

# Research Data

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## Elementary school pilot study

*A pilot study of iLs in the following institutions:* **WESTVIEW ELEMENTARY SCHOOL, ROCKY MOUNTAIN ELEMENTARY SCHOOL, THORNTON ELEMENTARY SCHOOL, COMPASS MONTESSORI SCHOOL**

**DATE:** 2008-2009 School Year

### **PILOT SUMMARY**

A total of 20 public school children participated in a 3-month Integrated Listening Systems (iLs) pilot study during 2008-2009 school year. The results include pre- and post-study standardized test scores, as well as teacher comments. This was not a controlled study. Students who were receiving academic intervention or therapy were not taken out of those programs during the iLs pilot period.

The 20 children were selected by the teachers and administrative staff of the 4 participating schools. They were a combination of special education and general education students, some having IEPs and/or a formal diagnoses, others had neither.

### **INTERVENTION SUMMARY**

The iLs program combines specific sound and movement protocols. The sound component is delivered via the iLs "Focus," a portable system which includes processed music loaded onto an iPod and air/bone conduction headphones powered by a mini-amplifier. Each child's iLs program was customized per their specific needs, e.g. sensory motor, attention, auditory processing, etc. All sessions were 1 hour in length, with 3-4 sessions per week. The programs were ~3 months long and were implemented over a 10-week period. All pre- and post-program testing was done within 2 months of the iLs program. Each school used their districts' required standardized tests to measure change. The test results and teacher reports were collected by school staff and consolidated into the case study synopses below.

### **RESULTS SUMMARY**

Teachers reported "significant improvement" in 19 of the 20 children in one or more of the following areas: cognitive functioning, reading, independent task completion and behavior. "Significant improvement" is defined as either achieving substantially higher scores on post-program testing, being transitioned from special education to general education or overcoming a substantial attentional/behavioral deficit based on teacher observation. 100% of the teachers involved in the pilot study found the iLs program to be very effective. 100% of the teachers recommend iLs to other schools as a cost-effective remediation.

### **ROCKY MOUNTAIN ELEMENTARY SCHOOL:** 5 students

"The thing that was really exciting was that all the kids saw huge gains. Especially in the visual perception tests, almost everyone's improvement was off the charts. The confidence change was also across the board. The kids seemed to begin to see themselves as learners whereas before the program many of them saw themselves as losers. Every single child in the iLs program has come and asked to do it again. Every single parent called or came in and has asked to do it again. It's been amazing."

**Ilyne Engel, Rocky Mountain Elementary Physical Therapist and iLs Program Monitor**

### **Boy, grade 1**

Challenge/Diagnosis: LD in the area of reading comprehension, struggling in all academic areas, behavioral concerns in school and at home, very significant attention/focus problems;

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Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total  
Pre/Post Scores:

District Math Assessment – score of 55 > score of 89 (low average range to proficient)

\*Beery Visual Motor – 42%ile > 95%ile

\*Beery Visual Perception – 19%ile > 73% (moderate delay to average range)

\*Beery Motor Coordination – 37%ile > 45%ile (moderate delay to average range)

**Teacher/Parent Comments** - About 1 month into the iLs program, the Reading Intervention teacher, who was unaware of iLs, commented to the classroom teacher that this child seemed more focused and ready to learn. The teacher also commented that his reading change was dramatic, going from being a non-reader to reading better than his peers.

## **Girl, grade 1**

Challenge/Diagnosis: not progressing at same rate as peers; concentration and academic problems  
Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total  
Pre/Post Scores:

District Math Assessment – score of 41 > score of 82 (low average to proficient)

Writing – score of 4 > score of 10 (below grade level to at grade level)

Beery Visual Motor – 87%ile > 94%ile

Beery Visual Perception – 19%ile > 90% (moderate delay to average range)

Beery Motor Coordination – 27%ile > 87%ile (moderate delay to average range)

**Teacher/Parent Comments:** Teachers report significant changes in reading, writing and math as evidenced by student's Beery test score improvement in Visual Perception and Motor Coordination. Her concentration in class is no longer a problem.

\* One of the basic aspects of an individual's ability to think and know (cognition) is how one is able to perceive certain stimuli. Assessing perception skills—how individuals may respond to things they see, hear, and touch—is, therefore, a basic part of assessing cognitive function. The Beery-Buktenica Test, also known as the Developmental Test of Visual-Motor Integration or VMI, measures these perception skills. It's designed to identify deficits in visual perception, fine motor skills, and hand-eye coordination. It may be used to diagnose cognitive development disorders in young children through an analysis of visual construction skills.

## **Boy, grade 4**

Challenge/Diagnosis: LD in the area of reading (2 years behind)

iLs Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total  
Pre/Post Scores:

BRI Reading – 2.0 > 3.0 (2-years behind to 1 year behind)

Beery Visual Motor – 47%ile > 63%ile

Beery Motor Coordination – 53%ile > 59%ile (moderate delay to average range)

**Teacher/Parent Comments:** Student gained one year in reading test scores and his behavior was no longer a problem in the classroom.

## **Boy, grade 3**

Challenge/Diagnosis: Autism

iLs Program: Sensory Motor program; 60 1-hour sessions

Pre/Post Scores:

PALS Reading – score of 2.3 (below grade level) > score of 3.6 (on grade level)

Beery Visual Motor – 42%ile > 84%ile (average to above average)

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Beery Visual Perception – 4%ile > 34% (significant delay to average range)

Beery Motor Coordination – 9%ile > 68%ile (significant delay to average range)

**Teacher/Parent Comments:** Teachers comment that student made major changes during the 3-month iLs program, only some of which are reflected in his academic scores. His reading comprehension went from significantly delayed to average. Unable after trying for 2 years to tie his shoes, by the 8<sup>th</sup> session of iLs he wants to tie his shoes and does so correctly 4 times out of 4. Teachers and parents comment on a dramatic change in his sense of empathy – he now has genuine concern for other people and things – and he is much calmer and more relaxed. The changes have enabled the student to participate in class more effectively, develop relationships, and given him more confidence. His mother has signed up for iLs training with the hope to help others like her son.

### **Boy, grade 2**

Challenge/Diagnosis: LD in the area of speech and language

iLs Program: iLs combined Sensory Motor and Auditory Processing program; 30 1-hour sessions total

Pre/Post Scores:

Dist. Math Ass. – score of 33 > score of 69

Writing – score of 4 > score of 10 (below grade level to grade level)

Beery Visual Motor – 9%ile > 39%ile (significant delay to average range)

Beery Visual Perception – 2%ile > 58% (significant delay to average range)

Beery Motor Coordination – 10%ile > 37%ile (significant delay to average range)

**Teacher/Parent Comments:** For 3 years prior to iLs he showed no change in his Beery tests, remaining in the 2-3% range. During the 3-month iLs program he went from “significantly delayed” to the “average range” in Visual Motor, Visual Perception and Motor Coordination. Teachers report a significant improvement in his self-control, concentration and self-esteem.

### **THORNTON ELEMENTARY: 4 students**

“We’ve had excellent results using iLs with a wide variety of kids – learning difficulties, processing, reading, etc. It’s a structured way to provide a variety of gross motor activities, which is hard to do in a school with limited resources. The fact that iLs can be implemented by a para-professional or a parent is also important in terms of school resources.”

**Jackie Taylor, Thornton Elementary Occupational Therapist**

### **Boy, age 8**

Challenge/Diagnosis: LD in the area of reading comprehension possibly due to an auditory processing disorder

Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total

Pre/Post Scores:

Woodcock Johnson Auditory/Visual Learning gained 1 year 11 months

Woodcock Johnson Retrieval Fluency gain of 2 years 6 months

Woodcock Johnson Decision Speed gain of 3 years 7 months

District Reading Assessment (DRA): Gain of 1 year in reading ability

**Teacher/Parent Comments:** Teacher reports the child made significant gains in reading. After being a beginning reader for three years, he started to accelerate his learning rate over the four-month period, going from reading mostly books with a pattern to decoding and comprehending more difficult material.

### **Boy, age 9**

Challenge/Diagnosis: LD in the areas of written expression and reading comprehension; suspected APD

iLs Program: iLs combined program for sensory motor and attention; 30 1-hour sessions total

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Pre/Post Scores:

Woodcock-Johnson Auditory/Visual gain of 1 year 10 months

Beery Developmental Test of Visual-Motor Integration (copying designs) went from 18%ile to 48%ile

District Reading Assessment (DRA) - Gain of 1 year in reading comprehension over 4 months

Teacher/Parent Comments: Teachers report dramatic change in reading comprehension, quality and quantity of writing as well as verbal participation in class. Student is still receiving special education services and performing slightly below grade level in most subjects, but his ability to sit in class and attend is much improved.

## **Boy, age 5.5 years**

Challenge/Diagnosis: general education student selected for the pilot because seemed to have reached a plateau in learning and pre-reading skills; also showed sensory integration deficits

iLs Program: iLs sensory motor program; 30 1-hour sessions

Pre/Post Scores:

Woodcock-Johnson Auditory/Visual gain of 3 years 5 months

Woodcock Johnson Decision Speed gain of 3 years 3 months

Beery Developmental Test of Visual-Motor Integration (copying designs) went from 12<sup>th</sup> to 19<sup>th</sup> percentile (deficient range to below average)

Scores in letters, sounds, math and writing began at lowest score possible and ended at grade level; now writes as many as 7 sentences at a time using sounds.

**Teacher/Parent Comments:** Teachers report significant improvements in learning ability due to increased ability to focus and concentrate, task on task. Math, reading and writing skills also improved

## **Boy 2, age 5.5 years**

Challenge/Diagnosis: general education student selected for the pilot because seemed to have reached a plateau in learning and pre-reading skills; also showed sensory integration deficits

iLs Program: 30 session iLs sensory motor and attention combined program

Pre/Post Scores:

Woodcock-Johnson: showed 6-12 month gains in Auditory/Visual, Decision Speed and Pair Cancellation

**Teacher/Parent Comments:** Teacher reports improvement in ability to follow instructions, auditory memory, reading and writing; he can now follow instructions given to entire group.

## **COMPASS MONTESSORI SCHOOL – 7 students**

“It was interesting in that we saw huge behavioral and/or academic changes in all of the children in the program. Changes occurred for some children immediately, others not until the end of the program. Those with emotional and self-regulation issues were able to make friends better once they became calmer, which in turn helped their self-confidence. Those who improved academically were so proud of themselves and their newfound abilities that they also became more self-confident. There was some frustration along the way as the kids went through their changes, but in the end it was quite a success. Of course the teachers and parents were really impressed with the results.”

**Ann Webb, School RN and iLs Program Monitor**

## **Boy, age 5**

Challenge/Diagnosis: attention/behavioral and reading problems; parents were asked to have student evaluated for possible sensory integration problems

iLs Program: iLs combined program for sensory motor and attention; 30 1-hour sessions total

Pre/Post Scores: Too young for standardized testing.

**Teacher/Parent Comments:** fewer behavioral issues at school, reading at K level, better focus; teacher informed parents an evaluation is no longer necessary, behavior is fine now

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## **Boy, age 11**

Challenge/Diagnosis: behavioral difficulties at school

iLs Program: iLs combined program for sensory motor and attention; 30 1-hour sessions total

Pre/Post Scores: CSAP scores (Colorado Student Assessment Program) still pending

**Teacher/Parent Comments:** began sleeping and eating better during program, less irritable; parents and teachers have had no further social or scholastic challenges with student since completing the program

## **Boy, age 9**

Challenge/Diagnosis: perceptual communicative disorder; behavior deteriorates when frustrated, esp. with writing;

iLs Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total

Pre/Post Scores: CSAP scores (Colorado Student Assessment Program) still pending

**Teacher/Parent Comments:** Parents and teachers report that mood swings have leveled out, his handwriting and general attitude are much improved. Student found that the iLs program helped him get control of his emotions, which changed his ability to make friends and get along with others. Toward the end of the program, he would ask his teacher for the iLs headphones when he felt himself getting upset.

## **Girl, age 11**

Challenge/Diagnosis: LD in the area of reading and auditory processing; showed deficits in organization, writing and motor skills

iLs Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total

Pre/Post Scores: Follow up standardized testing not available due to child's illness during the end of school year testing.

**Teacher/Parent Comments:** After 10 sessions, student's handwriting was unrecognizable by her parents and teachers. Her organization is much improved both at home and at school. Prior to program she hated reading, now she reads books in her free time with no prompting. Parents also comment on her improved organizational skills.

## **Boy, age 11**

Challenge/Diagnosis: attention deficits, not reading, sensory integration issues, background noise challenge, difficulty staying on track in conversation (auditory processing disorder symptoms)

iLs Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total

Pre/Post Scores: CSAP scores (Colorado Student Assessment Program) still pending

**Teacher/Parent Comments:** Student had a good program and saw very noticeable gains in his concentration and his processing abilities. He underwent an emotional period mid-program for a few days which caused concern among the teachers. (Note: a brief, 2-3 day, period of regressive behavior is not uncommon in iLs programs as one undergoes a 're-organization' period.) Teachers comment he is now more focused and better able to adapt to social situations. He is making friends more easily and feeling self-confident. Although he is acting at a more age appropriate level, teachers feel he could benefit from continuing iLs, especially the iLs Expressive Language program.

## **Girl, age 7**

Challenge/Diagnosis: LD in the area of speech, prone to temper tantrums

iLs Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total

Pre/Post Scores: 98% improvement in reading fluency and comprehension and an 82% improvement in

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vocabulary and oral language usage (DIBELS).

**Teacher/Parent Comments:** Parents comment: “She has dramatically fewer temper tantrums at home and her speech is much, much better.” Parents and teachers feel an extended iLs program would be beneficial.

## **Girl, age 9**

Challenge/Diagnosis: behind grade level in reading speed and comprehension and in math; easily distracted

iLs Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total  
Pre/Post Scores: 22% improvement in reading fluency and comprehension (DIBELS)

**Teacher/Parent Comments:** Her coordination is better, definitely reading faster and comprehending more; seems more grounded overall. Her teachers also commented on her improved focus. After two years of trying, was finally able to learn to ride her bike.

## **WESTVIEW ELEMENTARY – 4 students**

“Based on our limited experience, I would definitely recommend iLs to schools and parents to try. We had 3 out of 4 children see great changes in their reading and writing, and the 4<sup>th</sup> child saw really nice improvement in her self-confidence which helped her all around.”

**Kelly Leonard-Johnson, Westview Reading Intervention Specialist**

Note: Videotaped Interviews with Westview Elementary Kindergarten teachers can be seen at [www.integratedlistening.com](http://www.integratedlistening.com).

## **Girl, grade 2**

Challenge/Diagnosis: LD in the area of auditory processing

iLs Program: iLs Sensory Motor/Reading combination program of 30 1-hour sessions total  
Pre/Post Scores:

Math Assessment – Before: 33%ile After: 53%ile

PALS Reading (Phonological Awareness Literacy Screening) – Before: Pre-Primer C After: Primer

**Teacher/Parent Comments:** Student started the iLs program after mid-year testing and that is when her reading growth occurred. In addition to reading, her math ability improved. Nevertheless, she still has an IEP. The literacy teacher feels that the biggest changes for student occurred in her selfconfidence. Her self-esteem grew immensely as a result of the iLs program, and this has improved her overall performance in and out of school.

## **Girl, Kindergarten**

Challenge/Diagnosis: demonstrating deficit in learning and pre-reading skills

iLs Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total  
Pre/Post Scores:

PALS (Phonological and Literacy Screening) summed score – Before: 31 After: 92

Math – Before: 33%ile After: 85%ile

OT Screening – Before: Yellow Zone (8/14 points) After: Green Zone (13/14 points)

**Teacher/Parent Comments:** Teachers report significant changes in auditory processing skills, including verbal and written expressive language abilities; student went from not being able to write a single letter to being able to write a 5-sentence story; changes in self-confidence and class participation also significant.

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### **Girl 2, Kindergarten**

Challenge/Diagnosis: demonstrating deficit in learning and pre-reading skills

iLs Program: iLs combined program for sensory motor and auditory processing; 30 1-hour sessions total

Pre/Post Scores:

PALS (Phonological and Literacy Screening) summed score – Before: 17 (below average) After: 94 (proficient)

Math – Before: no data After: 94%ile

OT Screening – Before: Red Zone (5/14 points) After: Green Zone (13/14 points)

**Teacher/Parent Comments:** Teachers report significant changes in processing – verbal and written. Student became more self-confident and engaged in learning process. Increased ability to stay on task as well as to follow line of thought to completion (written and verbal).

### **Girl 3, Kindergarten**

Challenge/Diagnosis: APD diagnosis

iLs Program: iLs combined program of Sensory Motor and Auditory Processing - 50 sessions

Pre/Post Scores:

PALS summed score – Before: 25 (below average) After: 105 (24 points above benchmark)

Math – Before: 16 out of 35 (below avg) After: 35 out of 39 (“proficient”)

Writing Checklist - Pre: 4 out of 16 Post: 14 out of 16 (proficient = 12)

**Teacher/Parent Comments:** Student’s parents took her to an audiologist when she was 6 because she was not progressing normally in reading and writing. The audiologist saw signs of APD (auditory processing disorder) and soon thereafter the student began the iLs program. Four weeks into the iLs program, she began writing individual letters and words; within 3 months she was writing complete stories with coherent story lines. Parents report that she began riding a bike for first time about 6 weeks into the iLs program. Her self-confidence and interest in interacting with others increased at a similar pace as her motor skills and processing. Student says that the iLs program makes her feel calmer and more in control. She came to associate iLs with her success in school and has since asked her mother if she could do repeat the program.