

2010

A Chance To
Grow

HEADSTART AND SMART- EARLY CHILDHOOD

Follow-Up Study: Elementary school results in Detroit Lakes, Minnesota

Prepared by: Gary Miller Consulting, Carl Franzen, Jeanette Lieberman

History

Over the past fifteen or so years, A Chance To Grow (ACTG) worked with elementary schools throughout the nation training teachers to introduce its S.M.A.R.T. curriculum (*Stimulating Maturity through Accelerated Readiness Training*) into K-3 classrooms to provide brain stimulation to improved learning readiness and early literacy. Recognizing that brain stimulation training should be even more effective with younger children, ACTG began a five-year demonstration partnership with Head Start programs in two locations - MAHUBE in rural northwest Minnesota and ACCAP in Anoka and Washington counties in the Twin Cities metro area. For the first four years of the demonstration program, S.M.A.R.T.- EC was introduced into Head Start classrooms. Each year children were assessed for learning readiness gains. In Year Four (2009-2010), children who received S.M.A.R.T. – EC were followed into elementary school to see how well they performed relative to their classmates and relative to national norms. This report presents the results of the Year Four Follow-Up Study.

S.M.A.R.T. IN ELEMENTARY SCHOOLS

Before beginning to describe the S.M.A.R.T. –EC work with Head Start centers, it is important to briefly describe the predecessor work of introducing S.M.A.R.T. activities in elementary grades. S.M.A.R.T. (*Stimulating Maturity through Accelerated Readiness Training*) is a major initiative of A Chance To Grow, a non-profit agency located in Minneapolis, MN. ACTG has been providing teacher training to elementary teachers in twelve states in order that S.M.A.R.T. activities can be integrated into the normal classroom.

The goal of S.M.A.R.T. is to help children who are at-risk for failing in school to develop strong learning skills and early literacy skills. S.M.A.R.T. is designed to improve student readiness for learning, with a specific emphasis on reading capacity. ACTG believes S.M.A.R.T. to be an important compensatory strategy that addresses brain deficits and improves learning readiness – a prerequisite for more complex cognitive learning to follow.

The S.M.A.R.T. curriculum is built around a variety of physical exercises that provide specific brain stimulation associated with learning. The S.M.A.R.T. curriculum includes a variety of physical exercises each designed to promote brain stimulation and to develop learning readiness and student readiness skills. Each of the individual exercises are brief in nature and are designed to be done daily with children in a single 30-minute time segment or delivered in smaller spurts throughout each day. The activities provide multi-sensory stimulation, such as being able to move the eyes from left to right across a page, adjust visual focus between the desk and board, and sound out letters to form words. In addition to developing visual and auditory skills for reading, S.M.A.R.T. activities enhance body awareness, eye-hand coordination, fine motor abilities, and integrate

primitive reflexes. By using heightened stimulation levels with more repetitions for longer duration, students' brains receive more preparation for academic learning. S.M.A.R.T. exercises emphasize brain stem automatic functions, increase the speed of neural impulses, and develop/improve connections between brain hemispheres – all preconditions for later conceptual learning.

S.M.A.R.T. integrates developmental maturation techniques into the regular elementary school curriculum to produce a “booster” effect for the acquisition, retention, and mastery of basic academic skills. The actual “deliverers” of the S.M.A.R.T. curriculum are teachers and assistants – they lead the children through the S.M.A.R.T. exercises each day (either in a 30 minute special session or by integrating the exercises into the regular classroom at opportune times during the day). ACTG staff train elementary school teachers in the basics of brain development and how to implement the S.M.A.R.T. curriculum in their classrooms through a week-long summer training workshop and provide onsite, ongoing mentoring for the teachers over the next few years. It is expected that the initial years of implementing S.M.A.R.T. along with the mentoring will provide the incentives, the staff capacities, and changes in school culture to sustain S.M.A.R.T. after the initial period of external funding.

In the past decade and under the influence of No Child Left Behind legislation, schools have tried to make students smarter by increasing the amount of facts and content in the curriculum. However children, and especially children in poverty, need more than just content – they need capacity. Without improving the brain's capacity to process incoming stimuli and data, student achievement will stagnate. The skills that the business community says that children need (the so-called 21st Century skills) are not about content but about the way our minds work - reducing the achievement gap and developing problem-solving abilities, communication skills, and creativity is about developing the brain and its processing ability, as well as teaching specific content.

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S.M.A.R.T. EC Demonstration Program

ACTG believed that the pre-school years are optimal for brain stimulation effectiveness and therefore felt that applying the S.M.A.R.T. program to an even younger age group made sense, since brain plasticity at younger ages should make the intervention more effective. If school readiness gaps can be reduced prior to entering public school, chances are greater that learning gaps can be reduced even further. In 2005, ACTG decided to apply its S.M.A.R.T. program at pre-school levels – termed S.M.A.R.T.-EC (*Stimulating Maturity through Accelerated Readiness Training – Early Childhood*). S.M.A.R.T.-EC was an attempt to replicate with preschool children the positive results that had previously been achieved with elementary school children. See Appendix A for a more detailed description of the S.M.A.R.T.-EC Demonstration Program.

ACTG staff adapted the SMART curriculum (for elementary school students) into a new SMART-EC curriculum for younger children (Head Start pre-schoolers). ACTG staff then took the existing SMART workshop for elementary level teachers and re-formatted it from a four-day workshop to a two and one-half day format with content and activities designed to be more appropriate for the Head Start teacher and the pre-school child. In order to extend the training, monthly follow-up and on-site mentoring, a critical part of the S.M.A.R.T. program, was increased in the S.M.A.R.T.-EC model. A new SMART-EC handbook was developed for Head Start teachers and assistants.

From 2005 through 2009, A Chance To Grow introduced and implemented S.M.A.R.T.-EC in nine Head Start centers in Northwest Minnesota and in fourteen centers in Anoka and Washington Counties. Necessary adjustments were made to the S.M.A.R.T. curriculum and training to make it age-appropriate for the Head Start pre-school settings. Head Start staff were trained in the S.M.A.R.T.-EC curriculum in a two and one-half day workshop held in the summer before the new academic year. In addition, Head Start received regular on-site mentoring and monitoring from ACTG staff (initially, bi-monthly and then on a monthly basis).

The first year (2005/2006) was a beta year devoted to training, launching the program, and adapting S.M.A.R.T.-EC to pre-school conditions and to the specifics of the Head Start Centers. Years two through four were the demonstration program years – running S.M.A.R.T.-EC in the Head Start centers, comparing test outcomes of Head Start children receiving S.M.A.R.T.-EC with children in Head Start but not receiving S.M.A.R.T.-EC, and continuing to learn from the initial implementation.

Head Start sites were chosen for a number of reasons, but mostly because all of the children in Head Start are low income. S.M.A.R.T.-EC interventions are particularly important for low-income children who, because of poverty and environmental stressors, are more likely to enter school with much lower rates of learning readiness and much higher risks of learning difficulties:

- A number of researchers have documented that many students, especially those from poverty backgrounds, start school at a significant disadvantage (Sarane Boocock and Kimberly Scott, Kids in Context (2005); Annette Lareau, Unequal Childhoods (2003); Valerie Lee and David Burkam, Inequality at the Starting Gate (2002); Susan Mayer, What Money Can't Buy (1997)).
- Hart and Risley found that while children from middle-class, stable homes enter kindergarten with a vocabulary of around 4,000 words, children from deprived environments in the same class may only know about

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2,000 words. The latter group of children is significantly and dramatically slower in learning new vocabulary during the pre-school years. (Betty Hart and Todd Risley, Meaningful Differences, 1995).

- More than one-third of children with only one risk factor for failure will score in the bottom 25th percentile in reading. However, 50 percent of U.S. kindergartners come from families with one or more risk factors for school failure (Susan H. Landry, “Supporting Cognitive Development in Early Childhood,” Address given at White House Summit on Early Childhood, U.S. Department of Education, 2001).
- Roughly half of children entering Minnesota kindergartens were not proficient in language/literacy and mathematical thinking (Minnesota School Readiness Business Advisory Council, Ready for School, 2004).
- Children entering kindergarten from lower income families and with parents with less education were significantly more likely than children from higher incomes and with parents with more education to be rated not proficient in language/literacy and mathematical thinking (Minnesota School Readiness Study, 2004).

Evaluation

Over the three-year period, S.M.A.R.T.-EC was evaluated on different dimensions and outcomes:

Can the original S.M.A.R.T. intervention model be adapted and successfully implemented in Head Start centers?

Yes. The three-year evaluation concluded that the S.M.A.R.T. curriculum could be adapted to pre-school settings. The modified S.M.A.R.T. curriculum was appropriate for the age level of Head Start children. Ease of implementation was also appropriate. However, some difficulties occurred with teacher/staff variability in implementation and with the lack of time for S.M.A.R.T.-EC in half-day Head Start classes. In addition, the contexts of the rural Head Start and the urban Head Start were quite different, resulting in separate analyses by region.

Does the S.M.A.R.T.-EC intervention produce improvements in school/learning readiness and early literacy skills?

Yes. Compared to Head Start children who did not receive S.M.A.R.T.-EC, Head Start children who received S.M.A.R.T.-EC performed better on a majority of learning readiness and early literacy tests. Teacher assessments of S.M.A.R.T.-EC were very positive. According to teachers, students in the S.M.A.R.T.-EC classrooms learned skills faster, focused and concentrated better, and learned letters and shapes better. In terms of cognitive improvements, two sets of standardized tests were used - IGDI

(Individual Growth and Development Indicators) and the Brigance K & 1 Screen II. In six out of eight comparisons of classrooms at both sites, S.M.A.R.T.-EC end-of-the-year test scores were higher than those of comparison classrooms. In five out of six comparisons of Fall to Spring improvement scores on IGDI, S.M.A.R.T.-EC children performed better than children in comparison classrooms. Finally, S.M.A.R.T.-EC children's scores for both IGDI and Brigance tests at both sites compared favorably to norms established for five-year olds (a measure of school readiness).

Does the S.M.A.R.T.-EC implementation last beyond the years that outside funding is available?

Yes. The Head Start centers in this study have continued to employ S.M.A.R.T.-EC as part of their normal programs - beyond the period where supplemental funding was provided. Almost two years later, teachers at both the Northwest Minnesota site and the urban site continue to use S.M.A.R.T., even though supplemental funding has stopped. In addition, S.M.A.R.T.-EC has been introduced into other centers that originally served as control classrooms.

“Do the S.M.A.R.T.-EC effects last over time and produce success in elementary school?”

Do the S.M.A.R.T.-EC effects last over time and produce success in elementary school?

This is the focus of this report – the Follow-Up Study of S.M.A.R.T.-EC students in early elementary school in Detroit Lakes, Minnesota. This report presents test score data for Head Start/S.M.A.R.T.-EC children as they progress through their early elementary grades.

S.M.A.R.T./EC Follow-up Study

The S.M.A.R.T./EC Follow-Up Study answers Question #4 (above). The S.M.A.R.T.-EC Follow-Up Study tracks Head Start/S.M.A.R.T.-EC students into elementary school and asks the general question (Question #4 above) – “Do the S.M.A.R.T.-EC effects last over time and produce success in elementary school? This analysis examines the longer-term value of S.M.A.R.T. – EC by tracking benchmark test results of Head Start/S.M.A.R.T.-EC students as they progressed from Kindergarten through Second Grade.

In order to ascertain the degree to which Head Start/S.M.A.R.T.-EC children were ready for elementary school and were able to perform on par with normative expectations and with other, mostly middle-class children in these schools, we asked two basic evaluation questions:

- ⇒ Were Head Start/S.M.A.R.T.-EC children “ready to learn” at time of entry into Kindergarten?

- ⇒ How well did the Head Start/S.M.A.R.T.-EC students perform on academic tests?
- ⇒ How well did Head Start/S.M.A.R.T.-EC students perform relative to national norms?

While the S.M.A.R.T.-EC Demonstration Program was conducted in two locations (rural northwest Minnesota and Anoka/Washington counties in the metro area), the S.M.A.R.T.-EC Follow-Up Study was only conducted in one of these locations - in two elementary schools in Northwest Minnesota. The Head Start centers in Anoka/Washington counties were not included because of extreme difficulties in tracking Head Start/S.M.A.R.T.-EC students into 63 different schools. Thus, the Follow-Up Study tracks 35 Head Start/S.M.A.R.T.-EC children in their first years at two elementary schools in Detroit Lakes. In addition, test scores for 165 other students in these classrooms were collected for comparison purposes.

Because of funding limitations, the Follow-Up evaluation relied upon standardized tests that these schools regularly used in their assessments of student progress (See Appendix B). We obtained standardized test scores for Head Start/S.M.A.R.T. children on a variety of early learning skills in Kindergarten, First Grade, and Second Grade (third grade test scores will be available in future years). Anonymity was guaranteed by working with ID numbers not attached to student identities. Both schools use some combination of two nationally-normed and standardized tests - AimsWeb and MAP. Test score results were analyzed separately for the two elementary schools because test administration schedules varied between the two schools. We relied upon standardized test scores, because they could be retrieved with minimal extra effort from the schools. Also, tests of elementary academic skills regularly assessed in the early elementary school years provided a strong test of the effects of S.M.A.R.T. -EC/Head Start on reducing the achievement gap (all Head Start students are low income). However, Appendix C provides some concerns about the role of testing in education and in evaluation research.

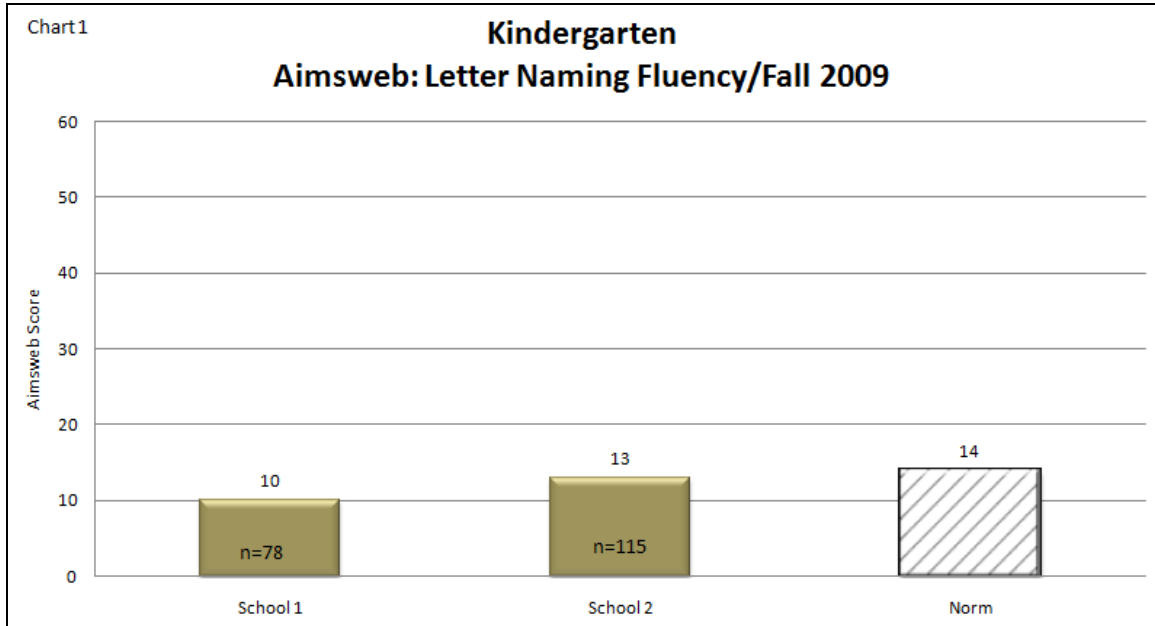
“Were Head Start/S.M.A.R.T.-EC children “ready to learn?” the answer is a qualified yes.

READY TO LEARN

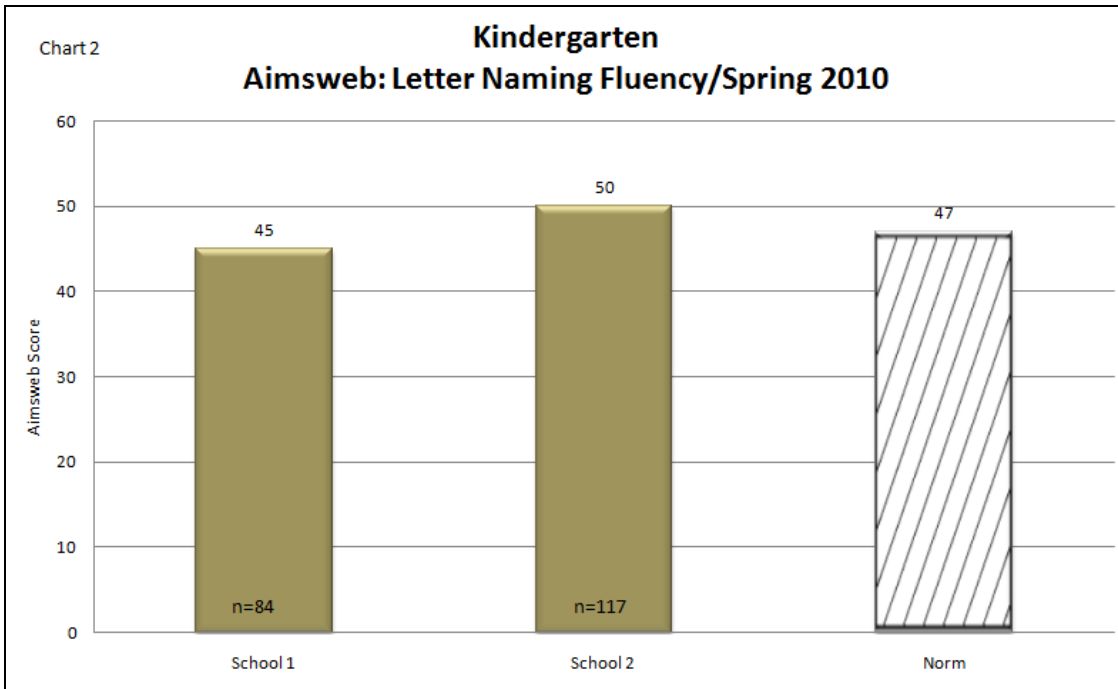
In response to the question “Were Head Start/S.M.A.R.T.-EC children “ready to learn?” the answer is a qualified yes. We compared Head Start/S.M.A.R.T.-EC student scores to national norms in the Fall (time of entry into Kindergarten) and in the Spring (time for transition to Grade 1).

To understand whether Head Start/S.M.A.R.T.-EC children were ready to learn at the elementary school level, we examined the Letter Naming Fluency test scores (a strand of AIMSweb) given to Kindergarten students when they were first tested. In the Letter Naming Fluency subtest, students identify letters and distinguish between upper and lower case. This test is identified frequently as the best single indicator of risk for

reading failure. These benchmark assessments for Head Start/ S.M.A.R.T.-EC Kindergarteners were compared to national norms. If the Head Start/S.M.A.R.T.-EC children entered school performing at the norm for children of this age, we would conclude that they were ready to learn.



As seen in Chart #1, Head Start/S.M.A.R.T.-EC children in School #1 enter kindergarten performing on the Letter Naming Fluency subtest of AIMSweb at virtually the national norm. In School #2, The Head Start/S.M.A.R.T.-EC children entered kindergarten scoring even closer to the national norm. Head Start students with S.M.A.R.T.-EC are “ready to learn” by the time they enter Kindergarten.



Charts 2 and 3 make the same comparison at the end of the Kindergarten year and provide some information about readiness for elementary school. Chart 2 looks at Letter Naming Fluency in the Spring and shows that the Head Start/S.M.A.R.T.-EC children performed at roughly the national norm.

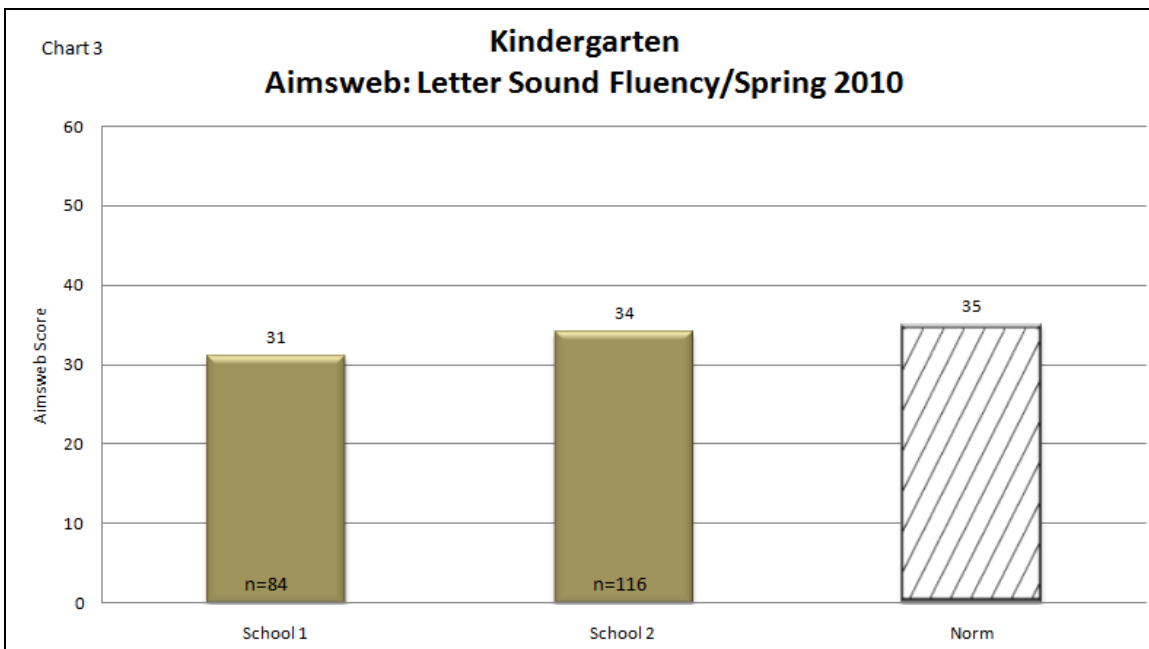


Chart 3 compares Head Start/S.M.A.R.T.-EC children with national norms for the Letter Sound Fluency subtest of AIMSweb. In the Letter Sound Fluency subtest, children are asked to sound out letters correctly. A good result indicates the possession of skills

needed later for reading. Again, the Head Start/S.M.A.R.T.-EC children are just slightly below the national norm.

In examining the pattern across these two testing periods in the Kindergarten year and across two subtests of AIMSweb, we see a consistent pattern of Head Start/S.M.A.R.T.-EC students scoring at the level of the national norm or just slightly below it.

It should be noted that comparing Head Start/S.M.A.R.T.-EC test scores with national norms is a somewhat demanding norm, since this norm encompasses children from all income levels. Yet, since this is the expectation of public schools, we felt that it was an appropriate comparison.

CAVEAT: We need to exercise some caution in how we interpret these test scores (as well as the rest of the test score results in this report). Originally, we intended to use another Head Start center as a comparison group – Head Start children who did not receive S.M.A.R.T.-EC. However, we discovered that, after the fact, teachers at this Head Start site introduced many of the S.M.A.R.T.-EC exercises and activities on their own. As such, the usefulness of this center as a control site was compromised (parenthetically, the initiative of these teachers in incorporating S.M.A.R.T.-EC program dimensions into their classrooms is a positive sign of teacher acceptance and endorsement of S.M.A.R.T.-EC).

The loss of a comparison site renders a direct test of S.M.A.R.T.-EC problematic. When we find positive effects among Head Start students who received S.M.A.R.T.-EC, it is not possible to separate out the Head Start effects from the S.M.A.R.T.-EC effects. All that we can conclude is that the Head Start/S.M.A.R.T.-EC experience has positive effects. For the practitioner, this matters little since they can take reassurance from the positive effect. On the other hand, researchers would prefer to be able to separate out the effects. This caveat needs to be kept in mind when interpreting the results in the remainder of this report.

S.M.A.R.T.-EC STUDENT PERFORMANCE

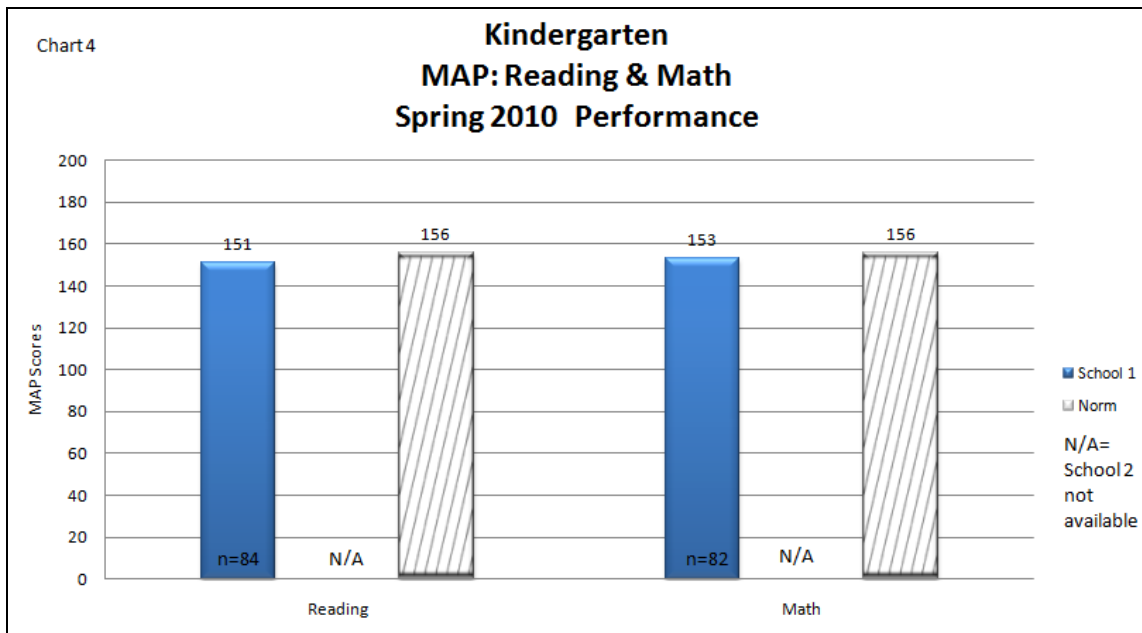
It is encouraging to see that Head Start/S.M.A.R.T.-EC children enter Kindergarten ready to learn. An equally important question is whether this level of learning and performance persists over time. In order to answer this question, the evaluation team followed up a subsample of children who received one or two years of S.M.A.R.T. interventions in Head Start pre-school by examining their progress in their early years of public school. We compared test scores of Head Start/S.M.A.R.T.-EC children in elementary school to national norms and to test scores of other, more middle class students who did not receive Head Start and S.M.A.R.T.-EC:

- In comparing Head Start/S.M.A.R.T.-EC children to national norms for their grade level, the S.M.A.R.T.-EC children have test scores at the normative level – at both First Grade and at Second Grade.

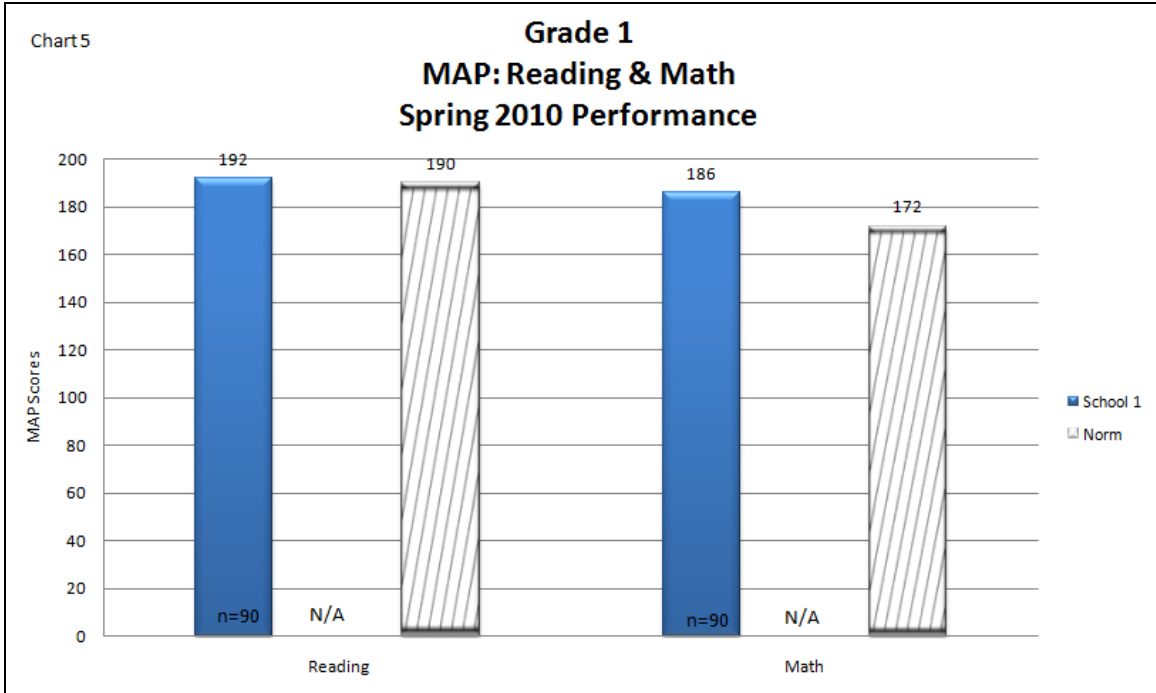
- And, Head Start/S.M.A.R.T.-EC had test scores at a level comparable to other, more middle class students.

Comparison to Norms

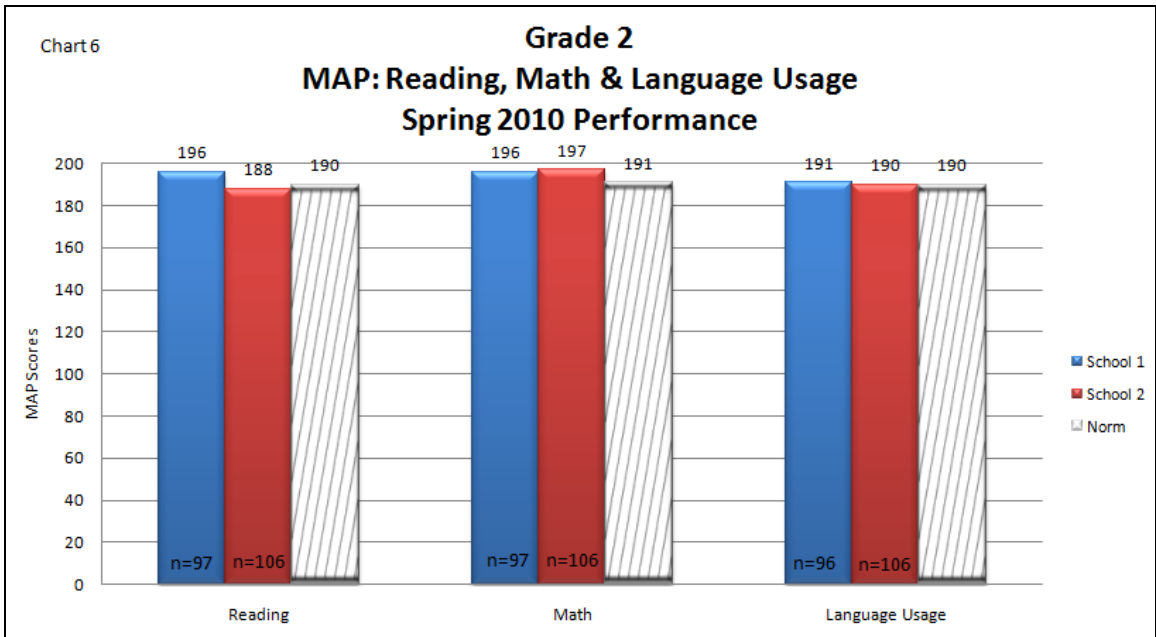
Head Start/S.M.A.R.T.-EC children were compared to national norms at the end of the school year for each of the grade levels - Kindergarten, First Grade, and Second Grade. Charts 4, 5, and 6 present these comparisons and provide evidence that at all three grade levels the Head Start/S.M.A.R.T.-EC met or exceeded normative expectations.



As Chart 4 indicates, Head Start/S.M.A.R.T.-EC children at School #1 (School #2 did not use MAP tests for Kindergartners) scored virtually at the normative level for both the MAP Reading and Math tests by the end of the 2009-2010 academic year.



As Chart 5 indicates, Head Start/S.M.A.R.T.-EC children at School #1 met and exceeded the norm for the MAP Reading and Math tests for First Graders in Spring 2010.

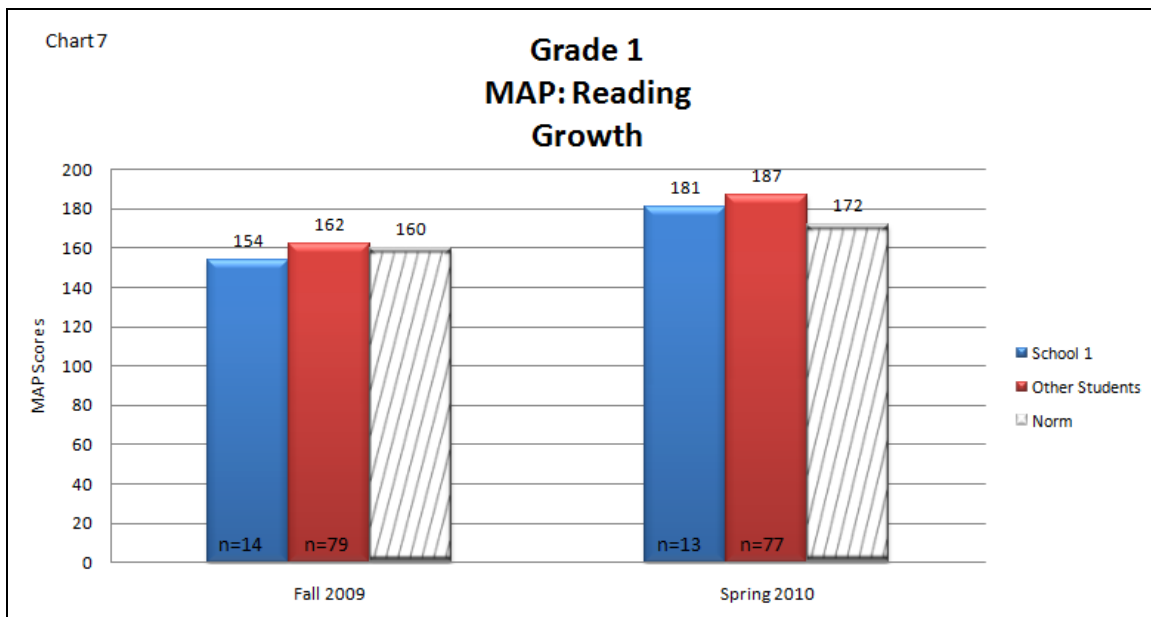


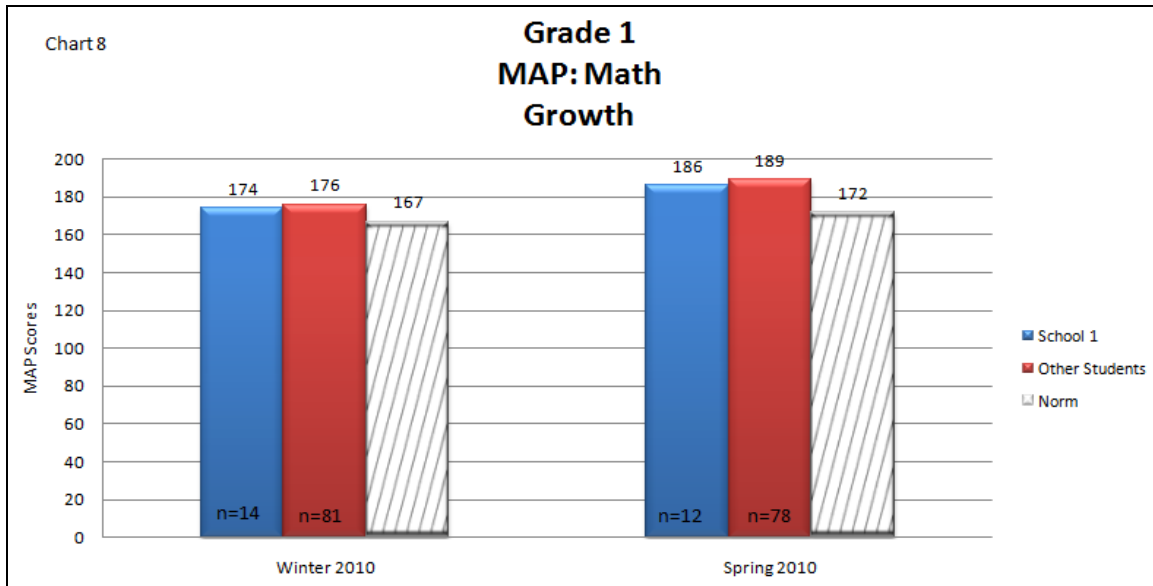
And, as Chart 6 indicates, the Second Graders performed as well. The Head Start/S.M.A.R.T.-Ed students at School #1 performed at the normative levels for the MAP Reading and Math tests for Second Graders in Spring 2010.

Student Growth

To see if the Head Start/S.M.A.R.T.-EC students improve at normal rates, we examined MAP test scores for current First and Second Graders at both schools and compared them with two benchmarks – national norms and progress of other students at these schools who did not receive S.M.A.R.T.-EC. The MAP test allows us to assess growth over time. It begins with relatively simple tasks and test items and becomes more difficult as the student progresses through the academic year. Over time, students are asked to read words using phonetic analysis; divide words into syllables and use word patterns; use context clues to understand new words; and use knowledge of root words, antonyms, and synonyms.

Charts 7, 8, 9, 10 and 11 compare Head Start/S.M.A.R.T.-EC student growth with national norms and with other students (Charts 7 and 8 provide test scores only for School #1 since the MAP subtests were not administered in First Grade in School #2). These charts show that Head Start/S.M.A.R.T.-EC students grow or improve in MAP Reading, Math, and Language Usage test scores at rates comparable to national norms and at rates comparable to other students at the same school who did not receive S.M.A.R.T.-EC.

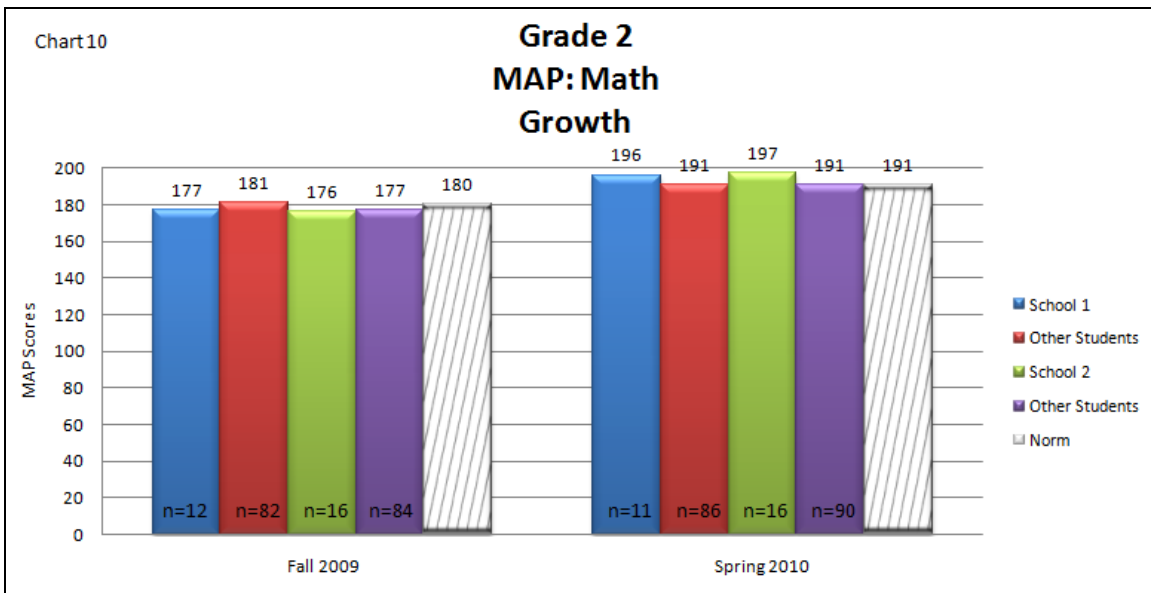
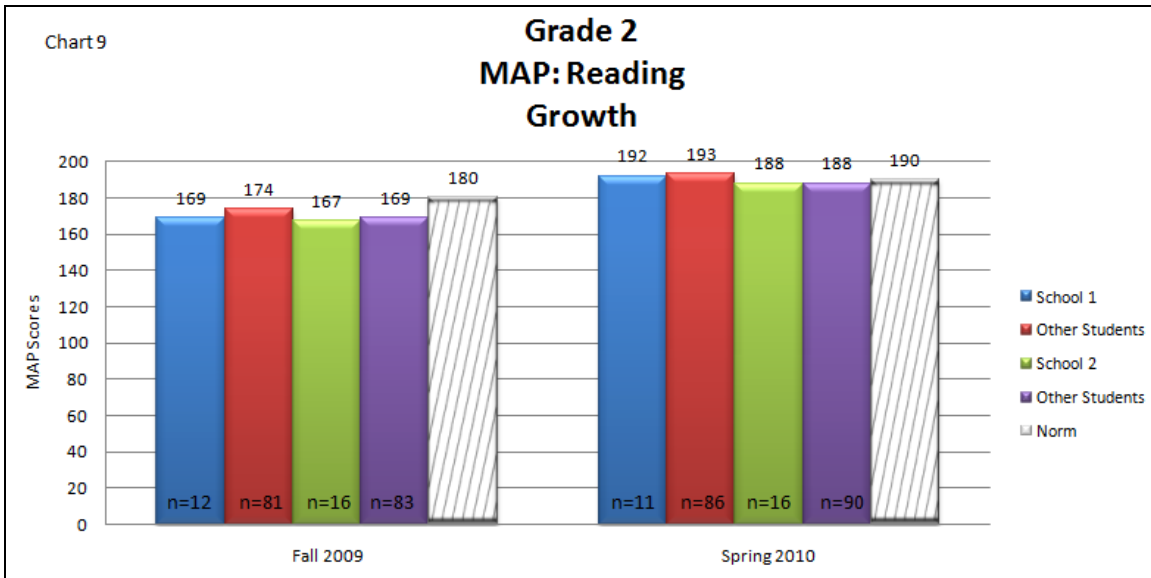




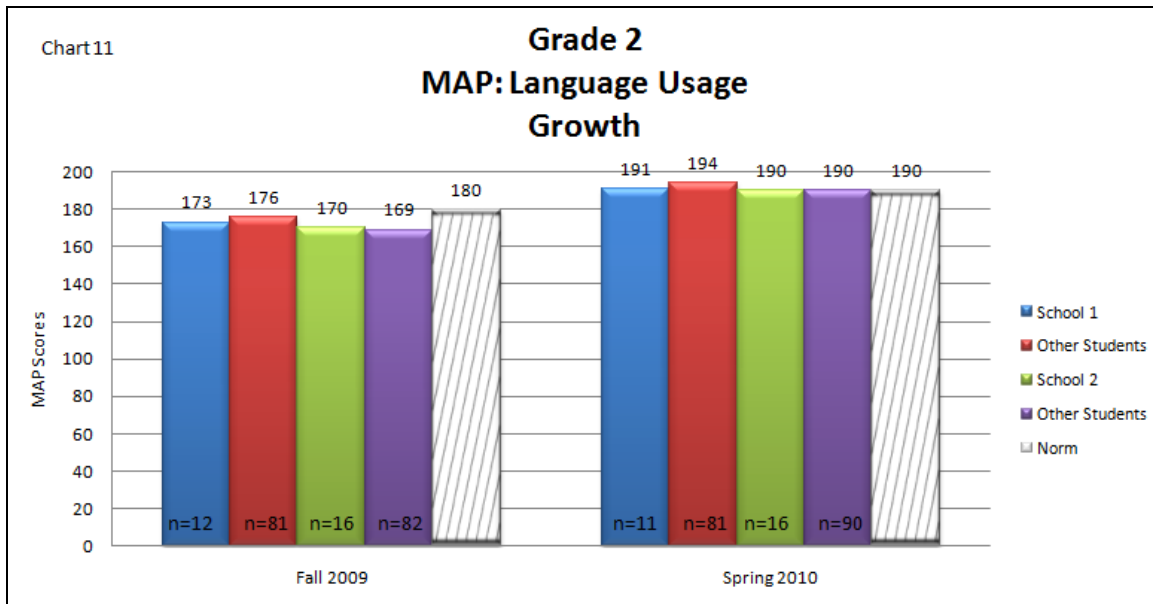
Charts 7 and 8 provide a clear picture that:

- Head Start/S.M.A.R.T.-EC students begin Grade One slightly below or at the national norms for Reading and Math but make up this difference and, by the end of the academic year, they are scoring at the national norm in Reading and above the norm in Math.
- Head Start/S.M.A.R.T.-EC students in Grade One perform at basically the same level as other students in their classes.

Charts 9 and 10 show that the same pattern of results occurs for Second Graders at both schools. The Head Start/S.M.A.R.T.-EC students begin the academic year with Reading and Math scores slightly below the national norm, but by the end of the academic year, they are at the norm or above it. Also, Head Start students with S.M.A.R.T.-EC mirror almost exactly the performance of other students at their grade level and at the same school



And, finally, Chart 11 shows basically the same pattern for another subtest – Language Usage.



SUMMARY

Tracking Head Start/S.M.A.R.T.-EC students into elementary school provides solid evidence that these students enter public school ready to learn and continue to learn at levels that are expected of all students. These are impressive results for their consistency across grade level, type of early literacy dimension tested, and school attended.

And, there is no evidence of the Head Start fade – these performances at the normative level continued through Grade Two. There is always a concern about whether gains observed in Head Start will persist into the elementary grades. Prior studies of Head Start suggest that the cognitive gains of Head Start “fade” by the third grade in regular school. This is not so for the Head Start/S.M.A.R.T.-EC children in this study. Not only did the Head Start/S.M.A.R.T.-EC students come to Kindergarten “ready to learn,” but they continued to perform on the MAP tests for both Reading and Math at levels consistent with national norms for these tests at all grade levels – Kindergarten, First Grade, and Second Grade. This consistently good performance contradicts the notion of the “Head Start fade.” (in actuality, evidence of the fade is mixed. See W. Steven Barnett, “The Battle Over Head Start: What the Research Shows,” NIEER Working Papers, 2002). For these Head Start/S.M.A.R.T.-EC students through second grade, the evidence is clear - there is no fade.

The evaluation team will continue working with the elementary schools to gather test score data of these Head Start/S.M.A.R.T.-EC students as they complete Third Grade.

ACKNOWLEDGEMENTS

The evaluation team wishes to thank a number of individuals who provided the evaluation team with assistance in the collection and transfer of data for this first Follow-Up study. First, the Detroit Lakes school district office and the two participating schools have shown a strong commitment to learn from the S. M. A. R. T.-EC demonstration project. Specifically, we thank Lowell Niklaus, Curriculum Director of the school district, who provided us with data on elementary academic progress. The two school Principals, Jerry Hanson of Roosevelt Elementary and Sanford Nelson of Rossman Elementary, made it possible for this study to occur. They all demonstrated a commitment to learning about factors supporting student growth that was both unusual and commendable.

This evaluation study was made possible by grants to A Chance To Grow in support of the S.M.A.R.T. – EC demonstration project over the first four years, which included financial support for an external evaluation. We acknowledge the generous support of The McKnight Foundation, The Bush Foundation, The Minneapolis Foundation, the Otto Bremer Foundation, the Sheltering Arms Foundation, the Jay and Rose Phillips Foundation, the Fred & Katherine Andersen Foundation, UBS Financial, and the Jostens Foundation.

Finally, but not least, A Chance To Grow would like to acknowledge the strong support of the two Head Start sites (MAHUBE and ACCAP) and to sincerely thank them for their operational support of the S.M.A.R.T.-EC Demonstration Program. These Head Start programs stuck with this effort for long periods (four years in the case of MAHUBE and three years in the case of ACCAP) and were instrumental in our learning process. ACTG would like to note the far-sighted leadership of the two management teams – Leah Pigatti, Margaret Aho, Joyce Duffney, and Michelle Wilkowski at MAHUBE and Jackie Cross, Joyce Kulla, Jan Berqual, Sue Brletich, Kishwar Bayunus, and Cindy Rothstein. And, most importantly, ACTG thanks the many Head Start teachers and assistants who did the real heavy lifting – delivering S.M.A.R.T. – EC to the hundreds of Head Start children, as well as helping the evaluation team with data collection, testing, and interview time. In particular, we thank Deb Gilbertson, Edie Kyllonen, Elissa Braaten, Ky Deblieck, Melissa Mack, and Robin Soyring at MAHUBE and Beth Lemke, Cassie Andersen, Cindy Sperr, Donna Hayes, Jocelyn Bredemus, Kristi Edmonds, Mary Smith, Monica Torgerson, Priscilla Lalime, and Sandy Uργο at ACCAP. Finally, we would be remiss to not express our appreciation to the many Teacher Assistants and Aides at both MAHUBE and ACCAP.

APPENDIX A


THE S.M.A.R.T. - EC DEMONSTRATION PROGRAM

Since 1985, A Chance To Grow (ACTG) has been committed to the application of brain research, new technology, and learning research to overcome the initial limitations and expectations facing children with brain injuries or cognitive delays related to poverty and family instability. ACTG was initially dedicated to helping children with brain injuries. Over time, ACTG has expanded this initial focus on children with brain injuries to children with learning gaps and disabilities of children coming from families in poverty to, today, improving the learning outcomes for all children – both healthy and unhealthy. The result was S.M.A.R.T. (Stimulating Maturity through Accelerated Readiness Training) - a new learning intervention that adapted the physical exercise regime previously used with brain-injured children to fit into the constraints of a public school – limited time and the need to use public school teachers to implement the program. S.M.A.R.T. is based on understandings of how the brain works and is especially designed to improve the physical, visual and hearing skills necessary for reading and academic success. S.M.A.R.T. integrates neurostimulation activities into a regular academic curriculum. While S.M.A.R.T. can help all children, it is particularly effective in helping resolve learning readiness gaps for students in the bottom half of academic achievement.

In 2005, ACTG decided to extend its S.M.A.R.T. program into pre-school levels, because:

- Evidence is mounting regarding the long-term academic and social benefits of early childhood education;
- The pre-school years are optimal for brain stimulation effectiveness - it was felt that applying the S.M.A.R.T. program to an even younger age group made sense, since brain development and plasticity at younger ages should make the intervention even stronger.
- If school readiness gaps can be reduced prior to entering public school, chances are greater that learning gaps can be reduced even further.

S.M.A.R.T. - EC is an adaptation of the S.M.A.R.T. curriculum for pre-school children. It is often assumed that children have acquired the readiness skills necessary for the learning of academic skills. These readiness skills include oral language development, visual recognition and discrimination, eye-hand coordination, social interaction skills, attention for following directions, pencil-paper skills, general coordination for gross movement, and self-confidence for resilience in the face of challenges. However, a 2004 Minnesota Department of Education report concluded that roughly half of the sampled children entering kindergarten were not ready for school and that children with parents with lesser education were two to three times more likely to be rated as not ready.



The S.M.A.R.T. - EC Demonstration Program was designed to test whether the S.M.A.R.T. learning intervention (originally designed for elementary school children) can be adapted for younger, pre-school children. The structure of this project paralleled ACTG's work with over 250 elementary schools throughout the country, providing initial and ongoing training to and hands-on mentoring with educators in order to increase children's learning readiness skills and ultimately, their reading skills. S.M.A.R.T. - EC adapted the existing elementary school based workshop content and methodology to the Head Start environment.

The S.M.A.R.T. - EC Demonstration Program worked with Head Start centers in two locations – in northwest Minnesota (MAHUBE) and in Anoka and Washington counties in the Twin Cities metropolitan area (ACCAP). S.M.A.R.T. - EC consists of three critical components:

- ⇒ The S.M.A.R.T. - EC curriculum: The S.M.A.R.T. - EC curriculum is used on a daily basis (at least 20 minutes per day). S.M.A.R.T. - EC activities provide heightened visual, auditory, vestibular, and kinesthetic inputs to the brain over the course of the school year. See below for more details.
- ⇒ S.M.A.R.T. - EC Workshops: All Head Start teachers, teachers' assistants, and teacher aides who implement S.M.A.R.T. - EC participated in two and a half day workshops to introduce them to S.M.A.R.T. - EC and provide them with the tools to implement the S.M.A.R.T. - EC curriculum. The elementary school S.M.A.R.T. workshop, typically four days in length, was reduced in length for S.M.A.R.T. - EC teachers. S.M.A.R.T. - EC provided workshop participants with a program manual and a Curriculum Guide.
- ⇒ Ongoing Mentoring for Head Start Teachers: The S.M.A.R.T. - EC Demonstration Program recognized that the implementation of the program requires follow-up, on-site mentoring for newly-trained S.M.A.R.T. - EC Head Start staff. For the first three months of the project, mentors visited twice a month. While the elementary school S.M.A.R.T. mentoring model involves monthly on-site visits, the intensified S.M.A.R.T. - EC mentoring was established to provide closer oversight of program implementation and to extend the training of the teachers.

The S.M.A.R.T. Curriculum: S.M.A.R.T. developers drew from the latest brain research and a variety of developmental programs and activities in order to create a purposeful, enriching environment. The organized and structured program provides a frequency and intensity of stimulation greater than what occurs routinely in normal child development.

Activities

- ⇒ **Balance Beams** – used in classrooms and on playgrounds. **Primary purpose:** to encourage balance and body awareness. When a child walks slowly across a balance beam, his/her body is developing balance and learning where it is in space. **Classroom relevance:** Body awareness helps children sit still and remain seated in their chairs. Additionally, this skill leads to understanding one's own left and right and, in turn, having the ability to read from left to right. Children who have problems with body awareness may fall out of their chairs; have a short attention span, reverse letters or words.

- ⇒ **Rebounders** – similar to trampolines. **Primary purpose:** to encourage development of the Proprioceptive system. When a child jumps on a rebounder, the muscles, joints, ligaments, bones and tendons in the body are stimulated. This helps the child's body understand the orientation of the body parts and movements. **Classroom relevance:** A matured Proprioceptive system is necessary for a child to perform in the classroom. This skill teaches the child's body how much muscle tension is needed to sit in a chair properly and how to grade muscle movement appropriately. Children who have problems with Proprioception may sit in a chair with poor posture and may respond to touch with too much or too little force.

- ⇒ **Overhead Ladder** – similar to Monkey Bars. **Primary purpose:** to encourage eye teaming. When a child is moving across the bars, he/she must look at and grasp the rungs one by one. In doing so, the child's eyes must work as a team to fuse together the image seen by each eye into one single image, or the child misses the rung and cannot get across. **Classroom relevance:** Eye teaming is an extremely important skill for reading. When reading, the eyes must also work as a team to fuse the image seen by each eye or the child will see the text as double. Children who have problems with eye teaming may fatigue easily, show a decline in comprehension when reading and even avoid academics entirely.

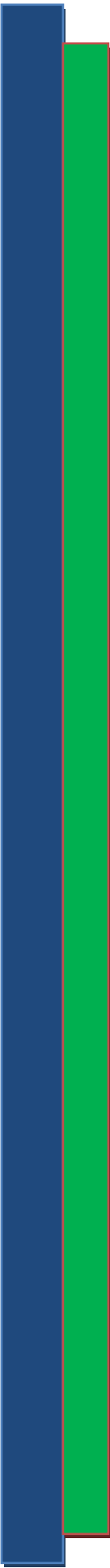
- ⇒ **Spinning** – known as Helicopter Spins. **Primary purpose:** to encourage body awareness. When a child is spinning, the fluid in the inner ear is moving and sending information about where the child's body is in space. At the same time it is stimulating the same part of the brain that popular impulse control medications stimulate. This produces a calmer, more focused child. **Classroom relevance:** Body awareness helps children sit still and remain seated in their chairs. Additionally, this skill leads to understanding one's own left and right and, in turn, having the ability to read from left to right. Children who have problems

with body awareness may fall out of their chairs; have a short attention span, reverse letters or words.

- ⇒ **Auditory Activities** – include phonemic awareness, blending and auditory discrimination. **Primary purpose:** to encourage auditory skills vital to reading. When children are exposed to S.M.A.R.T. auditory activities, they hear many repetitions of same/different/similar sounds and blends in a game-like fashion. The auditory system stores that information in the language area of the brain for later use, i.e. when they learn to read. **Classroom relevance:** The ability to recognize, discriminate and blend sounds and then words is crucial to reading. The child must have the ability to recognize sounds in order to later match sounds to letters. He/she must also have the ability to discriminate between similar sounds, especially vowel sounds and finally then blend sounds together in order to begin to learn to read. Children who have problems with these auditory skills cannot follow directions or fail to complete their work, impulsively blurt out answers to questions and avoid or dislike academics entirely.

Skills

- ⇒ **Eye-hand Coordination** – also known as visual motor integration. **Primary purpose:** to integrate vision with the motor system to reproduce complex patterns. This means handwriting. Eye-hand coordination activities include ball and beanbag games as well as many board and paper pencil games. **Classroom relevance:** Eye-hand coordination is the motor component for learning language. Children who have problems with eye-hand coordination may have poor handwriting, drawing, cutting, and other fine motor tasks.
- ⇒ **Visual Acuity** – also known as clarity of sight. **Primary purpose:** to improve or fine tune visual clarity. Many visual activities are used in the S.M.A.R.T. program, several of which involve the focusing and relaxing of eye muscles and lenses. By doing these activities, the child is able to see more clearly both in the distance and at a near point, or reading range. **Classroom relevance:** Visual acuity is extremely important for academic success. A child working at a desk must be able to see the work clearly and maintain that clarity for the duration of the assigned time. He/she must also have the ability to see the chalk/white board clearly and finally shift the focus from the board to desk quickly and accurately. Children who have problems with visual acuity may squint, blink or rub their eyes, complain of headaches, take longer than necessary to complete assignments or avoid reading assignments entirely.
- ⇒ **Fine Motor Skills** – also known as pre-writing skills. **Primary purpose:** to develop small muscles in the hand and fingers in preparation for holding writing tools. Fine motor skills are enhanced and developed as a child works with his/her hands to manipulate small objects. Additionally, sensory stimulation on the hands through the activity of crawling opens the hands and lays the foundation for good



fine motor skills. Gross motor activities like crawling and fine motor activities like lacing cards and stringing beads develop this skill. **Classroom relevance:** Fine motor skills are a prerequisite for writing. The child must be able to hold the pencil properly to produce or reproduce the necessary information. Holding the pencil properly involves the proper amount of tension and the proper hand placement on the pencil. Children who have problems with fine motor skills may have poor handwriting, drawing, cutting, and other fine motor tasks.

- ⇒ **Spatial Relations** – include bilateral coordination, left right awareness and directionality. **Primary purpose:** to develop normal internal and external spatial concepts that are used to interact with and organize the environment. These skills are necessary for a child to build an awareness within his/her body of concepts such as left and right, up and down, and front and back, as well as to make judgments about the location of objects in reference to other objects and to the child's own body. **Classroom relevance:** Spatial relations are essential when learning to read and write. When a child reads he/she must read from left to right. In order to do so the child must first have an understanding of what is left or right on his/her own body. Once that is accomplished, the child can then project that understanding onto an inanimate object like a book or worksheet. Children who have problems with spatial relations may confuse similar letters or words, misalign digits, reverse letters or words and have improper spacing between letters and words.

- ⇒ **Primitive Reflexes** – **Primary purpose:** to integrate retained primitive reflexes, which in normal development are expected to be integrated by the end of the first year of life. Activities related to these reflexes require only two minutes per day throughout the school year and children who are then able to integrate these reflexes enjoy the freedom of writing with ease and sitting comfortably in their chairs. **Classroom relevance:** Retained primitive reflexes can influence how the child holds a pencil and whether or not he/she has the ability to sit in a chair. Children with retained primitive reflexes can display a range of difficulties in the classroom including using too much pressure when writing which causes the lead of the pencil to break, holding material to one side when reading or writing, the need to sit with legs straight and arms bent or leg bent and arms straight and even hyperactivity.

APPENDIX B

STANDARDIZED TESTS

Both schools utilized standardized and normed tests to measure student progress:


⇒ AIMSweb Tests: AIMSweb is a paper test administered one-on-one a minimum of three times a year (Fall, Winter, Spring) to monitor progress in reading and early literacy. During the test the student and teacher are opposite from each other. Each question is timed. The test only takes a few minutes to administer. Scores are tabulated based on the number of individual correct answers given, for example, circle the correct word, or the number of words read correctly in a minute. If a student scores below age/grade level and intervention is required, he/she can be tested more often, as frequently as once a week. This allows the teacher to focus on the student's needs with extra attention and assignments.

- Kindergarteners and First Graders start with two tests:
 - Letter Naming Fluency. Student identifies letters and distinguishes between upper and lower case. This test is identified frequently as the best single indicator of risk for reading failure.
 - Letter Sound Fluency. Student sounds out letters correctly. Indicates ability to learn general reading skills.

Both Rossman and Roosevelt start AIMSweb testing with the Fall of Kindergarten. Since the schools only started using AIMSweb in 2009, there are no Kindergarten results for some classes.

- In First Grade a third test is added to the mix:
 - Oral Reading Fluency. Student reads text aloud to tester.
- In Third Grade a fourth test is added to test reading comprehension:
 - MAZE. Student selects the correct word from a choice of words to fill in the blank within the reading text.

⇒ MAP Test: The MAP test is an adaptive computer-given test where the student is given a series of questions that range up or down in difficulty depending on the student's ability. There is no time limit or a set number of questions. If the student fails to answer a question correctly, he/she is directed to an easier path of questions. When questions are answered correctly, the student is directed to more questions at that same level and, with continued success, to increasingly more difficult questions. The goal of the tester is to discover where the student is comfortable. The RIT* score given the student represents that comfort level. The questions are pre-ranked for difficulty and grouped. A RIT score is associated



with each group of questions. In other words, the student's score is equated to that group of questions where comfort/success is achieved.

RIT scores are used to identify a student's learning level and to measure progress each time the test is given (Fall, Winter, Spring). Because the test is normed, schools can anticipate where a student should be based on age/grade.

Rossmann begins MAP testing in the Spring of the students' Kindergarten year with Reading and Math assessments. Roosevelt starts MAP testing in the Fall of the Second Grade. The goals for Reading start with identifying uppercase and lowercase letters, progressing to identifying words and sentences. Math assessment begins by asking students to count, compare and understand the values of whole numbers. The test material gets progressively more difficult when success is demonstrated.

APPENDIX C

EVALUATION AND TESTING


The evaluation of the SMART-EC Demonstration Program has relied heavily upon standardized testing as a measure of children's progress. Testing is important and will only become more important in education. However, the enthusiasm for testing and accountability must be tempered with an appreciation for its limits.

Validity of Testing at the Pre-School Level: From the beginning of the S.M.A.R.T.-EC Demonstration Project, there were concerns about valid testing of school readiness and early literacy skills. Can standardized tests be reliably applied with 4-5 year old children? Do they have the attention spans necessary for valid test administration? Are they too easily distracted from the tasks at hand? Will they be motivated sufficiently to perform well on these tests? Do they understand test directions? The two tests used (Brigance and IGDI) were chosen to be age-appropriate, but we still have concerns about test administration. We still have concerns about standardized testing with very young children.

Consistency of S.M.A.R.T.-EC Implementation: Testing is supposed to measure the effect of a particular educational program or intervention – in this case, the S.M.A.R.T.-EC curriculum. However, we know from observations and class records that there was considerable variation in teacher implementation – number of S.M.A.R.T.-EC minutes per day, number of days per week, etc. We have two concerns:

- ⇒ Was there too much variation in application of S.M.A.R.T.-EC that it introduced extraneous variation into the test design?
- ⇒ Did the constraints of a Head Start day (especially in half-day programs) prevent the intervention from reaching a critical level of application. ACTG believes that it takes 80 hours of S.M.A.R.T.-EC application to achieve a strong effect. Some classrooms did not achieve this level. The overall budget for S.M.A.R.T.-EC was tight and did not allow evaluators to actually conduct program implementation observations or to implement reliable measures of program fidelity. And, teacher records of intervention application proved to be too unreliable to directly test this.

Testing Capacity vs. Testing Skill Acquisition: It is more difficult to test for improvements in learning capacity than it is to test for skill acquisition. If we want to test the efficacy of a tutoring program, we test the level of skills before and after the tutoring. There is a symmetry between skills taught and skills measured. This is not the case with capacity. In the case of S.M.A.R.T.-EC, the intervention is designed to improve learning capacity or learning readiness through brain stimulation. Yet, what is measured after the intervention are performances in early literacy – the assumption being that the brain

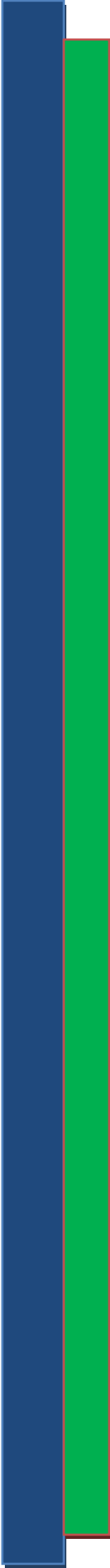


stimulation prepared the child for improved learning that was taught in the normal classroom.

Some of the results in the S.M.A.R.T.-EC evaluation are mixed. Interviews with teachers revealed quite strong support for S.M.A.R.T.-EC, provided some changes and allowances are made in future implementation. Teachers reported how S.M.A.R.T.-EC got them to re-examine their own teaching approaches, gave them a better perspective on the relationship between brain development and early childhood education, and revealed important changes in children's learning, behaviors, and school readiness. These observations were consistent with many of the test results. However, not all of the test results were consistent. This lack of consistency presents challenges to inference, leading the evaluation team to probe for a ways to resolve these differences and not fall into the usual trap of believing quantitative data to the exclusion of the qualitative information.

It also led us to question the wisdom of a sole focus on testing with pre-school children. While the urge to develop objective testing is understandable, our desire to obtain quantifiable results immediately can overshadow the wisdom and perceptions of the program practitioners – the teachers. We know that quantitative data on program effectiveness is much more persuasive with decision-makers than the softer, qualitative data gathered from observations and interviews with teachers. However, teacher comments have led the evaluation team to an appreciation of a much broader conception of “what works.” Rather than just focusing on testing results, we now pay close attention to teacher comments on changes in children's attention, interests, positive behaviors, and readiness for school. Teacher observations are data of equal importance, not merely interesting comments to supplement the quantitative data. As we finish this evaluation process, we have become even more convinced of the importance of attending to teacher observations and experiences. Evaluators tend to have a built-in bias against using programmers as sources of data, assuming that they will be positively biased in favor of good things and negatively biased against revealing problems or failures. We definitely did not find this to be the case. Instead, we found the teachers to be quite frank and willing to discuss both positive and negative aspects of the program and its implementation.

The question is not standardized tests vs. other measures. Both are helpful and can be useful as long as we not forget that each provides only a partial picture. In our evaluation work, we strive to reflect this complexity and to provide a more comprehensive view of the program by combining quantitative measurement with qualitative observations and practitioner reflections. However, this more complicated approach is capable of producing inconsistent results. While our mental models are usually simple, reality often intrudes and provides a complex and somewhat messier rendition. In the face of such mixed results, we are left to muddle through the somewhat confusing results and to make policy and program decisions based on less than ideal information.



General Testing Issues: Over the past 3-4 decades, testing in education has shifted from a diagnostic tool for individual students to assuming a paramount role in assessing how schools and the system are doing. Standardized tests have now become the principal, and in too many cases, the only indicator of performance of schools, school districts, state education departments, and the nation vis-à-vis other countries. And, tests have shifted from diagnostic tools to tell teachers, students, and parents how they are doing to high-stakes tests with real-life consequences for teachers, schools, and states. Daniel Koretz (Measuring Up, 2008) warns of possible dangers:

In all, educational testing is much like a powerful medication. If used carefully, it can be immensely informative, and it can be a very powerful tool for changing education for the better. Used indiscriminately, it poses a risk of various and severe side effects. Unlike powerful medications, however, tests are used with little independent oversight. Let the buyer beware.

According to Koretz, educational testing is ubiquitous in America. In our opinion, as well as that of others (e.g., Chapter 8 of Diane Ravitch, The Death and Life of the Great American School System, 2010) testing today has become something of a mania. Testing has become so important that it often trumps any other form of assessment. In the past, tests reflected learning. Today, it is safe to say that tests also drive learning – see “A Test of Strategy,” Star Tribune, 10/13/09.

The various evaluations of S.M.A.R.T. and S.M.A.R.T.-EC always have always used standardized measures as the test of success. Tests have a role but not the only role – they need to be supplemented with other, usually non-quantitative, indicators. Our evaluations have always examined multiple outcomes – test scores; teacher evaluations; administration decisions about continuation; etc. Yet, experience tells us that readers of the evaluation will look at test scores and use as the primary, if not sole, determinant of program success. Nothing could be further from our intent, yet it is an unfortunate reality about education testing. We should never use test scores as the only measure of success, but decision-makers often do.