 2001). However, the software places a continuous emphasis on word recognition skills when assisting early readers.

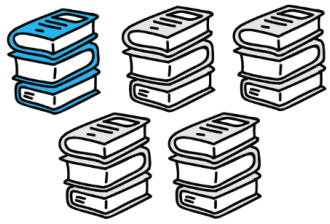
Applying The Foundational Ideas	Principle 3: Students Need Sufficient Practice

IMSE: *To support growth, "students need sufficient practice and review in decoding and encoding, knowledge and application of concept skills, and exposure to decodable text."*

TRL: *"Reading practice is critical for developing fluency, building vocabulary, and enhancing comprehension. The more students read, the better readers they become, and the better readers they become, the more they enjoy reading. It's a virtuous cycle that leads to greater literacy achievement."*

Research confirms what intuition implies: frequent practice is essential for students. Moreover, oral reading emerges as the most effective form of practice. However, student engagement in practice is declining over time.



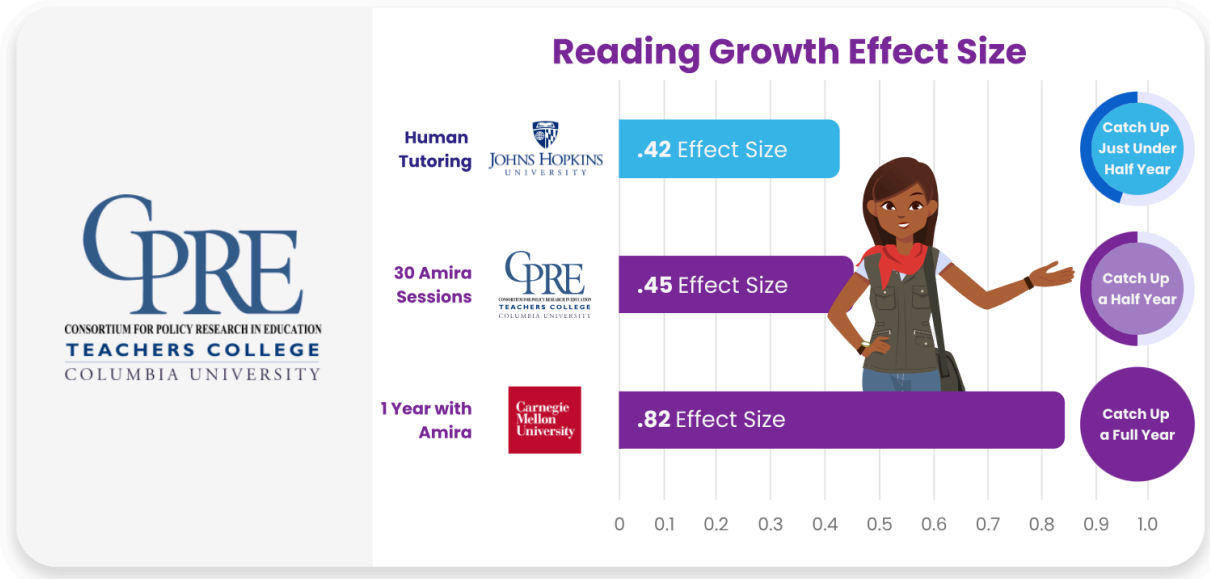


Fewer than **one in five students** reads an average of **30 or more minutes per day.**

"Daily reading practice and the magic of 15 minutes." Renaissance. 23 January 2018,
https://www.renaissance.com/2018/01/23/blog-magic-15-minutes-reading-practice-reading-growth/

Amira represents the most significant breakthrough in reading practice since the introduction of Accelerated Reader approximately thirty years ago. For the first time, independent practice has built in Science of Reading scaffolding to build strong reading habits. And with Amira, students are required to do the work – it's reading based on reading, not clicking.

The Amira program is built around a recommended 30 minute per week dosage. Research has demonstrated that just 30 minutes per week for a full school year leads to an effect size of 0.82.



Amira LEARNING

Applying The Foundational Ideas	**Principle 4: Work with decodable text**

IMSE: *"Decodable text provides the opportunity for children to apply the phonics skills they are learning in a controlled, supportive environment. By using decodable text in instruction, teachers can help students build fluency, comprehension, and confidence in their reading abilities."*

TRL: *"Decodable text is a powerful tool for teaching beginning readers how to decode words accurately and fluently."*

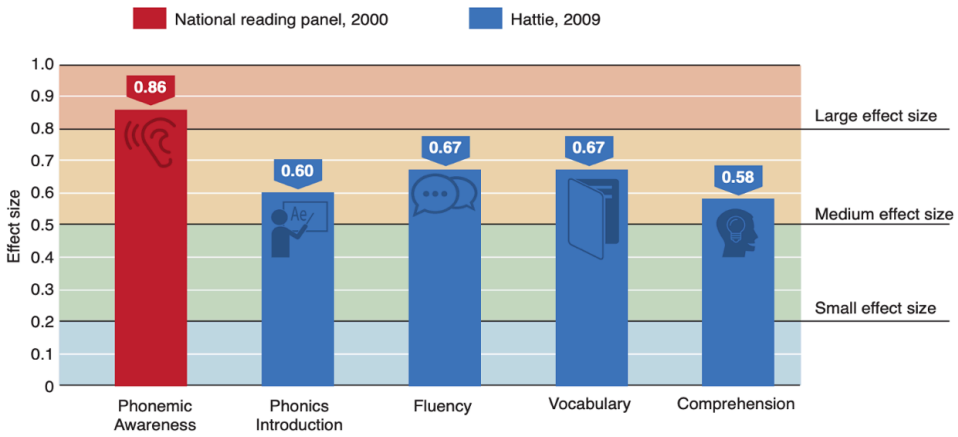
When students who are still building foundational reading skills are working with Amira, 100% of the passages are decodable. Amira's library of reading resources encompasses hundreds of decodables appropriate for students from Kindergarten to 3rd Grade.

Applying The Foundational Ideas	**Principle 5: Help with the 5 essential components**

IMSE: *"Effective reading instruction is instruction that is explicitly taught across all five pillars of reading: phonemic awareness, phonics, fluency, vocabulary, and comprehension. Students with dyslexia need direct instruction in these five areas with an emphasis on phonemic awareness and phonics."*

TRL: *"Reading instruction should be explicit, systematic, sequential, and cumulative, addressing all five essential components of reading: phonemic awareness, phonics, fluency, vocabulary, and comprehension."*

For decades, reading scientists have unanimously endorsed the importance of delivering instruction across five essential pillars, as shown below. Per Hattie's seminal research, instruction in each pillar delivers effect size.



Because Amira is designed around Scarborough's Reading Rope (Scarborough, 2001), students are helped in all 5 essential components of reading. But, Amira is uniquely able to help students with fluency and phonemic awareness. These two pillars often present challenges – building both phonemic awareness and fluency requires significant instructional time with each student.

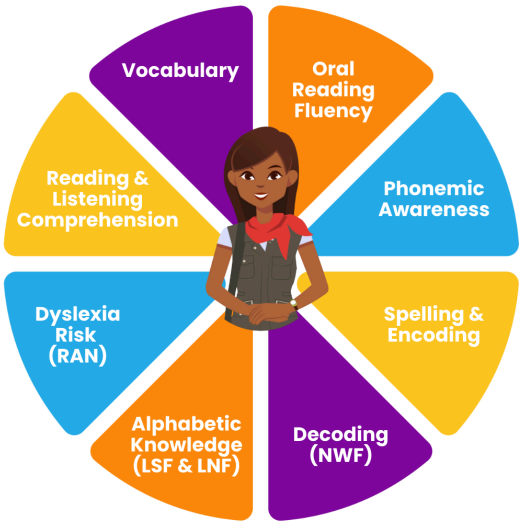
Principles 6-9: Leveraging Assessments To Drive Instruction

The principle of diagnosing before prescribing is a fundamental best practice, and the Science of Reading underscores this principle in reading instruction. Amira epitomizes the use of assessment as a catalyst for improvement to drive instruction.

Leveraging Assessments To Drive Instruction	**Principle 6: Dyslexia screening covers all recommended tasks**

IDA: *"Research indicates first-grade screening measures are most successful when they include assessment of the following areas: phoneme awareness, specifically phoneme segmentation, blending, and manipulation tasks; letter naming fluency; letter sound association; phonological memory, including nonword repetition; oral vocabulary; and word recognition fluency (i.e., accuracy and rate) (Compton, et al., 2010; Jenkins & Johnson, 2008)."*

The International Dyslexia Association Recommends a range of tasks be used for dyslexia screening at all grade levels. Amira is the only screener that encompasses every single recommended measure. All of the tasks supported by Amira are shown in the graphic below.



1. **Phonics: The ability to manipulate parts of words.**
    - **Elision**: The student is asked to break words into subparts or segments. Phonological Elision is a core task in the Amira Dyslexia Screener.
    - **Blending**: The student is asked to put together sounds to make a word (e.g., "What word do these sounds make? /s/ /a/ /t/"). Blending is a core task in the Amira Dyslexia Screener.
2. **Phonemic Awareness: The ability to hear and manipulate individual sounds in words.**
    - **Phoneme Segmentation**: The student is asked to break apart a word into its individual sounds (e.g., "What sounds do you hear in the word 'cat'?). Segmentation is a core task in the Amira Dyslexia Screener.

- **Phoneme Deletion**: the student is asked to say a word without a certain sound (e.g., "Say 'sat' without the /s/ sound."). Change One Sound is an available task within the Amira Dyslexia Screener.

3. **Rapid Automatized Naming (RAN): The ability to quickly name letters or common objects.**
    - **Rapid Letter or Object Naming**: The student is asked to name letters or common objects as quickly as possible (e.g. "Name as many letters as you can?). RAN is a core task in Amira's Dyslexia Screener.

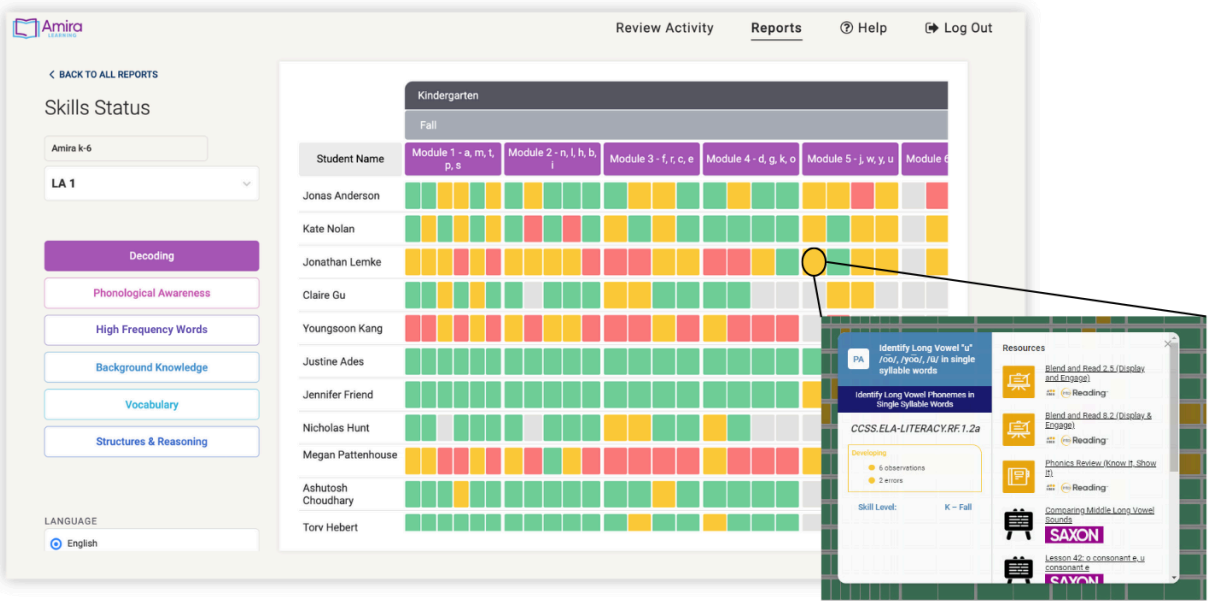
4. **Letter Knowledge: The ability to identify and name letters.**
    - **Letter Naming**: The student is asked to name letters presented in isolation (e.g. "What is the name of this letter?"). The Amira Dyslexia Screener supports both Letter Naming Fluency (LNF) and Letter Sound Fluency (LSF).

Amira comprehensively supports the modes of identifying dyslexia markers recommended by the International Dyslexia Association and State Education Agencies, and has been approved by most State Education Agencies as a universal and/or dyslexia screener. See a 1st grade student and a 4th grade student completing the Amira Benchmark Assessment which includes the Dyslexia Risk Screener.

Leveraging Assessments To Drive Instruction	Principle 7: Help differentiate with assessment

IMSE: *"Assessment is crucial in guiding instruction. It allows teachers to differentiate instruction to meet the needs of all students. Ongoing assessment provides valuable feedback on what is working and what may need to be revised or retaught. It helps teachers determine what skills to teach, how to group students, and how to monitor progress over time."*

TRL: *"Classroom teachers must be trained to use appropriate screening, assessment, and progress-monitoring tools to identify struggling readers and adjust instruction to meet individual student needs."*



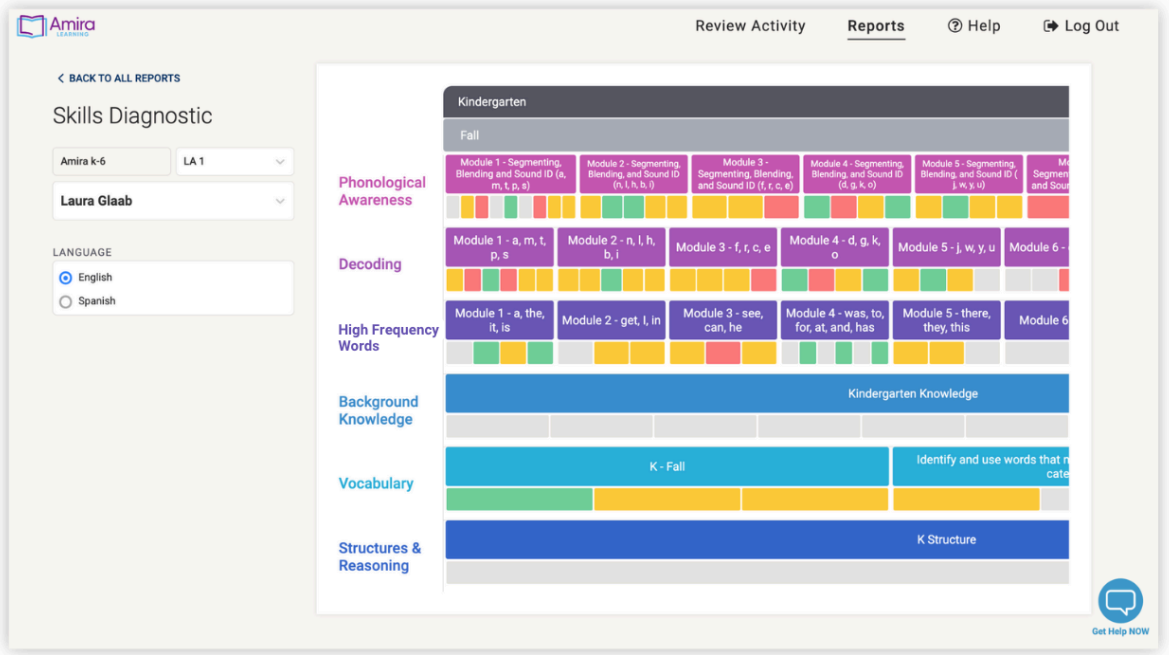
With each assessment and practice session, Amira gathers detailed data on students' reading skills and provides multiple different reports to help teachers, administrators, and families understand students' reading strengths and gaps. The reports are designed to support teachers in addressing individual and group learning needs, and several reports provide aligned instructional resources to support the teacher's instruction. The ability to view students' reading skill gaps on a class level and individual level allows teachers to differentiate their instruction based on the most up-to-date and detailed needs of their students.

Leveraging Assessments To Drive Instruction	**Principle 8: Instruction is assessment driven**

IMSE: *"Assessment drives instruction. By regularly assessing each student, the teacher can determine what each student knows, and what he or she needs to learn next."*

TRL: *"Assessment should drive instruction, not the other way around."*

The general principle at work is that instruction should be driven by assessment. In education, assessment has tended to be seen as the “test”, the thing you do at the end of an instructional cycle (the school year). The primary use case has been to “judge”: to assign a grade for the student, the teacher, the school or the district. Science of Reading emphasizes “Assessment First”. The science tells us that instructional decision-making needs to emanate from data, not guesswork. Just as technological progress has enabled physicians to employ advanced diagnostic equipment such as MRIs for patient assessment, Amira provides a detailed snapshot of mastery, offering teachers clear guidance on how to meet student needs.



Amira is able to listen to each student read hundreds of words weekly, to break down that reading into evidence for and against that student’s mastery of thousands of reading skills, and then to build up a composite picture of student status that helps teachers make data-driven decisions on how to help each student. Furthermore, Amira’s practice is constantly changing and adjusting as it assesses students’ reading skills and ‘learns’ what students have mastered and still need practice with.This is another key example of how Amira is not simply Science of Reading conformant but is an innovation essential to enabling Science of Reading classrooms to actually work.

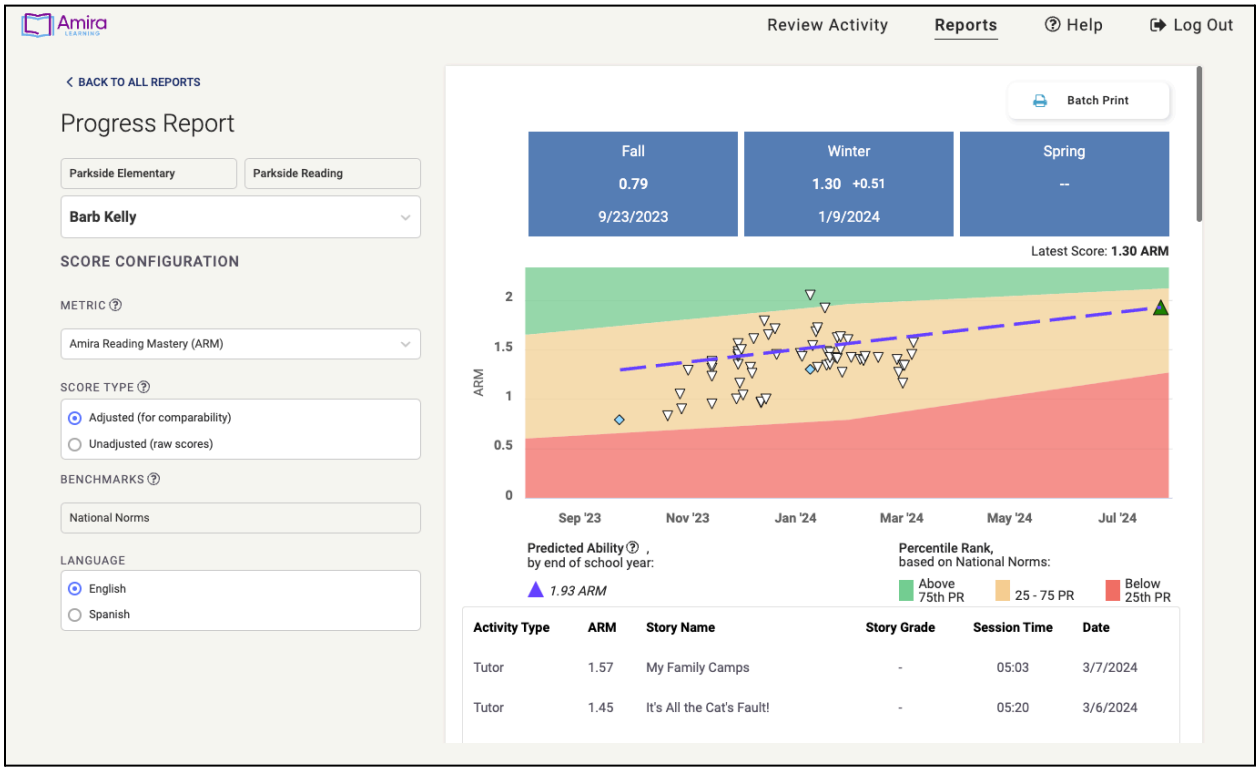
Leveraging Assessments To Drive Instruction	Principle 9: Requires continuous progress monitoring

IDA: *Progress monitoring should be "Frequent, explicit, and ongoing, using multiple measures and assessments that target the specific areas of reading and writing that are impacted by dyslexia" (IDA, 2020, p. 13).*

TRL: *"Progress monitoring is essential for students with reading difficulties. This includes monitoring progress towards individualized goals as well as determining the effectiveness of interventions."*

As students move up the curve of reading mastery, the pace of change is shocking. The Hasbrouck & Tindal norms shows a typical young reader moves from 0 WCPM in the winter of First Grade to 70 WCPM 24 months later. Research shows that for most normally progressing students, the Fall Screener is obsolete by October.

The need for continual assessment and the need for large doses of explicit instruction have created a hopeless tug of war for many districts. Downsize the assessment protocol and teachers stop doing evidence-based differentiation; assess constantly and instructional time is lost.



Principles 10-17: Sequencing Skills

Reading science research has identified many discrete skills that aid reading mastery. And, as enumerated above, models like the Reading Rope (Scarborough, 2001) and the 5 Pillars stake out the territory that every SoR literacy program should follow. But the consensus of the science is that there are 7 key principles for guiding reading instruction that ideally overlay on top of the basic curricular threads. The science suggests that reading instruction should unfold with two complementary drivers:

1. A sequential journey of skill acquisition that begins with letter sounds, moves onto phonemic awareness (segmentation and blending), and then encompasses decoding and encoding.
2. Constantly balancing student ability of word recognition and language comprehension.

Sequencing Skills	**Principle 10: Early emphasis on phonic decoding**

IMSE: *"Early emphasis on phonic decoding is crucial because it directly affects reading fluency and comprehension. For struggling readers, the development of phonics skills can unlock the code to reading and give them a way to access text that they may have found impossible before."*

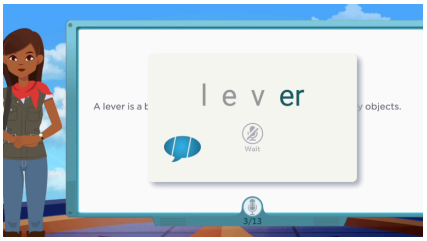
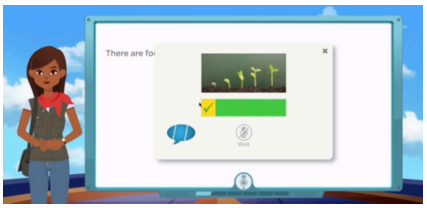
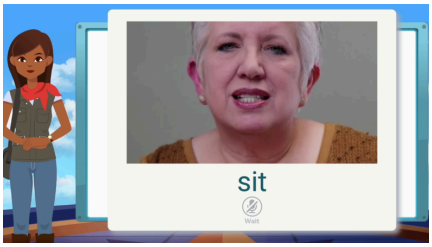
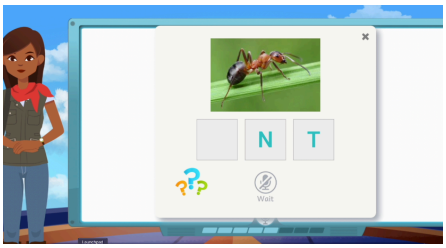
TRL: *"The explicit teaching of phonics is particularly important for beginning and struggling readers. Research has shown that when phonics instruction is introduced early and taught systematically and explicitly, it can significantly improve reading outcomes."*

In Kindergarten:
87% of interventions are phonics/decoding.
11 on average per session.

In 1st grade:
72% of interventions are phonics/decoding.
7 on average per session.

In 3rd grade:
39% of interventions are phonics/decoding.
3 on average per session.

Amira works to build student's phonic decoding skills. For readers whose fluency is less than 20 WCPM, approximately two-thirds of Amira's micro-interventions will focus on phonemic awareness, phonics, and decoding. The Intelligent Tutor's arsenal of interventions in these areas spans more than 20 tutoring techniques, including:

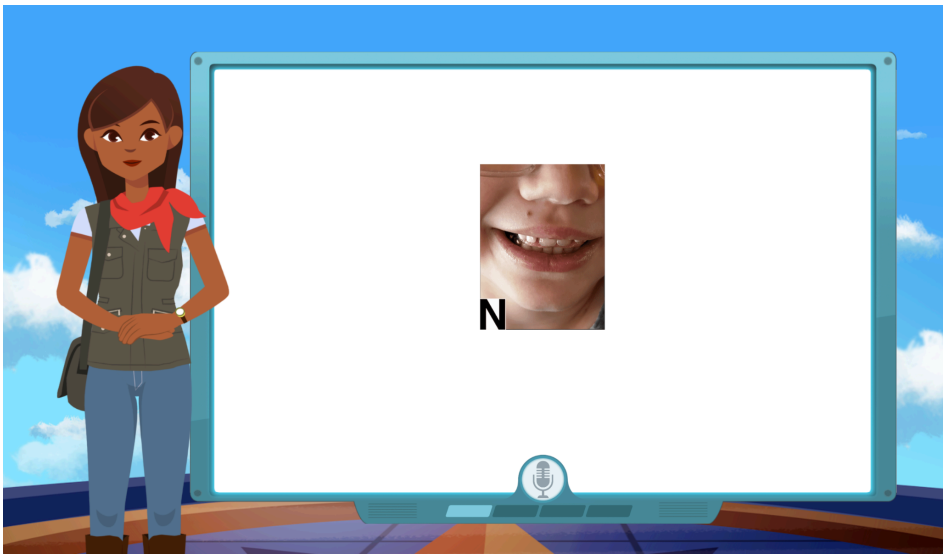
Micro-Intervention	Description	Picture
Phonics Sound Out	Amira lights up the parts of a word and says the sounds. The child repeats.	
Say One Sound	Amira asks the student to practice segmenting sounds without letters.	
Elkonin Sound Box - Show Graphemes	Amira asks students to move the red dots into boxes while they say the sounds making up a word. Students move the dots, say the sounds, and then blend the entire word. At the end, the graphemes are displayed.	
Phonemic Lip Sync	Amira shows students a video of an adult accurately pronouncing the sounds of a word. Students are asked to then blend the parts of the word they've heard.	
Word Investigator	Amira asks a child to choose the sound missing in a word.	

Sequencing Skills	**Principle 11: Sounds first: have initial focus on letter sounds**

IMSE: *"Students need to learn the sounds of the letters in order to decode words. This process should begin with the most reliable sound for each letter. Learning these sounds is an essential first step in the process of learning to read."*

TRL: *"Letter-sound correspondences should be taught systematically and explicitly, with an emphasis on the most common sounds of each letter. Instruction should begin with the most reliable sound of each letter, and students should be taught to blend sounds together to form words as soon as possible."*

Amira's Early Reader Skills Scaffold was designed in partnership with the reading scientists at The City University of New York (CUNY)/Brooklyn College. The Skills Scaffold centers on systematic and explicit instruction of letter-sound correspondence. Amira delivers a sequential and cumulative set of "lessons" for each letter-sound correspondence.



The scientists at CUNY, led by Dr. Linnae Ehri, are renowned. Amira's Skills Scaffold was created by Dr. Katie Miles to help students master the relationship between letters and their base sound.

Task	Goal	Research Foundation
Explicit Instruction In Skill	Establish a baseline of context and understanding	SoR Baseline
Echo Reading	Sound Familiarity	Dr. Branson-Thayer – Chanting
Letter Flies	Sound Identification	Dr. Katie Miles – Early focus on sound identification
Up & Down	Phonemic Awareness	Dr. Katie Miles
Say One Sound	Phoneme Isolation	Dr. Katie Miles
CVC Reading	Decoding	
Sound Boxes	Phonemic Awareness and Decoding	Kelsey M Ross
Repetitive Sentence Reading	Word Recognition	

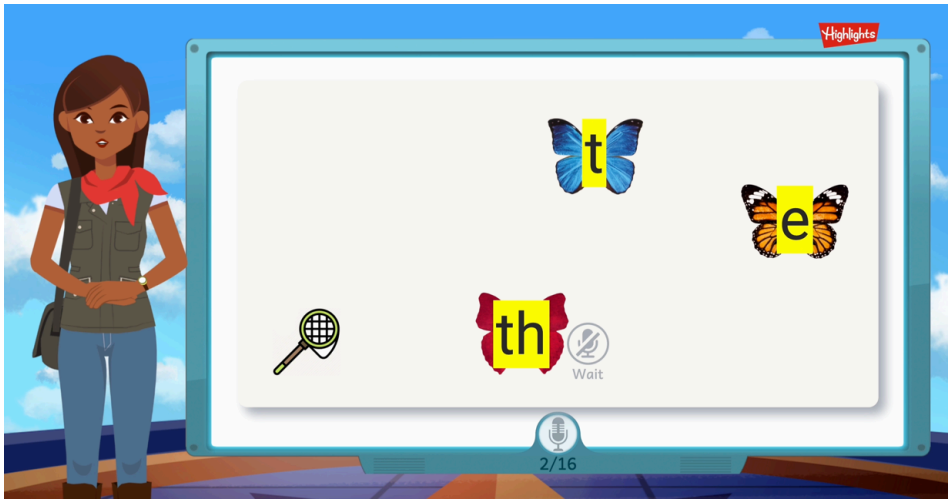
Amira uses a range of multi-sensory techniques to help children move from hearing sounds to associating those sounds with printed letters. One example is Amira's Letter Flies intervention, in which students hear a word, then hear one sound in that word from Amira, and then must chase the right letter-labeled butterfly with a net to capture that sound.

Sequencing Skills	**Principle 12: Phonics is an important part of instruction**

IDA: *"Systematic and explicit instruction in phonics should be a priority in beginning reading programs, as it is an essential foundation for students' reading development. Students with dyslexia and other struggling readers require more time and a greater emphasis on phonics instruction in order to develop strong decoding skills."*

IMSE: *"Phonics instruction is a critical component of a structured literacy approach. It is an explicit, systematic method of teaching students how to decode words. Effective phonics instruction involves teaching the relationship between sounds and letters, including the sounds represented by letter combinations."*

For students reading less than 30 WCPM, Amira delivers 5 to 10 phonics interventions in every session. The tutoring techniques employed rest on the best research about how to build phonics skills. For example, Amira's Letter Flies micro-intervention relies on the multi-sensory, tapping, and explicit linking characteristics that have produced the greatest gains. (Ehri et. Al (2001) and Berninger et. Al. (2010)).



Amira's Early Reader Skills Scaffold provides explicit help with more than one hundred letter-sound combinations, delivering phonics instruction on consonants, long & short vowels, and digraphs.

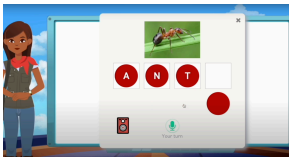
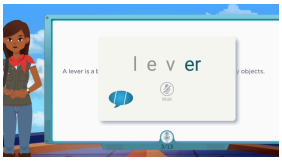
Sequencing Skills	**Principle 13: Build blending automaticity**

IMSE: *"Children must master blending skills before moving on to more complex decoding strategies."*

TRL: *"Blending skills should be taught explicitly and systematically as part of a comprehensive phonics program."*

Many Amira interventions help students to build blending skills. Torgesen, J.K., Wagner, R.K., Rashotte, C.A. (1994) and Ehri (1995) found that blending is a crucial step in attaining automaticity in word recognition. These studies also demonstrated that blending skills come from repeated practice. Facilitating this repetition is Amira's strong suit. Infinite patience and infinite scale means Amira can work individually with each student to power blending capacity.

Here are some of Amira's micro-interventions that require blending:

Micro-Intervention	Description	Picture
Up & Down	Children practice segmenting the sounds of a word and blending them back together.	
Sound Box	Amira asks students to move the red dots into boxes while they say the sounds making up a word. Students move the dots, say the sounds, and then blend the entire word. At the end, the graphemes are displayed.	
Change One Sound	Amira asks the student to manipulate part of a target word by changing a beginning, middle, or ending sound.	
Phonemic Sound Out	Amira lights up the parts of a word and says the sounds. The child repeats.	

Sequencing Skills	**Principle 14: Support for orthographic mapping**

IMSE: *"The goal of reading instruction should be to create fluent and automatic word recognition through the development of strong, detailed phonological representations that lead to efficient and accurate orthographic mapping."*

The research indicates that two techniques tend to build orthographic mapping; multi-sensory instruction and visual-orthographic training.

Multi-sensory Instruction: Multi-sensory techniques, such as those used in Orton-Gillingham and other structured literacy programs, are effective in teaching orthographic mapping. A study of Orton-Gillingham's multi-sensory approach found that students who received this type of instruction had significantly better word reading and spelling abilities than those who received standard reading instruction (Birsh, 2005).

Visual-Orthographic Training: Research suggests that targeted visual-orthographic training, such as teaching students to recognize common letter patterns and word families, can improve orthographic mapping abilities. For example, a study of struggling readers found that visual-orthographic training led to significant improvements in word recognition and decoding skills (Lovett, Lacerenza, Borden, Frijters, Steinbach, & De Palma, 2000).

Amira makes extensive use of both multi-sensory techniques and visual-orthographic training. Roughly 60% of the micro-interventions Amira delivers make use of more than one sense. Amira asks learners to use audio, visual, touch, kinetic motion, rhythm and even dance as vehicles for building reading skills generally and orthographic mapping particularly. See it in action here.

Sequencing Skills	**Principle 15: Encoding is a key developmental process**

IDA: *"Teaching spelling is important for individuals with dyslexia because it directly reinforces phonics and phonemic awareness instruction, improves reading fluency, and builds writing and reading comprehension. Learning to spell by segmenting words into their individual sounds (phonemes) and then representing the sounds with letters (graphemes) is the foundational skill necessary for successful writing and reading."*

IMSE: *"Encoding is a critical skill that allows students to apply their phonics knowledge to the task of writing words. This enables them to write words accurately and with confidence. Encoding skills should be explicitly taught and reinforced through repeated practice."*

Amira has several interventions that build and reinforce spelling and encoding. These 'Spell Out' interactions are employed frequently with students bridging from early decoding to fluency. See it in action here.

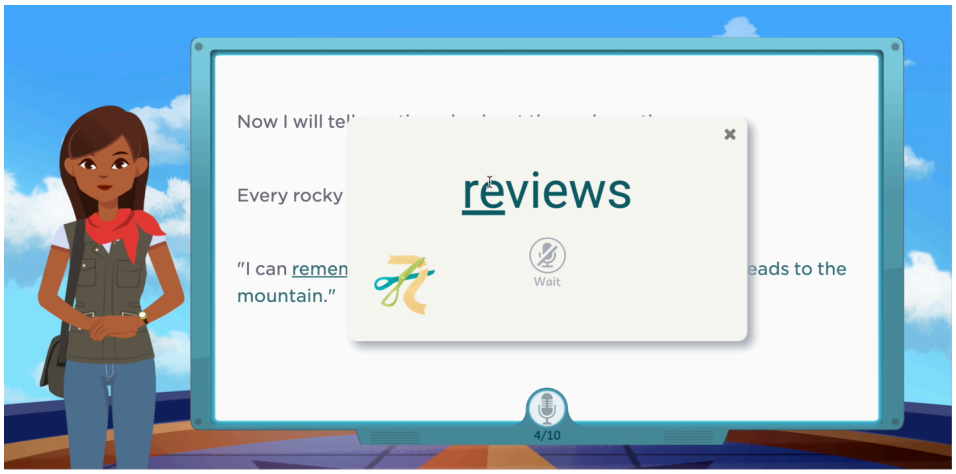
Sequencing Skills	**Principle 16: Understand morphology**

IMSE: *"Teaching morphology can help students build their vocabulary, as well as improve their reading comprehension."*

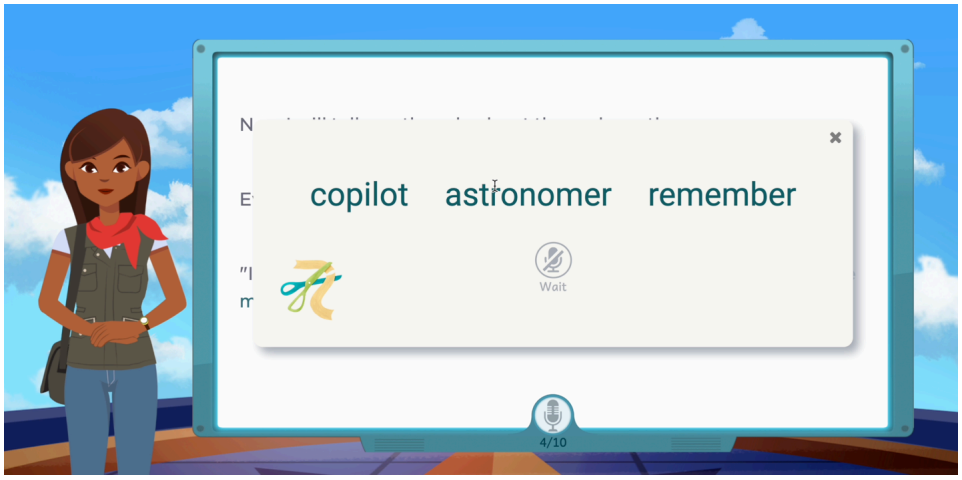
TRL: *"Teaching morphology is critical for developing students' vocabulary and word recognition skills. Understanding the meaning of prefixes, suffixes, and roots allows students to make connections between words and build a deep understanding of the English language. Research suggests that teaching morphology can have a positive impact on reading comprehension, especially for struggling readers."*

As student fluency grows, Amira interleaves an increasing diet of instruction & practice on the language comprehension side of the Reading Rope (Scarborough, 2001). This includes two key interventions related to morphology. For students reading more than 40 WCPM, Amira works on morphology in ~8% of interventions.

One example of Amira's assistance with morphology is the Morphemes Quiz Micro-Intervention. In this interaction, Amira highlights a prefix, suffix, or root, explaining the meaning of the morpheme.



Then, Amira asks the student to identify the morpheme in other words, helping to build understanding of the difference between prefixes, suffixes, and roots, while creating capacity to identify morphology at sight.

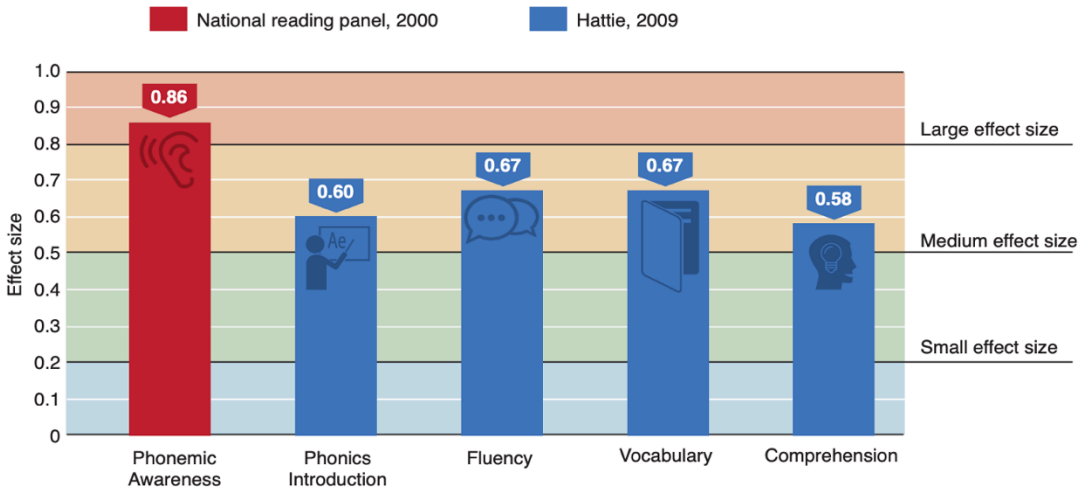


Sequencing Skills	**Principle 17: Phonemic awareness is first among equals**

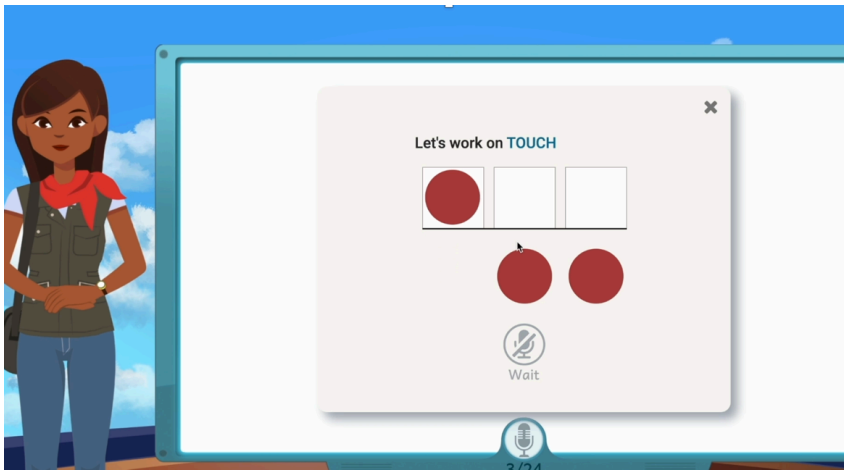
IMSE: *"Phonemic awareness is the ability to manipulate sounds in spoken words. It is a critical component in learning to read and write. Research has shown that children who have difficulty with phonemic awareness are at risk for reading difficulties."*

TRL: *"The foundation of reading is phonemic awareness, phonics, and decoding, which are essential to fluent reading and reading comprehension."*

Science of Reading emphasizes the need to build skills across the Reading Rope (Scarborough, 2001). But SoR also super-emphasizes the importance of phonemic awareness. The research is clear that phonemic awareness is the launching pad from which students accelerate towards mastery.

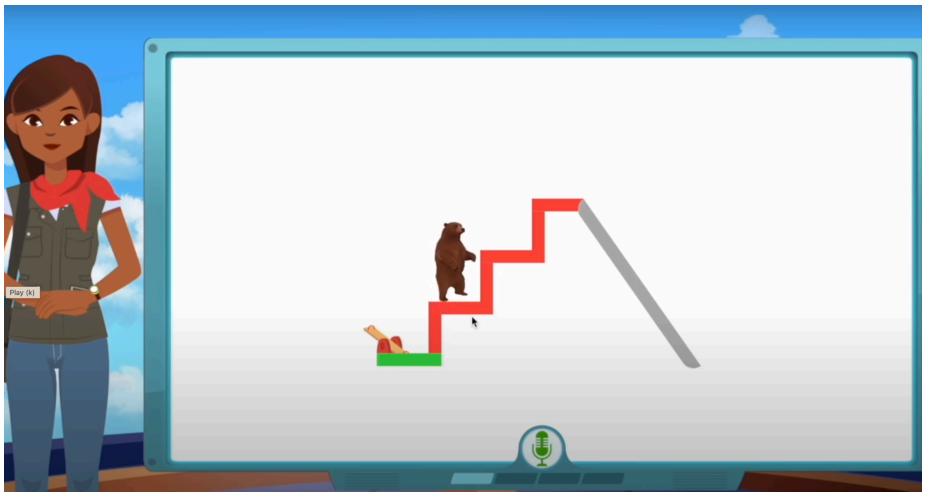


Amira's most frequently used micro-intervention is the Elkonin Sound Box:



Sound Boxes have powered effect size in a range of recent research. A study by Schatschneider et al. (2004) found that first-grade students who received instruction in phoneme segmentation using Elkonin Sound Boxes showed greater gains in phonemic awareness and letter-sound knowledge. A study by Bowers et al. (2010) found that using sound boxes in combination with explicit instruction in letter-sound correspondences led to significant improvements in phonemic awareness and early reading skills for struggling readers in first and second grades.

Amira's phonemic awareness tutoring begins with using Sound Boxes and extends far beyond. Interventions like Up & Down provide a range of vehicles for building a student's awareness of sounds as components of words.



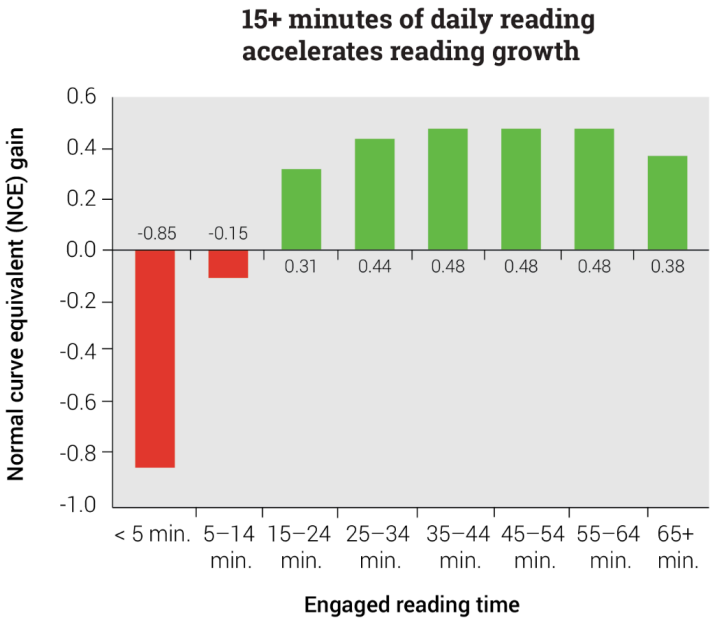
Principles 18-20: Brain-Based How To's

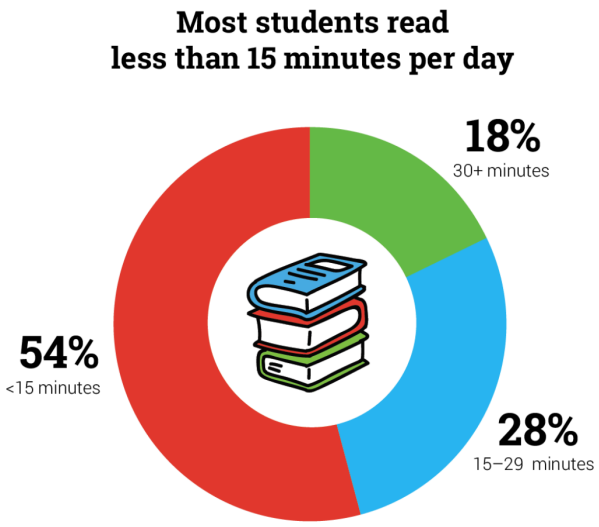
The science has established a few universal imperatives about how to deliver reading instruction. The brain has learned how to learn over millions of years of evolution. Tapping into the brain's strengths and avoiding brain-based learning traps is at the heart of the Science of Reading 'switch' from balanced literacy to structured literacy.

Brain-Based How To's	**Principle 18: Regular dictation builds skills**

IDA: *"Oral reading practice should be a key component of every dyslexia intervention program. Reading aloud helps students learn to decode, develop fluency, and understand what they're reading. Teachers and parents should encourage oral reading practice at home, too."*

IMSE: *"Reading aloud is an important part of a comprehensive reading program. Reading aloud supports the development of fluency, comprehension, and vocabulary."*





"Daily reading practice and the magic of 15 minutes." Renaissance. 23 January 2018,
https://www.renaissance.com/2018/01/23/blog-magic-15-minutes-reading-practice-reading-growth/

Research suggests that when someone reads out loud, they are more likely to engage with the material and remember it better than when they read silently to themselves. This is because reading out loud involves both visual and auditory processing, which helps to reinforce memory retention and enhance comprehension.

One study published in the journal *Memory* found that reading out loud resulted in significantly better memory recall compared to reading silently. Another study published in the *Journal of Educational Psychology* found that reading out loud was particularly effective for improving reading comprehension among children with reading difficulties. The researchers found that when children with reading difficulties read out loud, they were better able to focus on and understand the material.

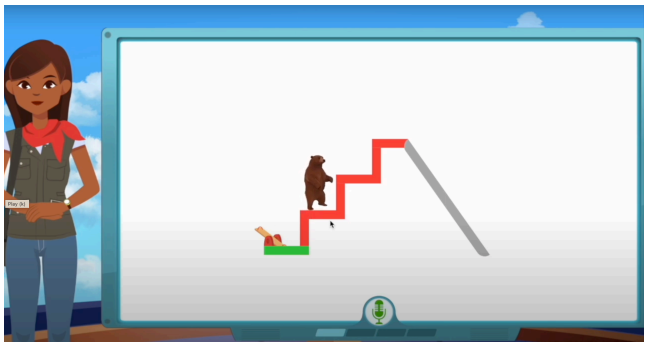
Amira is the only tool in existence that ensures that every student engages in oral reading regularly. Reading out loud to no one doesn't work – students lose focus and purpose. Reading to Amira feels a lot like reading to a friend. It's still hard work, but Amira's scaffolding and feedback make it worthwhile.

Brain-Based How To's	**Principle 19: Use multi-sensory approaches**

IMSE: *"Multi-sensory teaching is one of the most effective ways to teach struggling learners how to read. When students learn using their senses of sight, hearing, touch, and movement, they are more likely to retain and apply what they have learned. Using multi-sensory teaching techniques not only makes reading more enjoyable for students, but it is also a proven method for increasing reading success."*

The brain is a creature of our senses. It evolved in conjunction with our eyes and ears and mechanoreceptors. Efficient and effective mechanisms for building reading tap into all of the learner's senses. Amira is designed to nudge students into using their fingers, looking at explanatory images, hearing chunks of sound, laughing, moving, and otherwise engaging.

Here's one example: in the Up & Down intervention, students see colors to help them understand progress and next steps. They hear the full word and then have to break it into phonemic chunks. They use speech to articulate those phonemes. They use touch and movement to bring the bear down the slide. The intervention is a stew of sensory involvement.

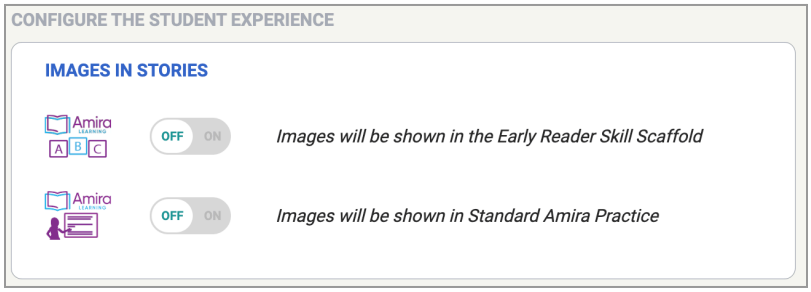


Brain-Based How To's	Principle 20: No cueing

IDA: *"Effective reading instruction involves teaching students to decode words accurately and efficiently by relying on phonemic awareness, phonics, and decoding skills. Strategies that rely on guessing words based on context or visual cues, also known as 'cueing', can impede the development of these critical skills and ultimately limit a student's ability to become a proficient reader."*

TRL: *"Cueing strategies, such as guessing words based on context or picture clues, can lead to inaccurate and inefficient reading, as students rely on incomplete or incorrect information to make sense of the text. This can have long-term consequences for reading proficiency and comprehension, as students may struggle to decode unfamiliar words and comprehend complex texts."*

Amira scrupulously avoids cueing. Because Amira supports importing content, the software even supports a setting which strips any images or pictures out of content authored with visuals.

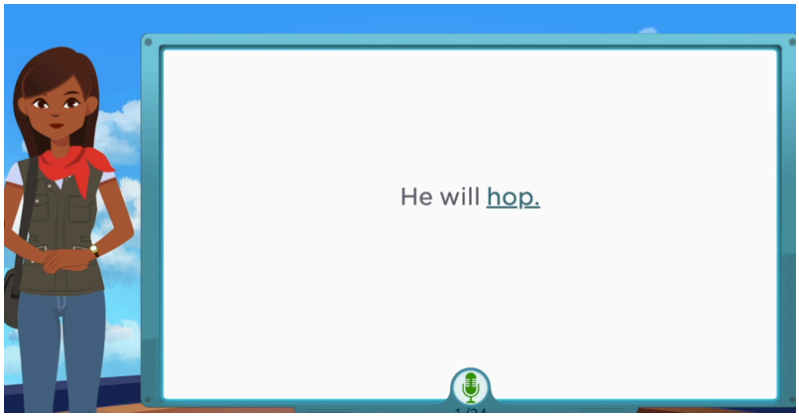


Amira only uses pictures in interventions aimed at building vocabulary and comprehension. As documented in the mass of research, cueing while students are reading is detrimental, while scaffolding comprehension instruction with images is vital.

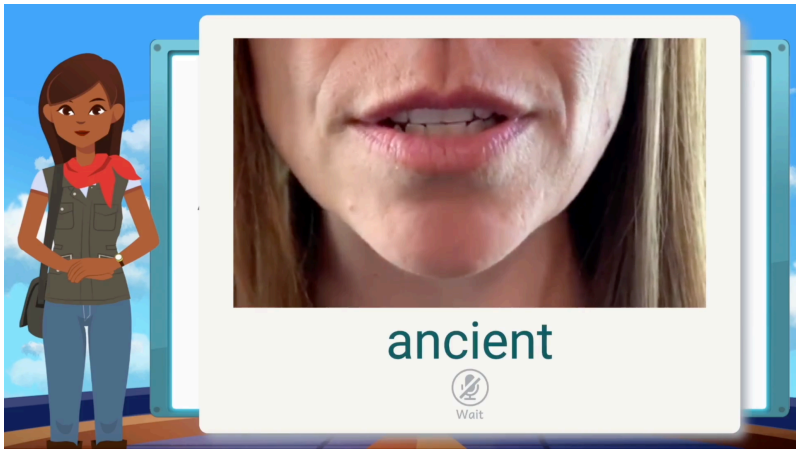
1. "The incorporation of visual materials and graphic organizers into instruction has been shown to improve comprehension for students who are struggling readers." (Denton, Vaughn, & Fletcher, 2003, p. 327)
2. "The use of illustrations in text can aid in comprehension by making abstract concepts more concrete and by making connections between words and their meanings." (National Reading Panel, 2000, p. 4-9)
3. "Illustrations provide a valuable resource for children in building vocabulary and extending their understanding of the world around them." (Sulzby & Teale, 1996, p. 158)
4. "Incorporating pictures into reading instruction can facilitate comprehension by helping students to visualize and remember the meaning of new words and concepts." (Cirino & Pollard-Durodola, 2011, p. 44)

Amira strictly follows the research around pictures – no images are used during oral reading, and images are consistently incorporated into a range of micro-interventions aimed at improving comprehension.

Reading Experience In Amira:



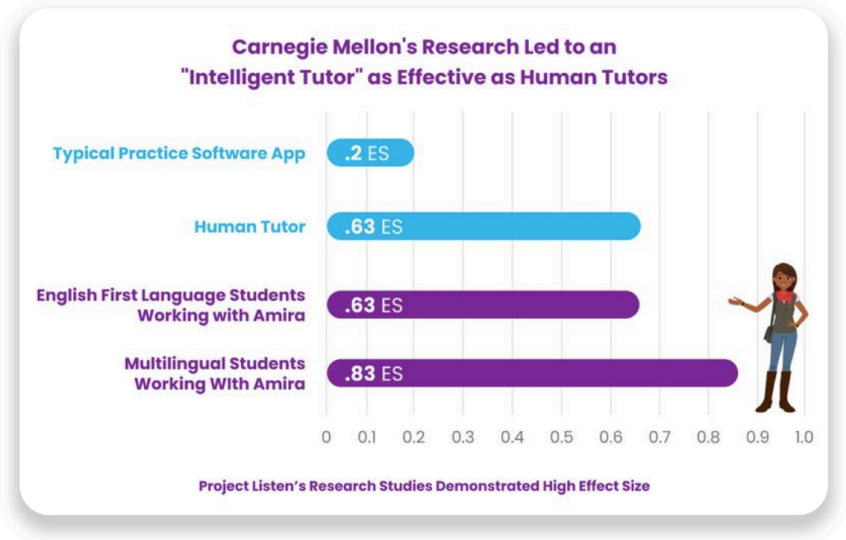
Intervention Experience In Amira:



First Principle Of Science: Do What Works

The entire basis of “the Science of Reading” is to do what the research tells us. A mass of research and real-life experience has demonstrated that Amira accelerates reading growth.

You can find the massive history of research behind Amira here.



You can review the published, independent University research documenting Amira’s effect size on the Amira web site.

You can find independent corroboration of Amira’s efficacy here.

The bottom line is that Amira works. Just as the science tells us that explicit, systematic instruction in phonics is needle-moving, the research demonstrates that Amira’s high-dosage SoR-powered tutoring delivers accelerated growth.