

Working with Utah’s Rural School Districts to Expand and Enhance UPSTART

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School preparedness—especially acquiring cognitive skills such as basic literacy knowledge—is one of the most important elements of early childhood education. Yet many recent efforts have met with discouraging results. Because school preparedness has proven to be such a difficult problem to address, it is reasonable to expect future solutions to be more innovative or even revolutionary in approach while still providing rigorous theoretical and empirical justification for their usefulness.

The proposed project is a partnership between the non-profit Waterford Research Institute (Waterford) and Utah's geographically far-flung 18 rural school districts designed to expand and enhance Waterford's novel home-based technology solution for school preparedness in Utah—UPSTART (Utah Preparing Students Today for a Rewarding Tomorrow). UPSTART is an in-home preschool program that uses Waterford's award-winning software to provide preschool-age children (the year before they enter kindergarten) with an individualized reading, math, and science curriculum with a focus on reading instruction. With a research-based early learning curriculum and a unique User Support team, UPSTART forms a partnership with parents to ensure their children obtain the education necessary to start them on the path to success in school. To participate in the program, parents/caregivers must commit that their children will use the program 15 minutes a day, five days a week. And the results have been impressive. To date, at the conclusion of the program year, children who have met the usage requirements have been assessed at the Kindergarten Advanced level, which indicates the children start kindergarten at a level roughly equivalent to the ability level of students nationwide in the last three months of kindergarten. This average is regardless of ethnicity, socio-economic status, and geographic locale.

A state-funded UPSTART pilot was established by the Utah Legislature in 2008. In its first four years, UPSTART has been shown to offer a strong academic program and also provide

proof of the extraordinary educational power of technology. Now, for UPSTART to reach its full potential, two things must happen: 1) decision-makers, especially legislators, must be entirely convinced that UPSTART can successfully reach the children other pre-K programs may overlook or be unable to serve (in this project, rural school children), and 2) a public/private partnership between Waterford and Utah public schools must be facilitated to strengthen the program to meet districts' pre-K needs and provide a smooth transition for UPSTART children into school. To achieve both goals, district-level support is critical. Funding from an i3 validation grant will be used to reach children from rural districts that have traditionally had less access to educational resources than Utah's large urban and suburban districts. Funding will also be used to implement a cooperation model with districts that can serve as the basis for a larger statewide program in Utah as well as a regional and national model.

The project is aligned with i3's Absolute Priority *Serving Rural Communities*. In keeping with i3 program requirements, the project also addresses the Absolute Priority *Effective Use of Technology*. In terms of Competitive Preference Priorities, the proposed project addresses all three CPP(s): *Improving Cost-Effectiveness and Productivity*; *Enabling Broad Adoption of Effective Practices*; and *Supporting Novice i3 Applicants*. Finally, the proposed UPSTART expansion addresses the Invitational Priority *Supporting High-Quality Early Learning* as it ensures that children, especially those who may not have access to traditional early learning programs, can participate in program activities and enter kindergarten prepared for success.

Selection Criterion A: Significance

Unmet Demand

Language and word learning skills are significantly affected by early family experience (Hart & Risley, 1995), and early reading difficulties can sometimes appear even before a child enters kindergarten. Whether a problem begins before or during the time a child starts school, research has noted that large differences in reading technique and achievement are made apparent as early as first grade (Stanovich, 2000). Students that are behind during the first years

of school tend to learn at a slower rate than students who begin ahead. Often, this results in a so-called “Matthew effect” for reading skills, in which the academically “rich” become richer and the “poor” become poorer (Walberg, 2003).

Many recent efforts to improve reading instruction in U.S. primary schools have not met with encouraging results, especially among lower-performing students (Viteritti, 2004, p. 69; Guthrie & Springer, 2004; Cohen, Raudenbush, & Ball, 2003). In 2005, the National Assessment of Educational Progress (NAEP) reported that more than one-third of American fourth-grade students performed at the lowest level (Below Basic) on the NAEP reading skills test, a measure of reading comprehension [National Center for Education Statistics (NCES), 2008]. Recent efforts to improve reading instruction on a national scale, like the No Child Left Behind Act and its Early Reading First program, have moved public schools toward setting more specific goals for accountability and instructional methods for reading (Department of Education, 2008).

Results from recent federal efforts, while encouraging in certain areas, have not proven to be unequivocally positive; scores from the 2009 NAEP show that progress in early reading achievement continues to be very slow, even though progress has been made by lower-performing students in the early grades. The 2009 test showed no significant changes in racial/ethnic gaps, gender gaps, or gaps by type of school when compared to scores from 2007, and reading average scores among fourth-graders did not improve at all (NCES, 2010).

Making improvements to early reading instruction continues to present a significant problem for both educators and policymakers.

A Unique Home-Based Solution

The solution under examination here is an expansion and enhancement of Waterford’s UPSTART program which combines the educational power of Waterford’s early learning software with the home’s readily available resources to teach pre-literacy and early literacy skills to beginning readers. UPSTART is an innovative program that uses technology to: 1) improve

early cognitive growth; 2) close the achievement gap for ELL and lower SES students; and 3) provide service to rural areas to improve their academic success. Both the theoretical framework for UPSTART and the results from testing show UPSTART to offer an immediate and significant opportunity for preparing children for school. The aim is to provide a rationale for investment to achieve broader implementation and scaling of the program which, overall, prepares children to succeed in school and helps schools to achieve their learning goals.

Heckman (2001) demonstrated the importance of concentrating financial investments with preschool children, where the return on investment appears to be the greatest. As a consequence of his research, about 80% of states have introduced some version of a universal preschool approach. But the cost of offering traditional pre-K programs is high and can, in fact, be prohibitive for states, especially during economic downturns when states' resources are strapped to continue to meet existing K-12 program needs. The cost of traditional classroom-based pre-K programs is estimated to be \$8,700 per child [National Institute for Early Education Research (NIEER), 2010], including facilities, administration, and support services.

In addition to the cost element, research also brings into question some aspects of universal pre-K. Loeb et.al., noted in a Policy Analysis for California Education report that about two-thirds of children in America currently attend a preschool, and while attendance generates modest intellectual gains, the data on the behavioral impact of preschool on the children is mixed at best (Loeb, Bridges, Bassock, Fuller, & Rumberger, 2005). Their data are drawn from a study of over 14,000 students, and this work heightens the importance of finding alternative solutions to institutionalized preschool. Perhaps even more importantly, their work defines the academic limits of what can be expected from a universal preschool program which currently produces only modest gains.

Learning at home is an available and viable preschool alternative. The home has immense potential for influencing a child because, from birth until high school graduation, only 13% of a child's waking hours are spent in school. Time available at home is a major untapped

resource for addressing traditional educational settings' time limitations (Walberg, 2003).

Technology-Delivered Curriculum and a Proactive Support Organization

Home-based learning, of course, raises the issue of curriculum and academic supervision. Technology can provide an innovative and cost-effective curriculum, and software can individualize instruction to a degree necessary to undergird the successful education of children (Christensen, Johnson, & Horn, 2008). Computer-assisted instruction (CAI) in the classroom has been shown to allow for a dynamic presentation of material, individualized instruction, and a high level of engagement in the learning process. CAI can provide immediate feedback to responses, reinforcement, and, in some cases, an adaptive, learner-centered course of instruction. These benefits have been related to substantive student gains in knowledge (Lepper & Gurtner, 1989; Wenglinsky, 1998) and may help eliminate certain impediments to effective intervention among younger school-aged students and at-risk children (e.g., Fish et al., 2008). Additionally, the use of software is artistically engaging for children and is generationally appropriate—today's children are “digital natives” and adapt quickly and easily to software-based instruction. Waterford's UPSTART program places technology in the home and uses it to offer a strong, individualized academic program for preschool children. If a child spends just 15 minutes a day, five days a week—the requirement for participation in UPSTART—using the software, s/he will be provided with 90 hours of individualized instruction in a year, which is 30 times the amount of individualized instruction that a school environment can offer (Conant, 1973).

Equally as important as the software curriculum is academic supervision. UPSTART draws upon the home's resources—available time, the presence of a concerned parent or caregiver, a reliable environment to learn, known daily routines—to help address critical education needs. To undergird the home component, Waterford has established the UPSTART User Support Center to provide technical, motivational, and curriculum support. Within the center, representatives answer questions, respond to concerns, and also proactively motivate

program participants to achieve optimal use and results from the program. Representatives are assigned a yearly caseload of approximately one hundred homes and establish communication and support lines with their participants. With support from i3, Waterford will integrate into the support function a district-based UPSTART liaison to work with center representatives assigned to district participants. Center representatives unfamiliar with the workings of district school readiness programs, and district personnel who may be unfamiliar with technology and using it with young children, will all receive training and support to provide a unified and seamless year of support for participants from entry into UPSTART to entry into kindergarten. With the addition of the district liaisons, UPSTART will also have access to participating children once they are in school. With this access, Waterford will work with districts to add a new dimension to UPSTART: use of the program in the summers after kindergarten and first grades to forestall learning decay and the “summer slump” that can undermine school learning progress. This summer use is a key recommendation from UPSTART’s external evaluator and an enhancement Waterford is keen to add to the UPSTART program. Together, district liaisons and Waterford representatives will be partnering learning aides for participants and parents.

Results

A response to Evidence Standards is found at Appendix D and includes a discussion of CAI, particularly Waterford’s reading software, and UPSTART results to date. The following findings are noteworthy.

Research examining the effectiveness of adaptive, sequence-based CAI has been very positive. The use of adaptive learning systems in early education classrooms has resulted in greater reading ability gains compared to controls for kindergarteners living in poverty (Hecht and Close, 2002), ELL kindergarteners (Powers & Price-Johnson, 2006), suburban kindergarteners (Cassady & Smith, 2003; Macaruso & Walker, 2008), and suburban first graders (Cassady

& Smith, 2005; Macaruso, Hook, & McCabe, 2006; Savage, Abrami, Hipps, & Deault, 2009).

Waterford Early Reading Program[™] (WERP), the school version of *Rusty and Rosy Learn with Me*[™] (Rusty and Rosy), which serves as UPSTART's home curriculum, has been formally assessed in a variety of schools and districts of varying size, location, and socioeconomic status, and results are consistent in supporting the software's considerable effectiveness. After a statewide implementation of the software (N=2414) in Idaho kindergartens, evaluators, working in connection with the Albertson Foundation, reported strong evidence from a representative sample of eight school districts for its effectiveness among academically disadvantaged students. After one year with the program, the effect size for students who had originally tested in the lowest third on standardized reading measures was 1.14, and the overall effect size for students who completed the program was 0.52.

Cassady and Smith published the first of two Waterford-related studies in 2003. An Indiana school implemented the software in its kindergarten classes to work in conjunction with existing literacy instruction; the evaluation used the Phonological Abilities Tests (PAT) at three points during the trial year (beginning, middle, end) to assess student gains for basic literacy skills. Another school in the area, which had not implemented the program at all, served as the control group. Teachers in both schools, as participants in the Intentional Reading Project (IRP), were engaged in ongoing professional development activities, and both schools received various other resources throughout the year; the researchers were careful to ensure that Waterford software was the principal curricular difference. Despite no significant differences in pre-test scores, students using the software experienced a faster acquisition of phonological awareness skills than students who had not used the program, $F(2, 85) = 3.05, p < .05, \eta^2 = .07$.

As follow-up to their study with kindergarteners, Cassady and Smith examined the effect on reading achievement gains during the first-grade year. Again, students who used the software experienced significantly greater reading skill gains on a standardized test (the CTBS Terra Nova) than the comparison group, $F(1, 91) = 10.61, p < .002, \eta^2 = .10$. Researchers also noted

that it was the lowest-performing students who benefited most from the program; these students dramatically outperformed the low-performing comparison group ($F [1, 21] = 15.67, p < .001, \eta^2 = .43$). By the end of the first-grade year, test scores among this “at-risk” group were equivalent to those of the moderate-performing students in the comparison classes.

The What Works Clearinghouse reviewed an Ohio study that included more than 70 kindergarten students from six schools in Ohio and found evidence (with reservations) supporting the reading software’s value for alphabets and comprehension. In evaluating its effectiveness, WERP was found to have potentially positive effects on alphabets—+19 percentile points—while the comprehension improvement index was +4 percentile points (What Works Clearinghouse, 2007).

The consistency of the research results, both within and between studies, is striking. In each of the studies, students using Waterford software outperformed comparison-groups in most, if not all, of examined assessment measures. It is important to note that in no case did the comparisons outperform Waterford students. Waterford has always focused its development and iteration on research; because of this, its software has demonstrated remarkable strength, robustness, and adaptability. Results have been consistent in a wide variety of early-education contexts—and regardless of which assessments have been used. Waterford’s software has been proven to be a considerable and flexible tool for helping children reach their whole learning potential.

UPSTART has provided an entirely new environment for measuring the effectiveness of Waterford software because, prior to UPSTART, the use of Waterford software had been confined to the school classroom. Similarly, studying pre-school children in the home is important because, although the software is designed to accommodate children of this age, all previous tests had taken place among kindergarten or early primary students.

UPSTART began in 2009 and was implemented to some degree in every public school district throughout Utah. Substantial efforts were made to reach low-income and minority

students, and in the first year of the program 61% of UPSTART participants came from low-income homes (by Year 5, that number has increased to 72%), and 20% classified their ethnicities as non-white. The program provides state funding for the installation of computers and Internet access in homes that do not have them.

As part of the program evaluation, a large number of UPSTART children (N = 1,347) used Rusty and Rosy in their homes. Children were asked to spend 15 minutes a day with the software, five days a week, until the time they entered kindergarten. Only results from Level 1 of Rusty and Rosy were considered for the evaluation. Gains were measured using *Waterford Assessments of Core Skills*[™] (WACS). WACS is a new computerized adaptive test of early literacy consisting of 11 separate subtests. Initial content validity for WACS was established against state and national standards for the 11 subtests. All items were then calibrated for Item Response Theory to determine item difficulty. To establish concurrent validity and predictive validity student performance on WACS was compared to performance on five commonly used standardized tests also measuring early reading skills; all correlations between tests are significant, ranging from $r = .41$ to $r = .78$ (median $r = .63$). Additional analyses indicate that WACS is internally consistent and has strong test-retest reliability ($r = .90$). Due to attrition effects (i.e., some children did not take the WACS post-test, and others took neither the pre-test nor the post-test), the analyses included usage data and test scores for 784 students.

Among the principal hypotheses for the study was increased time with Rusty and Rosy would result in corresponding increases in pre- to post-test gains. Among the 784 children who took both the pre-test and the post-test, average usage (once outliers were eliminated) was approximately 13.80 minutes per calendar day, more than 30% more than the recommended proxy value of 10.71 minutes per calendar day. Once outliers were removed, analysis results showed use was a significant predictor ($p < .000$; Adj. $R^2 = .093$) of early-reading achievement

gains (Heuston, 2010). It was also found that children who had used the program for less than the recommended time experienced only small gains on the WACS test ($M=11.8$, $SD=316.7$) when compared to children who used the program for about the recommended amount of time ($M=163.1$, $SD=346.5$) and to children who used the program for significantly more than the right amount of time ($M=263.5$, $SD=350.3$). Finally, the time children took to master skills decreased as compliance to recommended usage increased ($p < .000$), suggesting that the relative rate of learning increased as children spent more time with Rusty and Rosy.

The UPSTART Year 1 usage data showed three significant findings from the first year of the program: participants met or exceeded the minimum requirements for usage of the program (78 minutes a week compared to the required 75 minutes a week); participants representing the lowest SES correlated to the groups using the program the most; and Hispanic students used the program significantly more than their Caucasian counterparts.

Using WACS as the measure, on average, Year 1 UPSTART participants completed the program at the Kindergarten Advanced level (In WACS scoring, if a student receives a Kindergarten Advanced score, it indicates that the student's ability is similar to the ability level of the top third of kindergarteners nationwide). This average is for students from rural and urban settings, all ethnicities, and upper and lower SES levels. Question difficulty ranges for WACS by grade and Year 1 final WACS score data by individual skill, ethnicity, SES, language, and other preschool attendance are found at Appendix D.

In subsequent years, parents/caregivers were asked to commit to meeting usage requirements, and data from Year 1 were used to prove the results value of the commitment. Improvements were also made in the UPSTART User Support Center based on Year 1 experience. As a result, weekly usage increased substantially to 93 minutes a week in Year 2 and 103 minutes in Year 3. Pre-to-post growth was measured and demonstrated using WACS

results in both years, and Year 2 and 3 participants completed the program at Kindergarten Advanced level according to WACS.

Contribution to Advancement of Theory, Knowledge, and Practices

As part of the UPSTART pilot, the Utah State Office of Education contracted with the Evaluation and Training Institute (ETI) to provide an external assessment of the program. Evaluation results have been extremely positive. The most extensive study was the recently released Year 3 study. The evaluation of UPSTART's third year of implementation used a pretest-posttest control group design to assess the program's impact on developing children's early literacy skills in preschool. Other objectives included documenting the extent to which participants used the computerized curriculum, establishing the relationship between curriculum usage and literacy outcomes, and reviewing the degree to which the participants met the program's curriculum usage criteria.

Three hundred and five children were measured on two tests of early literacy skills, the Brigance Inventory of Early Development and the Bader Reading and Language Assessment. Differences in the development of literacy skills between a sample of UPSTART participants (the treatment group) and a group of similar nonparticipants (the control group) in the year prior to enrollment in kindergarten were examined.

Brigance Growth Score Results showed growth rates were significantly different between the treatment and control group for the overall Brigance and five subtests. All of these differences in growth rates favored the UPSTART treatment group. On average, the UPSTART participants scored 28 points higher on the Brigance posttest. The study reported an effect size estimated to be .68 for Total Brigance. Figure 1 uses bar charts to compare the growth rates of

the UPSTART treatment and control group as measured by the Total Brigance and each of its subtests from pretest to posttest for the matched samples.

Bader Growth Score Results indicated the UPSTART group showed significantly stronger growth rates relative to the control group on the Total Bader and all of the Bader subtests as well. Figure 2 compares the growth rates of the treatment and control group as measured by the Total Bader and each of its subtests from pretest to posttest for the matched samples. The study reported a .85 effect size and noted, “the UPSTART impact as measured by the Bader was substantial, not only in size but in breadth, as the gains in phonological awareness were observed for UPSTART participants across the board for all three subtests as well as for the Total Bader.”

Other notable findings showed: length of participation in the UPSTART curriculum was significantly and positively correlated with literacy skills at the beginning of kindergarten; the UPSTART graduation rate continued to rise each year to 94% in Year 3, indicating UPSTART is making very good progress in achieving the curriculum usage goals set for program implementation; and evidence from Year 3 results suggests that UPSTART’s use of education technology in a home based approach has considerable merit for facilitating the development of school readiness in young preschool children. The entire report is included at Appendix D.

Parent satisfaction with UPSTART has also been impressive. During December 2009, Waterford engaged the research group Dan Jones & Associates to conduct telephone interviews in English and Spanish of 321 parents and caregivers of children enrolled in UPSTART regarding their experience with the program. The results were extremely positive, to wit: 98% said they would recommend the program; 97% said they would enroll another child in

UPSTART; 96% declared their child more ready to enter kindergarten because of UPSTART; and 92% supported expansion of the program to serve more Utah children.

Figure 1. Growth Rate Comparisons on the Brigance

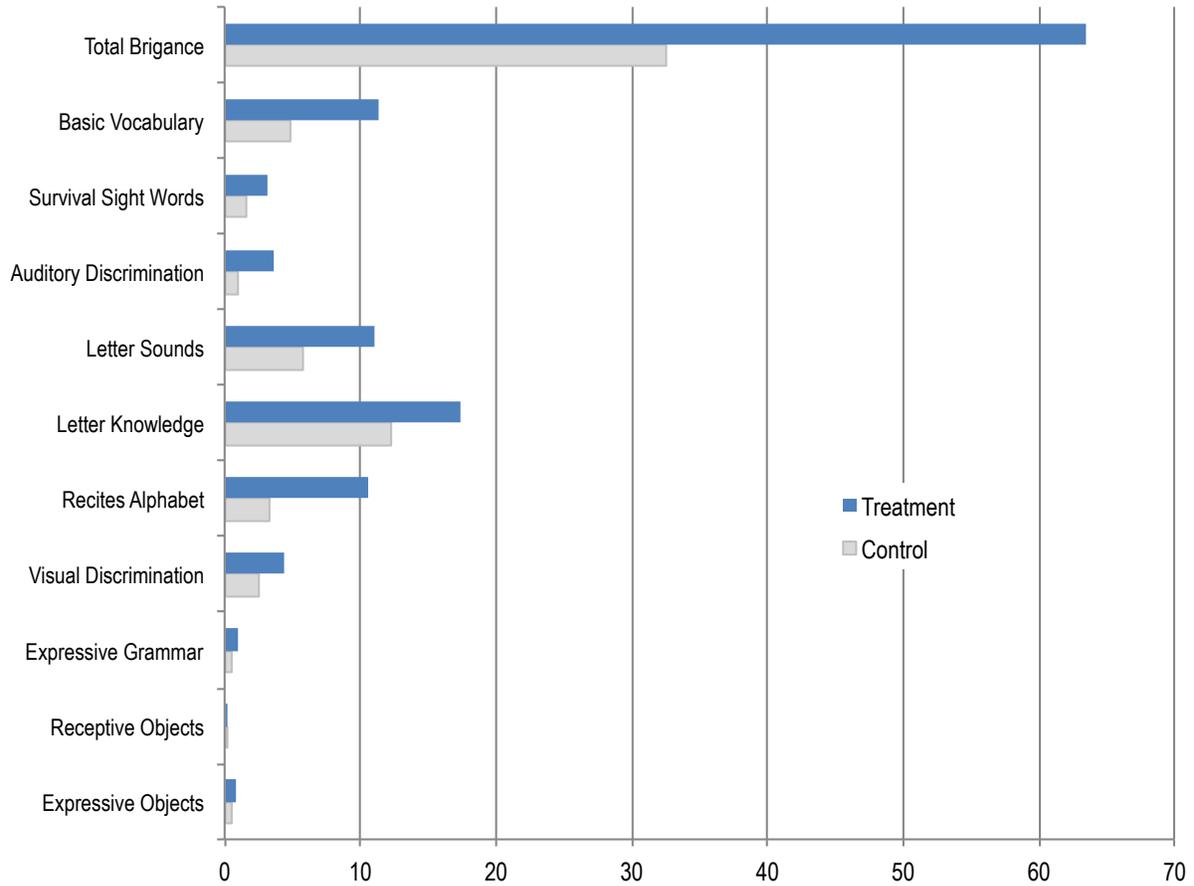
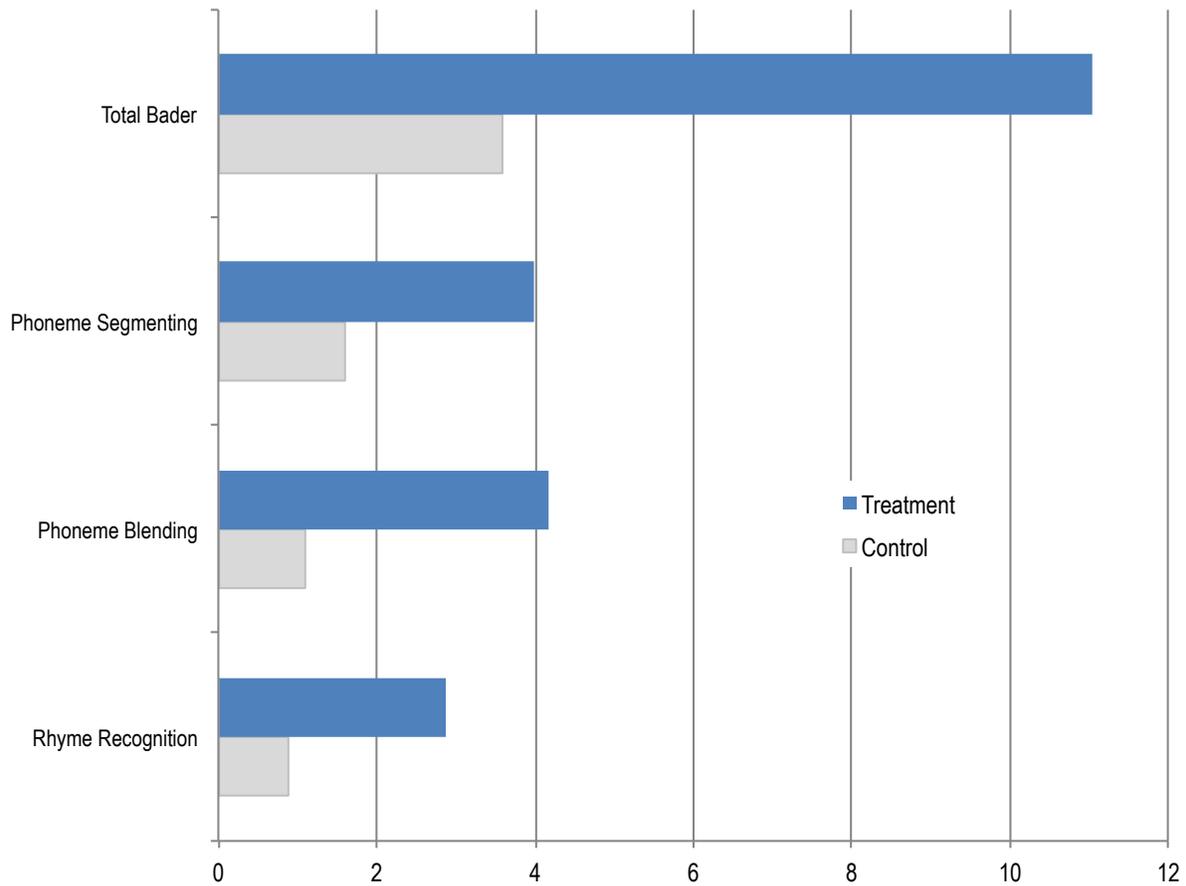


Figure 2. Growth Rate Comparisons on the Bader



Feasibility of National Expansion

There is a high probability of successfully expanding UPSTART regionally and nationally based on two factors: 1) UPSTART’s cost-effectiveness; and 2) Waterford’s historical experience implementing large programs to favorable outcomes.

In the five-year UPSTART pilot currently in its last year in Utah, the average cost of UPSTART is \$1,340 per child. This includes providing computers and Internet to approximately one-third of participants who do not have access to those resources at home. This compares extremely favorably to the NIEER estimate of \$8,700 per child for universal preschool. Comparing those costs in an implementation of 2,000 children, for example, shows

UPSTART at \$2,680,000 and a traditional classroom-based program at \$17,400,000.

Waterford believes that once UPSTART is scaled widely costs will be further reduced. Estimated costs for reaching additional participants are as follows (estimates include equipment and Internet costs for 35% of participants): \$92,666,230 for 150,000 participants or \$618 per participant; \$149,162,504 for 250,000 participants or \$597 per participant; and \$291,930,199 for 500,000 participants or \$584 per participant.

Classroom-based instruction, on the other hand, does not scale; in fact, it will always increase because of rising new-construction costs and additional salary costs and ever-increasing personnel benefit rates.

Waterford's capacity to bring UPSTART to scale is also based on a history of successful large-program implementations. Waterford was founded in 1976, and, in 1978, used a grant from the National Science Foundation to produce the world's first educational videodisc, "The Development of Living Things." During the same time period, the U.S. Army, the U.S. Navy, and industrial clients contracted with Waterford to produce education and training products. To date, Waterford has invested more than \$150 million in its early learning products, and currently more than half a million schoolchildren around the world use the software.

Waterford has implemented numerous successful large-scale technology-based education programs. In 1998, the *Waterford Early Reading Program*TM was implemented in nearly every kindergarten classroom in Idaho, thanks to a grant of \$15 million from the J.A. and Kathryn Albertson Foundation. Funding was authorized in May 1998, and turn-key computer stations were built and shipped September 1 for the start of the school year. Training was made available to all school participants, and Waterford also made a video for remote installations. Dr. Herbert J. Walberg evaluated the Idaho reading initiative and found "the Waterford program also appears spectacularly effective for beginning readers who initially scored in the lower third of the group when they began to learn to read. . . . Waterford effects, for example, were comparable or

superior to tutoring, increasing instructional time, increasing the academically stimulating features of the home environment, and class size reduction.” (Walberg, 2001)

Idaho passed legislation in spring 1999 which required testing in early reading skills to begin in fall 1999. Idaho approached Waterford to build fall/winter/spring tests for kindergarten through third grade (12 tests in all) with related training and parent and teacher guides. The task required close collaboration between Waterford and the Idaho State Department of Education. The assessment was expanded to pre-K, translated to Spanish, and used successfully by more than 70,000 students across the state from 1999-2007.

Waterford has more than 15 years of experience providing effective remote and on-site support to schools across the country to remedy software-related issues and problems, including: conducting testing and other research to verify problems and develop solutions; sending Waterford personnel to school customer sites to observe problems firsthand and develop solutions; doing product development work to implement solutions; transmitting solutions to schools as appropriate; and directly updating customer systems for newly developed patches and new program releases to fix identified “bugs.”

In 2009, Waterford received a contract from the Utah State Office of Education (USOE) to administer UPSTART and place the program in 1,300 homes across Utah. Based on successful completion of the first year, the contract has been renewed for four additional years (through 2014). Altogether, \$9.4 million has been approved by the Utah legislature, and at the completion of Year 5 of the program, Waterford will have served more than 7,000 children. Interest in the program has increased each year, and more than 1,000 children were placed on a waiting list for the Year 5 program.

Selection Criterion B: Quality of the Project Design: Goals, Strategies, and Actions

The proposed five-year UPSTART project is designed to expand the program’s potential impact in rural areas across the United States by first focusing on Utah’s 18 rural school districts as identified in the Utah Foundation’s report, “Reaching for Educational Equity: An Evaluation

of Utah’s Rural Schools” (2012). The report clearly notes, “Utah’s rural schools face significant educational challenges,” and points out “by nature of their small size and the resulting financial constraints, rural schools have difficulty providing the course offerings and facilities of non-rural schools, which in turn may be holding back rural students.” In addition to their geographic remoteness and few pre-K programs, the Utah rural districts also are at an economic disadvantage, with 48.2% of children qualifying for free and reduced lunch, compared to the 37.7% non-rural average. All of the partnering districts have had children in the UPSTART program, but none have had a large, impactful (in terms of overall district school readiness), number of students in the program. Utah State Superintendent of Education, Dr. Martell Menlove, has agreed that USOE will work with Waterford to ensure districts’ involvement and dedication to the program (see Appendix G).

One “class” of four year olds in the 18 districts will be studied. Districts and estimated annual four-year-old populations are shown in the following chart.

District	Total Enrollment	Estimated 4 Year Olds
Beaver	1,540	120
Daggett	169	15
Duchesne	4,574	355
Emery	2,313	180
Garfield	927	73
Grand	1,467	115
Kane	1,175	92
Millard	2,815	220
North Sanpete	2,420	190
North Summit	983	77
Piute	317	26
Rich	491	40
San Juan	2,922	230
Sevier	4,546	360
South Sanpete	3,124	245
South Summit	1,457	115
Tintic	210	18
Wayne	539	44
	31,989	2,515

Goals, Action Plan, and Further Testing and Development

Approximately 70% of the total number of four year olds in the districts—1,760—will be studied over a five-year timetable. The program will include UPSTART instruction the academic year before participants enter kindergarten, as well as during the summer months after kindergarten and first and second grades. The inclusion of summer use is an extension of program recommendations by the UPSTART external evaluator, but lack of funding has precluded this addition to the program. This is a key development that i3 funding will make possible.

Significant planning and evaluation will comprise six months of preparation and study at the beginning and end of the five-year project. Project goals are to: 1) successfully expand implementation of UPSTART in participating rural school districts; and 2) work with district personnel to enhance children’s experience on the program, meet the pre-K educational needs of the districts, and effectively transition children to school and work with them during the summers to avoid summer learning decay. Waterford’s strategy is comprised of seven components: 1) providing three related Waterford software programs that focus on reading, assessment, and reading intervention; 2) working closely and in concert with Utah’s pre-K-16 education community through the UPSTART Advisory Committee (which includes representatives from the Governor’s Office, USOE, Salt Lake Community College, and the University of Utah); 3) coordinating with 18 rural Utah school districts through district UPSTART liaisons to reach 70% of each district’s pre-K population the year before the children go to school, implement and support UPSTART to provide a successful home learning experience, effect a smooth transition for the UPSTART children into the traditional kindergarten classroom, and use the UPSTART curriculum in three subsequent summers to stave off the “summer slump”; 4) training Waterford support center personnel and district liaisons to work together to provide unified technological, programmatic, and motivational support for

home users; 5) directing efforts and resources to expand outreach as necessary to serve any special needs of the rural districts that result from their lack of access to resources; 6) providing an in-depth external evaluation of the expanded UPSTART program; and 7) disseminating program results to researchers, practitioners, and other interested parties, including district and USOE personnel, Utah Legislative leadership, and states looking for a cost-effective alternative to universal preschool or an effective and inexpensive way to reach rural populations that frequently cannot be served by classroom-based early learning programs.

With district personnel's help, Waterford will make every effort to reach families in poverty, and those homes will receive the necessary hardware and Internet connectivity for the year they participate in the program. While computer and Internet expenses are a large part of the budget for the project, it is imperative to reach those children who, arguably, are the ones who will benefit most from the UPSTART program. They will also be a key target group of Waterford and district support, which will be provided in both English and Spanish, should the homes be Spanish-speaking. The emphasis is to ensure these parents/caregivers and children have the help they need to succeed in the program. Experience with families from low-income homes will also provide important information to Waterford, the UPSTART external evaluator, and participating school districts about successful strategies for engaging and serving these children and their families.

Waterford's approach to implementing the UPSTART program centers on three software components: *Rusty and Rosy Learn with Me*[™] (Rusty and Rosy) is the main curriculum and focuses on reading readiness; *Camp Consonant*[™] assists multi-sensory learners; and *Waterford Assessments of Core Skills*[™] (WACS), assesses early literacy. Rusty and Rosy provides individualized curriculum depth and richness with more than 450 instructional hours. UPSTART children are required to use Rusty and Rosy for at least 15 minutes a day, 5 days a week, a pattern designed to strengthen neural pathways by providing consistent repetition of the learning activities. Usage is tracked within the program and monitored weekly by Waterford

personnel. Camp Consonant, with more than 150 hours of instruction, provides children who need to overcome reading problems the consistent, intense, structured study they need. In UPSTART, the child simply replaces Rusty and Rosy with Camp Consonant, using the program 15 minutes a day, 5 days a week. WACS is an adaptive reading assessment designed to assess eleven key pre-literacy and reading skills. WACS is administered at the beginning and end of the UPSTART pre-K year to measure learning gains.

The software programs offer a home-access solution to three key objectives necessary for children to achieve reading success: access to vocabulary and spoken words from birth through age four; access to training in the alphabet, print concepts, and phonemic awareness—skills identified as essential for reading success; access to additional instruction for the 20% of children who struggle with reading and, as a result, need tutoring; and access to assessment so training and intervention can begin even before formal schooling begins.

The two WACS testing sessions coincide with parent/caregiver meetings. At the first meeting, parents are given an overview of the research-based program and its successful results and asked to commit to the usage requirement of 15 minutes a day, five days a week. If they are reluctant to maintain the necessary usage, they simply exit the meeting without equipment once their child completes WACS. Equipment is distributed to those who do commit, along with easy to understand instructions on installing the software or setting up the pre-loaded computers. Parents are guided through the Rusty and Rosy Parent Manager, and the resource role of Waterford support personnel and the district liaison is explained. Parents are also advised of the weekly usage emails and introduced to the UPSTART websites—both English and Spanish—as an ongoing program resource. Supporting activities are discussed, and Camp Consonant is described as a potential alternative for some children. An ongoing relationship with both support center personnel and the district liaison is encouraged. The meeting also provides an opportunity for district liaisons to discuss requirements for entry into kindergarten and important related dates. As with all UPSTART activities, sessions are conducted in both English and Spanish. At

the second meeting, parents and caregivers fill out an in-depth evaluation of the program (provided in both English and Spanish). Families are encouraged to attend and celebrate, and UPSTART children and parents/caregivers receive diplomas and congratulatory certificates.

Ongoing assistance is provided by Waterford's UPSTART User Support Center, which provides both technical and curriculum support. Within the center, representatives function similarly to education paraprofessionals, providing assistance to parents/caregivers using a variety of strategies that have been proven to work. They prepare instructional materials for the program websites, monitor participant usage, and support parents/caregivers and their children by not only answering questions and responding to concerns, but also by motivating program participants to achieve optimal use and results from the program. Programmatic and technological support cases and all other interactions with families are logged on the UPSTART database. Frequent communication is supported by written materials, DVD and online training, emails, and phone calls. Representatives also provide basic technical support, and, if necessary, they move more difficult technical issues to UPSTART field support representatives. Overall, the strategy is to provide families with a steady stream of data on children's usage and performance as well as to introduce motivational strategies for maintaining parent and child interest. This unique support system forms a partnership with parents and caregivers to ensure their children obtain the education necessary to start them on the path to success in school. Sixty percent of center representatives speak both English and Spanish.

Funding from i3 will be used to add district-level support to this already successful model. Waterford staff and district liaisons will be trained annually to work together to establish best practices to benefit participants. Waterford personnel will be assigned to work with and support specific liaisons and districts and will attend related district training programs to become better acquainted with their families. In addition to working cooperatively to provide support to

participants, district liaisons will also be responsible for integrating district school-preparedness milestone requirements into program outreach and activities.

Using i3 Funds to Address Barriers

The project specifically addresses a number of existing educational barriers. The first is the common problem of excluding rural school districts and schools from exemplary research programs because of their geographical distance. UPSTART's use of technology bridges that gap, and rural children receive exactly the same program as their urban and suburban counterparts. The second is the gap between traditional public K-12 and innovative programs spawned outside the public school realm. The proposed UPSTART program builds on a five-year working relationship with the Utah State Office of Education and Utah school districts. The bugs in the relationship, frankly, were worked out in Years 1 and 2 of the program, and there is an appreciation now that UPSTART can reach children that traditional pre-K programs cannot. Similarly, Waterford now acknowledges that the UPSTART program is best offered in partnership to reach the most children. School districts can deliver pre-K children in their communities that Waterford might otherwise not capture in its marketing and advertising nets. The inclusion of an extensive outside evaluation refutes barrier three, claims that the program is shown to be successful because Waterford is using "its own test." While Waterford's WACS test has been proven to be an effective early learning assessment tool and is gaining a broader following, it still is easier when spreading the UPSTART gospel to allude to a third party using more widely used and better known tests for the assessment data. Finally, the program will counter the frequently voiced fourth barrier, "We can't pay for K-12; how can we do pre-K?" argument common among legislators and school officials. At about one-eighth the cost of traditional classroom-based pre-K, UPSTART demands a second look based on its academic outcomes and ability to be deployed universally. Other operational barriers and solutions are described in the Assurances and Certifications, GEPA Section 427.

Selection Criterion 3: Quality of the Management Plan

Responsibilities, Objectives, Timelines, and Milestones

Key responsibilities for the UPSTART rural expansion are well-defined. Waterford will: 1) provide program recruitment materials and use its non-profit status to secure publicity for marketing the program; 2) purchase hardware and Internet service for participating lower SES homes; 3) train Waterford personnel and district liaisons to achieve best practices; 4) conduct pre- and post- testing for children to measure gains; 5) work with district personnel to provide training sessions for parents; and 6) provide the independent evaluator with full access to program information and findings. Districts will: 1) provide Waterford with information on district population demographics, district administrative structure, and district goals for early education; 2) assist Waterford in promoting the program, including securing backing from gatekeepers in local programs such as Head Start and Migrant Head Start that serve the pre-K population; 3) with grant funds, hire a district UPSTART liaison who will be trained along with Waterford personnel to develop best practices for the UPSTART program; 4) work with Waterford to implement and support the program during the pre-K year and the following three summers; and 5) provide access to data to assess the program. Together, Waterford and the district liaisons will provide continuity between children exiting the UPSTART program and moving on to kindergarten in district elementary schools. Milestones, steps to implement, expected outcomes, performance indicators and timeline follow.

Milestones	Steps to Implement	Expected Outcome	Performance Indicators	Timeline
Districts hire and retain liaisons	Waterford forwards money annually	Successful selection and retention at district level	Districts use standard evaluation criteria	Ongoing throughout the grant
User Support representatives and district liaisons trained	Work with training/mentoring/coaching staff to provide annual training	Fully functioning User Support team and district liaisons	Parent evaluations at end of UPSTART year	June, Year 1
Waterford and	Flyers, outreach to Head	Enough homes	Overall	Ongoing

districts recruit participants, pre-register, and register	Starts, Migrant Head Starts service providers for low-income families, churches, newspaper advertisements, community-based events, schools; focus on lower SES and ELL homes	to fulfill targets for participation and control for grant	numbers, SES participation, ELL participation, and rural participation meet target participation goals	throughout the grant with special emphasis in March-April timeframe
Parent/care-giver training and equipment distribution	Advise parents/caregivers of training times	Parents receive in-person training in each district (English and Spanish) and receive equipment; emphasis on importance of weekly usage to achieve learning outcomes	Successful training means fewer technology and curriculum calls; parents motivate children to achieve target usage	July-August of each year
Assessment of participating children	Use WACS for testing.	Baseline and final scores/grade-placement levels	Children successfully tested two times	July of Year 1/August of Year 2
Cooperate fully with external evaluator	Demographic data and WACS scores provided to external evaluator; treatment and control group children identified; district liaisons assist with testing	External evaluator has all necessary data to complete evaluation	Open lines of communication between program director and external evaluator; evaluation completed in timely manner each year with information provided to Waterford and districts	Ongoing throughout the program
Ongoing curriculum and technical support to participating families	Waterford reps and district liaisons work in concern to participants' needs	Usage goals and academic achievement goals met or exceeded	Weekly usage data and improvement in WACS scores throughout the child's	UPSTART pre-K year

			participation in the program	
Maintain and improve UPSTART websites (English and Spanish)	Seek ideas from participants and district liaisons especially for Kids' Corner	A useful on-line tool to help parents/ caregivers find complementary activities for children	Website hits and final evaluations	Ongoing
Monitor usage and make motivation calls.	Waterford reps and district liaisons make weekly calls and have monthly contact with children homes	Usage goals and academic achievement goals met or exceeded	Weekly usage data and improvement in WACS scores throughout the child's participation in the program	UPSTART pre-K year
Summer Use	Waterford reps and district liaisons work in concert to reacquaint participants with program and establish summer use requirements and patterns	Usage goals and academic achievement goals met or exceeded	Weekly usage data collected	3-month period after kindergarten and grades 1 and 2.
Final reports filed and results disseminated widely	External evaluator completes evaluation; external evaluator and Waterford project director submit articles and otherwise seek opportunities to present findings	Dissemination of results throughout the disciplines and in the popular press	Publications and presentations	Ongoing after the grant is completed

Clarity and Coherence of the Expansion, Financial, and Operating Model

Funding from i3 will be used to: 1) expand the number of homes and children in rural Utah districts served by UPSTART; 2) train Waterford and district personnel to work together as a program support unit; 3) supply hardware and Internet access to ensure that children who are low-income are able to participate in the program; 4) provide training and programmatic and technological support for parents/caregivers; and 5) maintain a cost-effective administrative approach to the program. Funding will also be used for an extensive evaluation of the expanded

program conducted by the Evaluation and Training Institute.

As noted above on pages 14 – 16, there is a high probability of successfully expanding UPSTART regionally and nationally based on two factors: UPSTART’s cost-effectiveness and Waterford’s historical experience implementing large programs to favorable outcomes.

Waterford is in the fifth year of successfully implementing the UPSTART program, and scaling the program will benefit greatly from what Waterford has learned in those years; in other words, the project is ready for immediate implementation now. Waterford has fulfilled all aspects of the Utah state-funded UPSTART program on time and within the budget; in fact, each year Waterford has exceeded the number of children to be served stipulated by the state contract. USOE and the Utah State Legislature Public Education Appropriations Committee have publicly praised the program, particularly its ability to reach participants statewide, its participant support function, its overall administration, and the cost-effectiveness of the program. People who initially spoke out against UPSTART because its use of technology with young children have come to appreciate the results of only 15 minutes a day of use and children’s engagement with the program. Those concerned that the program happened outside of the Utah public K-12 system have come to appreciate the program’s accomplishments, particularly its recruitment of and success with non-English speaking families and economically disadvantaged families. And all have been impressed that Waterford has been able to deliver technology to every corner of Utah—no matter how remote—to deliver the pre-K program to communities that do not have access to such programs.

Selection Criterion D: Personnel

Qualifications, Experience, and Responsibilities

Waterford currently has in place the expertise at all levels necessary to implement the proposed UPSTART project. Resumes for key personnel are found at Appendix F. Dr. Claudia Miner is Executive Director of the UPSTART program. Miner works closely with both the Utah Legislature to secure ongoing support for UPSTART and USOE and the UPSTART Advisory

Committee to administer the program. Prior to coming to Waterford she had a thirteen-year tenure at the Desert Research Institute in Reno, Nevada, where she planned, implemented, and oversaw three statewide K-12 programs. Dr. Haya Shamir, Vice President of Applied Research and Learning and Chief Scientist at Waterford, oversaw the development of WACS, including all aspects of validation. She will work primarily with the external evaluator for the project. Cory Saunders, Vice President of Technology at Waterford, has over fifteen years of experience in all aspects of software development and support. He will serve as software/technology director for the i3 grant, overseeing new software builds as well as revisions to the UPSTART database architecture. Ann Izzo, Managing Director of UPSTART and Director of the UPSTART User Support Center, will oversee support representatives, field support technicians, equipment distribution, and training. Izzo has more than 15 years of user support experience. She designed and implemented current UPSTART support functions and continually evaluates and updates procedures.

Dr. Jon Hobbs, president of the Evaluation and Training Institute (ETI), is a psychologist, specializing in educational and psychological measurement, research design, and statistical analysis. Hobbs has experience coordinating state-wide educational reform efforts, managing large scale research projects and applying multi-level statistical methods to educational data. His content expertise includes learning achievement, lifespan development, social cognition, and children's use of technology (with an emphasis on Internet safety and technology in K-12 schools). He has a Doctorate in Educational Psychology and a Master's of Science in Counseling Psychology.

Because Waterford already has a successfully functioning UPSTART program underway statewide in Utah, and because UPSTART is technology-based, staffing the project will be straightforward. Waterford will immediately hire the personnel to scale up UPSTART and pass grant funds on to the districts to hire UPSTART liaisons.

The i3 UPSTART project timeline is included with the budget narrative and is based on

management and implementation procedures for the current UPSTART program.

Selection Criterion E: Quality of Project Evaluation

Assessment of the Work to be Performed

The experimental and control groups (neither assigned randomly) will take a common assessment at four points in time: before enrolling in the program, at the beginning of kindergarten, at the beginning of grade one, at the beginning of grade two and finally at the beginning of grade 3. We will use a control groups to help answer the question of whether UPSTART improves school readiness for children and whether that effect is continued with repeated summer program exposure (Cook & Campbell, 1979).

Research Questions

RQ1: *Does UPSTART improve school readiness?*

RQ2: *Does UPSTART sustain improvements in school readiness?*

Where the outcomes are:

- **Measures of early literacy skills relevant to emerging readers (e.g., phonological awareness, letter recognition, awareness of concepts of print and oral language comprehension) and beginning readers (e.g., word recognition and phonics).**
- **The proportion of students promoted to first grade.**
- **The proportion of students referred for special and compensatory education at the beginning of first grade.**

RQ3: *To what extent was the program implemented in terms of minutes of exposure per participant per week?*

RQ4: *What percent of participants completed the full implementation program?*

RQ5: *How does level of implementation relate to school readiness outcomes?*

Data for research questions 3 and 4 can be obtained from records maintained by the Waterford Institute. Answers to these questions can be derived from descriptive statistics. The answer to Research Question 5 can be derived from statistical analyses of the relationship between exposure to the computer-assisted program of instruction (based on Waterford records) and the outcomes of interest.

Sampling Plan

Our proposed design can be implemented with a sample of 900 students sampled from 18 Utah public schools districts. Sampling was calculated using an inflation factor of 10 percent to counter the possibility of study attrition between kindergarten and Grade 3.¹ We propose to implement our sampling plan in 18 school districts. Our sampling plan calls for selecting 50 pre-kindergarten students per district, 25 of whom will be participating in UPSTART and 25 who will not (controls).

The general sampling plan meets an 80 percent statistical power criterion assuming the need to detect small effects for UPSTART with a 95 percent level of confidence. The sampling plan is based on the use of a multiple linear regression analysis at each of the two posttest data points using a hierarchical regression design with five covariates² entered in a control step to adjust for between group differences that affect the outcomes measured, followed by the set of interest, which is membership in the treatment or control groups.

¹ Families moving out of the district or deciding to opt out of study participation.

² The covariate set would involve a composite of student characteristics including sex, ethnicity, primary language spoken, income eligibility for free or reduced price lunch (poverty or family income indicator), and whether the child attended preschool. This information should be obtainable from the Waterford Institute and/or the public schools for treatment and control students.

Selection of Districts.

The program vendor will supply us with a list of the 18 districts, and we will recruit for the two groups. Our sampling plan assumes the selection of larger schools with multiple kindergarten classes (probably in excess of three kindergartens per school).

We propose to select those schools within the district that have enrolled the largest number of UPSTART participants. We would also prefer to select schools that already administer student assessments at kindergarten and beyond. If this can be done using the instruments we have in mind – the DIBELS for literacy assessment-- then extant test data can be used to some extent in the study.

Selection of Treatment Students.

Twenty-five treatment students from each of the eighteen participating districts will be randomly selected from those students who participated in UPSTART with at least 1100 minutes of computer usage beginning pre-kindergarten.³

Selection of Random Sample Control Students.

Twenty-five kindergarten students from each of the participating schools who did not participate in UPSTART will be randomly selected to participate in the study.

Outcome Measures

The reading skills taught by the Waterford Early Learning Program at Level 1 of the curriculum (www.waterfordearlylearning.org) include:

- **Phonological Awareness: phonemic segmenting and blending.**
- **Phonics: letter name knowledge, sound knowledge, and word reading.**
- **Comprehension and Vocabulary: vocabulary knowledge.**

³ This corresponds to six months of program usage according to Powers and Price-Johnson, (2007b).

- **Language Concepts: oral reading fluency.**

We propose to use the *Preschool Early Literacy Indicator (PELI)* and the *Brigance IED II* to measure early literacy skills pre-kindergarten, and the *Dynamic Indicators of Basic Early Literacy Skills NEXT (DIBELS)*, to measure reading skills in kindergarten and grades 1 through 3. The DIBELS has been used in prior evaluations of the Waterford Early Learning Program (see Powers and Price-Johnson, 2007, a & b).

The Brigance. The Brigance IED was selected as an early literacy measure of phonics and vocabulary knowledge and as a measure of pre-kindergarten academic and cognitive skills. Ten of the Brigance scales will be administered from the language development and academic/cognitive domains.

The Brigance language development scales included the:

- *Expressive Objects subtest*: the child is asked to name pictures shown by an assessor. (Total possible subtest score = 27)
- *Receptive Objects subtest*: the child is asked to point to pictures named by an assessor. (Total possible subtest score = 27)
- *Expressive Grammar subtest*: the child is assessed on the ability to use plural *s*, *ing*, prepositions, and interpret and talk about an illustration. (Total possible subtest score = 12)

The Brigance academic and cognitive literacy scales included the:

- *Visual Discrimination subtest*: the assessment focuses on the child's ability to identify similarities and differences between forms, uppercase letters, lowercase letters, and words. (Total possible subtest score = 20)

- *Recites Alphabet* subtest: the child is asked to recite the alphabet. (Total possible subtest score = 26)
- *Lowercase Letter Knowledge* subtest: the child is asked to name and recognize (point to) lower case letters presented by an assessor. (Total possible subtest score = 52)
- *Sounds of Lowercase Letters* subtest: the child is assessed on the ability to produce sounds of lowercase letters. (Total possible subtest score = 26)
- *Auditory Discrimination* subtest: the assessment focuses on the child's ability to identify if two words sound the same or different. (Total possible subtest score = 10)
- *Survival Sight Words* subtest: the assessment focuses on the child's ability to read survival sight words that appear on signs in public places. (Total possible subtest score = 16)
- *Basic Pre-Primer Vocabulary* subtest: the assessment focuses on the child's ability to read basic vocabulary words found in pre-primer reading programs. (Total possible subtest score = 24)
- *Total Brigance*: sum of the language and cognitive subtest scores. (Total possible score = 240)

The Preschool Early Literacy Indicator (PELI), which measures is a storybook-embedded assessment of essential pre-literacy and oral language skills needed for kindergarten, was designed by the creators of the DIBELS. The assessment is designed for preschool and pre-kindergarten students (ages 3-5). The PELI measures alphabet knowledge, vocabulary and oral language, phonemic awareness, and listening comprehension, and is given in a storybook format that is familiar to most preschool students. According to the authors, research has been ongoing on the instrument since 2009, and it has shown good psychometric properties: the alternate form

reliability of the PELI for the total score ranges from .89 to .92. In addition, it has shown strong concurrent validity with standardized norm-referenced measure of early literacy and language skills, such as the Clinical Evaluation of Language Fundamentals and the DIBELS (LNF, FSF).

Dynamic Indicators of Basic Early Literacy Skills. The DIBELS is a battery of brief early literacy tests that are individually administered in approximately 10-15 minutes by a trained teacher or other professional. To the extent possible, we will obtain extant DIBELS data from the schools participating in the study. Otherwise, we will use our own trained assessors to collect the desired DIBELS data.

Statistical Analysis

We will use raw scores for the various reading subtest analyses. Hierarchical linear modeling analysis will be used at the data points to estimate the extent to which the treatment group differs from the controls groups the various outcome measures of interest. A 2-level hierarchical model design will be used, where children's outcomes (level 1) are nested within district group differences (level 2). A set of covariates will be entered in step one to control for between group differences. The data will be subset for statistically significant *covariates to examine subgroup effects if sample sizes are adequate.*

We will also use state norms for grade one promotion, referral to special education, and referral to Title I compensatory education to compare rates for the total UPSTART population of students with the population rates for entering grade one students in Utah for the specific school years. In addition to estimating treatment effects, we will also examine the relationship of implementation factors to outcomes of interest for the UPSTART participants. One such factor is how variation in the amount of computer time recorded affects the outcomes of interest. This can

be examined through simple regression analyses involving the treatment group subset, using the covariate set to control for differences among UPSTART participants.

Timeline

The project timeline is presented below, but will be finalized once the program timeline is in place.

Work Plan Task Descriptions

Year 1

	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Tasks												
1. Kick-off meeting	X											
2. Finalize design	X											
3. Select Schools	X	X										
4. Data arrangements		X										
5. Train Assessors	X	X										
6. Select T & C Groups		X										
7. Collect Data		X	X	X								
8. First Report*												X
9. Management	X	X	X	X	X	X	X	X	X	X	X	X

*First Report will be a status update of the year’s activities

Years 2-4

	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Tasks												
1. Kick-off meeting	X											
2. Review design	X											
3. Collect Data	X	X	X	X								
4. Annual Report*								X				
7. Management	X	X	X	X	X	X	X	X	X	X	X	X

*Annual Report will be a technical report with statistical analyses and yearly evaluation findings