
Academy of READING Academy of MATH

▶▶▶▶ EFFICACY STUDY

Spring Independent School District (ISD), TX

2007-2008 School Year

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August 2008

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Introduction

The goal of this project was to evaluate the efficacy of the Academy of READING® and Academy of MATH® with struggling elementary, middle, and high school students. Gains were examined on the AutoSkill Placement tests and Texas Assessment of Knowledge and Skills (TAKS) standardized test.

Students from 26 schools in Spring ISD, 19 elementary schools, 6 middle schools, and 1 9th-grade center used the Academy of READING and/or Academy of MATH during the 2007-2008 school year or during the summer school session.

Section 1: Implementation Fidelity

Academy of READING

Students. 2176 students from 26 schools in Spring ISD participated in this study during the 2007-2008 school year and 194 students participated during the summer school session.

Table 1. Distribution of students across grades

Grade	Sample Size
2	303
3	557
4	457
5	439
6	124
7	97
8	117
9	82

Implementation. In Academy of READING, students spent a total of 15.9 hours, on average, in the program and 11.0 hours on focused training. On average, students spent 35 minutes per week using the Academy of READING, well below the AutoSkill best-practices guidelines of 90 minutes per week. Implementation fidelity is shown by school in Figure 1. Table 2 shows fidelity measures by school along with the associated gains on the AutoSkill Cloze Paragraph test of reading proficiency.

Figure 1. Program Fidelity by School.

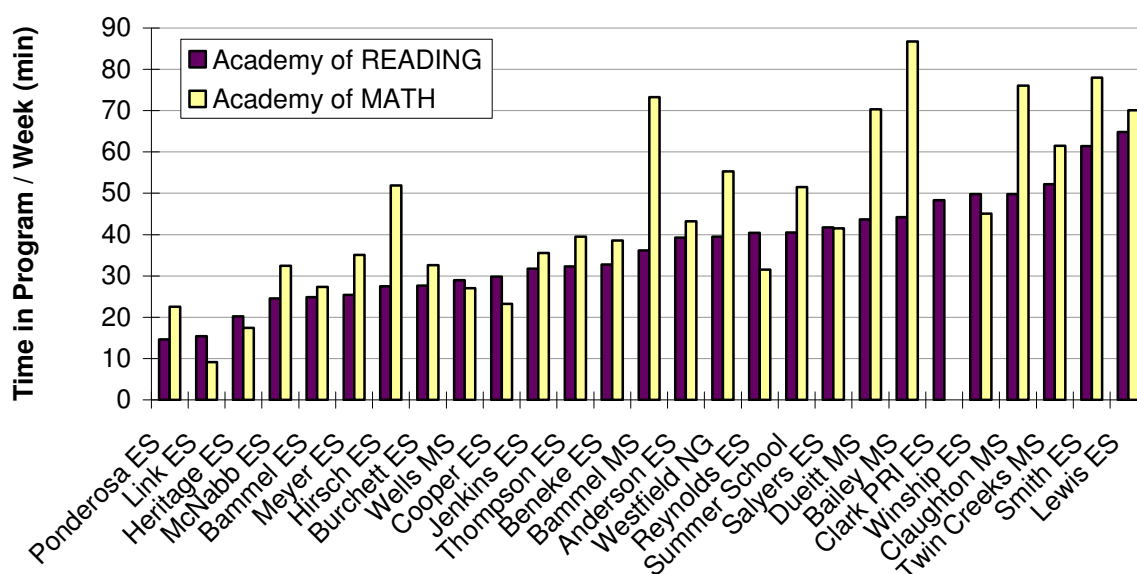


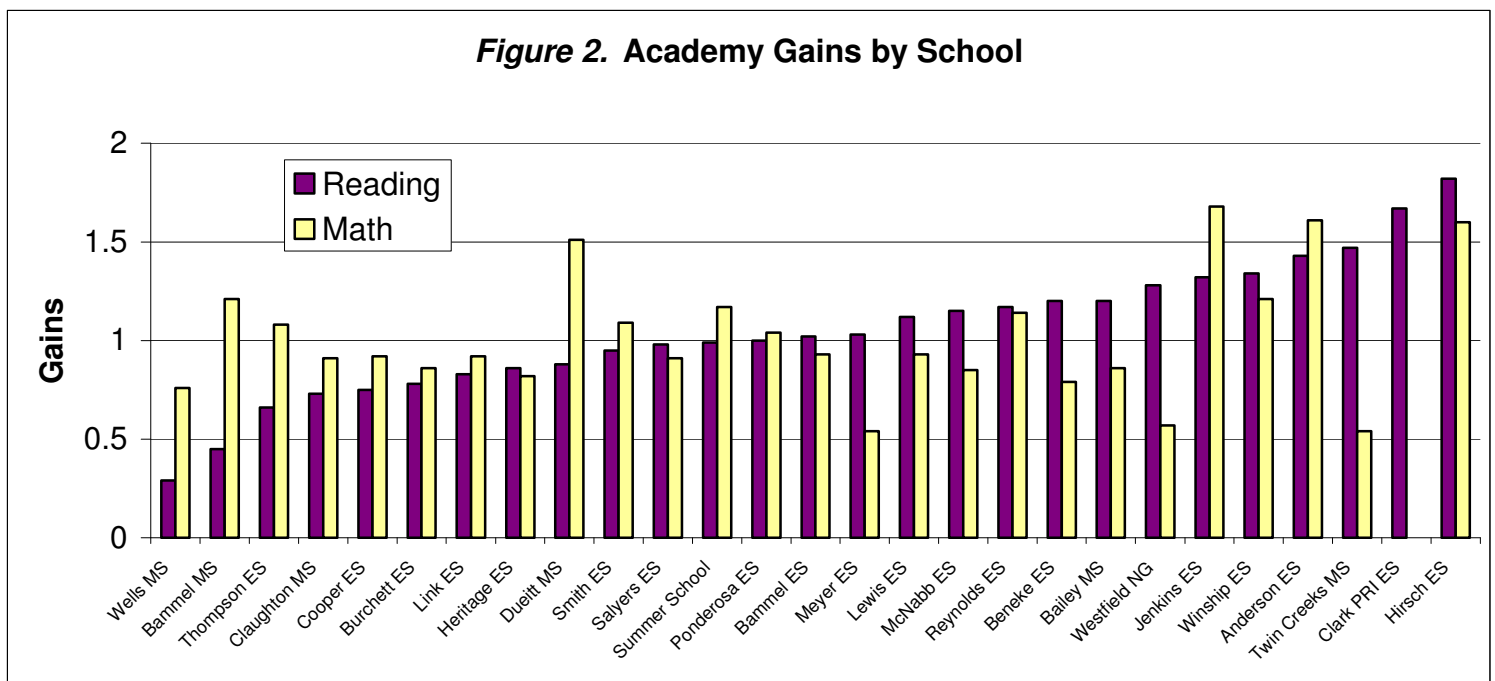
Table 2. Academy of READING fidelity measures and gains by school.

School	N	Time in Program (hr)	Focused Training (hr)	Time /Week (min)	Percent Complete	Skills Mastered	Gains (Post-Pretest)
Bammel ES	174	10.2	6.9	24	29.4	16	1.0
Ponderosa_ES	188	7.2	4.2	14	24.4	13	1.0
Winship ES	68	22.7	14.0	49	45.6	29	1.3
Reynolds ES	225	21.0	15.2	40	60.7	30	1.2
Meyer ES	29	9.0	6.2	25	24.2	15	1.0
Jenkins ES	93	15.1	9.7	31	36.5	22	1.3
Hirsch ES	57	14.1	9.7	27	35.2	20	1.8
Anderson ES	76	17.6	13.4	39	52.6	30	1.4
Link ES	24	6.8	3.7	15	15.3	8	0.8
Smith ES	61	29.0	18.1	61	54.9	31	1.0
Beneke ES	94	16.0	11.7	32	48.9	25	1.2
Thompson ES	29	16.0	10.0	32	32.0	20	0.7
Heritage ES	65	10.3	6.5	20	23.7	14	0.9
Salyers ES	55	16.3	11.5	41	43.4	22	1.0
Burchett ES	72	14.0	8.8	27	32.9	19	0.8
Cooper ES	102	12.8	8.8	29	31.2	18	0.7

McNabb ES	52	13.3	8.9	24	31.0	14	1.2
Lewis ES	114	23.0	17.3	64	54.2	31	1.1
Clark PRI ES	18	22.4	16.4	48	53.4	31	1.7
Wells MS	82	11.4	7.0	28	32.8	22	0.3
Dueitt MS	34	18.4	11.7	43	44.9	33	0.9
Twin_Creeks_MS	38	21.0	16.0	52	62.9	40	1.5
Bammel MS	49	16.9	12.4	36.1	44.6	30	0.4
Cloughton MS	86	15.5	10.6	49	41.7	30	0.7
Bailey MS	15	23.0	17.6	44	75.9	54	1.2
Westfield 9 th Grd	82	21.0	15.6	39	58.0	39	1.3
Summer School	194	16.2	11.6	40	45.8	27	1.0

Results. Students completed an average of 42.0% of the program and mastered 25 skills. Students made gains of 1.04 levels on the AutoSkill Cloze Paragraph test of reading proficiency, roughly equivalent to one grade level. Gains by school are shown in Figure 2.

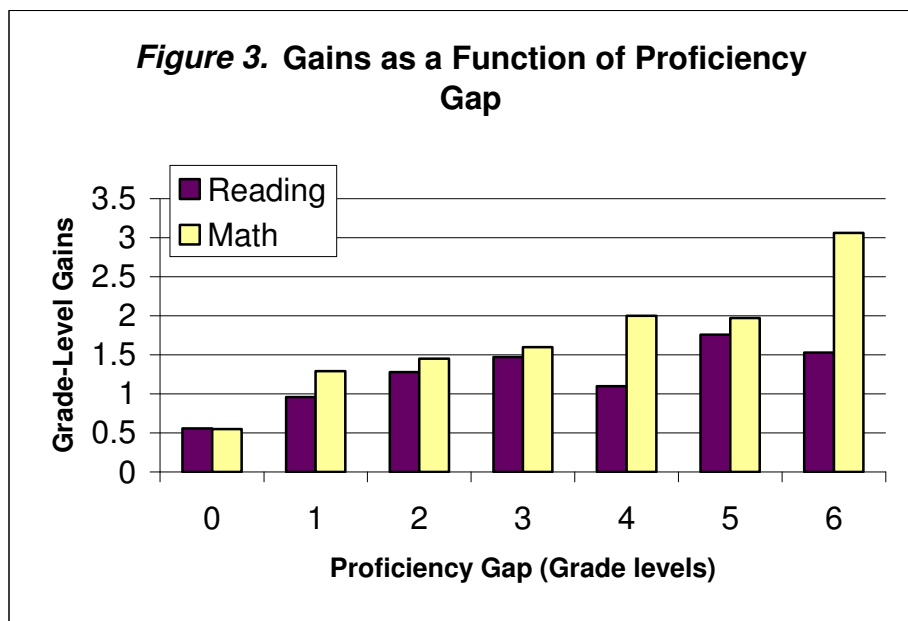
Figure 2. Academy Gains by School



Students who spent greater amounts of time training in the Academy of READING showed greater improvement in reading proficiency. Gains in the Academy of READING were significantly correlated with measures of implementation fidelity including: time spent in program ($r = .12$), time spent on focused training ($r = .15$), number of weeks spent training ($r = .11$), and percentage of program completed ($r = .12$; all $p < .001$). Gains were also significantly correlated with pre-test level ($r = -.31$); thus students who started out at a lower reading-proficiency level made larger gains – allowing them to close the proficiency gap.

Overall, students using the Academy of READING made statistically significant gains on the AutoSkill Cloze Paragraph test, $t(2175) = 31.69, p < .001$. Gains were significant for each grade, all $p < .05$. All schools showed statistically significant gains (all $p < .05$), with the exception of Bammel Middle School, which showed marginally significant gains ($p = .06$) and Wells Middle School.

To further investigate the finding that students who started at a lower proficiency made greater gains, students' *proficiency gap* was calculated by subtracting their pretest proficiency-score (grade-level equivalent) from their actual grade level. This resulted in a proficiency gap score, measured in grade levels, with a score of zero reflecting a student who is performing at grade level and positive values reflecting a student who is performing *below* grade level (e.g., a proficiency gap of two reflects a student who is performing two grades below their grade level). Students performing at grade level and up to nine grade levels below grade level made significant proficiency gains (all $p < .05$). As shown in Figure 3, students with larger deficits made greater gains – helping them close the proficiency gap.



Academy of MATH

Students. 2176 students from elementary and middle schools in Spring ISD participated in this study. Twenty-five schools participated during the 2007-2008 school year and 206 students participated during summer school.

Table 3. Distribution of students across grades

Grade	Sample Size
1	17
2	217
3	392
4	471
5	394
6	170
7	185
8	276
9	3

Implementation. In Academy of MATH, students spent 17.4 hours, on average, in the program and 13.2 hours on focused training. On average, students spent 44 minutes per week using the Academy of MATH, well below the AutoSkill best-practices guidelines of 90 minutes per week. Implementation fidelity is shown by school in Figure 1. Table 4 shows fidelity measures by school along with the associated gains on the AutoSkill Math Placement Test.

Table 4. Academy of MATH fidelity measures and gains by school.

School	N	Time in Program (hr)	Focused Training (hr)	Time /Week (min)	Percent Complete	Skills Mastered	Gains (Post-Pretest)
Bammel ES	162	11.5	9.5	27	28.0	19	0.9
Ponderosa_ES	304	10.4	7.7	22	26.0	16	1.0
Winship ES	56	21.4	16.5	45	48.3	34	1.2
Reynolds ES	62	16.8	13.0	31	41.7	31	1.1
Meyer ES	37	6.7	4.9	35.0	17.7	11	0.5
Jenkins ES	12	13.6	10.4	35	35.4	25	1.7
Hirsch ES	88	22.0	17.8	51	47.9	32	1.6
Anderson ES	52	18.4	14.3	43	52.2	35	1.6
Link ES	9	4.5	2.8	9	10.6	5	0.9
Smith ES	53	34.2	25.4	78	65.5	44	1.1
Beneke ES	109	16.6	13.2	38	41.9	28	0.8
Thompson ES	24	19.3	14.7	39	40.1	28	1.1
Heritage ES	51	7.9	5.4	17	20.8	15	0.8

Salyers ES	62	13.6	10.2	41	30.5	17	0.9
Burchett ES	106	16.9	13.3	32	41.8	28	0.9
Cooper ES	45	12.8	9.9	23	30.7	23	0.9
McNabb ES	63	16.5	12.5	32	42.6	26	0.9
Lewis ES	56	23.2	18.5	70	55.5	35	0.9
Wells MS	104	10.8	7.1	27	17.5	13	0.8
Dueitt MS	69	32.4	23.8	70	50.9	46	1.5
Twin_Creeks_MS	36	20.2	15.1	61	41.4	32	0.5
Bammel MS	158	26.7	19.2	73	47.2	43	1.2
Cloughton MS	173	14.7	9.9	76	21.0	17	0.9
Bailey MS	25	35.5	26.7	86	57.3	46	0.8
Westfield 9 th Grd	3	10.5	7.84	55	29.5	25	0.6
Summer School	206	22.1	16.7	51	40.9	35	1.2

Results. Students completed an average of 36.4% of the program and mastered 27 skills. Students made gains of 1.04 levels on the AutoSkill Math Placement test – roughly equivalent to one grade level. Gains by school are shown in Figure 2.

Students who spent greater amounts of time training in the Academy of MATH showed greater improvement in math proficiency. Gains in the Academy of MATH were significantly correlated with measures of implementation fidelity including: time spent in program ($r = .21$), time spent on focused training ($r = .21$), number of weeks spent training ($r = .13$), and percentage of program completed ($r = .33$; all $p < .001$). Gains were also significantly correlated with pre-test level ($r = -.34$); thus students who started out at a lower math-proficiency level made larger gains – allowing them to close the proficiency gap.

Overall, students using the Academy of MATH made statistically significant gains on the AutoSkill Math Placement test, $t(2175) = 31.69$, $p < .001$. Gains were significant for each grade, all $p < .005$. All schools showed statistically significant gains (all $p < .05$), with the exception of Twin Creeks Middle School, which showed marginally significant gains ($p = .05$) and Westfield 9th-grade center, which had too few students ($n = 3$) to examine gains statistically.

To further investigate the finding that students who started at a lower proficiency made greater gains, students' *proficiency gap* was calculated by subtracting their pretest proficiency-score (grade-level equivalent) from their actual grade level. This resulted in a proficiency gap score, measured in grade levels, with a score of zero reflecting a student who is performing at grade level and positive values reflecting a student who is performing *below* grade level (e.g., a proficiency gap of two reflects a student who is performing two grades below their grade level). Students performing from three grades above grade level to eight grades below grade level made significant proficiency gains (all $p < .05$). As shown in Figure 3, students with larger proficiency gaps made greater gains – helping them close the proficiency gap.

Section 2: Texas Assessment of Knowledge and Skills (TAKS) Results

Students. TAKS scores from 2007 and 2008 were available for 206 students in third through eighth grade who trained using the Academy of READING and 453 students in third, fourth, sixth and seventh grade who trained using the Academy of MATH. TAKS Reading scores were provided for a further 1357 students who did not use the Academy of READING. TAKS Math scores were provided for a further 1936 students who did not use the Academy of MATH. These non-users represent students within the same schools who were not identified as candidates for this intervention and are used here as a comparison group. Based on the 2007 TAKS scores, prior to training the comparison group had significantly higher Reading (2301 vs. 2024) and Math scale scores (2267 vs. 2079) than the students targeted for intervention with the Academy of READING and Academy of MATH; $t(289) = 15.84$ and $t(771) = 18.43$, respectively, both $p < .001$. It is important to note that the gains demonstrated by struggling students are generally much lower than their more proficient peers—resulting in a widening proficiency gap.

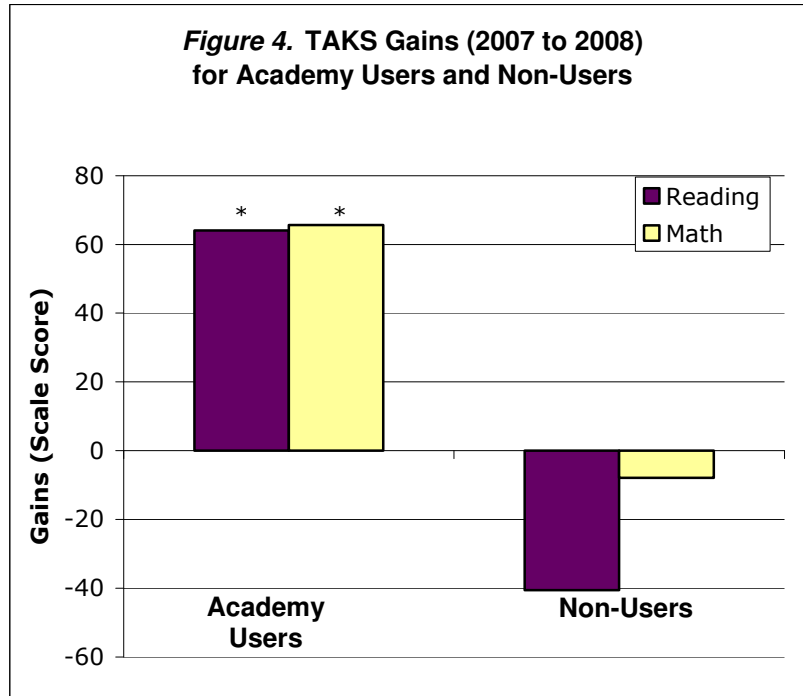
Implementation. In the Academy of READING group, students spent a total of 13.8 hours, on average, in the program and 9.3 hours on focused training, completing 36.4% of the program. In the Academy of MATH group, students spent a total of 16.0 hours, on average, in the program and 11.8 hours on focused training, completing 33.1% of the program. Note that program use was lower for the subset of Academy users with TAKS scores, compared to the larger group of users detailed in Section 1.

Results. TAKS scores were significantly correlated with both of the AutoSkill internal tests (both $p < .001$). TAKS Reading scores were correlated with the AutoSkill Cloze paragraph test ($r = .51$), and TAKS Math scores were correlated with the AutoSkill Math Placement test ($r = .22$).

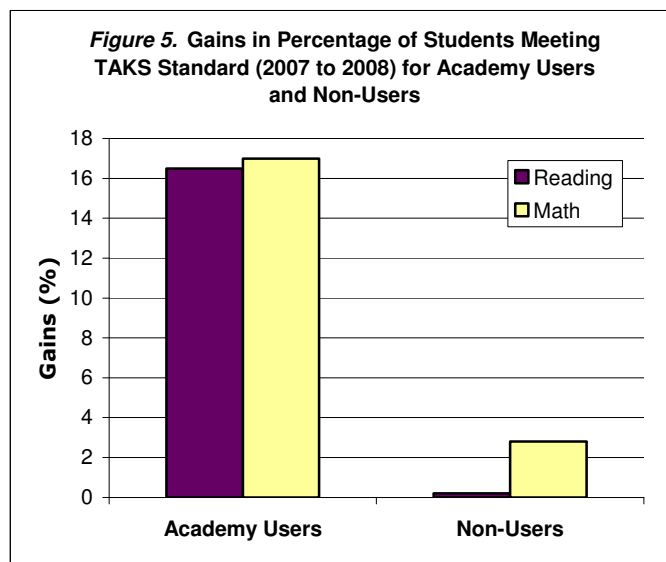
Does use of the Academy of READING and Academy of MATH improve students TAKS scores?

Students who used the Academy of READING showed significant gains of 64.1 scale scores from 2007 to 2008 on the TAKS Reading test, $t(205) = 4.02$, $p < .001$. Students who used the Academy of MATH showed significant gains of 65.6 scale scores from 2007 to 2008 on the TAKS Math test, $t(452) = 9.77$, $p < .001$.

As shown in Figure 4, students who used the Academy of READING had significantly higher gains on the TAKS Reading test than non-users (64 vs. -40 scale score points, respectively), $t(1561) = -6.88$, $p < .001$. Also shown in Figure 4, students who used the Academy of MATH had significantly higher gains on the TAKS Math test than non-users (65 vs. -8 scale score points, respectively), $t(791) = -9.45$, $p < .001$.



As shown in Figure 5, from 2007 (prior to training) to 2008 (following training), the percentage of Academy of READING users who met the TAKS standard in Reading increased by 16.5 % (from 38.8 to 55.3%). In contrast, for non-users, the percentage of students who met the standard increased by only 0.2% (from 87.3 to 87.5%). From 2007 (prior to training) to 2008 (following training), the percentage of Academy of MATH users who met the TAKS standard in Math increased by 17.0 % (from 42.3 to 59.3%). In contrast, for non-users, the percentage of students who met the standard increased by only 2.8% (from 82.3 to 85.1%).



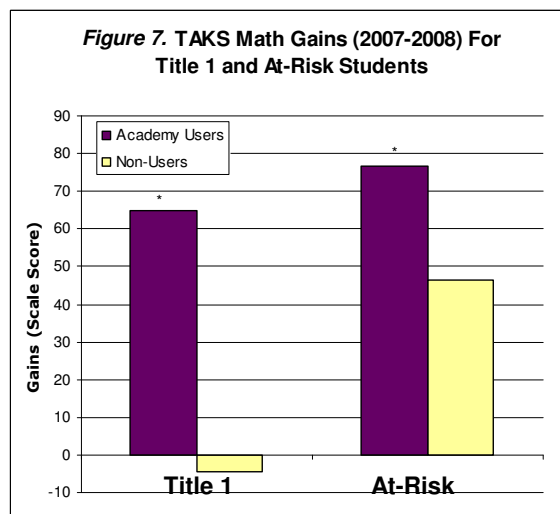
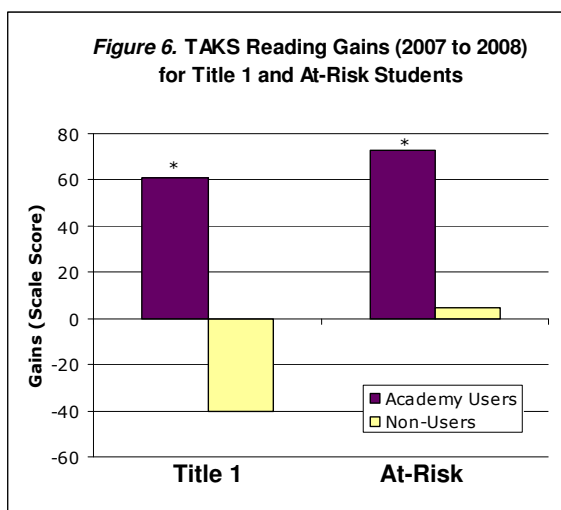
Summary. Use of the Academy of READING and Academy of MATH improved students TAKS scores and increased the percentage of students able to meet the TAKS standard in Reading and Math. Despite the lower gains generally demonstrated by less skilled students, those who used the Academy of READING and Academy of MATH demonstrated higher TAKS gains than their more proficient peers -- 104 points higher in Reading and 73 points higher in Math, allowing them to close the proficiency gap.

Which student groups benefit the most from using the Academy of READING and Academy of MATH?

For Academy of READING users, TAKS Reading gains (from 2007-2008) were statistically significant for Title 1 students, At-Risk students, Economically Disadvantaged students (i.e., Eligible for Free Lunch), and students of all represented ethnicities (i.e., Asian/Pacific Islanders, African American, Hispanic, and White), all $p < .05$.

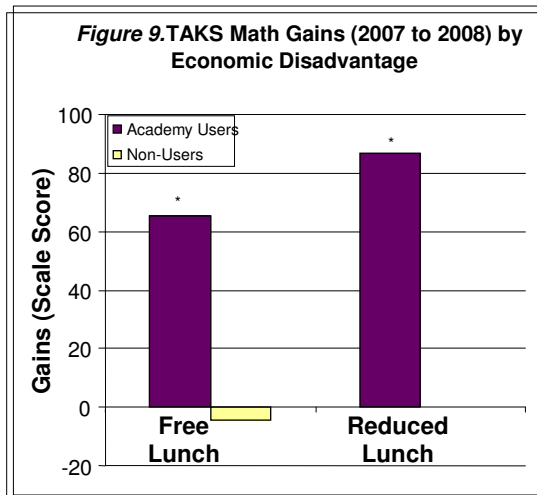
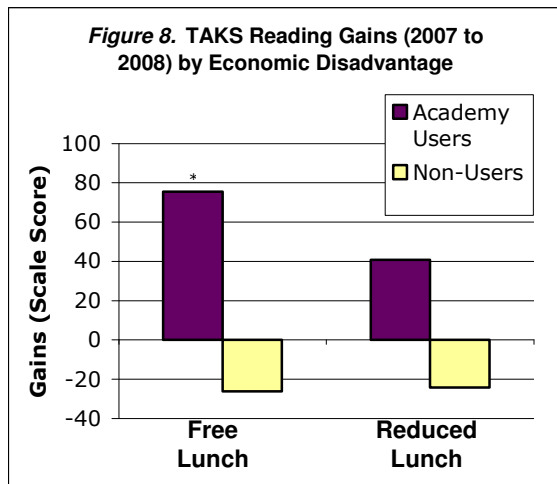
For Academy of MATH users, TAKS Math gains (from 2007-2008) were statistically significant for Title 1 students, At-Risk students, Economically Disadvantaged students (i.e., Eligible for Free and Reduced Lunch) and African American, Hispanic, and White students, all $p < .05$.

Title 1 and At-Risk Students. As shown in Figure 6, Title 1 and At-Risk students who used the Academy of READING had significantly higher gains on the TAKS Reading test than non-users, $t(1363) = -6.36$ and $t(714) = -3.38$, respectively, both $p < .001$. As shown in Figure 7, Title 1 and At-Risk students who used the Academy of MATH had significantly higher gains on the TAKS Math test than non-users, $t(716) = -8.28$ and $t(662) = -2.70$, respectively, both $p < .01$.

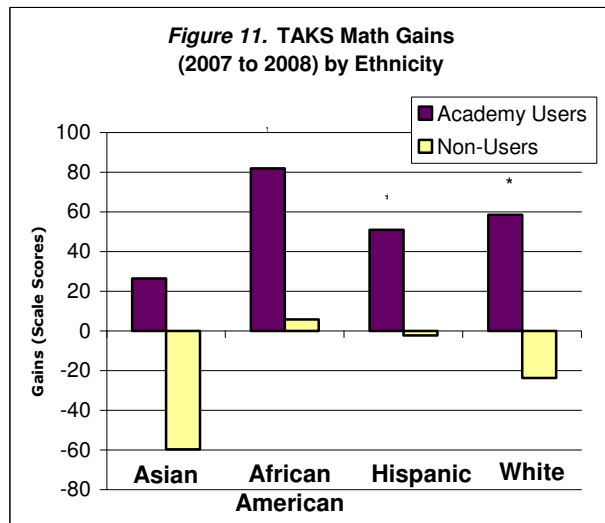
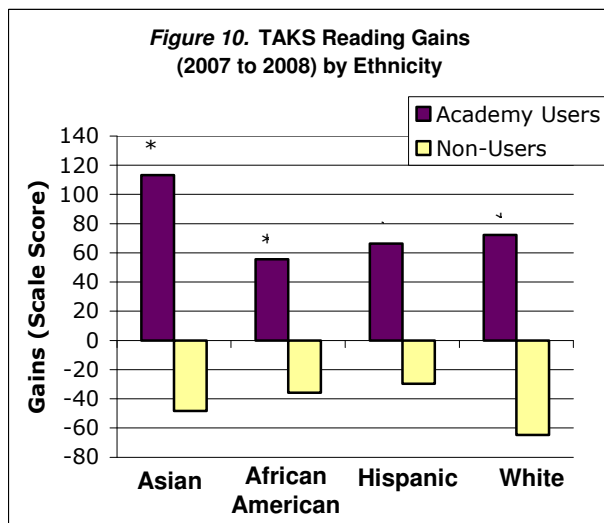


Economically Disadvantaged Students. As shown in Figure 8, the significantly higher TAKS gains for students who trained using the Academy of READING are evidenced for students eligible for free lunch, $p < .001$. This trend is also evidenced for students

eligible for reduced lunch, though did not reach statistical significance, $p = .08$. As shown in Figure 9, the significantly higher TAKS gains for students who trained using the Academy of MATH are evidenced in all economic disadvantage groups, all $p < .001$.



Ethnic Groups. As shown in Figure 10, the significantly higher TAKS gains for students who trained using the Academy of READING are evidenced for students of all ethnicities, all $p < .05$. As shown in Figure 11, the significantly higher TAKS gains for students who trained using the Academy of MATH are evidenced for African American, Hispanic, and White students, all $p < .001$, and approached significance for Asian/Pacific Islander students, $p = .06$.



Summary. The Academy of READING was an effective intervention for Title 1 students (TAKS gains 100 points higher than non-users), At-Risk students (gains 68 points higher than non-users), Economically Disadvantaged students (gains 101 points higher than non-users), and students of all ethnicities (gains 91-161 points higher than non-users).

The Academy of MATH was an effective intervention for Title 1 students (TAKS gains 69 points higher than non-users), At-Risk students (gains 30 points higher than non-users), Economically Disadvantaged students (gains 70-86 points higher than non-users), and students of all ethnicities (gains 53-88 points higher than non-users).

Table 5. Reading TAKS Gains for Academy of READING Users and Non-Users

Student Group	Mean Gain (Scale Score)		Standard Deviation		Sample Size	
	Academy Users	Non- Users	Academy Users	Non- Users	Academy Users	Non- Users
Overall	64.1	-40.5	228.7	199.3	206	1357
Asian/Pacific_Islander	113.1	-48.3	254.0	207.3	8	67
African_American	55.4	-35.7	228.0	201.1	88	504
Hispanic	66.2	-29.5	245.3	200.1	88	483
White	72.1	-64.7	151.7	192.8	22	300
Free Lunch	75.4	-26.1	259.1	217.2	126	627
Reduced Lunch	40.8	-24.2	223.4	204.4	36	194
Title 1	60.7	-40.2	227.2	199.5	191	1174
At Risk	72.7	4.5	226.8	227.4	166	550

Table 6. Math TAKS Gains for Academy of MATH Users and Non-Users

Student Group	Mean Gain (Scale Score)		Standard Deviation		Sample Size	
	Academy Users	Non- Users	Academy Users	Non- Users	Academy Users	Non- Users
Overall	65.6	-7.9	142.9	172.5	453	1936
Asian/Pacific_Islander	26.4	-59.6	112.9	206.7	9	118
African_American	81.9	5.8	161.2	184.3	204	674
Hispanic	50.9	-2.3	129.2	160.0	172	690
White	58.4	-23.7	116.1	160.0	67	450
Free Lunch	65.5	-4.4	139.4	181.1	241	857
Reduced Lunch	86.5	0.0	170.1	156.5	87	269
Title 1	64.8	-4.4	146.6	173.7	412	1709
At Risk	76.6	46.5	138.1	185.2	269	654

Summary

The goal of this project was to evaluate the efficacy of the Academy of READING® and Academy of MATH® with struggling students. Gains were examined on the AutoSkill Placement tests and Texas Assessment of Knowledge and Skills (TAKS) standardized test.

Academy of READING

- ▶ After an average of only 13.8 hours using the Academy of READING, students had TAKS gains 104 scale score points higher than non-users.
- ▶ The percentage of students who met the TAKS Reading standard increased by 16% after using the Academy of READING.
- ▶ Title 1 students, At-Risk students, Economically Disadvantaged students, and students of all ethnicities who used the Academy of READING had significantly higher TAKS Reading gains than non-users.

Academy of MATH

- ▶ After an average of only 16.0 hours using the Academy of MATH, students had TAKS gains 73 scale score points higher than non-users.
- ▶ The percentage of students who met the TAKS Math standard increased by 17% after using the Academy of MATH.
- ▶ Title 1 students, At-Risk students, Economically Disadvantaged students, and African American, Hispanic, and White students who used the Academy of MATH had significantly higher TAKS Math gains than non-users.

About Marcie Penner-Wilger

Marcie Penner-Wilger is an award-winning cognitive scientist with over a decade of research experience in the development of math skills in children and adults. In addition to her role as Cognitive Scientist for AutoSkill International, Marcie is a member of the Centre for Applied Cognitive Research at Carleton University. She has been published in scientific journals including: *Memory & Cognition*, and the *Journal of Experimental Child Psychology*. Marcie has also served as a reviewer for scientific journals including: *Journal of Experimental Psychology: Learning, Memory & Cognition*; *Quarterly Journal of Experimental Psychology*; and *European Journal of Cognitive Psychology*.

About AutoSkill

AutoSkill International Inc. delivers highly effective and scalable literacy intervention solutions to help struggling elementary, middle and high school students master the foundation skills of reading and math. AutoSkill products use a research-based approach that is proven to generate significant and sustainable gains for at-risk students of all ages and abilities. The company's award-winning software provides an individualized and engaging experience for students, and a comprehensive set of monitoring, management and reporting tools for teachers and administrators. AutoSkill deploys its literacy intervention solutions across schools and districts in the U.S., Canada, and Europe. For more information visit www.autoskill.com.

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