



*Research to Support the first Orton-Gillingham-based distance
learning program for students with language-based learning
differences*

**by Gloria Julius, Ed.D.
Chief Learning Officer**

**Calvert Education Services
Hunt Valley, MD 21031**

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Verticy Learning

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Introduction

“The biggest change I’ve seen in my son since beginning the program is his confidence level. At Scouts last night, he was called upon to read a segment about the rights and duties of American citizens. A year ago that would have been a horribly humiliating experience! He wouldn’t have been able to read many of the words and would have been too panicked to even try. Last night he just started at the beginning, did his best, and ended up missing only one word! I had to do my best not to be too obviously proud of him in front of the other Scouts.”

--A parent of a dyslexic child who is enrolled in **Verticy Learning**

In 2006, **Calvert School Education Services** partnered with the Jemicy School in Baltimore, Maryland, to create **Verticy Learning**, the first comprehensive curriculum that addresses the needs of children with language-based learning differences outside of the traditional classroom setting. Since 1906, Calvert School has inspired children to reach their full academic potential by helping parents deliver an expert education in the home setting. Calvert combines current standards-aligned curriculum materials and time-tested instructional methods with high-quality, innovative computer-based technology to educate students in a 21st century learning environment. The detailed, step-by-step daily lessons for the core curriculum are based on the program of study taught at Calvert’s private day school in Baltimore, Maryland.

Since 1973, **Jemicy School**, a private school in Baltimore, has educated bright, college-bound students who struggle to reach success in traditional academic programs. Jemicy School's experience educating students with language-based learning differences has led them to empower thousands of students to realize their intellectual and social potential. Jemicy's highly trained, experienced faculty are proficient in various multi-sensory learning methods that have been proven in their classrooms year after year. These methods are highly successful in helping students with dyslexia learn how to read, write, and spell, despite their learning differences. Not only do they teach foundational skills in the way that works best for students with language-based learning differences, they also establish a stable educational framework to help these students lead a confident and successful academic life. Most importantly, Jemicy educational professionals are able to articulate their pedagogy which facilitated the development of **Verticy Learning** and made these effective techniques available to teachers and parents.

This paper begins by unfolding the instructional purpose and design of the **Verticy Learning** program. The second section offers a sampling of the decades of research studies that have revealed the efficacy of the Orton-Gillingham methodology upon which **Verticy Learning** is based. Results from additional studies support the integration of the technological components into the program. The third section aligns **Verticy Learning** to the research cited in the previous section that informed course design. Included also in this section are results shown by students who participated in the inaugural year which also served as a beta test for continued development. Testimonials from families using Verticy are inserted throughout the text.

What is *Verticy Learning*?

Verticy Learning is a comprehensive individualized, multi-sensory curriculum that is based on Orton-Gillingham methodology and multimodal strategies that for decades have proven to be successful in teaching students with language-based learning differences. While there are other programs that provide supplementary learning using Orton-Gillingham techniques, **Verticy Learning** is the first program that incorporates that specialized instruction into the entire curriculum experience that is designed to be delivered outside the classroom setting. Emphasis is placed on systematic, explicit, direct instruction of concepts and skills supported and enhanced by a teaching approach that includes visual, kinesthetic, auditory and tactile strategies (VAKT). The goal of the program is to help struggling readers become confident, focused, independent readers and writers.

"We ...want to pass on to you that we are seeing fantastic results. This observation is supported by her reading tutor who works as a multi-sensory reading teacher at a local private school for children with learning disabilities specializing in dyslexia. She calls the progress "amazing".

Verticy Learning applies the same educational approach used at the prestigious Jemicy School, where the faculty has successfully taught hundreds of elementary and middle-school students with language-based learning differences over the last 35 years. Jemicy's expert team of instructors has developed dynamic and effective teaching techniques incorporating the time-tested Orton-Gillingham methods of multi-sensory learning. These techniques have been applied to the world-renowned Calvert School curriculum creating a unique and powerful academic program for students who have traditionally struggled with reading. The students receive a comprehensive education as they overcome reading and writing challenges. Valuable computer-based applications are integrated throughout the program to support various aspects of the Verticy program and to help students become proficient, independent readers and writers.

Verticy Learning is designed to be delivered as a home-based instructional program under the direction of a Learning Guide (a responsible adult who is most often a parent) or in school resource rooms as an intervention language arts program for elementary and middle school students. Daily lessons include a variety of interactive activities and resources that are delivered face-to-face, via desktop software, and through web-based tools and learning resources.

Verticy Learning offers a customized comprehensive program with four curricular strands: Phonics/Spelling, Grammar/Composition, Mathematics, and core content (Literature, History, Geography, Science, Art, Art History, Computer Skills and Applications). Phonics/Spelling and Grammar/Composition strands instruct skills on a continuum of four levels: Orange, Yellow, Green, and Red.

Phonics/Spelling. The Orange level of Phonics/Spelling is an appropriate place for beginning level readers who need to focus on vowel and consonant sounds. Throughout this level, students build a solid foundation of phonics and spelling skills, beginning with an introduction to the alphabet sequence and the sound syllable relationship. From



there, students study basic syllable types and division patterns, spelling rules, and vowel teams.

Each subsequent level progresses in a spiraling continuum of new and review through the Yellow and Green levels to the most advanced Red level. At the Red level students practice automaticity and fluency and work to solidify the more complex concepts of reading and spelling, such as syllable division rules, blends, slides, various complex consonant concepts, compound words, and suffixes. (See Table 1)

Level	Orange	Yellow	Green	Red
Intro to the alphabet				
Intro and teach short vowels				
Intro and teach consonants				
review short vowels				
review consonants				
intro to syllable				
closed syllable				
single syllable sight words				
syllable patterns				
spelling rules				
teach or review blends				
slides				
consonant digraphs				
long vowels				
open syllable				
silent e				
simple suffixes/suffixes				
basic vowel teams/ vowel teams				
consonant -le				
r-controlled vowels				
compound words/ double letter compound words				
homophones				
soft letters				
silent letters				
stable final syllables				
prefixes				
final endings				
schwa				
new sounds				
exceptions to rules				
final f to v				
contractions				
confusing pairs				
plurals				
possessives				

Table 1. Continuum of skills presented in Phonics/Spelling levels of **Verticy Learning**

Grammar/Composition. The Grammar strand introduces students to sentence types with correct capitalization and punctuation at the Orange level through parts of speech, singular and plural nouns and verbs, verb tenses, and subordinate clauses until they are able to recognize subject-verb agreement at the end of the Red level. (See Table 2)



The Orange Level of Composition builds basic writing skills with a primary focus on informational writing. At the start of the Composition strand, students begin to write weekly journal entries to understand that composition is simply “thoughts written down”. Application of the four-step writing process progresses through each level. Students learn to use graphic organizer software to record and organize thoughts. They combine sentences into paragraphs and paragraphs into stories, essays, and reports. Each level continues to implement multi-sensory strategies in order to prepare students for more complex grammar and composition mastery. They also begin to proofread their writing. Through the levels of composition study, the students review and master the foundations of quality writing, while adding concentration in publishing, advanced journaling, research, and oral presentations. By the end of the Red level, students are ready to publish and present a research paper. (See Table 3)

Level	Orange	Yellow	Green	Red
Grammar				
intro to sentence				
incomplete sentence, sentence fragment				
complete sentence				
sentence punctuation				
capitalization				
punctuation				
action verbs				
simple subject/complete subject				
verb/predicate				
simple predicate/complete predicate				
statement/declarative				
question/interrogative				
command/imperative				
exclamation/exclamatory				
pronouns				
adjectives				
articles				
pronouns, object and subject				
singular and plural (s/es)				
verbs, tense				
past, present, future				
compound sentence				
connecting words				
adverb				
expand sentences				
time signal words				
being verbs				
verb phrase				
helping verbs				
punctuating direct quotations				
explanatory words				
comma rules				
compound subject				
compound predicate				
proper, common nouns				
pronouns, possessive				
subject compliments				
conjunctions, coordinating and subordinating				
semicolons				
predicate adjectives				
subordinate clause				
complex sentences				
possessive noun as an adjective				
prepositions and phrases				
labeling parts of speech				
interjections				
subject - verb agreement				

Table 2. Continuum of skills presented in Grammar levels of **Verticity Learning**

Level	Orange	Yellow	Green	Red
Composition				
weekly journal entries				
word choice, detailed words				
use illustrations with compositions				
making lists				
organizing ideas				
intro to paragraph				
supporting sentences				
subject				
topic sentence				
concluding sentence				
basic paragraph				
intro to composition				
proofreading				
missing words or information				
example paragraph				
outlining				
reason paragraph				
introductory phrase				
process paragraph				
transition words				
persuasion paragraph				
add details, general to specific				
expand paragraph				
compare and contrast paragraph				
writing using the 5ws				
narration paragraphs				
friendly and thank you letters				
two-three paragraph composition				
creative story				
figures of speech, similes, metaphors				
author's point of view				
book report				
classification paragraph				
strategies for notetaking				
publishing, sharing				
advanced journaling				
researching and presenting				

Table 3. Continuum of skills presented in Composition levels of *Verticy Learning*

Mathematics. *Verticy Learning* includes a customized Verticy Math Companion to complement the *Calvert Math* program. The Math Companion uses Orton-Gillingham methods to introduce new math vocabulary at the outset of each chapter. The Companion also includes interactive games and activities that are designed to reinforce the concepts that are covered in the course.

All teacher and student materials within each instructional strand are included in the course kit. Each instructional strand includes a lesson manual with explicit lesson plans, independent practice materials for students, manipulatives, assorted cards for automaticity practice, and an instructional DVD that demonstrates teaching strategies that are used in the program. Each lesson plan is presented in a consistent framework that includes the materials and books and list of assignments for the day, the learning objective(s) for each lesson, introduction and background including review of previously introduced skills, VAKT activities that extend and support instruction, guided practice, independent student practice, and application. The program provides cumulative reviews after every ten lessons and comprehensive student assessments at the end of every twenty lessons.

Research to Support the Development of *Verticy Learning*

The growing body of research over the last several decades is beginning to demonstrate how children develop reading skills, why some children struggle to learn to read, and what can be done to help all readers achieve proficiency.

How do children learn to read?

Reading is a complex and multifaceted activity. Reading proficiency requires an individual to recognize and manipulate sounds and letters, to recognize combinations of letters in print as words and sentences, to understand the definition of the words, to read a series of words fluently, and, finally, to make sense of those words to garner meaning from the text.

Through its meta-analysis of research studies on the reading process, the National Reading Panel (2000) concluded that for a person to be proficient in reading, five common elements must be present: phonological/phonemic awareness, phonics, vocabulary, fluency, and comprehension.

Phonological and Phonemic Awareness. Phonological awareness addresses the sounds of language. Phonological processing is the ability to segment, blend, and manipulate sounds of speech. Instruction in phonological awareness includes awareness of sound at the phoneme, word, rhyme, and syllable levels. Phonological and phonemic awareness are vital preconditions for attainment of reading and spelling proficiency.

*"This year we are in the **Verticy** program...Our daughter is learning and retaining SO much more. The behaviors. . .reactions to poor treatment have completely stopped. There is no longer a need for OT or therapy that was needed weekly just 6 months ago. She, too, has LD and other challenges, but I see SO MUCH potential now. . .She now feels confident and capable, in part from the interaction with her ATS [Advisory Teaching Service] teacher..."*

Lindamood, & Lindamood, 1993).

The 2000 National Reading Panel report focuses on one component of phonological awareness—phonemic awareness. Effective teaching strategies for phonemic awareness include teaching students to isolate sounds (identify a particular sound in a word); to identify or recognize the same sound in different words; to categorize words by identifying one word that begins or ends with a different sound from a group of words; to segment and blend the sounds in a word; and to manipulate sounds in a word by substituting, adding, and deleting sounds to create new words. Children's phonemic awareness ability is the strongest language-related predictor of success in reading and correlates highly with reading ability through 12th grade (Calfee,

Phonics. The most effective instruction quickly moves the student from phonemic awareness or the awareness of a particular sound, to phonics or the association of that sound with a letter symbol. Once letter symbols are introduced, students should be able

to manipulate the sounds within words by using their knowledge of sound/symbol relationships. The National Reading Panel (2000) concluded that systematic phonics instruction brings about the greatest improvements in reading ability.

Vocabulary. As the student learns to apply phonics skills, he may be able to decode the word, but if a student does not know what a word means, comprehension is often negatively affected. Mapping words to their meanings can help students understand what they read. While much vocabulary acquisition comes from incidental learning, instructional strategies, such as repeated exposure to words, pre-teaching vocabulary, and using context clues, are also effective.

Mastering a collection of high-frequency, or sight, words speeds up fluency and meaning in reading and helps students learn related words. Students need multiple exposures to high-frequency words in order to obtain mastery. Presenting the words in meaningful context, associating them with other known words, and presenting them in an assortment of frameworks, including using mnemonics, are successful instructional practices.

*"I just wanted to let you know the boys are enjoying school every day!! We are seeing small improvements so far. . . I just want you all to know that this program is amazing for my children and me!! I am so glad we found **Verticy!!**"*

Fluency. Samuels (2002) suggests that children who read word by word expend so much energy on word naming that little comprehension results. Samuels, along with other researchers, has shown that repeated practice with familiar reading passages at a child's independent reading level can improve fluency and lead to improved comprehension.

Comprehension. Comprehension is the ultimate goal of reading. Without comprehension, true reading does not occur. One cannot gain knowledge or pleasure from what is read if comprehension is not evident. Comprehension is best taught, practiced, and enhanced when students interact with reading materials at their developmental or instructional level. Using developmentally appropriate materials with comprehension instruction that is direct and explicit and that focuses on a few basic reading strategies can lead to improved reading performance.

Why do some readers struggle?

Members of the National Reading Panel have indicated that phonemic awareness is vital in beginning reading. Some children pick up these concepts easily and quickly begin to read fluently, while others find them abstract and difficult. In order to read a language like English that is based on the alphabet, one must know that written symbols systematically represent spoken sounds. Because the listener hears words as a single unit in spoken language, some children cannot perceive that words are made up of separate sounds. For example, they cannot hear the differences in the onset of two rhyming words. They also may have difficulty separating or segmenting the sounds from one another that would enable them to learn which sounds, or phonemes, are

represented by certain letters. As a result, they may not readily develop reading fluency, resulting in poor comprehension, limited learning, and often a dislike for reading.

If beginning readers read the words in a laborious, inefficient manner, they are concentrating so much on decoding the words that they cannot remember the words that they have read, much less relate the ideas to their background knowledge. Thus, the ultimate goal of reading instruction for children to understand and enjoy what they read may not be achieved. (G. R. Lyons, 2000)

The lack of phonological awareness is found prominently in children who exhibit characteristics of language-based learning differences. Children who are challenged with phonological processing have difficulty retrieving and using phonological codes in memory and have problems storing the information once it is retrieved.

Statistics show that 15-20 percent of the people in the United States have a language-based learning difference. Of the students with specific learning disabilities receiving special education services, 70-80 percent of them have deficits in reading (The International Dyslexia Association, 2009)

What is a language-based learning difference?

A language-based learning difference (LLD) is a language learning disorder that results in deficits in reading, spelling, and often, written language. LLDs are caused by a difference in brain structure that is present at birth and is often hereditary. There are many kinds of learning differences, including dyslexia, dysgraphia, and dyscalculia, and they can affect people in various ways. LLDs affect both genders equally as well as all ethnic and socio-economic backgrounds.

“My son's reading fluency is improving, and his accuracy with word and sentence dictation is increasing greatly. I can see his confidence growing, and he simply beams when I commend him on the fruits of his labors! Thank you!”

Dyslexia is the most common form of an LLD. Students who evidence dyslexia have adequate general cognitive ability but manifest considerable challenges in learning to read by conventional instruction (Critchley, 1970). There is strong evidence that phonemic awareness and phonological coding constitute the prime deficit in dyslexia (Van Orden, 1991). Students with dyslexia also have difficulty with phonics (i.e., the ability to sound out words), making reading less automatic and slower, thus interfering with their reading comprehension. Deficits in phonics make spelling considerably less accurate and automatic because students use the same phonological code to decode and encode, but in different directions.

What works with students who have language-based learning differences?

Although most students do not require special intensive methodology to learn to read, those with dyslexia require explicit teaching in the application of phonologic rules to print (Torgesen, Wagner, & Simmons, 1990). Reading programs that are not

phonologically based fail to provide the dyslexic student sufficient opportunity to practice and learn phonics rules.

Current research, much of which is supported by the National Institute of Child Health and Human Development (NICHD), has demonstrated the value of explicit, structured language teaching for all students, especially those with dyslexia. For example, Lee Swanson (1999) found that direct instruction of learning strategies produced great outcomes with students with learning differences.

Some of the strategies that show the most positive outcomes for students with LLD, or for those with average I.Q. but who were underachieving relative to their peers, use direct, explicit teaching of letter-sound relationships, syllable patterns, and meaningful word parts, and provide a great deal of successful skill practice. Effective instructional approaches include sequencing, drill-repetition-practice-feedback, segmentation of information, use of visual and/or structured presentation media, scaffolding to control task difficulty, modeling problem-solving steps or tasks, presenting cues to prompt strategies, supplementing teacher instruction with homework or tutoring, and directed response/questioning of students.

Effective intervention and remediation programs often contain vocabulary instruction, language comprehension, writing, and fluency-building exercises. Word recognition and spelling skills are meaningfully applied in reading and writing of sentences and text passages. Another important aspect of successful intervention is immediate reinforcement and constructive feedback to students. Instructors discourage guessing at words and skipping words. Instead they teach students to analyze unknown words using the skills that they have learned.

“I am so grateful for this program and the assistance our ATS teacher has provided. It has opened a door that seemed almost impossible (at least too overwhelming) for us to open ourselves. That door is the world of reading for our child. This program has eliminated the feeling of ‘impossible.’ Thank you!”

Multi-sensory experiences also help to anchor verbal information through nonlanguage mental representations. Multi-sensory learning involves the concurrent use of visual, auditory, kinesthetic, and tactile means to enhance memory and learning of written language. By using all of their senses, students with LLD are able to link the various techniques in learning to read and spell. In the early twentieth century, Dr. Samuel Terry Orton suggested that students of all ages would benefit from teaching the fundamentals of sound association with letter forms through both visual presentation and written reproduction.

Because students with dyslexia may have difficulty relating to the logic of language structures, learning objectives should be highly sequential. Comprehension and metacognitive processes need to be taught to aid these students in using language rules mindfully to guide their reading and spelling. These processes often are not intuitive in dyslexic students. The Orton-Gillingham instructional methods are based on each of these theoretical premises. (Oakland, 1998)

What is the Orton-Gillingham Approach?

Programs that make a difference may vary in their techniques, but they have a common philosophy behind them. Most programs that are most effective for students with LLDs include multi-sensory practice for symbol learning. Dr. Orton and his colleagues began using multi-sensory methods in the mid-1920s at the mobile mental health clinic that he directed in Iowa. Dr. Orton was influenced by the kinesthetic methods described by Grace Fernald and Helen Keller.

Anna Gillingham and Bessie Stillman based their original 1936 teaching manual for the “alphabetic method” on Dr. Orton’s theories. They combined multi-sensory techniques with teaching the structure of written English, including sounds, word parts, and common spelling rules. The Orton-Gillingham approach refers to the structured, sequential, and multi-sensory techniques that were established by Dr. Orton, Ms. Gillingham, and their colleagues. Many programs today incorporate methods and principles that were first described in this initial work. Even though the Orton-Gillingham approach has been around for over eighty years, the methodology still proves to be effective with dyslexic students today.

“My son has had a wonderful experience using this program. He loves it. Walls of frustration that impeded his progress with other methods seem to have fallen away. The quality has been consistently excellent.”

The development of reading and spelling skills in students with dyslexia, by definition, is delayed and often remains delayed despite years of instruction. Oakland and colleagues (1998) suggest that three principles facilitate reading development in these children: the provision of a highly structured phonetic-instruction training program with heavy emphasis on the alphabetic system, drill and repetition to compensate for short-term verbal memory deficits, and multi-sensory methods to promote non-language mental representations. Oakland led a study involving 48 students with dyslexia. The 48 students had full-scale IQs that equal or exceed 90 and received greater than 90 on the Word Recognition subtest of the Wide Range Achievement Test-Revised (WRAT-R). Twenty-two students received instruction using an Orton-Gillingham-based program. Twenty-six students received normal reading instruction with support as needed. Instruction occurred five days per week over ten months for two years. Following the two-year program, students displaying dyslexia who were taught using the Orton-Gillingham methods made significant gains in their ability to decode nonsense words, word recognition, and reading comprehension when compared to the control who were taught using reading programs that did not use explicit instruction in alphabetic code. It is important to note that in the tested concepts, the experimental group initially performed lower than the control group, but, ultimately, after two years, performed significantly higher than the control group. Groups did not differ in spelling.

East (1969) conducted a three-year study with one hundred (100) first grade students. All of the students used basal reading texts as their basis. Orton-Gillingham methods were used by trained teachers with the experimental group. East concluded that Orton-

Gillingham techniques were superior in improving word knowledge, word discrimination, and reading comprehension on a variety of assessment tools such as Metropolitan Reading Test, Pitner-Cunningham Primary Test, Draw-a-Man Test, and Slingerland SLD Screening Test. He also found that Orton-Gillingham techniques are of greatest value as a preventative measure before a child becomes frustrated with reading.

Dev et. al (2002) concluded that after two years of intervention using Orton-Gillingham systems of instruction with a group of at-risk rural first graders, participating students showed marked improvement in reading scores, and those considered at risk for reading difficulties at the beginning of first grade no longer needed special education services.

Vickery et. al (1987) reported the results of a four-year study of reading and spelling in both remedial and nonremedial classes in a public school that used multi-sensory methods as recommended by Orton-Gillingham. Following this multi-sensory approach, California Achievement Test (CAT) scores in reading and spelling for students in both settings improved over baseline scores. Additionally, the researchers found a tendency for the CAT mean scores to increase with the number of years that students had been taught using Orton-Gillingham methods.

Ritchey and Goeke (2006) reviewed twelve studies that compared Orton-Gillingham methodology with more traditional interventions. Of the twelve studies, five reported that the Orton-Gillingham instruction was more effective than were comparison interventions for all measured outcomes; four studies reported that the Orton-Gillingham instruction was more effective for at least one outcome; and one reported no significant differences.

Emotions, Senses, and Perceptions. Several researchers have found that emotional responses that are stimulated by arousing events may boost memory by influencing the

brain processes that organize storage of memory (Brown & Kulik, 1977; LeDoux, 1996; McGaugh, 1991). The evidence seems compelling that emotions enhance memory. It is likely that the emotions that are generated by some learning events affect students' perceptions, thus influencing the amount and type of attention given to those events which, in turn, influence the content remembered (Reiser, 1990).

Research shows that people learn through their senses and perceptions. We remember ideas in terms of what we already know. We modify the input, remembering not only what our senses tell us, but what our perceptions make of it (Hunt, 1982; Mackenzie & White, 1982; Maki, 1990). Sensation—what our senses tell us—and perception—how the mind interprets that sensation—are at the base of all memory (Lerner, 1985; Smith, 1983) Not only does perception provide much of what we remember, but it also anchors events in our memory to a particular place and time (Kosslyn & Koenig, 1992). Significant gains in learning and self-concept occur when instructional conditions include students' preferred perceptual modalities. (Abraham, 1985; Allen & Butler, 1996; Callan, 1996; Grout, 1990).

Multimodal Instruction. It is important in planning instruction to differentiate for students who have preference for multiple modalities. Researchers have found that content that is encoded in more than one mode is more likely to be remembered (Mayer & Anderson, 1991; Pavio, 1986; Sadoski et al., 1993). Verbal material is easier to recall if it is linked with nonverbal material corroborating Orton and Gillingham's theories. Verbal and visual presentations linked together enhance the future recall of information and better problem solving transfer to new situations. Riding & Calvey (1975) found that computer-assisted lessons incorporating animated graphics resulted in higher scores on recall tests of knowledge, comprehension and application. Training students to use graphic organizers such as mind maps, Venn diagrams, time lines, and flow charts can aid in meaningful learning in a variety of content areas and across grade levels (Clarke, 1991; Jegede et al., 1990; Martin, 1991; Okebukola, 1992)

Carbo (1983) found that students with strong auditory and visual preferences tend to perform well in reading, while those with kinesthetic preferences have more difficulty in learning reading skills as they are traditionally taught. Frostig & Maslow (1979) also stressed the importance of movement in learning and of making the child an active, motivated learner by integrating perceptual modes. Kinesthetic and tactual students like to try things, touch, feel, and manipulate. They remember best what has been done. They need direct involvement in what they are learning and attack problems physically.

Varying teaching strategies to address all sensory preferences increases learning regardless of the individual student's primary preference (Eiszler, 1983). Eiszler (1983) and Dunn (1979) found that using varied multi-sensory techniques has been shown to increase achievement among slow learners who had not progressed with conventional strategies. Thus, by using multi-sensory strategies, teachers can engage and sustain the attention of all students.

"Thanks for all you've done. If the other families are getting as much out of this as we are, you're making a huge difference out here!"

Mnemonics. Researchers have affirmed that the mind remembers best with a mnemonic device (Bellezza, 1987; Scruggs & Mastropieri, 1990). It is thought that mnemonics increase the availability of multiple cues that involve both images and verbal association. Mnemonic devices can be useful in learning abstract concepts as well as concrete content (Levin & Levin, 1990; Mastropiere, Scruggs, & Falk, 1985). Visual mnemonics appear to not only improve a student's rote memory, but also enhance decision making, creative problem solving and analogical thinking (Levin, 1988; Levin & Levin, 1990)

Rehearsal and Repetition. Rehearsal and repetition is extremely important to memory (Herrmann et al., 1987; Herrmann & Palmisano, 1992; Smith, 1983). In order for information to remain in short-term long enough to move to long-term memory, an opportunity for rehearsal is necessary.

Some knowledge acquired through school persists far longer than previously expected, often more than thirty years (Conway et al., 1992). This very long-term memory can persist even with material that has not been used in the interim, particularly if that knowledge is acquired and practiced through “active” learning methods as opposed to “passive” learning methods. Skills or procedural learnings appear especially immune to long-term forgetting. In another study conducted by Bahrck & Hall (1991) the rate of retention for calculus was highest for students who had attained a high level of mastery initially, whether or not they used the material subsequent to their formal schooling.

Use of Graphic Organizers. Inspiration Software, Inc. contracted with the Institute for the Advancement of Research in Education (IARE) to review the theoretical and/or research bases of visual learning and the use of graphic organizers for instruction. IARE reviewed four major areas of literature to determine the effects of visual tools on student achievement, critical thinking, reading comprehension, and writing that Inspiration Software, Inc. had identified as key to its products’ potential effectiveness. The four areas that were reviewed are: 1) learning theories such as dual coding theory, schema theory, and cognitive load theory; 2) benefits of graphic organizers on literacy development that is further defined as vocabulary development, reading comprehension and writing skills; 3) use of graphic organizers for thinking and learning skills including critical thinking, retention, problem solving, and note taking; and 4) use of graphic organizers in other classroom work.

IARE cited 29 scientifically-based research studies in its review to show that a research base seems to exist to support the use of graphic organizers for improving student learning and performance across grade levels, with diverse students, and in a broad range of content areas.

Studies cited in the report affirm that by dual coding in both verbal and nonverbal formats, information is easier to retain and recall. The use of graphic organizers can help students link existing knowledge with new knowledge. Graphic organizers can help reduce the cognitive load on working memory and, consequently, enable more working memory resources to be devoted to learning new material.

*“We were much in the same situation just last year (and the proceeding years) with an IEP and teachers unable to deal or understand. This year we are in the **Verticy** program. Homeschooling has been amazing. Our daughter is learning and retaining SO much more. The behaviors...reactions to poor treatment have completely stopped. There is no longer a need for OT or therapy that was needed weekly just 6 months ago. She too has LD and other challenges, but I see SO MUCH potential now.”*

The report cites a study conducted by Brookbank (1999) and a meta-analysis of 23 studies by Moore & Readence (1984) that conclude that graphic organizers moderately affect vocabulary test scores and help improve reading comprehension. Two studies (Gallick-Jackson, 1997; Meyer, 1995) revealed primary students’ writing skills improved on posttests and writing samples with the use of graphic organizers.

IARE reports findings from studies (Brookbank et al, 1999; DeWispelaere & Kossack, 1996) that indicate that graphic organizers enable students to improve critical thinking

and higher order thinking skills, as measured by teacher observations and student performance on classroom projects. Overall findings of three studies (Bos & Anders, 1992; Ritchie & Volki, 2000; Griffin et al., 1995) indicate that graphic organizers help to improve student retention and recall of information for both elementary and junior high students with learning disabilities. One of those studies found that graphic organizers also help students transfer retention and recall skills to new situations (Griffin et al., 1995)

The report cites five studies (Guastello et al., 2000; Hawk, 1986; Ritchie & Volki, 2000; Simmons et al., 1988; Willerman & Mac Harg, 1991) that focused on the use of graphic organizers to facilitate middle level students' learning of science content. Findings from these studies showed that students using concept maps scored higher on posttests than students receiving more traditional types of instruction.

Other studies corroborated these findings using other content areas. Four studies (Alvermann & Boothby, 1983; Alvermann & Boothby, 1986; Armbruster et al., 1991; Griffin et al., 1995) found that graphic organizers used to organize information from expository texts in social studies helped students to select, organize, and recall relevant information. Students were also able to transfer thinking and learning skills to new situations and content areas. Braselton & Decker (1994) found graphic organizers helped sixth-grade mathematics students improve their problem-solving skills.

Students with learning disabilities typically lack reading comprehension skills and have difficulty comprehending content area texts (Scanlon et al., 1992). For the special population of students with learning disabilities, graphic organizers have been used with success. Seven studies included in this review (Boyle & Weishaar, 1997; Doyle, 1999; Gallego et al., 1989; Gardill & Jitendra, 1999; Griffin et al., 1991; Scanlon et al., 1992; Sinatra et al., 1984) focused on the use of graphic organizers with students with learning

“...he did learn, he even noticed it and was thrilled to see the dramatic improvement on his post test results. It has been an exciting, successful and rewarding year of learning. Thank you for all your efforts in preparing the curriculum.”

disabilities. Results indicate that graphic organizers are beneficial with this population of students. The studies found the use of graphic organizers to be an effective strategy in helping students comprehend content area material, organize information, and retain and recall content, as measured by posttests. Doyle (1999) found students with learning disabilities obtained higher test scores on end of chapter tests if they

used graphic organizers as study tools as compared to traditional linear note taking methods.

All of the studies included in the IARE review showed that using graphic organizers leads to improved student performance as measured by various forms of assessments classroom-based, observation, textbook, and standardized). Graphic organizers also have been found to result in superior student performance when compared with more traditional forms of instruction (e.g., lecture, linear note taking, question/answering).

Use of Assistive Reading Software. Elkind et.al (2002) found that assistive software allowed postsecondary students who had a primary diagnosis of attention disorder to attend better to their reading, to reduce their distractibility, to read with less stress and fatigue, and to read for longer periods of time. It helped them to read faster and to complete reading assignments in less time. In the study the students used assistive reading software that provides a synchronized visual and auditory presentation of text and incorporates study skills tools for highlighting and note taking. Students used the software for most of a semester to read assignments for an English class and in testing sessions. Comparisons were made between normal, unassisted reading and reading assisted by the software. Attention measures, reading speed, comprehension scores, and attitude questionnaire responses were obtained during these sessions. The study results indicate that assistive reading software should be considered as a significant intervention to assist students who have attention disorders and as an accommodation to help them compensate for their disabilities.

Jemicy Research Project

In 2004-05 Jemicy consultants partnered with an urban district to teach and mentor teachers using the phonology strand of an Orton-Gillingham-based program that is used effectively at the Jemicy School. The eight classroom teachers and six instructional support teachers (ISTs) and administrators who were chosen to participate in this training model taught in grades 3-5 special education classrooms in six schools in the district that did not meet Adequate Yearly Progress goals due to special education.

"You've done a fantastic job of refining it down to a simple daily lesson plan for ordinary people to use, and it works! I hope the results are as rewarding for you as they are for me."

During the course of seven months Jemicy consultants conducted an initial three-day workshop for all participants, a half-day workshop specifically for ISTs, lesson modeling, consultation sessions for two hours every other week, and a final follow-up workshop. Lesson plans were provided to the project teachers by the Jemicy consultants.

The sixty-eight (68) students who were enrolled in the project teachers' classrooms throughout the project were special education students with varying types and degrees of learning disabilities in grades three through five in self-contained settings. Students in all of the classrooms had baseline proficient reading scores ranging from 0.0 to 10.4 percent as measured on the state assessments. Students were pretested using the Letter-Word Identification and Word Attack subtests of the Woodcock Johnson Test of Achievement. The range of Grade Equivalent (GE) scores on the Word Identification subtest pretest was 0.0 to 6.9 with an average GE of 2.5. The GE range for the Word Attack subtest pretest was 0.0 to 16.9 with an average GE of 2.6.

Even after a short implementation period of only seven months, most student scores increased in both areas. Post test scores showed an average growth of 1.6 years with a range in GE scores from 0.7 to 18.0 in Word Identification and 0.0 to 18.0 in Word

Attack. Average Word Identification subtest posttest GE scores increased to an average of 3.4, and average Word Attack subtest posttest GE scores increased to an average of 3.9. Eighty-eight (88.0) percent of the students made significant progress in Word Identification with 28.4 percent improving one or more complete grade levels, and 82.4 percent of the students made significant progress in Word Attack with 48.5 percent improving one or more complete grade levels.

Students also learned how to complete independent work when that work was appropriate for their personal knowledge level. Student comments changed from “I don’t know” to “What will I learn next?”

How is *Verticy Learning* Aligned with Current Reading Research?

*“With our child completely “shut down” in school (according to a neuropsychologist report sent to the school) and her needing specialized curriculum and instruction that we couldn’t access we were seeing her self-esteem wither. We felt we had no hope or options until we found **Verticy**. (But we weren’t going to give up!) We received our books this week. The books, supports and integrated technologies are AMAZING! We will do standardized testing at the end of the year as we have for the last three years. I know the growth will be impressive and I look forward to sharing the results with you.”*

Because of the strong research base behind Orton-Gillingham methodology and the success that Jemicy School has had educating thousands of students with language-based learning differences using Orton-Gillingham-based programs, a strong precedent is naturally set for the long-term success of *Verticy Learning*.

Verticy Learning is an individualized, multi-sensory curriculum using Orton-Gillingham methodology and multimodal strategies that for decades have proven to be successful in teaching students with language-based learning differences. The lessons are designed to be delivered in the home or in school resource rooms using a suite of interactive activities and resources delivered both face-to-face, through desktop software, and using web-based tools and learning resources. The instructional program mirrors best practices as defined by years of research as described in studies similar to the

examples that are cited in this document.

Verticy Learning integrates within each lesson the five critical components of reading instruction--phonemic awareness, phonics, fluency, vocabulary and comprehension--as advocated by the National Reading Panel (2000), as well as, spelling, writing, oral language, and listening comprehension. Each component is taught using Orton-Gillingham methodology and other multimodal instructional techniques. Active instructional strategies that are used to introduce and reinforce concepts throughout the program include alpha tiles, missing letter deck, reading deck, spelling deck, word card reading, sight word deck, finger spelling, finger tapping, rainbow writing, and sky writing. These tools and activities promote spelling and reading skills by enabling students to retain information through sensory learning.

Another beneficial component of the program is the scaffolded practice that is embedded in the program. Each instructional routine consistently begins with a review of previously taught skills, and then continues with teacher modeling of a new skill or strategy, active guided practice and independent practice, with frequent progress monitoring checks to establish mastery. In addition to the day-to-day instructional methods that incorporate Orton-Gillingham methodology, **Verticy Learning** includes a collection of interactive electronic and online tools to help students maximize their learning potential.

Each lesson within the early levels of the Phonics/Spelling strand begins with phonological and/or phonemic awareness instruction that is explicit, systematic, and follows the continuum of word types from simplest to most complex. Phonemic awareness activities include sound blending, segmentation, deletion, substitution, and addition. This instruction is not given in isolation, but is linked with phonics instruction. Once students demonstrate understanding of sounds within a lesson, this knowledge is immediately associated with sound/symbol correspondence. To facilitate consistency in sound identification, examples of pronunciations is provided in sound files on the student web portal.

Vocabulary development is supported throughout all **Verticy Learning** instruction. Word meanings are taught along with sounds and used in context in sentences and text. An instructional routine includes introducing the word, providing the word's definition and examples, and checking for student understanding. Prefixes and suffixes are taught to support understanding of word meaning and spelling. Vocabulary is also enhanced in the core literature lessons with instruction in dialogue, story genre, puns, multiple meanings, similes, and figurative language. The Composition program emphasizes word use and vocabulary expansion in sentence design.

*"I sincerely hope the word about **Verticy** reaches all those families that struggled and worried like we did. Your program is much needed... by many."*

Fluency practice is provided through re-reading of familiar words, sentences, and text, and oral practice with controlled readers. At the Yellow level students learn to scoop words and phrases to set the foundation for formal introduction of fluency instruction at the Green level of Phonics/Spelling. At the Red level fluency instruction is more explicit and systematic to improve fluent reading of multisyllabic words, sentence diagramming for understanding phrasing, and voice marks for inflection and expression. Fluency is also practiced using web-based reading programs.

Comprehension instruction is systematically and explicitly addressed in **Verticy Learning's** core literature program. Literature and non-fictional text can be read aloud to students as they develop decoding skills. **Verticy Learning** students have access to literature selections in auditory format through Bookshare to support them as they become independent readers. Students can download audio files so they can listen to the text while following along in the book. Bookshare is supported by the U.S. Department of Education Office of Special Education Programs (OSEP).

In addition, optional Kurzweil assistive reading software is available to allow students to access their science and social studies textbooks electronically in visual and auditory formats. Students hear the words while following along with highlighted text.

To complement and reinforce comprehension instruction using the physical novels and texts that are supplied with each **Verticy Learning** course, students also have access to Reading A-Z.com and RazKids.com. Reading A-Z is an online leveled, guided reading program that allows students to expand their reading and comprehension skills through downloadable books. Reading A-Z provides students with more than 2,200 books including over 700 leveled readers in both fiction and nonfiction, with a variety of genres and text types. Teachers can instantly download and print reading resources that may be needed to meet the learning needs of the students.

RazKids.com offers an extensive online library of original stories that can be read to the students online or the students can read them independently. Developing readers have the opportunity to listen to books, read books, and record themselves reading books written at 27 levels of difficulty. The activities allow students to independently hear fluent reading being modeled, practice reading skills, and check their own comprehension. The students can record and play back their oral reading to check and improve reading accuracy and fluency skills.

Inspiration^R software is integrated into the **Verticy Learning** program to assist students in organizing and drafting ideas for written expression. Kidspiration tools for Orange, Yellow, and Green levels and Inspiration tools for the Red level are used across the curriculum for brainstorming, webbing, diagramming, planning, concept mapping, organizing, and outlining.

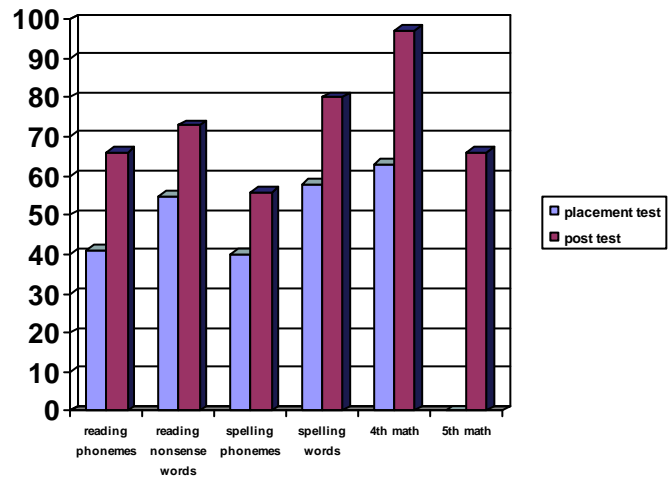
Is *Verticy Learning* effective? Pilot project results

In 2007 a group of forty students who were fourth-grade age participated in a pilot of the Yellow Level of the Verticy curriculum to determine if Verticy Learning showed enough potential to warrant continued development. Prior to entering the program all forty students, who were self-identified as struggling readers, were given an evaluation to determine whether they exhibited learning characteristics that this program was meant to address. The instrument assessed reading phonemes and nonsense words, spelling phonemes and words, and math skills. After the students reached the midpoint of the course (Lesson 80 or beyond), they were asked to participate in an interim evaluation to indicate growth for the students in the assessed areas. Seven students voluntarily responded to a request to participate in an interim evaluation. All seven students showed growth in four of the five areas—reading nonsense words, spelling phonemes, spelling words, and

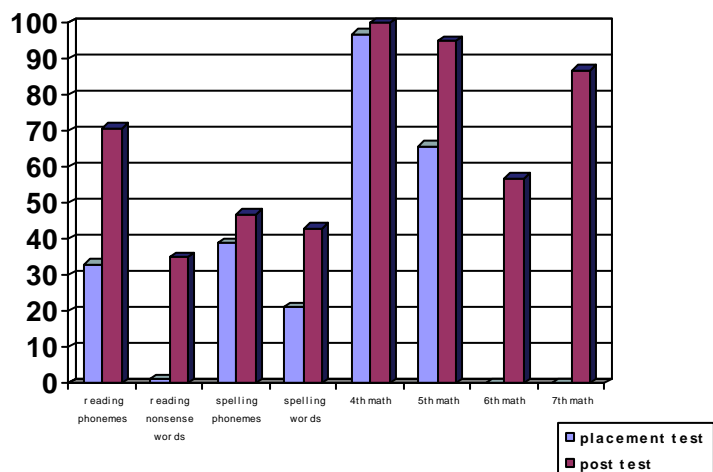
“...This is the end of our third week and we have seen drastic amazing results already. The software is GREAT also, and I don't know what I would do without Kidspiration or Kurzweil. What a life saver.”

fourth or fifth grade leveled math skills. Five of the seven students showed growth in the fifth area of reading phonemes. The graphs that are shown indicate the growth shown by three of the students in the sample.

Growth in reading nonsense words ranged from 8.5 to 335.3 percent from the preevaluation to the interim evaluation with a mean of 93.1 percent growth and median of 32.7 percent. One student whose score was not factored into these numbers read one nonsense word correctly on the preevaluation and read 35 nonsense words correctly on the interim evaluation which calculates to 3400 percent growth! Growth in spelling phonemes ranged from 20.5 to 102.7 percent with a mean of 44.8 percent growth and a median of 34.3 percent. Growth in spelling words ranged from 37.9 to 244.4 percent with a mean of 121.0 percent and median of 122.0 percent. Growth in reading phonemes ranged from -7.1 to 115.2 percent with a mean of 50.4 percent growth and median of 60.1 percent. Two students showed a slight decline in scores for reading phonemes.



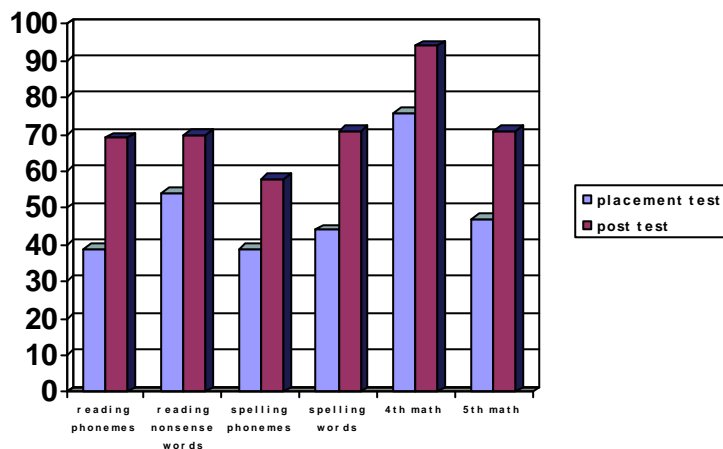
On the preevaluation, each of the students placed at or above the fourth grade level in math. Growth in fourth grade level math from the preevaluation to the interim evaluation ranged from 3.0 to 147.2 percent with a mean of 63.8 percent and median of 38.8 percent growth. The student who showed 3.0 percent growth had scored 97 percent on the grade four preevaluation and 100 percent on the grade four interim math evaluation. That student was working on fifth grade level math during this study and showed 43.9 percent growth at the fifth grade level from the preevaluation to the interim evaluation. In addition, this student scored 57 percent and 87 percent on the interim evaluation at sixth and seventh grade levels of math respectively compared to 0.0 percent on the preevaluation at each of those levels. Three other students showed from 51.1 to 126.1 percent growth in fifth grade level math skills.



Limitations and Conclusions

Because only 17.5 percent of the pilot students chose to participate in the interim evaluation, caution is recommended when generalizing the results; however, the gains that these students made, along with unsolicited testimonials that were presented from parents of the students who have participated in the program led to the conclusion that expansion of the continuum to at least three additional levels was warranted. Four levels of the continuum of ***Verticy Learning***

were made available in Fall 2009. Planning is underway to develop a transition level beyond the Red level to move students into the mainstream as well as a toolkit with learning strategies for mainstreamed students in high school and beyond.



Further Study in Progress

Verticy Learning staff continue to collect and analyze achievement data and comments as students complete the program. ***Verticy Learning*** staff is currently collaborating with researchers from Johns Hopkins University Center for Technology in Education to conduct more in-depth evaluation and longitudinal study.

Conclusion

Verticy Learning is the first program for students with language-based learning differences that is specifically designed to be implemented in a homeschool or distance learning environment. It can also be implemented in a resource room in a brick-and-mortar school setting. This unique comprehensive instructional program integrates best specialized research-based practices with long-standing experience in developing a rigorous, world-renowned curriculum so that students who have previously struggled in traditional school settings can now be confident and proficient readers and writers.

This paper summarized the research literature that informed the development of ***Verticy Learning***. Staff continues to collect and analyze student achievement data as the information becomes available. However, no educator can ignore the emotional side of learning. When a student is not feeling successful, s/he will resign from learning. On the other hand, when a student begins to thrive, s/he will be motivated to continue trying. The response from ***Verticy Learning*** families is overwhelmingly positive as

students who had spent their early years in school fraught with failure are beginning to find accomplishment and self-assurance. Inserted through this document are excerpts from many of the unsolicited comments. Identifying information has been extracted to maintain student confidentiality. Spelling, grammar, and punctuation are unedited. Who can attest to the value and worth of **Verticy Learning** better than this?

*“ . . . I have been using **Verticy** since September. . . and I can tell that he is improving already. The curriculum is rigorous and does require a time commitment as well as 1:1 attention from me to him. He is so worth it though...I read most of the science and history to . . . and he reads parts of it. My good friend has her son in a private LD school (similar to Jemicy) this year. She used the Verticy pilot last year. She said that they (his new school) are very impressed with the foundation laid by his **Verticy** education from last year. . .”*

----A parent of a dyslexic child who is enrolled in **Verticy Learning**

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