READING EGGS SCIENTIFIC RESEARCH BASE

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Early Literacy Development

The role of early literacy development as the key factor for student achievement in elementary school and beyond is proven. Learning how to read and comprehend a variety of texts is the single most important precursor to success in school, the community and later, their working lives. Students who experience success early in the literacy acquisition process are more likely to make steady progress towards becoming fluent readers who understand what they read. For primary-school educators and administrators, teaching this core skill is a central responsibility with the desired outcome that students achieve success and make continual progress in their literacy development. In order for this to happen, educators need effective research-based programs that help students to progress through the hundreds of skills needed to become fluent readers.

The Key Elements of Reading Eggs

Reading Eggs incorporates a wide variety of effective, research-based, learning activities within a highly motivational framework that help to keep students on task for longer periods of time. Through an interactive Web-based program, the design of *Reading Eggs* uses the following instructional elements that have been shown to be highly effective components of reading programs as evidenced in the research literature:

- an early and continued focus on phonemic awareness and phonics – the alphabetic principle
- building automaticity (instant recall) of a core list of high-frequency sight words
- repetition of activities and re-reading of texts to build fluency
- a wide range of motivational elements
- a variety of instructional formats
- parental involvement
- vocabulary activities that build understanding
- comprehension strategies that ensure reading for meaning is central.

Reading and understanding real books is the goal of every *Reading Eggs* lesson.

Reading Eggs is built on Solid Research

The *Reading Eggs Scientific Research Base* includes an in-depth review of the research literature that supports the wide variety of elements that make up the *Reading Eggs* program. It shows how *Reading Eggs* incorporates this research into all parts of the program from the instructional framework, lesson structure and types of activities, through to the motivational elements and reward structure. As described in the full report, research demonstrates that:

- Phonemic awareness skills provide children with the necessary listening skills to become aware that speech is made up of sounds and these sounds make words, syllables and phonemes. Playing with sounds, listening for phonemes and breaking words into parts are all useful precursor skills for learning to read.
- Ongoing systematic training in phonics skills is an essential part of successful early reading programs.
- Instant recall of a growing number of sight words helps to build fluency and enables students to read for meaning.
- Students need to learn a variety of concepts about print, to understand how books and print work.
- Building vocabulary is an essential part of all reading programs and is particularly important for students from a non-English-speaking background.
- The texts that students read should closely match their reading ability, so that reading is a successful activity where students have enough working memory at their disposal to make sense of what they read.
- Comprehending text and reading for meaning is the core goal of reading – decoding is not an end in itself; it must be coupled with understanding.
- Enjoyment of, and engagement with, instructional activities promotes student achievement and motivation which then increases time on task. Time on task is a key factor in improving reading success.
- Parental involvement improves student learning outcomes and achievement. Online programs that provide continual feedback to parents about their child's progress, make it easy for parents to be involved.

The *Reading Eggs* program combines all of these elements into an engaging, child-friendly world that children enjoy interacting with. The fully integrated playful elements suit the learning style of young children who learn best through play. The program, with a focus on student interaction and a lesson structure that uses a wide variety of short, motivating activities where the student continually earns rewards, encourages even the most reluctant readers to actively participate.

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Reading Eggs is built on the Five Essential Elements of Reading Instruction

The National Reading Panel's report in 2000 set out to review the research into reading instruction to find out 'what works'. Their results highlighted the five essential elements needed for a successful reading program. The *Put Reading First* paper summarised these essentials for teachers.

> *"The Panel reviewed more than 100,000 studies. Teachers can learn about and emphasize methods and approaches that have worked well and caused reading improvement for large numbers of children. It describes the findings of the National Reading Panel Report and provides analysis and discussion in five areas of reading instruction:* ***phonemic awareness, phonics, fluency, vocabulary, and text comprehension****."* (Ambruster, Lehr, Osborne, 2000, p.2)

Reading Eggs incorporates each of the five essential elements (Burns, Griffin & Snow, 1999) into the structure of its lessons. At present, there are 100 lessons and every lesson follows a similar structural pattern. Each *Reading Eggs* lesson is constructed using a variety of instructional and review activities, with 6 to 11 parts, that always include four or five of the essential elements. Early in the program, Phonemic Awareness is a highlighted instructional focus. Later, it may be replaced by phonics instruction (Adams, 1994). These sequential lessons create a bank of progressive learning resources for students ranging from 4 – 8 years of age. Many of the skills covered align with the phonics, spelling and word study continuum as described by Pinnell & Fountas (2010). Students can access these learning activities for an extended period of time as the program is large, comprehensive and its web-based delivery allows students to access it from school and home. As described by Allington (2005) key to effective instructional reading program design is scientifically-based reading activities combined with highly motivational elements. These have been shown to enable students to make ongoing, long term gains in reading, fluency and comprehension.

To illustrate how the lessons work we need to briefly describe one lesson in its entirety. As an example of an early lesson, Lesson One of the *Reading Eggs* program has six instructional lesson parts. The lesson introduces the letter ***m***. It includes a strong instructional focus on the phonic skill of recognising that the written letter makes a particular sound. Also the phonemic awareness skill of being able to hear the sound as part of spoken words is addressed. Lesson parts 1 and 2 use a highly engaging animation starring Sam the Ant who introduces a range of interactive activities to reinforce the letter's sound and its shape and then asks the student to listen for the sound in words. This last phonemic awareness activity is a regular element in these early lessons. Each of these two parts also contains a memorable song that acts as an additional child-friendly way to remember the letter sound. The program often uses multiple memory cues to reinforce a new skill to aid in learning retention; for example in this lesson the letter is linked to the picture of a mouse and Sam eats a cupcake and says mmm.

After the initial lesson animations, Lesson One continues with a variety of interactive activities focusing on letter formation and writing, vocabulary development and reading with comprehension. The third part of Lesson One builds letter formation skills by asking students to complete a dot-to-dot to make the letter m. This links to writing with the kinaesthetic reinforcement of moving the computer mouse to create the letter. Part 4 introduces the letter name with both its lower case and upper case forms. It also makes children aware of how the letter may vary when it appears in different fonts. Part 5 builds vocabulary awareness by introducing and reinforcing the words that will appear in the book at the end of the lesson. Part 6 is the e-book which is one of the 26 alphabet books that appear in the first 41 lessons (Murray, Stahl and Ivey, 1996). Each e-book appears with a cover and pages that turn to mimic the act of reading a real book so that students are gaining book handling skills as well (Clay, 1991). All books are read aloud to the student and act as a model for their own fluent reading of the text. Books are carefully levelled to match the child's reading level (Fountas & Pinnell, 2006) The last part of Lesson One, part 7, is where the child receives a reward for completing the lesson. Even here, there is a link to the lesson's instructional focus in the name of the new *Reading Eggs* critter that hatches out of an egg. Lesson One's fully animated 3D character is named Marshmallow Mouse and if you open up his matching critter card you will find that he is friends with a monkey and a meerkat, eats melons, drinks milk and lives in a mug, all reinforcing the lesson's focus letter sound.

These playful elements of the *Reading Eggs* program combine with the strong instructional focus on the Five Essential Elements of Reading Instruction to create a program that is both educationally rigorous and highly motivating for young learners. Student achievement is fostered by the structure of the program and its use of a wide variety of proven learning strategies (Marzano, Pickering and Pollock, 2001).

Essential Element 1 *Phonemic Awareness*

> *"Phonemic Awareness is the ability to hear, identify, and manipulate individual sounds — phonemes — in spoken words"* (Ambruster, Lehr, & Osborn. Put Reading First, 2000)

Phonemic Awareness has a range of subskills that many children only become aware of in a formal setting. Children are made conscious of them through instructional activities such as word games, language play, rhymes and other activities that develop their skills with words, syllables and the sounds within words – phonemes. Within the *Reading Eggs* program, the Phonemic Awareness sequence of instructional activities includes rhymes, alliteration, splitting and blending syllables into onsets and rimes, phonemic segmentation and manipulation tasks. These skills are developed progressively through the program with a focus on keeping the tasks simple in order to not overload children's cognitive operations and short-term memory as described by Anthony, Lonigan, Driscoll, Phillips and Burgess (2003). Developing these skills can have a significant influence on children's reading and spelling achievement (Byrne & Fielding-Barnsley, 1991).

> *"Researchers found that early knowledge of nursery rhymes was strongly and specifically related to development of more abstract phonological skills and of emergent reading abilities."* (Adams 1994, p81)

Reading Eggs incorporates a variety of Phonemic Awareness activities into the early lessons in the program as well as within the Playroom area. This awareness is developed through structured activities that immerse children in nursery rhymes, listening skills, sound play, and alphabet books (Johnston, Anderson & Holligan, 1996; Yopp & Yopp, 2000). The *Reading Eggs Playroom* area is designed for literacy learners who may have little or no experience of both literacy and computers, (it contains many mouse familiarity activities as well as early literacy activities) who are also often the youngest users of the program (some 30% of *Reading Eggs* at-home users are under 5 years of age). Within the suite of Phonemic Awareness activities, there is a focus on hearing the initial sounds of words and segmenting this sound to make the first phoneme clear to the student. The *Reading Eggs Playroom* also includes a variety of nursery rhymes for children to listen to and sing along with as they watch a simple animation of the story (Maclean, Bryant & Bradley, 1987). This introduces the student to the rhythm and rhyme that are fundamental parts of nursery rhymes and encourages children to memorise these sing-song rhymes so that they become some of the first simple stories that children can recall and retell, another important component for literacy development.

> *"The second best predictor of first-grade reading achievement was the ability to discriminate between phonemes … that correspond roughly to individual letters or graphemic units."* (Adams 1994, p65)
> *"To learn letter-sound correspondences, children must become aware of phonemes."* (p303)

Within the *Reading Eggs* lessons, students are frequently required to listen to two or three words and then choose the one that includes the lesson's focus sound. Often students are asked to focus on initial letter sounds. Other times they are focusing on end sounds, such as in Lesson 3 where students need to listen for the -am sound in words like ram, ham and swam. As researchers state, these phonemic awareness skills are best learnt as part of a larger literacy program such as *Reading Eggs*, where they become a meaningful part of their literacy development (Yopp & Yopp, 2000; Griffith and Olsen, 1992). These skills are highlighted in the Common Core State Standards: Foundational Skills K – 5, Standard 2: Phonological Awareness. "They are necessary and important components of an effective and comprehensive reading program designed to develop proficient readers with the capacity to comprehend texts across a range of types and disciplines" (2010).

Another large focus of the program has students work with onsets and rimes such as c-at, b-at, r-at etc., so that they become thoroughly familiar with segmenting words into smaller parts (Treiman, 1985 and 1986). These phoneme manipulation tasks build a student's phonemic awareness skills and also, when combined with phonics, rapidly increase a student's bank of readable words. (Goswami, 1999). As Marilyn Jager Adam states in *Beginning to Read: Thinking and Learning About Print*, this is a high utility strategy, as "nearly 500 primary grade words can be derived from a set of only 37 rimes" (Adams 1994). Rimes are also a useful way to show students how the vowel sounds work as the vowels in 95 percent of rimes "are pronounced the same way in every word in which they are found." (Adams, 1994). As vowel sounds can be a constant source of confusion for young readers, this research finding is a powerful one for literacy instruction. *Reading Eggs* uses rimes as a consistent way to introduce vowels and the different sounds they make within words, such as the letter ***a*** in the words can, cake and car (Wylie& Durrell, 1970).

Essential Element 2 *Phonics*

> *"Three main stumbling blocks are known to throw children off course on the journey to skilled reading. One obstacle is difficulty in understanding and using the alphabetic principle. Failure to grasp that written spellings systematically represent the sounds of spoken words makes it difficult … to recognize printed words."*
> (Snow, C., Burns S., Griffin P et al, 1998 p. 315)

The *Reading Eggs* program takes a synthetic phonics approach with instructional lessons that have an explicit focus of mapping an individual letter, or letter combination, with its appropriate sound. Each letter of the alphabet is introduced in its own lesson with a focus on reinforcing letter-sound relationships and highlighting the alphabetic principle. The program focuses on grapheme-phoneme correspondence knowledge, not for its own sake, but for the purpose of students using their grapho-phonemic knowledge to read words. (Adams, 1994, p. 245; Burns, Griffin & Snow, 1999.)The Phonemic Awareness component of these lessons is a crucial element in reinforcing this phonic knowledge. Lessons build on each other so that by Lesson 9, students are reading their first highly decodable book. All books in the first 60 lessons are highly decodable and provide students with on-level reading material where they can practise the skills learnt in both this lesson and all lessons to date. All words they encounter in the reading books have been introduced and reinforced within the *Reading Eggs* lessons. The *Reading Eggs Story Books* and nonfiction titles are constructed to provide children with opportunities to practise the letter-sound correspondences and sight words they have been learning by reading extended text. (Ehri & Chun, 1996; Ehri & Wilce, 1983). As emphasised by Ambruster, Lehr and Osborn (2000), "a systematic program of instruction provides children with ample opportunities to practise the relationships they are learning". The books are carefully matched to the reader's current reading abilities so as to engender reading success (Clay, 1991; Fountas & Pinnell, 2006).

> *"The primary focus of phonics instruction is to help beginning readers understand how letters are linked to sounds (phonemes) to form letter-sound correspondences and spelling patterns and to help them learn how to apply this knowledge in their reading."* (National Reading Panel, 2000)

As well as the alphabet, *Reading Eggs* includes a comprehensive phonics program that includes instructional lessons on such core phonics skills as working with beginning and end blends, the variety of vowel sounds, dipthongs, consonant letter sounds such as soft c and g, y, silent letters, double letter sounds, word families and multi-syllable word attack skills (Beck, 2006). This clearly defined sequence is outlined in the *Overview of the Levels* tables supplied on the *Reading Eggs* website. These tables show the progression of phonics and phonemic awareness skills, marked as *Letters and Sounds*. How they link to the other content and skills covered, including high-frequency sight words and vocabulary words in other lessons and the program as a whole, is also detailed.

The program also uses some analogy phonics techniques to build up a student's bank of readable words by focusing on word families using different onsets with the same rime. By blending a known rime with a new word onset, students who can read cat, can also read the words bat, sat, fat and mat. This strategy has been shown in Treiman's (1986) research to both improve students' phonics and spelling skills, and also to build their Phonemic Awareness. "Children work first with simple and orthographically regular onsets and rhymes." (Adams, 1994). By doing this they become aware of how to break syllables apart into their component phonemes. The two complementary skills of working with sounds in words and working with letters in words build a child's skill with letters, sounds and words in a profound, multi-sensory way that improves student achievement (Byrne and Fielding-Barnsley, 1989).

Systematic and explicit phonics instruction is an essential component of effective reading programs, especially those programs, such as *Reading Eggs*, that focus on teaching children to read in the first 2–3 years of school. Phonics instruction is a crucial part of the success of these programs and to be systematic and explicit, the *Reading Eggs* program introduces children to a large number of letter-sound relationships in a carefully structured sequence (Ambruster, Lehr and Osborn, 2000). This focus on phonics is embedded in a comprehensive reading program that recognises that phonics instruction is only one part of the reading puzzle and that students need to get plenty of practice using their phonics skills to read words, sentences and whole texts.

Essential Element 3 *Fluency*

> *"Fluency is important because it provides a bridge between word recognition and comprehension. Because fluent readers do not have to concentrate on decoding the words, they can focus their attention on what the text means. They can make connections among the ideas in the text and between the text and their background knowledge. In other words, fluent readers recognize words and comprehend at the same time."* (Ambruster, Lehr, & Osborn. Put Reading First, 2000)

Many skills come together when a student is reading fluently, including knowledge of what a fluent reader sounds like; familiarity with the words in the text; comprehension of the content; and an understanding of phrasing and context. To become fluent with a text, students often need to reread a text a number of times. Research shows this is a useful way to improve both fluency and comprehension. The *Reading Eggs* program has a range of strategies to increase reading fluency including modelled fluent reading of all books, rereading each book and activities that focus on increasing reading comprehension.

"If text is read in a laborious and inefficient manner, it will be difficult for the child to remember what has been read and to relate the ideas expressed in the text to his or her background knowledge." (Ambruster, Lehr and Osborn, 2000)

Many of the instructional activities within the *Reading Eggs* program aim to build automaticity in reading recall of an increasing bank of high-frequency sight words. Sight word recognition is one of the essential skills needed to become a fluent reader. The first 100 high-frequency sight words make up more than 50% of primary level reading texts. To be able to read these words and more instantly is to develop rapid word recognition skills – an essential part of becoming a skilled and fluent reader (Compton, 1997; Freebody & Byrne, 1988; Strickland & Morrow, 1991; Szeszulski & Szeszulski, 1987). There is much evidence that shows that the lack of a known body of high-frequency sight words is one of the major difficulties facing beginning readers. These words need to be mastered, their recall automatic, so that students develop rapid, automatic word recognition skills of an increasing bank of words. (Byrne, Freebody & Gates, 1992; Chall, 1983; Ehri, 1991). This allows students to use their working memory capacity to comprehend the text rather than labouring over decoding every single word. The more words students have in their long-term memory banks, the greater their ability to comprehend written text. (Reid, 1988). Students can then use the majority of their mental processes to read for meaning, gain information and enjoyment from text, add to their word and concept knowledge and their understandings of how texts work. (Mauer & Kamhi, 1996; Perfetti, 1985).

The *Reading Eggs* online *Story Books* reinforce the skills learnt in the previous lesson/s with a story that makes sense and is created using matching high-quality, full-colour illustrations. For the child reading these e-books, there is the perception that they are real books as the pages turn and they resemble paper-based books as closely as possible. These *real books* are read aloud by the narrator who models fluent reading to the child. The child can read along with the voice. The audio can then be turned off for the child to reread the book themselves. The high quality of the illustrations makes reading these books a worthwhile experience for the child so that the end point of reading for meaning is seen as the key goal. These books enhance the student's experience, motivation and, above all, level of achievement, as the learning is placed in the context of reading a book that is at their reading level and is interesting to look at and to read.

At present, the Reading Eggs *program has over 100 books as part of the program. This will grow to more than 200 books as new features and elements are added to the program. "Reading practice is generally recognized as an important contributor to fluency."* (National Reading Panel, 2000)

Essential Element 4 *Vocabulary*

> *"There is much evidence that vocabulary levels are strongly correlated with reading comprehension. (Chall, Jacobs & Baldwin, 1990) Even in the primary grades the range in vocabulary between children with smaller and bigger vocabularies is large."* (Biemiller 2004)

Children come to any reading program with very different vocabulary levels. Initially of course, this vocabulary only exists as listening and spoken vocabulary. The larger a child's speaking and listening vocabulary, the more words they will be able to easily map to their reading and writing vocabularies. Students who come to reading with a very limited English spoken vocabulary have more challenges to face when learning to read (Stahl & Fairbanks, 1986). A program such as *Reading Eggs* needs to accommodate children with a wide range of abilities and acknowledge that some learners may need extra assistance in the realm of vocabulary. The *Reading Eggs* program assists with vocabulary development by ensuring that all content area words are introduced with visual support – a matching picture – to provide context and increase word knowledge and retention. (Adams, 1990; National Reading Panel, 2000). This ensures that young literacy learners are familiar with the words used in any of the *Reading Eggs* texts.

> *"The studies reviewed suggest that vocabulary instruction does lead to gains in comprehension, but that methods must be appropriate to the age and ability of the reader. The use of computers in vocabulary instruction was found to be more effective than some traditional methods. It is clearly emerging as a potentially valuable aid to classroom teachers in the area of vocabulary instruction."* (National Reading Panel, 2000)

As students progress through the *Reading Eggs* program, they will encounter the focused skill lessons in the *Reading Eggs Skills Bank*. This area covers the three core English language skills of Spelling, Grammar and Vocabulary. Research has shown that instruction in these three areas supports both the development of reading skills and one another (Bear & Helman, 2004). Each *Skills Bank* area includes a sequential progression of instructional lessons that build student achievement in spelling, grammar and vocabulary. These lessons support the more than 100 reading lessons that make up the core of the *Reading Eggs* program. The *Skills Bank Spelling Lessons* help to build vocabulary by including sentence activities where students need to understand the meaning of each word as well as learn to spell it correctly. The *Skills Bank Vocabulary Lessons* are a carefully designed program of direct vocabulary instruction for children, aged 5–8 years. Each lesson presents a group of words around a theme and uses a variety of instructional formats to build word knowledge. "Sorting by concepts is a powerful platform for students to learn word meanings" (Bear & Helman, 2004). When students are learning about fruit, adding a new word, such as dragonfruit or pineapple to their vocabulary is going to be easier when linked to the fruits they may already know. By activating students' prior knowledge, the new vocabulary is made more meaningful (Coyne, Simmons and Kame'enui, 2004) and by providing multiple exposures to the new words, the direct instruction is more likely to be effective (Stahl, 1986). Learning about categories and subcategories is one way to learn about the way our world and its language is organised. (Stahl & Stahl, 2004) Giving students access to vocabulary activities as part of a rich learning environment has shown to be a useful way to reduce the gap between students with rich and poor vocabularies (Stanovich, 1986).

Much vocabulary acquisition comes from reading a wide variety of texts and reading storybooks is one of the most powerful means to expand vocabulary. The more children read, the larger their vocabulary. The *Reading Eggs* lessons contain more than 100 e-books and the *Reading Eggs Storylands* area will expand the storybook offering to more than 200 titles.

The *Reading Eggs Story Factory* within *Reading Eggs* provides students with the opportunity to write their own stories using the full-colour art provided as impetus for their story ideas. After a student completes their short story, they can choose to enter it into weekly contests. The best seven or eight student-generated stories each week are then shortlisted and displayed for all to see as the best of the week. All students then get a chance to vote for the best story of the week. These stories use a wide variety of vocabulary, depending on the students' knowledge and skills. The *Story Factory* provides new pictures with a matching vocabulary list each week as a fresh prompt for student writing. This area of the *Reading Eggs World* promotes a wide variety of skills, including building vocabulary in both reading and writing.

Essential Element 5 *Comprehension*

> *"Comprehension is critically important to the development of children's reading skills and therefore to the ability to obtain an education. Indeed, reading comprehension has come to be the "essence of reading," (Durkin, 1993), essential not only to academic learning in all subject areas but to lifelong learning as well* (National Reading Panel, 2000)

By presenting students with a suite of instructional materials within a rich learning environment, *Reading Eggs* creates a meaning-based approach to reading instruction. Each lesson is presented with the same structural features: an introductory instructional animation, followed by a series of activities that build word knowledge and automaticity. The lesson culminates with the student progressing to reading a new book, which can be either an alphabet, story or nonfiction title. The structure highlights the importance of reading extended meaningful text within the program. This integrated instructional cycle is shown to increase student motivation and levels of student achievement (Guthrie & Wigfield, 1997; Guthrie, Wigfield, Metsala & Cox, 1999).

> *"Instruction in comprehension can help students understand what they read, remember what they read, and communicate with others about what they read."* (Ambruster, Lehr and Osborn, Put Reading First, 2000)

A number of comprehension strategies have been shown to be effective in improving student achievement. When students are using the five most effective comprehension strategies, they can monitor their own comprehension, answer questions, use graphic organisers, generate questions, and recognise story structure. (Ambruster, Lehr and Osborn, 2000; Duke & Pearson, 2002.)A variety of comprehension strategies are highlighted within the *Reading Eggs* program. Students need to monitor their own comprehension when they complete activities and revisit texts previously read, but which are now shown to them in an incomplete format. In these activities students have to understand what they read to be able to correctly complete the texts. At the sentence level, students are regularly asked to recreate sentences that have become muddled. This activity focuses students on the syntactical structure of a sentence and how it is put together to make sense (Clay, 1990; 1991, 1993).

At the text level, students need to answer questions about texts to learn more about what they have read. Students learn about story structure by completing sequencing activities and when they re-order stories into their correct sequence. Writing stories within the *Reading Eggs Story Factory*, helps students learn about the structure of stories.

Reading Eggs includes a wide range of motivational elements

> *"Common sense and cognitive theory concur: Interest and engagement lead to robust learning." (Edelson and Joseph, 2001)*

Increasing students' motivation to complete learning activities and continue working through a program is an essential part of the construction of any instructional program (Ames, 1992; Huitt, 2001). This becomes even more essential in an online environment. Many students see technology-based programs as inherently motivating (Kulik & Kulik 1991; Relan, 1992). Other students may need extra motivational elements to prompt them to return to a website, as they may be completing work in a variety of settings including school, after school or home settings. *Reading Eggs* recognises the importance of student motivation in improving student learning outcomes and takes seriously the task of creating age-appropriate, motivational elements that will increase students' time-on-task (Taylor & Aldeman; 1999 Hannover, 1998; Nenniger, 1992; Schiefele, 1991). These age-appropriate reward systems focus on activities that children enjoy and that are part of the positive experiences that they may have already experienced during their time on non-educational, child-focused websites. The reward systems are high-interest, compelling and child-centred and are activated on completion of learning activities and at the end of lessons and maps (sets of 10 lessons). When students are motivated and interested in the material they are learning, they make greater connections between topics and can recall information more effectively (Alao & Guthrie 1999; Alexander, Kulikowich & Jetton, 1994; Guthrie and Wigfield, 1997).

There are many effective elements that can increase student motivation and interest within instructional learning environments. To increase student motivation, learning programs should be designed to: increase students' competence and levels of success (Ryan and Deci, 2000); make instruction meaningful by ensuring high levels of context (Biancarosa & Snow, 2004; Dole, Sloan & Trathen, 1995; Guthrie et al., 1996); reward higher levels of performance (Reeve & Deci, 1996); provide students with a high-interest variety of learning experiences (Ivey & Broaddus, 2000).

> "*People working with individual interests are motivated learners, in the sense that their activity appears purposeful, sustained, and ever deepening." (*Renninger, 2000)

Young children have a real desire to learn to read and if they are supported and successful in their efforts, this interest and desire will continue to grow. *Reading Eggs* helps to develop this intrinsic motivation by creating an instructional environment that embeds instruction in game-like activities. These instructional activities encourage children to play as they learn and when they succeed, children are rewarded with a variety of rewards. At an activity level, children are rewarded with *Golden Eggs* at the completion of each short activity. These get banked into their personal *Eggy Banks* for them to spend later on games, clothes for their avatar (individual online character) and house furnishings for their online house. This is a rich reward system that promotes student engagement and interest. (Patall, Cooper & Robinson 2008). As students see the golden eggs land in their *Eggy Bank*, they begin to learn the link between rewards and competence (Harackiewicz, J. M. 1979).

In addition, *Reading Eggs* rewards students on the completion of each lesson with a 3-dimensional, fully animated critter that hatches out of an egg. Each critter is a unique, fictional character with traits and interests, and as each new one hatches, it's added to the child's growing online collection of critters. Wanting to find out which critter is going to hatch out of this lesson's egg is very motivating for young children and research shows that this sort of element can be more motivating than positive performance feedback alone (Harackiewicz & Manderlink, 1984; Hidi 1990; Krapp, Hidi & Renninger, 1992) reports on the variety of experiments that reveal the positive impact of interest on engagement, attention and learning outcomes. After every 10 lessons, students complete a 20-question, multiple-choice assessment test which, if they pass, rewards them with a printable certificate with their name, at either a gold, silver or bronze level, depending on their score. These provide students with personalised recognition of their academic accomplishments and can be a strong motivator to improve student achievement (Marzano et al. 2001; Soe, Koki, & Chang, 2000). The wide variety of rewards within the program (Guthrie & Davis, 2003) and the highly interactive nature of the learning activities make *Reading Eggs* a compelling learning experience for young learners.

Reading Eggs encourages parental involvement

> *"There is substantial evidence that family engagement in children's learning is beneficial."* (Redding 2006)

Research shows that if parents are more involved in their children's education, either at home or at school, students achieve at higher levels over a sustained period of time. (Fan & Chen, 2001; Ferhmann, Keith and Rimmers, 1987; Hoover-Dempsey & Sandler 1995 and 1997; Miedel & Reynolds, 1999; Stevenson & Baker, 1987). When instructional environments are web-based, they provide the flexibility to allow parents to be involved in their children's academic success by making it easier for parents to access student reports and also to be involved at a time of their choosing. With the 24-hour access that the web allows, parents can be involved in the progress of their child on *Reading Eggs* in a variety of ways. They can witness their children's learning successes on the computer as they watch them work through their lessons. Parents can also receive feedback on their child's progress with regular reports emailed to them and accessed at any time.

Many factors can inhibit a parent's direct involvement in their children's schooling including work, transport and the needs of their other children. The majority of parents are very interested in the academic progress of their child/ren and would like to be more involved in helping their children succeed (Christenson, Rounds, & Gorney, 1992; Englund et al., 2004). A program such as *Reading Eggs* can bridge this gap between school and home and allows parents to be involved in improving their child's learning progress. The program can be accessed at home or at school, or in after-school settings or libraries, thereby enabling parents to actively participate in their child's education. Many parents favour the Internet as the best avenue for them to be more involved with their child's schooling (Bouffard, 2006; Lishka, 2002;). A web-based platform can improve communication between the three partners involved in a child's education; the child, the parent and the school, (Georgiou, 2007; Marshall & Rossett, 1997) and encourages higher expectations as well as increased interest in a student's academic progress.

There are a number of ways that the *Reading Eggs* program actively encourages parent involvement. The program contains a Parent Dashboard, where parents can access detailed summaries of their child's progress through the program. This includes knowing how many: lessons their child has completed, books they have read, stories they have written and what score they achieved on each assessment test/ end of map quiz. Whenever their child completes a set of 10 lessons and completes the end of map assessment test, an email is sent to the parent (this is an opt-in option) that informs the parent of their child's progress. Parents also receive an email when their child submits a story to the *Story Factory* weekly competition. Every story a child submits to the *Story Factory* competition is also saved as an e-book in the bookshelf in their *Reading Eggs House*. Parents can then also access their child's self-authored storybooks. The range of feedback mechanisms included in the *Reading Eggs* program can increase parental involvement in their child's schoolwork and academic progress which has been proven to boost student achievement.

References

Adams, M. J. (1994). *Beginning to Read: Thinking and Learning about Print.* The MIT Press.

Alao, S. & Guthrie, J. T., (1999). Predicting conceptual understanding with cognitive and motivational variables. *The Journal of Educational Research*, 92, 243–254.

Alexander, P.A., Kulikowich, J.M., & Jetton, T.L. (1994). Subject-matter knowledge: The influence of situation and motivation. *Review of Educational Research,* 64, 201-252.

Allington, R. L. (2005). *What really matters for struggling readers: Designing research based Programs* 2nd Edition. Allyn & Bacon.

Ames, C. (1992). Classrooms: Goals, Structures, and Student Motivation. *Journal of Educational Psychology, 84(3), 261–271.*

Ambruster, B. B., Lehr, F., & Osborn, J. (2000). *Put Reading First: The Research Building Blocks for Teaching Children to Read*. National Institute for Literacy.

Anthony, J. L., Lonigan, C. J., Driscoll, K., Phillips, B. M., & Burgess, S. R. (2003). Phonological sensitivity: A quasi-parallel progression of word structure units and cognitive operations. *Reading Research Quarterly, 38, 470–487.*

Bear, D. R., & Helman, L. (2004). Word study for vocabulary development in the early stages of literacy learning. *Vocabulary Instruction: From Research to Practice, 41–55.* The Guildford Press, NY.

Beck, I. L. (2006). *Making Sense of Phonics, The Hows and Whys*. The Australian Council for Educational Research (ACER).

Biancarosa, G., & Snow, C. E. (2004). *Reading next—a vision for action and research in middle and high school literacy*: A report to Carnegie Corporation for New York.

Biemiller, A. (2004). Teaching vocabulary in the Primary Grades: Vocabulary Instruction Needed. *Vocabulary Instruction Research to practice,* NY:The Guildford Press.

Bouffard, S. M. (2006). "Virtual" parent involvement: The role of the internet in parent-school communication. *Unpublished doctoral dissertation*, Durham, NC: Duke University.

Burns, M. S., Griffin, P., Snow, C. E. (1999). *Starting Out Right: A Guide to Promoting Children's Reading Success.* Committee on the prevention of reading Difficulties in Young Children, National Research Council, National Academy Press.

Byrne, B., & Fielding-Barnsley, R. (1991). Evaluation of a program to teach phonemic awareness to young children. *Journal of Educational Psychology,* 83, 451–455.

Byrne, B., & Fielding-Barnsley, R. (1989). Phonemic awareness and letter knowledge in the child's acquisitions of the alphabetic principle. *Journal of Educational Psychology,* 81(1), 313–321.

Byrne, B., Freebody, P., & Gates, A. (1992). Longitudinal data on the relations of word-reading strategies to comprehension, reading time, and phonemic awareness. *Reading Research Quarterly*, 27, pp. 141–51.

Chall, J. S., (1983) *learning to read: The great debate*. New York: McGraw Hill.

Chall, J. S., Jacobs, V., & Baldwin, L. (1990). *The Reading Crisis: Why Poor Children Fall Behind. Cambridge*, MA: Harvard University Press.

Christenson, S. L., Rounds, T., & Gorney, D. (1992). Family factors and student achievement: An avenue to increase students' success. *School Psychology Quarterly, 7,* 178–206.

Clay, M. (1993). *Reading Recovery, a Guidebook for Teachers in Training*. Portsmouth, NH: Heinemann.

Clay, M. M. (1991). *Becoming Literate: the Construction of Inner Control*. Portsmouth, NH: Heinemann.

Clay, M. M. (1990). *The Early Detection of Reading Difficulties.* Portsmouth, NH: Heinemann.

Common Core State Standards: English Language Arts & Literacy in History/Social Studies,
Science, and Technical Subjects (2010). Council of Chief State School Officers (CCSSO)
and the National Governors Association (NGA)

Compton, D. (1997). Using a developmental model to assess children's word recognition. *Intervention in School and Clinic*, 32, pp. 283-94.

Cooper, H., & Hedges, L.V. (1994). *The handbook of research synthesis*. New York: Russell Sage Foundation.

Coyne, M. D., Simmons, D. C., & Kame'enui, E. J. (2004). Vocabulary instruction for young children at risk of experiencing reading difficulties. *Vocabulary Instruction: From Research to Practice, 41–55.* The Guildford Press, NY.

Dole, J., Sloan, C., & Trathen, W. (1995). Teaching vocabulary within the context of literature.
Journal of Reading, 38, 452–460.

Duke, N. K., & Pearson, P. D. (2002). Effective practices for developing reading comprehension. In
A. E. Farstrup & S. J. Samuels (Eds.), *What research has to say about reading instruction* (pp. 205–243). Newark, DE: International Reading Association.

Durkin, D. (1993). *Teaching them to read* (6th ed.). Boston, MA: Allyn & Bacon.

Edelson, D. C., & Joseph, D. M., (2001). Motivating Active Learning: A Design Framework for Interest-Driven Learning. Downloaded June 2010 from http://www.designbasedresearch.org/reppubs/edelson-joseph.pdf

Ehri, L. (1991). Development of the ability to read words. In R. Barr, M. Kamil, P. Mosenthal and P. Pearson (eds.), *Handbook of Reading Research*. New York: Longman. Pp. 283-417.

Ehri, L. C., Chun, C., (1996). How alphabetic/phonemic knowledge facilitates text processing in emergent readers. *Literacy and Education: Essays in Memory of Dina Feitelson.* NJ: Hampton Press.

Ehri, L. C., Wilce, L. S., (1983). Development of word identification speed in skilled and less skilled beginning readers. *Journal of Educational Psychology 75: 3–18.*

Englund, M. M., Luckner, A. E., Whaley, G. J. L., & Egeland, B. (2004). Children's achievement in early elementary school: Longitudinal effects of parental involvement, expectations and quality of assistance. *Journal of Experimental Psychology, 96,* 723–730.

Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: A metaanalysis. *Educational Psychology Review, 13,* 1–22.

Fehrmann, P. G., Keith, T. Z., & Reimers, T. M. (1987). Home influence on school learning: Direct and indirect effects of parental involvement on high school grades. *Journal of Educational Research, 80,* 330–337.

Freebody, P., & Byrne, B. (1988). Word recognition strategies in elementary school children: Relationships to comprehension, reading time and phonemic awareness. *Reading Research Quarterly*, 27, pp. 13–26.

Fountas, I. C., & Pinnell, G. S. (2006). *Leveled Books K–8 Matching Texts to Readers for Effective Teaching*. Portsmouth, NH:Heinemann.

Georgiou, S. N. (2007).Parental Involvement beyond Demographics. *International Journal about Parents in Education* 2007, Vol.1, No. 0, 59–62

Goswami, U. (1999). Phonological development and reading by analogy: What is Analogy, and What is it Not? *Journal of Reading and Research*, 18, 139–45.

Griffith, P.L., & Olson, M.W. (1992). Phonemic awareness helps beginning readers break the code. *The Reading Teacher, 45*, 516–523.

Guthrie, J. T., & Davis, M. H. (2003). Motivating struggling readers in middle school through an engagement model of classroom practice. *Reading and Writing Quarterly, 19,* 59–85.

Guthrie, J. T., Van Meter, P., McCann, A. D., Wigfield, A., Bennett, L., Poundstone, C. C., et al. (1996). Growth of literacy engagement: Changes in motivations and strategies during concept-oriented reading instruction. *Reading Research Quarterly, 31,* 306–332.

Guthrie, J. T., Wigfield, A., Metsala, J. L., & Cox, K. E. (1999). Motivational and cognitive predictors of text comprehension and reading amount. *Scientific Studies of Reading, 3,* 231–256.

Guthrie, J. T., Wigfield, A. (1997). *Reading Engagement: Motivating Readers Through Integrated Instruction.* National Reading Research Center, International Reading Association.

Hall, C., & Coles, M. (1999) *Children's Reading Choices*. Routledge, NY.

Harackiewicz, J. M. (1979). The effects of reward contingency and performance feedback on intrinsic motivation. *Journal of Personality and Social Psychology, 37,* 1352–1361.

Harackiewicz, J. M., & Manderlink, G. (1984). A process analysis of the effects of performance contingent rewards on intrinsic motivation. *Journal of Experimental Social Psychology, 20,* 531–551.

Hidi, S. (1990). Interest and its contribution as a mental resource for learning. *Review of Educational Research, 60(4), 549–571.*

Hoover-Dempsey, K. V., & Sandler, H. M. (1995). Parental involvement in children's education: Why does it make a difference? *Teacher's College Record, 97,* 310–331.

Hoover-Dempsey, K. V., & Sandler, H. M. (1997). Why do parents become involved in their children's education? *Review of Educational Research, 67,* 3–42.

Huitt, W. (2001). Motivation to learn: An overview. *Educational Psychology Interactive*. Valdosta, GA: Valdosta State University. Retrieved June 2010, from http://www.edpsycinteractive.org/col/motivation/motivate.html

International Reading Association and National Association for the Education of Young Children. (1998) Learning to read and write: Developmentally appropriate practices for young children. *Reading Teachers*, 52, 193–216.

Ivey, G., & Broaddus, K. (2000). Tailoring the fit: Reading instruction and middle school readers. *The Reading Teacher, 54, 68–78.*

Johnston, R. S., Anderson, M., & Holligan, C. (1996). Knowledge of the alphabet and explicit awareness of phonemes in pre-readers: The nature of the relationship. *Reading and writing: An interdisciplinary Journal,* 8, 217–234.

Krapp, A., Hidi, S., & Renninger, K. A. (1992). Interest, learning, and development. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development (pp. 3–26*). Hillsdale, NJ: Erlbaum.

Kulik, C. C., & Kulik, J. A. (1991). Effectiveness of computer-based instruction: An updated analysis. *Computers in Human Behavior, 7,* 75–94.

Lishka, S. (2002). Using the internet to increase parent-school communication: A survey of parent interested and intended use of school web sites. *Unpublished Doctoral Dissertation*, Hartford, CT: University of Hartford.

Lockavitch, J. (1995) *Don't Close the Book on Your Not-yet Reader.* JFL Enterprises Inc, NC.

Maclean, M., Bryant, P., & Bradley, L. (1987). Rhymes, nursery rhymes, and reading in early childhood. *Merrill-Palmer Quarterly,* 33, 255–281.

Marshall, J., & Rossett, A. (1997). *How technology can forge links between school and home.* Electronic School Online.

Mauer, D., & Kamhi, A. (1996). Factors that influence phoneme-grapheme correspondence learning. *Journal of Learning Disabilities*, 29, pp. 259–70.

McGuinness, D., (1998) *Why Children Can't Read and what we can do about it*. Penguin

Marzano, R. J., Pickering, D. J., & Pollock, J. E. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Alexandria, VA: Association for Supervision and Curriculum Development.

Miedel, W. T., & Reynolds, A. J. (1999). Parent involvement in early intervention for disadvantaged children: Does it matter? *Journal of School Psychology, 37,* 379–402.

Mioduser, D., Nachmias, R., & Lahav, O. (2000). Web-based learning environments: Current pedagogical and technological state. *Journal of Research on Computing in Education, 33,* 55–76.

Murray, B. A., Stahl, S. A., & Ivey, M. G. (1996). Developing phoneme awareness through alphabet books. *Reading and writing: An Inderdisciplinary Journal,* 8, 306–322.

National Reading Panel, (2000). Report of the National Reading Panel, Teaching Children to Read: An Evidence-Based Assessment of the Scientific Research Literature on Reading and its Implications for Reading Instruction, 7–17.

Nenniger, P. (1992). Task motivation: An Interaction between the Cognitive and Content-oriented Dimensions in Learning. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The Role of Interest in Learning and Development (pp. 121–149*). Hillsdale, New Jersey: Laurence Erlbaum Associates.

Patall, E. A., Cooper, H., & Robinson, J. C. (2008). The effects of choice on intrinsic motivation and related outcomes: A meta-analysis of research findings. *Psychological Bulletin, 134,* 270–300.

Perfetti, C. (1985). *Reading Ability*. New York: Oxford University Press.

Pinnell, G. S., & Fountas, I. C. (2010). *The Continuum of Literacy Learning Grades PreK–2: A Guide to Teaching*. Portsmouth, NH Heinemann.

Redding, S. (2006). *The mega system: deciding, learning, connecting*. Lincoln, Il: Academic Development Institute.

Reeve, J., & Deci, E. L. (1996). Elements of the competitive situation that affect intrinsic motivation. *Personality and Social Psychology Bulletin, 22, 24–33.*

Reid, K. (1988). Learning and learning to learn. In K. Reid (ed.), *Teaching the Learning Disabled: A cognitive developmental approach*, pp. 5-28. Boston, MA: Allyn & Bacon.

Relan, A. (1992, February). Motivational strategies in computer-based instruction: Some lessons from theories and models of motivation. *In proceedings of selected research and development presentations at the Convention of the Association for Educational Communications and Technology.*

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25,* 54–67.

Schiefele, U. (1991). Interest, learning, and motivation. *Educational Psychologist, 26(3 & 4), 299–323*.

Snow, C., Burns S., Griffin P. (Eds) (1998). *Preventing Reading Difficulties in Young Children*. Washington DC: National Academy Press.

Soe, K., Koki, S., & Chang, J. M. (2000). *Effect of computer-assisted instruction (CAI) on reading achievement: A meta-analysis.* Honolulu, Hawaii: Pacific Resources for Education and Learning.

Spencer, R., & Hay, I., (1998). *Initial Reading Schemes and Their High Frequency Words*. Australian Journal of Language and Literacy, 1998.

Stahl, S. A. (1986). Three principles of effective vocabulary instruction. *Journal of Reading, 29, 662–668.*

Stahl, S. A., & Fairbanks, M. M., (1986). The effects of vocabulary instruction: A model-based meta-analysis. *Review of Educational Research, 56, 72–110.*

Stahl, S. A., & Stahl, K. A. D. (2004*).* Word Wizards all! Teaching word meanings in preschool and primary education. *Vocabulary Instruction: From Research to Practice, 41–55*. The Guildford Press, NY.

Stanovich, K. E. (1986). Matthew Effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21, 360–407.*

Stevenson, D. L., & Baker, D. P. (1987). The family–school relation and the child's school performance. C*hild Development, 58,* 1348–1357.

Strickland, D., & Morrow, L. (1991). *Emerging Literacy: Young children learn to read and write.* Newark, DE: International Reading Association.

Szeszulski, P., & Szeszulski, F. (1987). A comparison of word recognition processes in dyslexic and normal readers at two reading-age levels. *Journal of Experimental Child Psychology*, 44, pp. 364–76.

Taylor, L., & Adelman, H. (1999). Personalizing classroom instruction to account for motivational and developmental factors. *Reading & Writing Quarterly, 15,* 255–276.

Treiman, R. (1985). Onset and rimes as units of spoken syllables: Evidence from children. *Journal of Experimental Child Psychology, 39, 161–181.*

Treiman, R. (1986). The division between onsets and rimes in English syllables. *Journal of Memory and Language, 25, 476–491.*

Wylie, R. E., & Durrell, D. D. (1970). Teaching vowels through phonograms. *Elementary English,* 47, 787–791.

Yopp, H. K., & Yopp, R. H. (2000). Supporting phonemic awareness development in the classroom. *Reading Teacher, 54, 13*—143.

Appendix

No Child Left Behind

"…effective reading instruction includes teaching children to break apart and manipulate the sounds in words (phonemic awareness), teaching them that these sounds are represented by letters of the alphabet which can then be blended together to form words (phonics), having them practice what they have learned by reading aloud with guidance and feedback (guided oral reading), and applying reading comprehension strategies to guide and improve reading comprehension."

National Reading Panel's Essential Components of Reading Instruction

The following excerpts from the National Reading Panel (2000) summary report provide a brief description of each of the five essential components of reading instruction.

Phonemic Awareness

Phonemes are the smallest units composing spoken language. For example, the words "go" and "she" each consist of two sounds or phonemes. Instruction in phonemic awareness involves teaching children to focus on and manipulate phonemes in spoken syllables and words. Overall, the findings showed that teaching children to manipulate phonemes in words was highly effective under a variety of teaching conditions with a variety of learners across a range of grade and age levels and that teaching phonemic awareness to children significantly improves their reading more than instruction that lacks any attention to phonemic awareness. (p. 7)

Phonics

The primary focus of phonics instruction is to help beginning readers understand how letters are linked to sounds (phonemes) to form letter-sound correspondences and spelling patterns and to help them learn how to apply this knowledge in their reading. (p. 8)

The meta-analysis revealed that systematic phonics instruction produces significant benefits for students in kindergarten through sixth grade and for children having difficulty learning to read. The ability to read and spell words was enhanced in kindergartners who received systematic beginning phonics instruction. First-graders who were taught phonics systematically were better able to decode and spell, and they showed significant improvement in their ability to comprehend text. (p. 9)

Fluency

Fluent readers are able to read orally with speed, accuracy, and proper expression. Fluency is one of several critical factors necessary for reading comprehension. If text is read in a laborious and inefficient manner, it will be difficult for the child to remember what has been read and to relate the ideas expressed in the text to his or her background knowledge. (p.11)

The Panel concluded that guided repeated oral reading procedures that included guidance from teachers, peers, or parents had a significant and positive impact on word recognition, fluency, and comprehension across a range of grade levels. (p. 12)

Vocabulary

There are two types of vocabulary—oral and print. A reader who encounters a strange word in print can decode the word to speech. If it is in the reader's oral vocabulary, the reader will be able to understand it. If the word is not in the reader's oral vocabulary, the reader will have to determine the meaning by other means, if possible. Consequently, the larger the reader's vocabulary (either oral or print), the easier it is to make sense of the text. (p. 13)

The findings on vocabulary yielded several specific implications for teaching reading. First, vocabulary should be taught both directly and indirectly. Repetition and multiple exposures to vocabulary items are important. Learning in rich contexts, incidental learning, and use of computer technology all enhance the acquisition of vocabulary. (p. 14)

Text Comprehension

Comprehension is an active process that requires an intentional and thoughtful interaction between the reader and the text. Thus, readers derive meaning from text when they engage in intentional, problem solving thinking processes. (p. 14)

The evidence suggests that teaching a combination of reading comprehension techniques is the most effective. When students use them appropriately, they assist in recall, question answering, question generation, and summarization of texts. When used in combination, these techniques can improve results in standardized comprehension tests. (p. 15)