THE IMAGINATION LIBRARY PROGRAM AND THE KINDERGARTEN COHORT OF 2008-2009

By John Beckett
Supervisor of Research and Evaluation, Knox County Schools
Board Member, Knox County Imagination Library

BACKGROUND

During the autumn of 2009 we investigated the relationship between Imagination Library students and their kindergarten peers on our Kindergarten Literacy Assessment. At that time we saw that students in the Imagination Library program performed statistically significantly better on the assessment. We noted that this did not prove causation, because this was not a controlled study with random assignment of treatments; but that that there was a significant association between increased student performance and membership in the Imagination Library.

Three years have elapsed. These students have recently completed third grade and have taken Tennessee Comprehensive Assessment Program (TCAP) exams. The research question is, "Do Imagination Library alumni continue to outperform their peers?"

THE NUMERIC INDICATOR

Of the 4623 students in the cohort, 1100 did not take a TCAP achievement or modified achievement exam. Most of these students probably moved away from the district and were replaced by a similar number who entered the district and are not a part of this study. Students who took the TCAP achievement exam were given a variety of scores. One of these scores is the Normal Curve Equivalent (NCE). An NCE ranges from one to 99 with a median of 50 which also reflects the state median. An NCE is an equal-interval measure which allows us to perform mathematical operations with it. There were 171 students who took a modified version of the TCAP. These students were not considered in this portion of the study. In the end, we were able to investigate 1778 Imagination Library alumni and 1574 of their peers who were not in the Imagine Library Program.

THE OVERALL RESULTS

The bottom line and the answer to our research question is, "Yes". The Imagination Library Alumni continue to perform better than their peers. They averaged almost 5 NCEs better than their peers as seen in the chart on the next page.

All Students				
	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	1778	57.62	21.777	.516
Not IL Alumni	1574	52.68	22.259	.561

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
6.478	3350	.000	4.933	.762	3.440	6.426

How significant is the difference? Very significant. The cell highlighted in green is the p value. Stretching this out a few decimal places yields p = .0000000001 and indicates that the probability of a result being this extreme happening by chance is less than one in a billion. There is a statistically significant difference between the performance of the Imagination Library alumni and the performance of their peers.

THE DISAGGREATED RESULTS

While these results are very encouraging, we were able to break down students by various demographic subgroups and test their results. These results are contained in detail in Appendix A and are summarized as follows:

Subgroups where the Imagination Library alumni performed statistically significantly better than their peers using α = .05 as the threshold for significance:

- *Females*
- *Males*
- *Asians*
- *Hispanics*
- *Whites*
- *Ethnic combination of Blacks, Hispanics, and Native Americans (used by TNDOE)*
- *Free/Reduced Lunch Status (as a proxy for poverty)*
- *Paid Lunch Status*
- *Students who are in the same school as they were in kindergarten*
- *Students who are in a different school from kindergarten (as a measure of mobility)*

Subgroups where the Imagination Library alumni performed better than their peers, but not in a statistically significant manner:
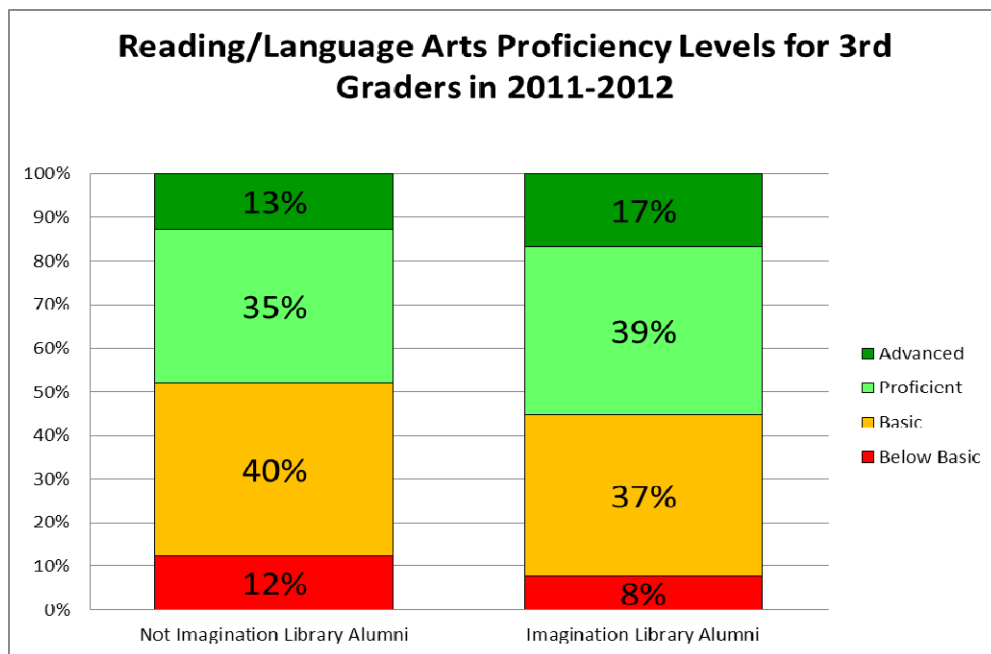
- *American Indians or Alaska Natives*
- *Blacks or African Americans*
- *Special Education Students*

There was one subgroup where the peer group outperformed the IL alumni and that is:

- *English Language Learners*

A COMPARISON OF PROFICIENCY LEVELS

While the TCAP achievement students received numeric NCEs, all students who took a TCAP exam were given a proficiency level. The following chart compares the proficiency levels of the Imagination Library alumni with the proficiency levels of their peers.

Reading/Language Arts Proficiency Levels for 3rd Graders in 2011-2012

	Not Imagination Library Alumni	Imagination Library Alumni
Advanced	13%	17%
Proficient	35%	39%
Basic	40%	37%
Below Basic	12%	8%

The Imagination Library alumni have higher percentages in the desired categories while having lower percentages in the lower performing categories. The numbers may not add up to 100% due to rounding. The Proficient/Basic line is often considered the demarcation between passing and failing. This data is presented in the chart that follows.

Percent Proficient or Advanced in Reading/Language Arts for 3rd Graders in 2011-2012
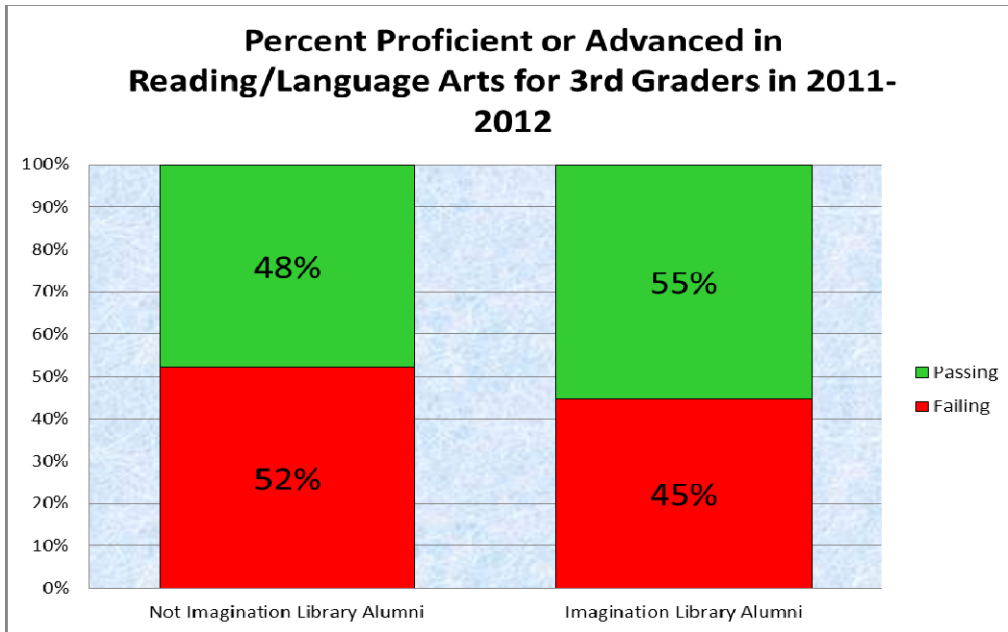
CONCLUSION

While there are too many extraneous variables to justify saying that being an Imagination Library alumni caused increased performance in third grade Reading/Language Arts, we can conclude that students who took part in the Imagination Library continued to outperform their peer who were not a part of the Imagination Library in a statistically significant way.

We also saw that this difference exhibited itself over almost every demographic category of student indicating its universal aspect. We also saw that this difference in scores played out into a difference in proficiency and passing levels between the two groups.

All Students

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	1778	57.62	21.777	.516
Not IL Alumni	1574	52.68	22.259	.561

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
6.478	3350	.000	4.933	.762	3.440	6.426

Gender = Female

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	900	60.36	20.935	.698
Not IL Alumni	730	54.88	22.328	.826

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
5.063	1514.748	.000	5.476	1.082	3.354	7.598

Gender = Male

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	878	54.81	22.272	.752
Not IL Alumni	841	50.88	22.023	.759

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
3.683	1715.261	.000	3.936	1.069	1.840	6.031

Ethnicity = American Indian or Alaska Native

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	6	68.00	21.936	8.955
Not IL Alumni	4	47.75	11.644	5.822

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
1.896	7.798	.096	20.250	10.682	-4.493	44.993

Ethnicity = Asian

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	31	72.32	16.568	2.976
Not IL Alumni	44	61.25	20.433	3.080

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
2.493	73	.015	11.073	4.441	2.221	19.924

Ethnicity = Black

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	221	43.17	18.004	1.211
Not IL Alumni	272	41.45	19.711	1.195

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
1.008	484.285	.314	1.715	1.702	-1.628	5.058

Ethnicity = Hispanic

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	62	51.65	24.131	3.065
Not IL Alumni	120	43.32	21.312	1.945

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
2.294	110.844	.024	8.328	3.630	1.135	15.522

Ethnicity = White

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	1442	59.65	21.284	.560
Not IL Alumni	1106	56.19	21.706	.653

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
4.036	2546	.000	3.464	.858	1.781	5.146

Ethnicity = Black, Hispanic, or Native American

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	289	45.50	20.054	1.180
Not IL Alumni	395	42.00	20.098	1.011

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
2.253	682	.025	3.502	1.554	.450	6.553

Lunch Status = Free/Reduced

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	694	47.31	20.263	.769
Not IL Alumni	772	43.76	20.138	.725

t-test for Equality of Means

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
3.356	1464	.001	3.545	1.056	1.473	5.618

Lunch Status = Paid

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	1064	64.38	19.898	.610
Not IL Alumni	778	61.38	20.592	.738

t-test for Equality of Means

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
3.143	1840	.002	2.994	.953	1.126	4.862
3.127	1641.040	.002	2.994	.958	1.116	4.873

Special Education Students

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	152	44.71	21.903	1.777
Not IL Alumni	138	40.41	22.036	1.876

t-test for Equality of Means

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
1.667	288	.097	4.305	2.583	-.779	9.388

English Language Learners

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	32	38.22	18.941	3.348
Not IL Alumni	114	40.50	19.973	1.871

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
-.577	144	.565	-2.281	3.952	-10.093	5.530

Same School = No

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	337	47.78	21.777	1.186
Not IL Alumni	428	44.62	22.147	1.070

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
1.973	763	.049	3.159	1.601	.016	6.302

Same School = Yes

	N	Mean	Std. Deviation	Std. Error Mean
IL Alumni	1441	59.92	21.133	.557
Not IL Alumni	1146	55.70	21.549	.637

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
5.004	2585	.000	4.223	.844	2.568	5.877