A Closer Look

Change in School Librarian Staffing Linked with Change in CSAP Reading Performance, 2005 to 2011

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The Library Research Service is a unit of the Colorado State Library, Colorado Department of Education, that is operated in partnership with the Library and Information Science Program, Morgridge College of Education, University of Denver.

This study was funded through the Library Services and Technology Act (LSTA) by the Colorado State Library, Colorado Department of Education.

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To cite this report (APA Style):
Lance, K., & Hofschire, L. (2012). *Change in School Librarian Staffing Linked with Change in CSAP Reading Performance, 2005 to 2011*. Denver, CO: Colorado State Library, Library Research Service.

Improving Academic Achievement

Introduction

In the September 2011 issue of *School Library Journal* (SLJ), we presented a national analysis of National Center for Education Statistics (NCES) state-level data on librarian staffing and fourth-grade reading scores from the National Assessment of Educational Progress (NAEP).[1] The results from this study indicated that states that gained school librarians from 2004-05 to 2008-09 showed greater increases in 4th grade reading scores than did states that lost librarians during this time period. As promised, we now move back to the Colorado context to examine the relationships between changes in school library staffing and changes in Colorado Student Assessment Program (CSAP) reading scores over time.

Librarians and Reading

Before launching into the data, analysis, and findings, let's consider what school librarians believe about the primacy of reading and what they see as their role in teaching it.

Reading is a window to the world. Reading is a foundational skill for learning, personal growth, and enjoyment. The degree to which students can read and understand text in all formats (e.g., picture, video, print) and all contexts is a key indicator of success in school and in life. As a lifelong learning skill, reading goes beyond decoding and comprehension to interpretation and development of new understandings.
American Association of School Librarians (AASL),
Standards for the 21st Century Learner

AASL's Standards for the 21st Century Learner do not just pay lip-service to the value of reading. They have been aligned with the Common Core standards that were derived from, and now influence, state standards-based tests, such as the CSAP reading tests.[2] It is clear that school librarians consider the teaching and encouragement of reading—both for curricular reasons and as a lifelong learning skill—to be among their most basic responsibilities. Accordingly, they intentionally pursue a wide variety of activities that should be expected to have a direct impact on students' reading scores.

Data Issues

As noted in the nationally focused SLJ article, our first analysis was exploratory and necessarily imprecise, due to the nature of the data available. The NCES counts of librarians included all librarians—endorsed and non-endorsed—and NAEP scores were limited to a specific grade. At the state level, more detailed library staffing and testing data were available that allowed us to improve upon this exploratory analysis. Also, we had

[1] Lance, K.C., & Hofschire, L. (2011, September 1). Something to shout about: New research shows that more librarians means higher reading scores. *School Library Journal, 57,* 28-33.
[2] See Crosswalk of the Common Core Standards and Standards for the 21st Century Learner at: http://www.ala.org/ala/mgrps/divs/aasl/guidelinesandstandards/commoncorecrosswalk/index.cfm.

access to considerably newer data for this study (2011) than for the national analysis (2009). Compared with the national analysis, this study required handling both staffing and test score data differently to accommodate the realities of the data at the local level

2005 and 2011

Why did we select 2005 and 2011 as the focal years of this study? The latter year was chosen because it is what is most currently available. As for 2005, that was the school year approximately halfway between the recent Great Recession and the previous recession. As tightened budgets resulting from recession and post-recession fiscal pressures have probably been the major factor influencing school library staffing decisions, it seemed important to choose a base year as distant as possible from the two latest recessions, both of which impacted public schools severely.

Colorado Data on School Library Staffing and CSAP Reading Scores

From the Colorado Department of Education (CDE), we obtained school-by-school staffing data that included counts of librarians and library assistants, both those endorsed and those not endorsed by CDE.

In Colorado, reading is one of the most prevalent areas of CSAP testing, including almost all students in grades 3 to 10. Based on their scores, the performance of students is categorized as advanced, proficient, partially proficient, or unsatisfactory. To maximize the number of cases (i.e., schools) in this study, we summarized reading results by school, adding the number of each school's students scoring at the advanced and unsatisfactory levels across grades and dividing by the number of students tested in the school. Similar testing statistics are made available for schools and districts on CDE's SchoolView® microsite.[3]

Analyzing school-level data across Colorado presented some challenges not experienced with the national analysis. Nationally, we looked at percent change in the number of school librarians in each state. Because librarians were reported in substantial numbers in all states, this worked. Examining local data statewide, we found that this would not work, due to the often all-or-nothing nature of school library staffing (i.e., some schools had no librarians in at least one of the two years in the study). Likewise, when examining reading scores nationwide, we looked at percent change in actual NAEP reading scores for fourth-graders. Examining local data statewide, we found that this would not work, due to the extremes in 2011 reading performance levels and the progress they represented since 2005. What was especially problematic was the confounding nature of these two elements. For instance, some schools with similar percentages of improvement over time had started out at opposite extremes—one advanced, the other unsatisfactory—in 2005.

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[3] http://www.schoolview.org/

To take into account these realities, change over time in both librarian staffing and reading performance levels was represented by two categorical variables.

Change in Endorsed Librarian Staffing Matrix

Disregarding school-to-school variations in full-time staffing counts and degrees of part-time status, we found that each school fell into one of four categories for librarian staffing trends:

1. It had an endorsed librarian in both 2005 and 2011.
2. It had an endorsed librarian in 2011, but did not have one in 2005.
3. It did not have an endorsed librarian in 2011, but did have one in 2005.
4. It did not have an endorsed librarian in either 2005 or 2011.

Level / Change for Reading Scores Matrices

Schools were also classified based on two dimensions related to CSAP reading scores: Whether they scored above or below the median for each performance level in 2011, and whether the change in their performance level between 2005 and 2011 was above or below the median for such change. Hence, each school also fell into one of four categories for level and change in reading scores:

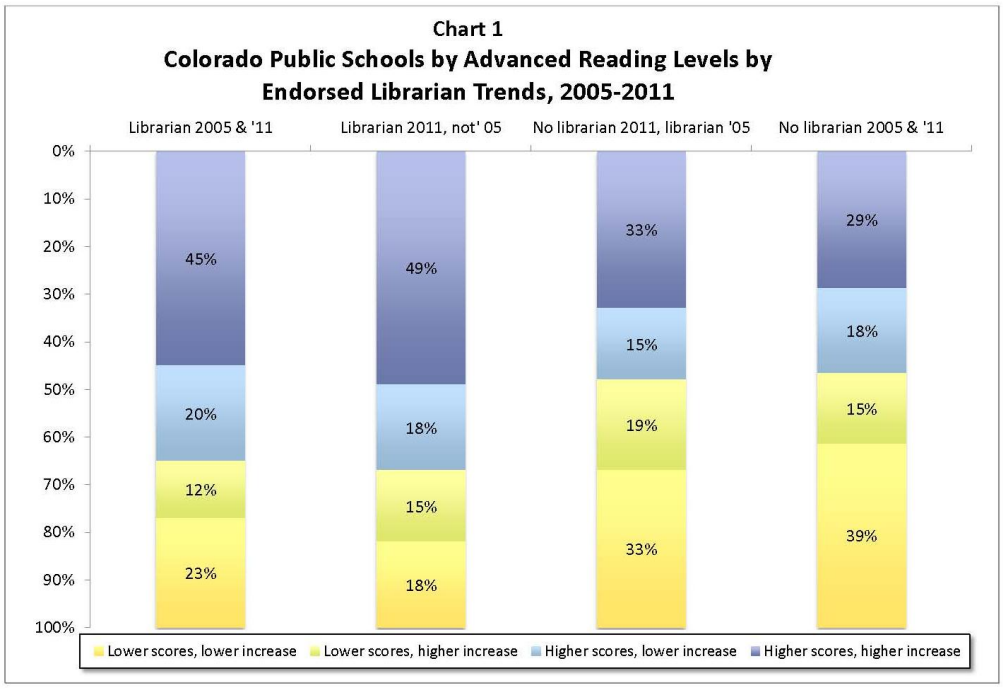
1. It had higher scores in 2011, and a higher increase in scores from 2005 to 2011.
2. It had higher scores in 2011, and a lower increase in scores from 2005 to 2011.
3. It had lower scores in 2011, and a higher increase in scores from 2005 to 2011.
4. It had lower scores in 2011, and a lower increase in scores from 2005 to 2011.

Advanced Reading Levels by Endorsed Librarian Trends, 2005 to 2011

Schools that either maintained or gained an endorsed librarian between 2005 and 2011 tended to have more students scoring advanced in reading in 2011 and to have increased their performance more than schools that either lost their librarians or never had one.

There is a positive and statistically significant relationship between advanced reading levels and endorsed librarian staffing trends (see Chart 1.)

Schools that either maintained or gained an endorsed librarian between 2005 and 2011 tended to have more students scoring advanced in reading in 2011 and to have increased their performance more since 2005 (45% and 49%, respectively) than schools that either lost their librarians or never had one (33% and 29%). Conversely, schools that either lost a librarian during that period or never had one (33% and 39%) tended to have fewer students scoring advanced in 2011 and to have seen lesser gains—or indeed, losses—since 2005 than schools that maintained or gained a librarian (23% and 18%).



Notably, schools with the largest percentage of higher advanced reading scores in 2011 and higher increases in advanced reading scores between 2005 and 2011 (49%) were those that gained an endorsed librarian during that interval. If an endorsed librarian is doing her or his job well, this is what one would expect.

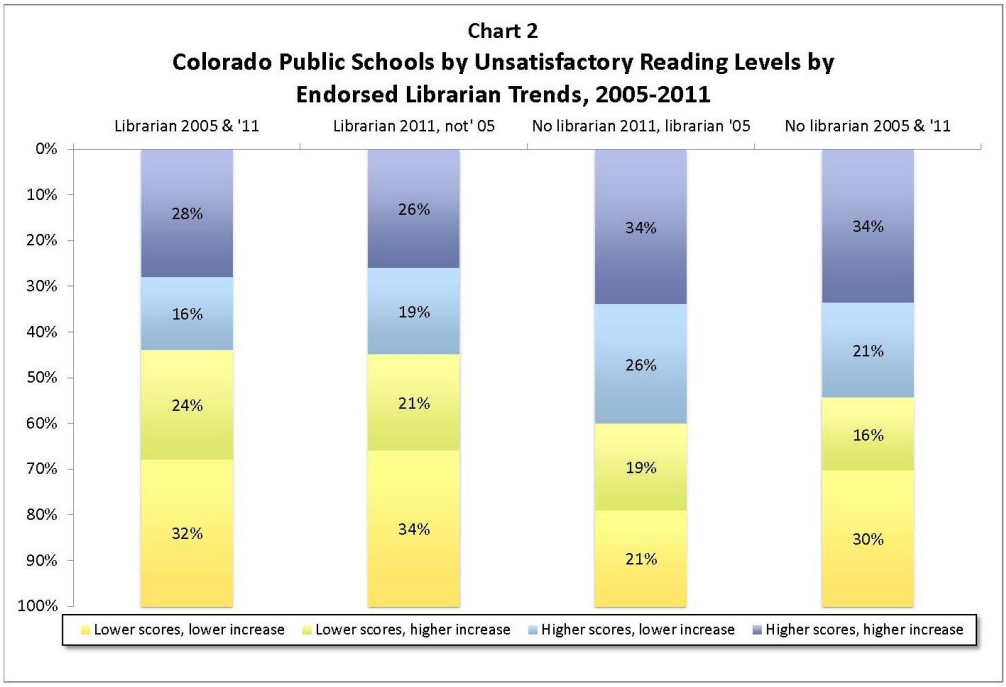
Unsatisfactory Reading Levels by Endorsed Librarian Trends, 2005 to 2011

There is a negative and statistically significant relationship between unsatisfactory reading levels and endorsed librarian staffing trends (see Chart 2).

Schools that either maintained or gained an endorsed librarian between 2005 and 2011 tended to have fewer students scoring unsatisfactory in reading in 2011 (i.e., lower scores) (28% and 26%, respectively) and to have reduced that problem more since 2005 (i.e., lower increase) than schools that either lost their librarians or never had one (both at 34%). Conversely, schools that either lost a librarian during this period or never had one (32% and 34%) tended to have more students scoring unsatisfactory in 2011 and to have seen that problem increase more since 2005 than schools that maintained or gained a librarian (21% and 30%).

Notably, schools with the largest percentage of lower unsatisfactory reading scores in 2011 and lower increases in that figure between 2005 and 2011 (34%) were those that gained an endorsed librarian during the interval. As with advanced reading scores, if an endorsed librarian is doing her or his job well, this is what one would expect.

Notably, schools with the largest percentage of higher advanced reading scores in 2011 and higher increases in advanced reading scores between 2005 and 2011 (49%) were those that gained an endorsed librarian during that interval.



Assessing Three Alternative Models of School Library Staffing by Association with CSAP Reading Scores, 2011

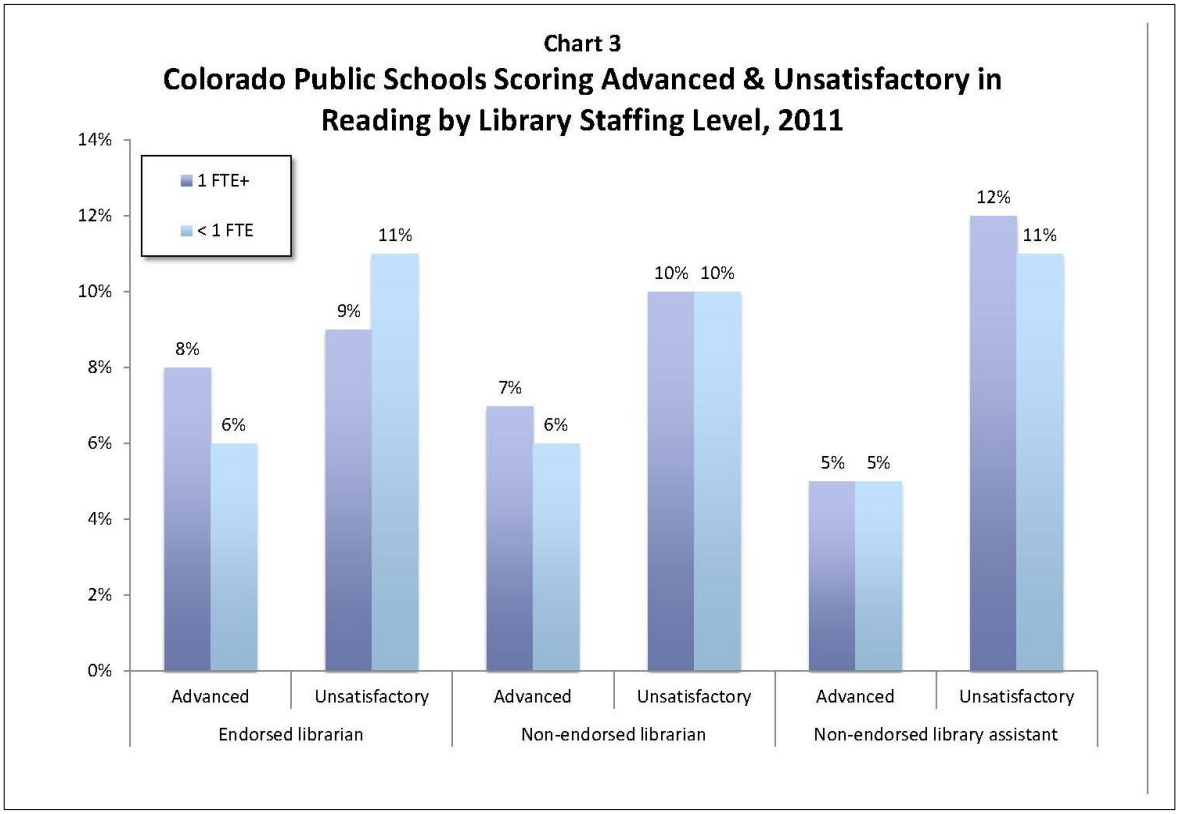
In the above analysis of change in librarian staffing and reading scores from 2005 to 2011, we see the consequences over time of schools shifting from one library staffing model to another. Basically, there are three major options for who runs a school library: an endorsed librarian (i.e., endorsed by CDE as either a School Librarian or a Teacher Librarian/Media Specialist), a non-endorsed librarian (i.e., having neither type of librarian endorsement), and a non-endorsed library assistant. Many school libraries have library assistants, ideally working under the supervision of an endorsed librarian. In reality, however, there are more and more schools—especially at the elementary level—where library assistants run libraries without supervision. It is the type of situation that would never be tolerated in the classroom teaching context at any level. Teacher aides rarely if ever work independently of teachers.

The results show that in 2011, schools with at least one FTE endorsed librarian averaged significantly higher advanced CSAP reading scores and significantly lower unsatisfactory scores than schools with less than one FTE endorsed librarian.

To shed further light on the relative merits of these three library staffing options, we examined 2011 data alone, comparing mean percentages of students earning advanced and unsatisfactory CSAP reading scores for schools with at least one full-time equivalent (FTE) endorsed librarian to schools with less than one FTE of this type. Similar analyses were conducted for non-endorsed librarians and non-endorsed library assistants. The results, illustrated in Chart 3, show that in 2011, schools with at least one FTE endorsed librarian averaged significantly higher advanced CSAP reading scores (8% vs. 6%) and significantly lower unsatisfactory scores (9% vs. 11%) than schools with less than one FTE endorsed librarian.

Differences in 2011 advanced and unsatisfactory reading scores for schools with and without non-endorsed librarians and with and without non-endorsed library assistants (working without endorsed or non-endorsed librarians)

were not statistically significant. In other words, school library programs that were not managed by endorsed librarians—whether the alternative was a non-endorsed librarian or library assistant—had no measurable association with CSAP reading scores.



Taking Poverty Into Account

Whenever studies of school libraries report associations between levels of library staffing and test scores, a very reasonable question is posed: Why do you believe this association reflects cause-and-effect? Perhaps, the questioner suggests, it is simply a matter of schools in wealthier communities being able to afford to employ endorsed librarians and parents in wealthier communities raising children who—being more advantaged socially and economically, and living in more information-rich home environments—tend to earn higher test scores. Indeed many of the school library impact studies conducted since 2000 found that the strongest predictor of test scores was poverty or the lack thereof in the community. Those studies also found that school libraries were still associated with test scores, even when poverty was taken into account.

To take it into account in this study, we conducted a partial correlation analysis of library staffing level and advanced and unsatisfactory reading levels, controlling for the percentage of students in a school who were eligible for Free and Reduced-Cost Meals (the generally accepted indicator of poverty in education research). In other words, this type of analysis

allowed us to determine whether librarian staffing still had an impact on CSAP scores, even when holding poverty constant. Our results differed slightly from the staffing model analyses discussed above. In this instance, both endorsed and non-endorsed librarians were positively correlated with advanced CSAP reading scores and negatively correlated with unsatisfactory scores. In other words, with poverty utilized as a control variable, both endorsed and non-endorsed librarians had positive and statistically significant correlations with reading scores. Notably, however, these relationships are stronger for endorsed librarians than non-endorsed ones. What did not change was the lack of relationship between non-endorsed library assistants working without a librarian and reading scores. Apparently, library assistants working without supervision do not have any impact on reading scores, either advanced or unsatisfactory.

Table 1. Partial Correlation Coefficients for CSAP Reading Achievement and Library Staffing Levels Controlling for Poverty for Colorado Public Schools, 2011

Percent of Students by CSAP Reading Level	School Library Staffing Level in Full-Time Equivalents (FTEs)		
	Endorsed librarian (N= 1548)	Non-endorsed librarian (N=1048)	Non-endorsed library assistant w/no librarian (N=766)
Advanced	.23*	.17*	.06
Unsatisfactory	-.12*	-.09**	-.02

*p <.001; ** p <.05

Notes to Table 1:

1. N represents the number of cases (schools) for which data were available, not the number of schools with each type of school library staff.
2. The standard of statistical significance is .01, indicating less than one chance in 100 that the results occurred randomly. Notably, for all but one of the significant findings, there was less than one chance in 1,000 of such a random occurrence.
3. The analysis for non-endorsed library assistants excluded schools with endorsed and non-endorsed librarians. Thus, the correlation coefficients for this staffing level are not comparable to the others.
4. Poverty was represented by the percentage of a school's students who were eligible for Free and Reduced-Cost Meals.

Conclusion

The findings of this Colorado analysis update, confirm, and extend the findings of our recent SLJ article. Similar to the results presented in that article, we found that students at schools that gained or maintained an endorsed librarian to manage the library program averaged higher CSAP reading scores and higher increases in those scores over time than students

at schools whose library programs were run by either non-endorsed librarians or library assistants. In the national analysis, it was not possible to distinguish between endorsed and non-endorsed librarians; so, these findings about the value of gaining or maintaining an endorsed librarian when school budgets get tight are new. As in earlier state-level school library impact studies and the SLJ national study, the association of endorsed librarians with higher reading scores cannot be explained away by local economic conditions.

The findings of these two studies could be extended in many ways. Here are a few ideas:

1. Colorado scores for subjects other than reading could be examined. Both writing and science are interesting prospects. Unfortunately, there are many subjects for which there are no state test scores. An especially challenging question for researchers of school library impact is "what data do we have, or could we create, to study student learning in other areas?"

2. Similar analyses could be conducted in other states. Mandated by federal and state governments, the data required to replicate this study are available in every state, so such studies do not have to be prohibitively expensive. So far, we have two studies: the national analysis published in SLJ and this state one. Similar studies should be done in a variety of different states around the U.S., as happened with the original Colorado-style impact studies. If similar findings can be reported from disparate settings, findings of this type will have more credence.

3. Qualitative studies could examine the very intriguing question of how teachers and students cope with the absence of an endorsed librarian or, in some cases, even an entire library program. As the data used in this study indicate, some schools manage to have successful students, despite what appear to be inadequately staffed library programs. They are not the norm, and certainly not the ideal; but, such schools do exist. Their existence raises many questions:

- How are these schools managing to meet their students' and teachers' needs, for both information resources and guidance in accessing and using them, short- and long-term?

- What alternatives are being employed in these schools? Do they rely heavily on online resources, alone or in combination with something else?

- Who guides the use of such resources: technology teachers, classroom teachers, or perhaps one special individual on the school's faculty or staff who is a de facto librarian?

- Or, do such schools have special relationships with the public and/or academic libraries in their communities that compensate for the lack of a strong school library program?

These are only a few of many possible questions about this phenomenon. To our knowledge, there have been no studies of these unusual cases. If we are to understand how school library programs are evolving, and may need to evolve, such studies are needed. It is not a matter of discovering who is "taking over" from school librarians. Perhaps we will discover a new niche in the school labor force that school librarians can occupy.

For the time being, what we know from this study and its predecessors is that the research on school librarians and their association with students' test scores is remarkably consistent in its findings: regardless of how rich or poor a community is, students tend to perform better on reading tests where, and when, their library programs are in the hands of endorsed librarians. Furthermore, at schools where library programs gain or maintain an endorsed librarian when school budgets get tight, students tend to excel. At schools where library programs lose or never had an endorsed librarian, students suffer as a result.

Appendix A

The following tables provide detailed results of the statistical analyses reported in this article.

Table A-1. Colorado Public Schools by Advanced Reading Levels by Endorsed Librarian Trends, 2005-2011

Advanced CSAP Reading Scores 2011 & 2005-2011	Endorsed Librarian Change, 2005-11				Total
	Librarian 2005 & 2011	Librarian 2011, not 2005	No librarian 2011, librarian 2005	No librarian 2005 & 2011	
Higher score, higher increase	128 44.9%	81 49.1%	34 33.3%	210 29.2%	453 35.6%
Higher score, lower increase	57 20.0%	30 18.2%	15 14.7%	128 17.8%	230 18.1%
Lower score, higher increase	35 12.3%	24 14.5%	19 18.6%	105 14.6%	183 14.4%
Lower score, lower increase	65 22.8%	30 18.2%	34 33.3%	277 38.5%	406 31.9%
Total	285 100.0%	165 100.0%	102 100.0%	720 100.0%	1272 100.0%

Chi-square = 54.243, p = .000

Table A-2. Colorado Public Schools by Unsatisfactory Reading Levels by Endorsed Librarian Trends, 2005-2011

Unsatisfactory CSAP Reading Scores 2011 & 2005-2011	Endorsed Librarian Change, 2005-11				Total
	Librarian 2005 & 2011	Librarian 2011, not 2005	No librarian 2011, librarian 2005	No librarian 2005 & 2011	
Higher score, higher increase	78 27.6%	43 26.1%	39 33.9%	253 33.5%	413 31.3%
Higher score, lower increase	46 16.3%	31 18.8%	30 26.1%	155 20.5%	262 19.9%
Lower score, higher increase	69 24.4%	35 21.2%	22 19.1%	123 16.3%	249 18.9%
Lower score, lower increase	90 31.8%	56 33.9%	24 20.9%	225 29.8%	395 29.9%
Total	283 100.0%	165 100.0%	115 100.0%	756 100.0%	1319 100.0%

Chi-square = 20.564, p = .015

Table A-3 (Part 1). Comparison-of-Means Analysis (t Test for Independent Samples) for Percent of Students with Advanced and Unsatisfactory Reading Scores by Endorsed Librarian Staffing, 2011

CSAP Reading Level Endorsed Librarian FTE	N	Mean	Standard Deviation	Standard Error Mean
Advanced				
>= 1.0000	405	.0814	.06524	.00324
< 1.0000	1144	.0565	.05421	.00160
Unsatisfactory				
>= 1.0000	405	.0899	.07765	.00386
< 1.0000	1144	.1060	.08996	.00266

Table A-3 (Part 2)

	t	df	p	Mean difference	Standard error difference	95% Confidence Interval	
						Lower	Upper
Advanced	6.874	612.695	.000	.02486	.00362	.01776	.03196
Unsatisfactory	-3.426	814.093	.001	-.01606	.00469	-.02525	-.00686

Advanced F = 16.786, p = .000

Unsatisfactory F = 11.412, p = .001

Table A-4 (Part 1). Comparison-of-Means Analysis (t Test for Independent Samples) for Percent of Students with Advanced and Unsatisfactory Reading Scores by Non-Endorsed Librarian Staffing, 2011

CSAP Reading Level Non-Endorsed Librarian FTE	N	Mean	Standard Deviation	Standard Error Mean
Advanced				
>= 1.0000	195	.0698	.05595	.00401
< 1.0000	1354	.0620	.05860	.00159
Unsatisfactory				
>= 1.0000	195	.0957	.07163	.00513
< 1.0000	1354	.1027	.08917	.00242

Table A-4 (Part 2).

	t	df	p	Mean difference	Standard error difference	95% Confidence Interval	
						Lower	Upper
Advanced	1.749	1547	.080	.00781	.00446	-.00095	.01656
Unsatisfactory	-1.220	288.207	.224	-.00692	.00567	-.02002	.00425

Advanced F = .012, p = .913

Unsatisfactory F = 7.322, p = .007

Table A-5 (Part 1). Comparison-of-Means Analysis (t Test for Independent Samples) for Percent of Students with Advanced and Unsatisfactory Reading Scores by Non-Endorsed Library Assistant Staffing, 2011

CSAP Reading Level Non-Endorsed Library Assistant FTE	N	Mean	Standard Deviation	Standard Error Mean
Advanced				
>= 1.0000	262	.0455	.04416	.00273
< 1.0000	507	.0505	.05080	.00226
Unsatisfactory				
>= 1.0000	262	.1198	.09311	.00575
< 1.0000	507	.1107	.09849	.00437

Table A-5 (Part 2).

	t	df	p	Mean difference	Standard error difference	95% Confidence Interval	
						Lower	Upper
Advanced	-1.416	596.179	.157	-.00501	.00354	-.01196	.00194
Unsatisfactory	1.244	767	.214	.00915	.00736	-.00529	.02359

Advanced F = 11.078, p = .001

Unsatisfactory F = .477, p = .490