Literacy Intervention

LANGUAGE! Live

Research Foundation

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Introduction

According to the Carnegie Council on Advancing Adolescent Literacy (2010), the educational system has been able to improve instruction in reading and writing skills of younger students in grades K–3, but has not been able to help adolescent students keep up with the accelerating demands of the global knowledge economy. While the problem is complex, we do know how to improve the low literacy skills of adolescent poor readers, and need to do so if the intent of college and career readiness standards is to be realized. Solutions require age-appropriate, effective, research-based instruction.

This paper introduces the program *LANGUAGE!® Live*. After we describe the extent and the nature of the problems of adolescents who struggle with reading, we discuss the content and instructional strategies for this population that are supported by current scientific research. We then describe the product and its components. We conclude the paper with a discussion of computer-assisted instruction and its benefits for adolescent students. The aim of this paper is not to provide instructions on how to use *LANGUAGE! Live* but rather to provide the research and rationale behind the product.

Consequences of Poor Reading

According to a recent analysis of the consequence of poor reading in adolescence, conducted by the William Penn Foundation (Balfanz & Herzog, 2006):

- Students who enter high school two or more years behind grade level in math and literacy have only a 50/50 chance of on-time promotion to the 10th grade.
- Ninth grade retention is a major risk factor for dropping out of high school.
- Sixth graders who fail English have a 1 in 8 chance of making it to the 12th grade on time.

Other statistics are equally alarming:

- Twenty-one percent of students with learning disabilities are estimated to be five or more grade levels behind in reading by the time they reach high school (National Center for Special Education Research at the Institute of Education Sciences, 2003).
- Every year, nearly 1.3 million students do not graduate from high school on time, and approximately 7,000 students drop out of high school every school day (Alliance for Excellent Education, 2010).
- One-third of juvenile offenders read below the fourth grade level, and about two-thirds of prison inmates are high school dropouts (National Association of State Boards of Education, 2005).

While most reading problems in young children can be attributed to poor foundational skills in phonological awareness, phonic decoding, and automatic word recognition, some students develop reading difficulties later, in the upper elementary grades, when text becomes more difficult and students shift from learning how to read to learning and comprehending new content from text (Leach, Scarborough, & Rescorla, 2003; Slavin, Cheung, Groff, & Lake, 2008). Students may fall behind because they cannot decode multi-syllable words, interpret the vocabulary and sentence structure of academic text, or make the required inferences. Once students fall behind, they are unlikely to progress or catch up unless intensive, appropriate intervention is provided (Deshler, Palinscar, Biancarosa, & Nair, 2007; National Association of State Boards of Education, 2005; Torgesen, 2004). The curriculum continues to move on, but many students do not. Consequently, the differences between the higher- and lower-performing students in any class widen over time (Lyon, 1995). The teacher is faced with a challenging task: How to differentiate instruction for students whose grade-level proficiencies range from nonexistent to academically advanced. Additionally, English learners, who will constitute 25% of the school population by 2020, often come into secondary school with inadequate basic reading skill in either or both their first or second language (August & Shanahan, 2006). Middle and high school teachers who teach four to six classes per day with 25 or more students in each class have great difficulty in meeting the wide-ranging needs of these students, no matter how dedicated and knowledgeable these teachers are.

The Nature of Reading Difficulties in Older Students

When a student falls behind in reading before third grade, or an older student reads at less than a third grade level, the most likely source of difficulty is slow and/or inaccurate word recognition (Boardman et al., 2008; Curtis, 2004; Scammacca et al., 2007). Word recognition problems, in turn, may be rooted in both phonological and orthographic processing difficulties (Dehaene, 2009; Fletcher, Lyon, Fuchs, & Barnes, 2007; Foorman & Torgesen, 2001). Phonological difficulties involve poorly specified memories for the sounds in words and difficulties

with phoneme segmentation. Orthographic processing problems involve poorly specified visual-orthographic memories for the letters and letter sequences in printed words. Word recognition in an alphabetic writing system depends first on phonological processing—the ability to identify, segment, and blend the individual speech sounds in words (Brady, 2011; Ehri, 2004; National Reading Panel, 2000). While phonological skills are crucial to the connection between spoken and written language, orthographic processing is often a concomitant weakness in poor readers. Students may learn to segment sounds, but often have only minimal grasp of how the sounds are represented in print, either for reading or spelling (Moats, 2010), unless they are directly taught how the print system works. Furthermore, and especially in older poor readers, word recognition and spelling depend on fast recognition and recall of syllable spelling patterns, meaningful word parts (morphemes), recurring letter patterns unique to English, and some oddly spelled common words. Students who are to achieve fast and accurate word reading in middle or high school levels must know more than basic phonics.

The majority of adolescent poor readers, then, continue to need instruction in accurate and automatic word recognition (Lovett, Barron, & Frijters, 2013; Vaughn & Fletcher, 2012), at either basic or more advanced levels. Word recognition, however, is not the whole story. Most adolescent struggling readers are also challenged by other essential components of reading: vocabulary, fluency, and many aspects of comprehension (Compton, Miller, Elleman, & Steacy, 2014), and are often unable to access content through reading alone. Between grades 2.5 and 5.0, struggling readers (who may or may not be eligible for special services) who know basic phonics often stumble on vowel correspondences and multisyllabic words—unable to break longer words into syllable chunks, prefixes, roots, and suffixes, or to recognize the vowel sounds represented by vowel teams (ea, oi, ue, etc.) (Archer, Gleason, & Vachon, 2003). When these skills are weak, they limit vocabulary growth, which is essential for comprehending content-laden text in subjects such as science, history, literature, or even math. The words students must recognize independently occur infrequently (Nagy & Anderson, 1984) but are the most important for comprehension across all content areas (Lee & Spratley, 2010; National Institute for Literacy, 2007).

Is it too late to address serious reading deficiencies after students reach middle school? Evidence abounds that it is not too late. Even though it is more difficult to find the time for remedial instruction, older students can be taught and will make significant progress with sustained, intensive, and individualized intervention. While there is strong empirical research supporting supplemental early intervention with students in kindergarten or first grade, a growing body of evidence suggests adolescents' literacy deficiencies can be remedied if these individuals receive direct, explicit, and systematic word recognition, vocabulary, and comprehension instruction (Archer et al., 2003; Calhoon, Sandow, & Hunter, 2010; Lovett, Lacerenza, De Palma, & Frijters, 2012; Snow & Biancarosa, 2003; Vadasy, Sanders, & Tudor, 2007; Vaughn, Gersten, & Chard, 2000). Indeed, computer-assisted instruction that incorporates these instructional approaches with adolescent struggling readers has also yielded promising results (Cheung & Slavin, 2011; Denson, 2008; Papalewis, 2004).

Guiding Principles for Effective Instruction for Adolescents Struggling with Reading

Many prominent researchers (e.g., Archer et al., 2003; Curtis, 2004; Curtis & Longo, 1999; Deshler et al., 2007; Lovett, et al., 2012; Morris et al., 2012; National Joint Committee on Learning Disabilities, 2008) agree on the guiding principles of effective instruction for adolescents who are at basic or below basic levels. According to broad consensus, instruction must:

- be driven by continuous formative assessments and progress monitoring data;
- provide explicit instruction in literacy-related foundational skills;
- honor the students' entering skill levels without insulting them;
- include a focus on higher-level thinking to promote engagement;
- teach the structure and functions of language and provide opportunities for extended discussion of text meaning and interpretation;
- use direct, systematic lessons organized by a logical scope and sequence;
- teach word analysis techniques that include segmenting and blending words by phoneme-grapheme correspondences, syllable patterns, common roots and affixes, and other morpho-syntactic representations;
- provide opportunities for students to build fluency through practice and repeated readings;
- directly pre-teach critical vocabulary that is essential to reading new text;
- explicitly teach comprehension monitoring techniques;
- carefully scaffold instruction to help the student become more independent;
- provide choice to students to increase motivation and active engagement, and to instill student accountability; and
- involve students in peer-mediated learning.

Some recent policy papers (Biancarosa & Snow, 2006; Kamil et al., 2008) heavily emphasize the importance of vocabulary and comprehension instruction with adolescent poor readers, and even discourage instruction focused on word recognition and reading foundations. Empirical research, however, suggests that the fundamentals should receive more emphasis until minimum reading proficiency is reached (Calhoon, 2005; Calhoon & Petscher, 2013; Calhoon et al., 2010; Curtis, 2004). At that point, the instructional focus can shift away from word analysis toward more and more demanding aspects of language comprehension.

Calhoon et al. (2010) compared three year-long intervention programs for middle school students to determine the best organization of the individual instructional reading components (phonological decoding, spelling, fluency, and reading comprehension). Three different formats were implemented daily for a full year with groups of randomly assigned adolescents reading below a 3.5 grade level. After approximately 97 hours of remedial reading instruction, students in the "additive" module outperformed others in decoding, spelling, and comprehension. In the "additive" module, students spent most of their time for the first two-thirds of the program learning a detailed approach to linguistic analysis of words. During the final weeks, the emphasis shifted to fluency and passage comprehension. Once the gaps in foundational skills were closed, students made more rapid progress in passage reading than students for whom that had been an emphasis from the beginning. The results of this unique study have recently been replicated with another middle school population (Calhoon & Petscher, 2013).

Aims of the Program: *LANGUAGE! Live*

With a firm understanding of the difficulties adolescent struggling readers face and knowledge of what it takes to provide effective instruction for this group of students, *LANGUAGE! Live* was created. This hybrid, web-based, and teacher-led intervention provides individualized, engaging, explicit, and systematic literacy instruction to middle school and high school poor readers who are reading substantially below grade level. It aims to promote at least a two-year gain in grade-level reading, resulting in sixth to eighth grade reading levels (depending on the student's entry level) over approximately four semesters of daily lessons averaging 90 minutes each. The program targets and remediates gaps in the foundational language skills that enable reading, including:

- conscious awareness of speech sounds in spoken words;
- analysis and spelling of written words by phoneme-grapheme correspondence, syllable, and morpheme;
- achievement of sufficient reading fluency to support comprehension;
- recognition and use of word meanings (vocabulary);
- understanding of grammar, syntax, and usage for speaking, reading, and writing;
- comprehension of informational and narrative text; and
- written expression.

The complete program targets an eighth grade reading level outcome, guided by several realities. The normal trajectory of growth in basic reading skill, as measured by fluency rates and word recognition skills, reaches a plateau at about sixth grade level (Fletcher et al., 2002). At that point, students achieve a fluency rate of approximately 120 words correct per minute or more. Fluency rates thereafter increase very gradually through eighth grade, as reading skill depends more and more on verbal comprehension (Schatschneider et al., 2004; Vellutino, Tunmer, Jaccard, & Chen, 2007). After basic reading skills are acquired, growth in reading depends on the student's ability to navigate the language and ideas of complex texts.

Once students can read at about a sixth grade level, they can decode the words in academic texts, participate in classroom instruction, read a daily newspaper, surf the Internet, and learn new information from reading (National Institute for Literacy, 2007). The average adult in the U.S., however, reads at about an eighth or ninth grade level. How are the additional gains achieved? Additional gains in reading are achieved by acquiring a wider and deeper vocabulary, more knowledge of the topics under discussion, better inference-making skill, familiarity with the structure of texts, and facility with complex syntax. All of these higher-level language comprehension skills, conversely, depend on the student's fluency and accuracy in reading the words on the page and the amount of time the student spends practicing reading in sufficiently complex, academic text. LANGUAGE! Live addresses all of the critical strands of skilled reading, adjusting the proportion of instructional time spent on each as the student progresses, providing the data-based individualization recommended by Fuchs, McMaster, Fuchs, and Otaiba (2013).

LANGUAGE! Live Components

At each *LANGUAGE! Live* level, there are two major components, Word Training and Text Training. Word Training is the online component of *LANGUAGE! Live* and focuses on the first two strands of explicit language instruction: conscious awareness of speech sounds in spoken words; and analysis and spelling of written words by phoneme-grapheme correspondence, syllable, and morpheme. Putting these two components (phonological awareness and word recognition) online has allowed students in a self-paced environment to master essential foundational skills before starting more advanced word study instruction (Reed & Vaughn, 2010). Since spelling, word recognition, and recognition of meaningful parts of words (morphemes) depend on the same underlying knowledge of language forms and systems, students must learn to analyze words structurally. Focusing on identifying the constituent parts of words will not only improve spelling (Tsesmeli & Seymour, 2009), but also word attack skills and the ability to read fluently for comprehension (Bhattacharya & Ehri, 2004; Ehri, 2014).

Word Training

Word Training, which includes instruction about phonics, syllabification, and/or morphology and syntax, is carried out on the computer and takes one-half of the instructional time (45 of the 90 minutes needed for daily program implementation). Instruction is cumulative, explicit, incremental, and systematic. Video tutorials and short, entertaining skits delivered by an acting team spice up the study of linguistics. Lessons include brief reviews of previously learned materials; explanations of orthography and word structure concepts; word reading practice and word use in context; recorded oral reading; word building; and word spelling activites (encoding). Sight-word recognition games supplement these lessons. A reading library can be accessed if students work through the lessons quickly.

The online component of *LANGUAGE! Live* provides a personalized learning experience that includes social media and other elements designed to enhance student motivation. *LANGUAGE! Live* meets students' innate needs for relatedness, competence, and autonomy with program features driven by the Self-Determination Theory (Niemiec & Ryan, 2009). Word Training lessons are self-paced and encourage self-directed learning. The avatar and profile created by students allow them to extend their personalities online, and establish a feeling of belonging and relatedness. The training updates on the Welcome Page and the Home Page, as well as the Lesson Dashboard, give students a sense of progress and competence when they see they are able to meet the challenge of their work. Use of the social aspects of the online component of *LANGUAGE! Live*, such as peer feedback and posting messages to the class and beyond, increases students' feelings of relatedness and belonging. The Gateways at the end of each unit, along with points earned for tasks completed and trophies earned for mastering skills, all contribute clear feedback to students about their progress, leading to a sense of competence and the likelihood of success. The combination of these elements within the online component of *LANGUAGE! Live* provides an environment where students will be optimistic, engaged, and persistent.

Text Training

Each Text Training lesson is designed to take 45 minutes. Text Training in *LANGUAGE! Live* is teacher-directed, carried out face-to-face in small groups, and includes: several guided readings of each text in the thematic units; in-depth exploration of vocabulary used in readings; direct, incremental teaching of grammar, syntax, and usage; carefully guided "close reading" of texts from different genres; and written expression relevant to the readings. The college and career readiness standards have been addressed throughout the program. In both Levels 1 and 2, there are 12 units. Each unit is organized around theme-centered readings and includes 10 lessons. In accordance with the guiding principles for effective instruction listed previously, the Text Training weaves together, via explicit instruction using graded passages and a logical scope and sequence, the components of reading and writing necessary to address comprehension of complex text. Teacher-guided dialogue and discussion address both the key ideas and details of each text. Even in the Level 1 lessons, when text is read aloud, students must engage in discussion, support ideas with reference to the text, and apply higher-level verbal reasoning skills to analysis and evaluation of the reading's structure and content. In addition to a guided highlighting routine, students learn how to recognize, respond to, and formulate text-dependent questions, and are asked to summarize and compare ideas across and within texts.

Within the units, there is a mixture of age-appropriate literary and informational texts that will hold the attention of students while increasing their knowledge of the world. The majority of the text used in each unit is authentic literature with intrinsic appeal for adolescent readers.

How Many Adolescents Will Benefit from *LANGUAGE! Live*?

On the National Assessment of Educational Progress (NAEP), 27% of eighth and 12th grade students in the United States scored Below Basic in reading, which the NAEP defines as "the partial mastery of the knowledge and skills that are fundamental for proficient work at a given grade level" (National Joint Committee on Learning Disabilities [NJCLD], 2008, "The Problem," para. 1). According to the NJCLD, these students have difficulty with one or more of the following:

- literal understanding of what is read;
- ability to identify specific aspects of the text that reflect overall meaning;
- extension of the ideas in the text by making simple inferences; and
- drawing conclusions based on the text.

At least one in four students nationally, at the middle and high school levels, cannot read with sufficient accuracy and speed to support basic comprehension, and/or they have pervasive weaknesses in oral and written language development. In high-poverty environments and low-performing schools, as many as 70% are not proficient in reading and writing at grade level. According to "The Nation's Report Card: Reading 2011" (National Center for Education Statistics, 2011), only 14% of African American, 18% of Hispanic, and 20% of Native American eighth graders scored at or above the proficient level in reading. The large majority of each group was at Basic or Below Basic. Adolescents who lack reading and writing proficiency will likely be predisposed to "the ranks of unskilled workers in a world where literacy is an absolute precondition for success" (Alliance for Excellent Education, 2010, p. 1).

LANGUAGE! Live provides appropriate instruction for at least 27% of the student population, which is two to three times as many students as will qualify for special education services.

Can Computer-Based Instruction Help Adolescents Struggling with Reading Difficulties?

While there is a growing need for more experimental research on how to improve the reading performances of adolescents struggling with reading difficulties, systematic and explicit computer-assisted instruction (CAI) has garnered promising support. CAI offers relevant, individualized instruction and practice that targets only what each student needs to learn. In addition, an interactive multimedia user interface cognitively engages the student and can motivate and encourage students to actively participate (Schacter,1999; Soe, Koki, & Chang, 2000; Tillman, 2010). In MacArthur, Ferretti, Okolo, and Cavalier's (2001) literature review of 15 years of research on CAI to teach or support students with reading disabilities, several studies supported the use of CAI to improve these students' phonological awareness and decoding abilities. Other literature reviews also support the use of CAI in teaching reading to students who struggle with the basics (Byrd, 2001; Hook, Macaruso, & Jones, 2001). Kulik (1994), using results from 51 independent studies of students in grades 6 through 12, found that CAI led to higher performance on tests, substantial savings in learning time, and more positive attitudes by participating students. While CAI has shown positive effects on students in all grade levels, Cheung & Slavin's (2011) meta-analysis of current studies using supplemental CAI and computer-managed learning systems to enhance reading achievement found that the differential impact of educational technology at various grade levels had a larger use at the secondary level than at the elementary level (mean effect size = .31). CAI looks very promising to help fill adolescent students' gaps in phonological and orthographic processing, decoding ability, fluency, and comprehension.

Computer-Adapted Technology to Support Differentiated Instruction

While research supports educational technology as a powerful bridge to higher reading achievement for students of various reading abilities, recent computer-adapted technology (CAT) programs have offered more encouraging news on improving the academic performance of students struggling with reading in all content-area subjects (Torgesen, Wagner, Rashotte, Herron, & Lindamood, 2010). The *LANGUAGE! Live* hybrid CAT reading program not only engages adolescents in learning that is relevant and meaningful, but also allows educators to better meet the needs of students with diverse abilities by means of differentiated instruction and automated assessments, both necessary components of effective computer-based instruction. *LANGUAGE! Live* follows a very individualized and detailed, researched-based reading development scope and sequence especially designed for each student, and it uses valid and reliable assessment tools to make accurate diagnoses and guide learning to best meet the individualized needs of students regularly receiving lessons. Using individualized instruction and pacing, students will not only develop mastery of relevant content, objectives, and prerequisite skills before new instruction is given, but will also be given multiple opportunities to practice these skills through engaging activities and guided reading of relevant, appropriate text. While struggling adolescent readers have difficulty making academic gains in reading and in content-area group-based

learning environments, CAT implementation can solve this problem by providing tutoring in basic reading skills and the "close reading" of text required by the college and career readiness standards. By monitoring student progress in skills that predict reading success and using student performance data to differentiate instruction, this program helps ensure that each student gains significantly in reading proficiency.

The online Word Training component of *LANGUAGE! Live* is better designed than most programs because the content itself—oral and written language structure—is taught with uncommon attention to linguistic detail. Amusing vignettes and videos pique the students' interest in understanding English. Speech sounds are accurately modeled and contrasted with one another. Spelling patterns are taught with respect to etymology, meaningful affixes and roots, syllable patterns, and grammar. Sufficient practice with each element, as it is used in context, leads to accumulation of skills that transfer to vocabulary and fluent reading for meaning. Correspondences between speech and print are presented as components of a system that, while complex, can be demystified and remembered.

Computer-Adapted Technology to Provide Immediate Corrective Feedback

According to Guskey (1997), "the best feedback to students is immediate, specific, and direct, and it offers explicit directions for improvement" (p. 157). Corrective feedback is a very important component in the *LANGUAGE! Live* learning process, because it facilitates the learner's evaluation of his or her own strengths and weaknesses. While many teachers are able to give occasional one-on-one feedback to students in the classroom, it is unrealistic to expect any teacher to instantaneously evaluate performance and provide immediate feedback to a classroom full of students. CAI is capable of providing immediate, personalized feedback to each student based on each student's performance, including the provision of instructive and consistent corrections, as well as the positive feedback that many struggling readers seldom receive (Hall, Hughes, & Filbert, 2000). In Hall et al.'s synthesis comparing five CAI interventions with different types of feedback (i.e., elaborated, corrective feedback with repeated practice vs. only supplying the students with correct/incorrect responses and moving on), students in the elaborated corrective feedback groups outperformed their peers in the other, more traditional type of feedback, in areas of word reading and comprehension. Adolescents also prefer computer-mediated feedback over teacher feedback because teacher feedback, especially in the classroom setting, has the potential to damage the motivation of students with low self-esteem or high self-consciousness (Kluger & Adler, 1993)—both characteristics associated with poor readers. Therefore, a well-designed CAI program has the potential to benefit the learning processes of poor readers by providing individualized, immediate, objective, and directed feedback without social stigmatizing.

Summary

LANGUAGE! Live responds to and embodies research on adolescent poor readers, on effective instruction, and on the most advantageous use of computer-assisted learning. Students and teachers will find the approach of using a social media-enhanced, personalized learning environment for the Word Training component to be motivating, interesting, and effective. The teacher-directed Text Training component provides text analysis, vocabulary, grammar, and writing skill instruction in small- and large-group settings. The combination of these two components of *LANGUAGE! Live* should promote at least a two-year gain in grade-level reading across approximately four semesters of daily lessons, resulting in sixth to eighth grade reading levels. This level of reading will allow students to access more complex texts, acquire a wider and deeper vocabulary, and become more knowledgeable about their world.

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