

MEMORANDUM

TO: Members, Utah State Board of Education

FROM: Diana Suddreth
Director, Teaching and Learning

DATE: April 14-15, 2016

INFORMATION: Report - *Utah Preparing Students Today for a Rewarding Tomorrow*
(UPSTART)

Background:

The UPSTART Program, outlined in 53A-1a-1000, is a home-based preschool program, developed and provided by Waterford, to prepare preschool children for school and future academic success. An independent evaluation is conducted to represent the effectiveness of UPSTART. This report addresses the number of families participating in the program, the frequency of use of the instructional software, and student performance on assessments.

Board Strategic Plan:

This item supports the following imperatives and strategies in the Board's Strategic Plan:

- Educational equity

Anticipated Action:

The Standards and Assessment Committee will review the Cohort 6 report on the UPSTART Program prior to its presentation to the Education Interim Committee.

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UPSTART Program

Report of FY 2016



Prepared by the
Utah State Office of Education

April 14- 15, 2016

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UPSTART

In Compliance with Intent Language of 53A-1a-1001

Introduction: UPSTART Cohort 6

Utah Preparing Students Today for a Rewarding Tomorrow (UPSTART) is a pilot project established by the Utah State Legislature that uses a home-based education technology approach to develop the school readiness skills of preschool children. In its sixth year of operation, the project's implementation contractor – the Waterford Institute – enrolled 5,091 preschool children and provided them with an adaptive program of computer-based early literacy instruction to prepare them academically for kindergarten. Children enrolled in the sixth year cohort, hereafter referred to as Cohort 6 (C6), participated in UPSTART from September 2014 through June 2015.

The UPSTART software uses adaptive lessons, digital books, songs, and activities to deliver early literacy content. The reading skills taught by the Waterford Early Learning Program at Level 1 of the curriculum¹ include:

- Phonological Awareness: phonemic segmenting and blending
- Phonics: letter name knowledge, letter sound knowledge, and word reading
- Comprehension and Vocabulary: vocabulary knowledge and oral comprehension
- Language Concepts: concepts of written language from letters and pictures to basic grammar

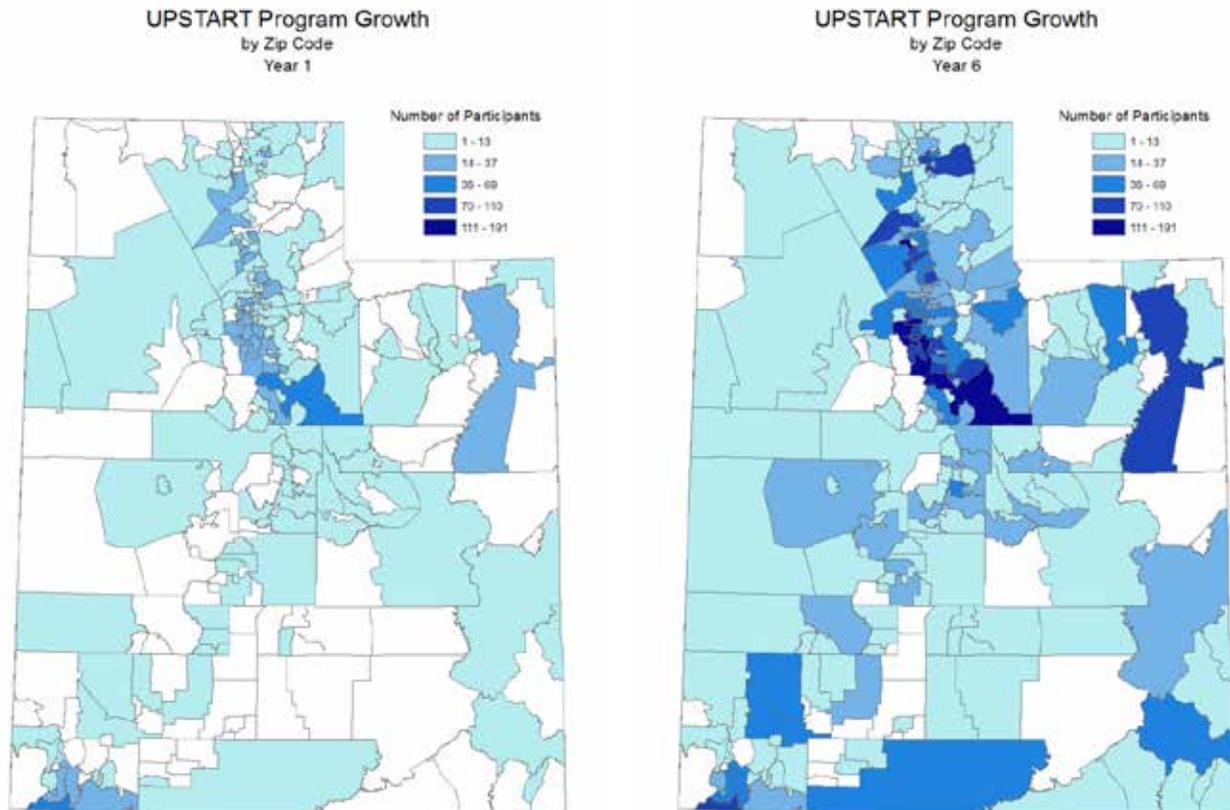
Children are encouraged to use the UPSTART program for 15 minutes a day, 5 days a week. Families are provided with parental resources and technical support from Waterford customer service representatives.

Program Implementation: Demographics

The 2014-15 program year marked a breakout year for UPSTART enrollment, rising from 1,577 preschool students in year five to 5,091 in year six, an increase of over 300 percent. This significant increase was due to an additional one million dollar allocation, less students requiring hardware and internet, and lower equipment cost. The maps depicted in **Figure 1** showcase UPSTART program participation by student zip code from the inception of the program (Year 1, N=1,248) to the most recent program year (Year 6, N=5,091). As seen below in **Figure 1**, the UPSTART program has furthered its reach over the past six years and augmented enrollment in both urban and rural areas of the state.

¹ Level One is the beginning point of the curriculum where the preschool child begins as a nonreader and is introduced to skills designed to teach the child to read.

Figure 1. Map of UPSTART program participation in Year 1 and Year 6



Demographic characteristics of the C6 population are presented below in Table 1, along with characteristics of UPSTART children comprising the matched treatment sample.

Table 1
Demographic Characteristics of C6 Population

Demographic Categories		All C6 UPSTART (N=5,091)	Matched Treatment (N=138)
Child's Gender	Male	48%	48%
	Female	52%	52%
Child's Ethnicity	White	83%	94%
	Hispanic	12%	2%
	Asian/Pacific Islander	3%	3%
	African American	1%	0%
	Native American	<1%	1%
	Other	2%	1%
	Child's Language	English	92%
	Spanish	7%	0%

	Other	1%	0%
	Some High School	3%	1%
Parent	High School Graduate	10%	15%
Educational	Some College	36%	83%
Attainment	College Graduate	42%	1%
	Advanced Degree	9%	0%
Parent Marital	Married	94%	95%
Status	Otherwise	6%	5%
Household	Under 100%	16%	12%
Poverty Level	Under 185%	45%	49%
	Under 200%	50%	53%

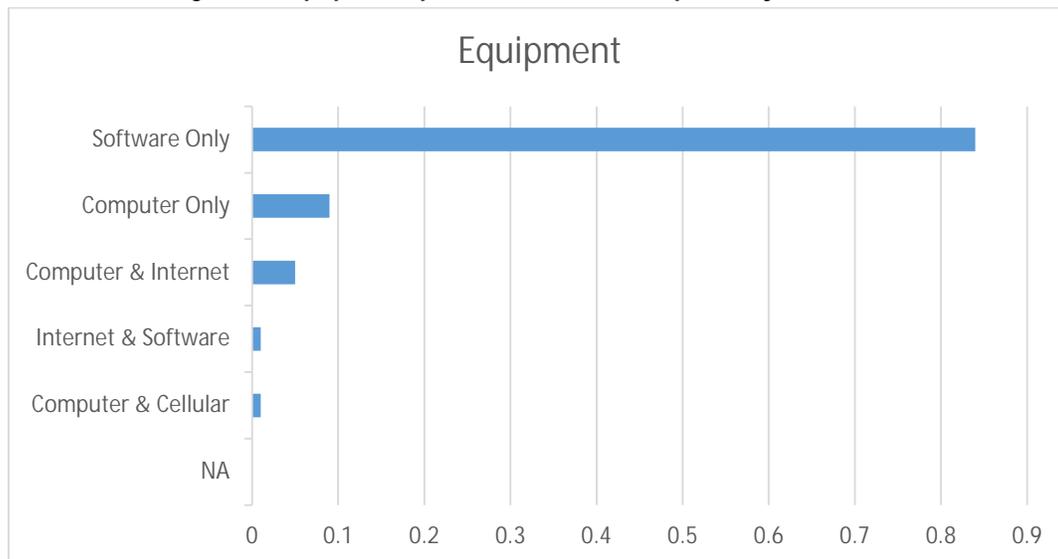
Note: Percentages may not add to 100% due to rounding.

Program Implementation: Equipment

The type of education technology provided to UPSTART children in Year 6 of the program is shown in **Figure 2**. The vast majority of UPSTART children (84%) used the Waterford website to retrieve the UPSTART program, allowing families to access the UPSTART curriculum from their home computers.

For the remaining students, UPSTART provided personal computers to 9% of the C6 children while they participated in the program. Another 5% of the C6 program participants were provided with internet subscriptions and personal computers. The remaining 7% of the C6 enrollment received various combinations of computer technology to enable them to access the UPSTART curriculum (see **Figure 2** for details).

Figure 2. Equipment provided to C6 Participants by Waterford



*Note: Percentages may not add to 100% due to rounding.

Program Implementation: Usage

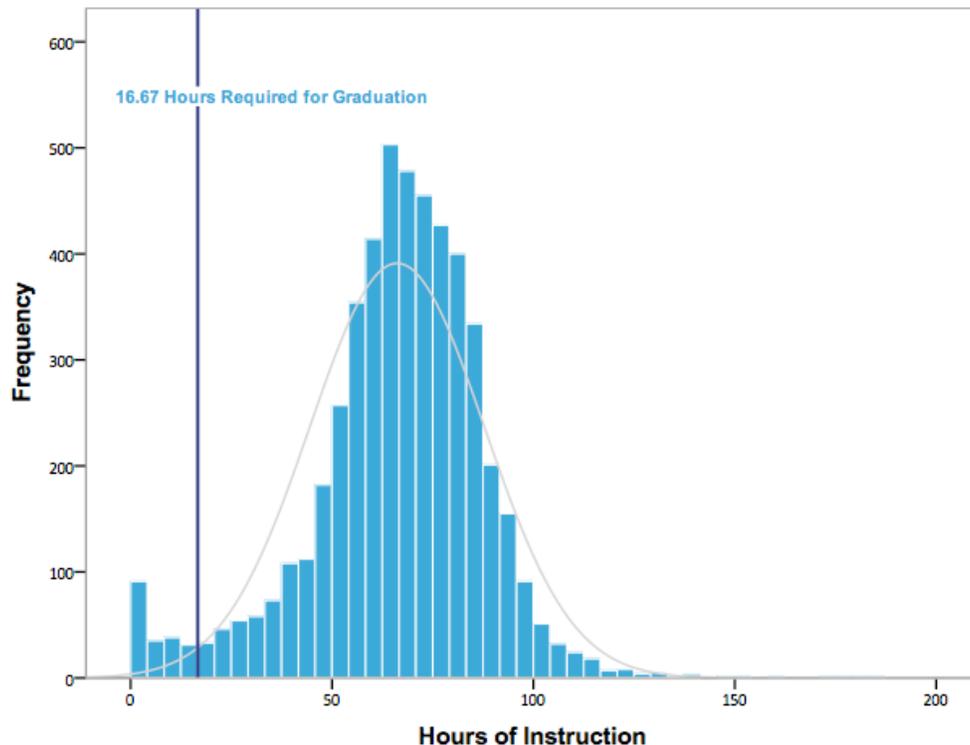
Program usage was reviewed for all UPSTART participants. The hours of instruction observed for all children enrolled in C6 are summarized in **Table 2**. The average level of usage was approximately 67 hours of instruction; this is slightly less than the average level of usage as documented in the fifth year of the program (71 hours). The C6 academic year covered 44 weeks of instruction, beginning the week of September 1, 2014 and ending June 29, 2015.

Table 2
C6 Hours of UPSTART Instruction

Group	N	Mean	SD	Range
All UPSTART	5,091	66.75	21.64	00.00 - 183.56

The histogram in **Figure 3** shows the distribution of hours of instruction for the total C6 population (N=5,091). Forty-five of the enrolled families who were provided instructional equipment (e.g., computers, an Internet subscription, and a computer drive) did not log any instructional time in the UPSTART curriculum and dropped out of the program within eight weeks of enrollment. At the other end of the spectrum, six children logged over 150 hours of instruction. For enrolled families whose children did use the curriculum, the average duration in the program was approximately 41 weeks. This usage pattern is similar to that observed in the fifth year of the program. Similar to previous years, the sixth year evaluation of UPSTART found curriculum usage to be significantly and positively related to literacy outcomes.

Figure 3. Hours of Instruction for C6 Families



Research Methods

The evaluation of UPSTART’s sixth cohort moved from using a nonequivalent control group, seen in previous years, to a pre-test/post-test design with a statistically balanced one-to-one match of treatment and control students to assess the program’s impact on developing children’s early literacy skills in preschool. The independent evaluator, ETI (Evaluation and Training Institute), enhanced the established evaluation design to meet a higher level of accountability for the Cohort 6 students and to ensure that the program resources were having a positive impact on school readiness. While requiring a larger sample size, the matching process enhanced their ability to detect treatment effects and, in general, improved the accuracy of the evaluation results. The research findings cover two areas: how the program was implemented and what types of impact it had on children’s literacy. Simply put, using a matching process to develop the treatment and control groups is a stronger method for ruling out the influence of preexisting differences between groups on program outcomes.

The matching process resulted in a data file with comparable (matched) students in each group so that there could be improved precision in estimating treatment effects. **Table 3** displays the demographic breakdown of the matched treatment and control groups.

Table 3
Matched Treatment-Control Comparisons on Key Demographics

Demographic Categories		Treatment (N=138)	Control (N=138)
Child Gender	Female	49%	49%
	Male	51%	51%
Child Ethnicity	Caucasian	98%	98%
	Hispanic	1%	1%
Child Language	English	100%	100%
Parent Education Level	High School Diploma	12%	10%
	Some College	75%	75%
	Bachelor’s degree	9%	9%
	Graduate degree	3%	5%
Parent Marital Status	Married	95%	89%
Household Income	Under \$10,000	2%	2%
	\$10k-\$24,999	5%	10%
	\$25k-\$49,999	29%	29%
	\$50k-\$74,999	35%	34%
	\$75k-\$99,999	24%	17%
	\$100k or more	5%	8%

Outcome Measures

The outcomes for the UPSTART evaluation are measures of early literacy skills that are aligned to the UPSTART curriculum and considered to be important predictors of later reading ability, such as phonological awareness, letter knowledge, and vocabulary. In order to measure these outcomes in our

treatment and control groups, ETI used appropriate subscales from two standardized measures of early literacy, the Brigance Inventory of Educational Development and the Bader Reading and Language Inventory.

The Brigance Inventory of Educational Development was selected as an early literacy measure of phonics and vocabulary knowledge and as a measure of pre-Kindergarten academic and cognitive skills. Ten scales were administered from the language development and academic/cognitive domains of the Brigance. Brigance subscales measured the literacy constructs of *vocabulary and syntax, pre-literacy discrimination, letter knowledge, and decoding*.

The Bader Reading and Language Inventory was selected as a measure of *phonological awareness*. Phonological awareness involves the child's ability to detect the sound structure of spoken words at three levels: rhyming, syllables, and phonemes. The Bader is comprised of three phonological awareness subtests: rhyme recognition, phonemic blending, phoneme segmentation.

Impacts on Literacy

Results from effect size and growth score analyses indicated that participation in UPSTART had a strong impact on children's emerging literacy skills. Children enrolled in UPSTART produced large effects (ES = .81) compared to control children on the Brigance composite, an instrument that measures decoding skills, letter knowledge, vocabulary and syntax, and pre-literacy discrimination. Similarly, UPSTART participants experienced large effects (ES = .95) on the Bader, an instrument assessing children's phonological awareness.

Do UPSTART students have better literacy skills at entry to kindergarten than control students?

Effect sizes² were calculated to show the magnitude of UPSTART's impact at post-test as measured by each of the 13 literacy subtests (10 Brigance subtests and 3 Bader subtests), and the Total Brigance and Bader Composites (composites include aggregated results of the subtests). An effect size (ES) is a measure that describes the magnitude of the difference between two groups, essentially standardizing a scale so the results are easy to interpret and have meaning. Cohen (1998) categorizes effect sizes as small (0.2), medium (0.5), and large (0.8). Combined post-test results showed that UPSTART participation had a large impact on students' early literacy skill development. In the matched post-test sample³ (N=271), UPSTART produced large effects (.95 and .81) as measured by the total Bader and Brigance composite scores (see **Figure 4**).

² Effect size (Cohen's *d*) was calculated for each test as the treatment group mean minus the control group mean divided by the pooled standard deviation.

³ Treatment Group (N = 138); Control Group (N = 133)

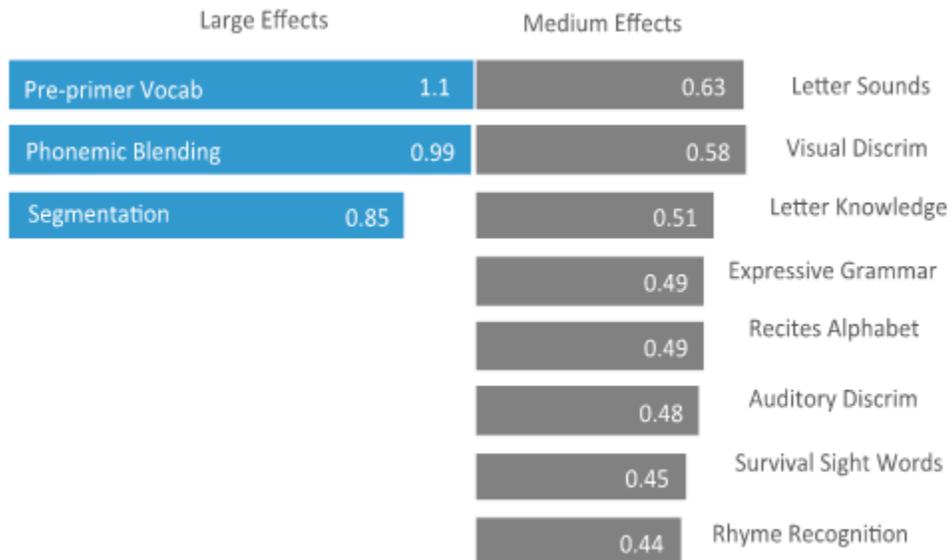
Figure 4. Brigance and Bader Posttest Analysis of Composite Scores



UPSTART children scored significantly higher on eleven of the thirteen Brigance and Bader subtests on the post-test, showing strong empirical evidence that UPSTART was successful helping children develop key early literacy skills. The ES estimates for individual subtests ranged from .44 (Rhyme Recognition) to 1.1 (Pre-primer Vocabulary) and would be considered medium to large effects. Expressive and Receptive Vocabulary subtests were the only subtests in which the treatment and control groups were non-significant at post-test.

Figure 5 presents the ES of each literacy subtest based on the size of their effects (small, medium or large). UPSTART had the largest impact on pre-primer vocabulary (1.1), phonemic blending (.99), and phonemic segmentation (.85).

Figure 5. Effect size estimates by magnitude of effect



Do UPSTART students show stronger literacy growth rates from preschool to kindergarten than control students?

Growth rates for the treatment and control children were compared based on the observed difference scores between the post-test and the pre-test.

- The treatment group showed significantly ($p < .05$) stronger mean literacy growth rates compared to the control group on the Total Bader and Brigance Composites, with the treatment group scoring an average of 7 points higher on the Bader and 37 points higher on the Brigance.
- The treatment group showed statistically stronger ($p < .05$) literacy growth rates compared to the control group on five out of ten Brigance subtests (Letter Knowledge, Letter Sounds, Auditory Discrimination, Survival Sight Words, and Basic Vocabulary) and all three Bader subtests (Rhyme Recognition, Phonemic Blending, and Segmentation).
- There was no difference in growth rates between the treatment and control group on the following four subtests: Expressive and Receptive Vocabulary (measures vocabulary and syntax), Expressive Grammar (measures vocabulary and syntax), Visual Discrimination (measures pre-literacy discrimination), and Recites Alphabet (measures letter knowledge).
- Of the five literacy constructs in which the Brigance and Bader subtests measure, Vocabulary and Syntax was the only construct in which growth rates between the treatment and control students were not statistically significant ($p < .05$).

Longitudinal Effects

Longitudinal data was gathered and measured against state averages, to inform whether UPSTART has a lasting effect. UPSTART students continually out performed state averages in DIBELS and SAGE testing in grades first through fourth. **Figures 6-11** display overall, special education (SPED), minority, low income, and English learner (EL) data.

Figure 6

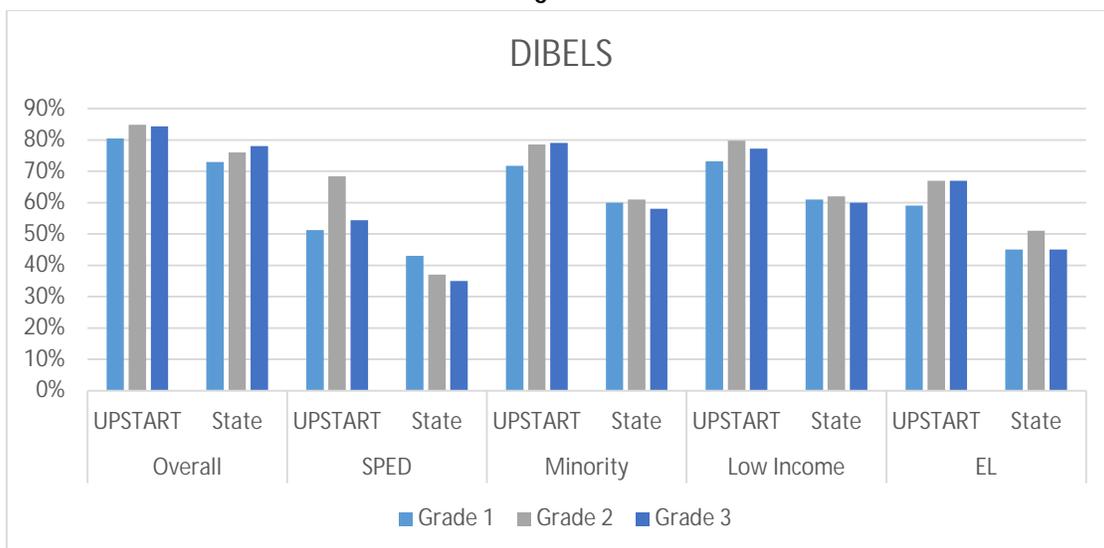


Figure 7

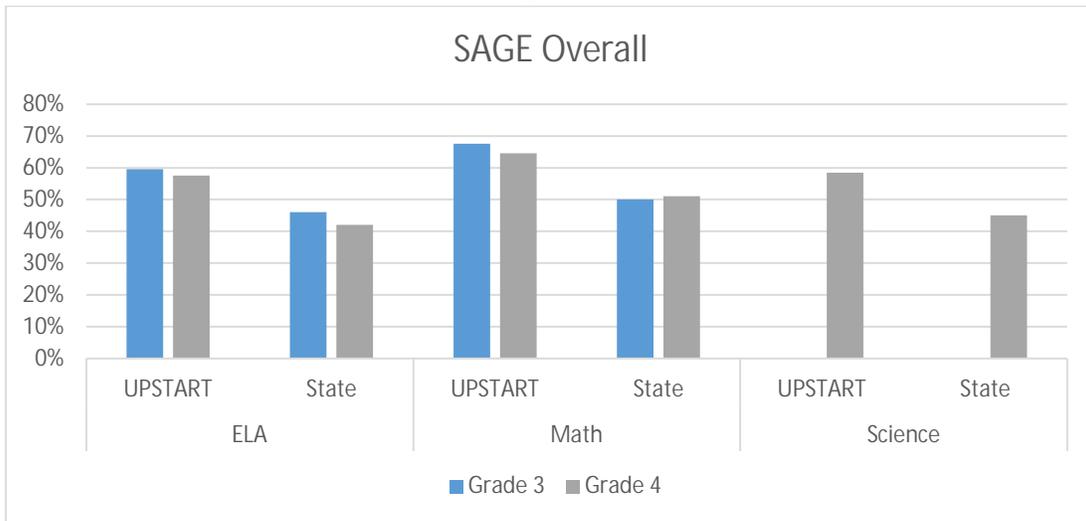


Figure 8

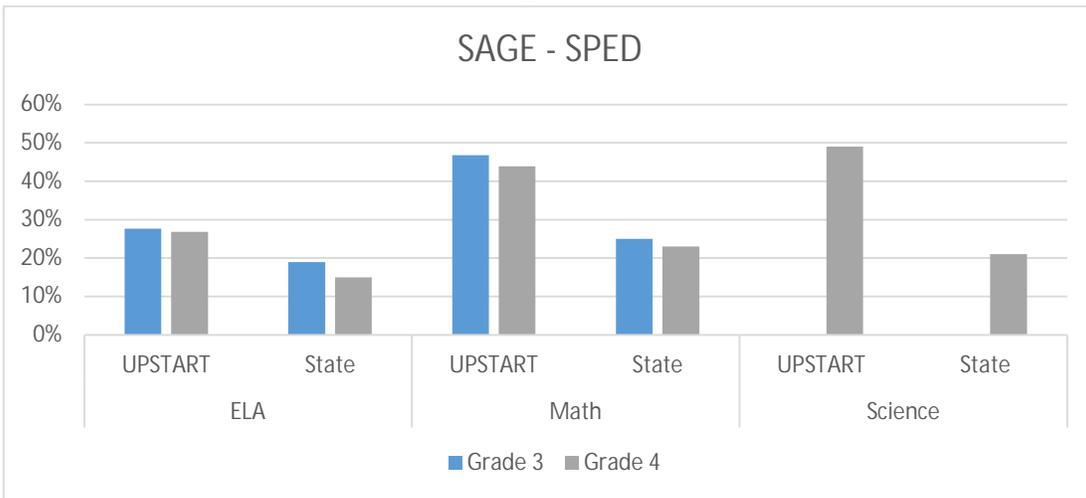


Figure 9

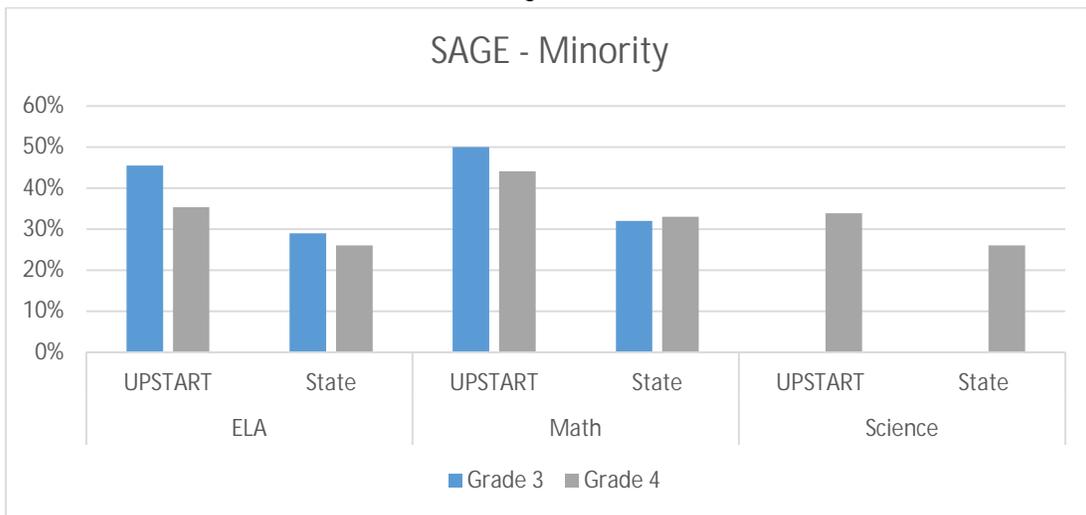


Figure 10

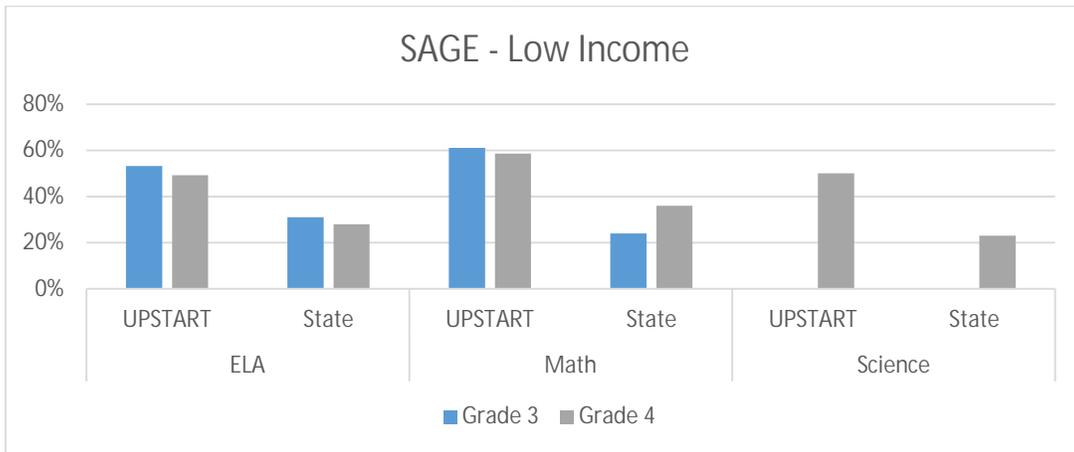
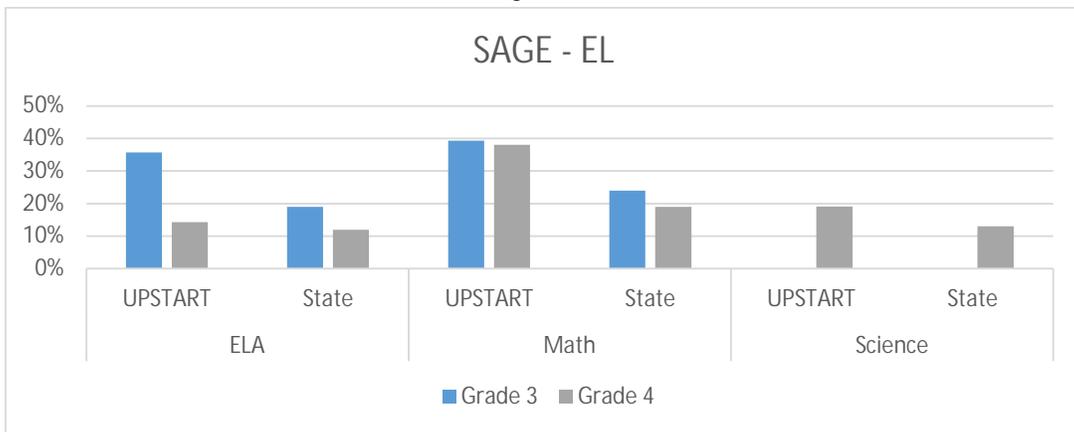


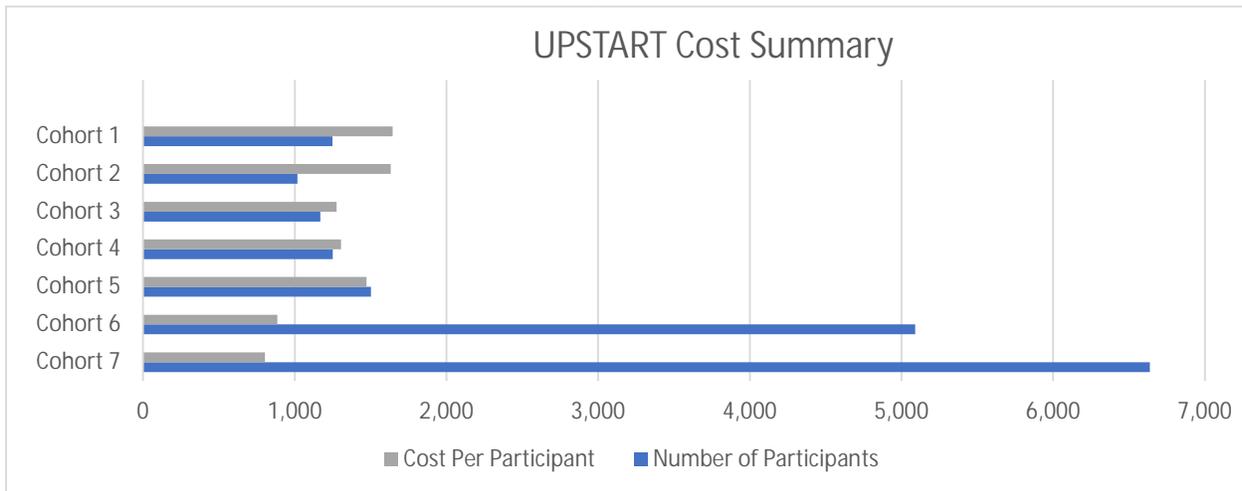
Figure 11



Participant Cost Summary

Figure 12 represents the per participant cost for each cohort of the UPSTART program since the program’s inception. Significant cost savings have occurred over the course of the program. This is primarily due to increased participant ownership of the required technological equipment.

Figure 12



Preschool and UPSTART

Approximately five years of data (C2-C6), sort out two variables that determine preschool exposure: a yes/no and approximate number of hours. When ETI cut the data and created a flag for students enrolled in 10 hours or more of preschool per week (a guess at what a minimum number of hours would be to establish a preschool treatment effect) the treatment and control groups showed very minor differences. In addition, the most important take-away, post literacy testing scores were not significantly correlated with either the yes/no preschool or the 10 hours or more. ETI uses measurements of additional preschool exposure to control for factors outside of the UPSTART program that could influence test scores in both groups (treatment and control); however, their research is not designed to measure the effects of additional preschool exposure alone.

Conclusion

The UPSTART program shows continued success at helping preschool age children develop literacy skills and prepare for school. These outcomes would have specific benefits to at-risk children, whose families struggle with poverty and other issues, and often lack the resources to help their children develop the literacy skills needed to succeed in school. The strong program effects support wide-scale implementation across at-risk preschool populations.