The Power of full-time certified school librarians in Missouri: Boosting student achievement across disciplines.

By Rene Burress, Charlene Atkins, Bryan McDonald & Darrell Burress

Snapshot

This study examines the impact of school librarian full-time equivalent (FTE) levels on student achievement in Missouri using state-level assessment data. The researchers obtained publicly available, aggregated data directly from the Missouri Department of Elementary and Secondary Education (MO DESE) to conduct statistical analyses on multiple districts, years, and content areas. The dataset included data points from Missouri K-12 public schools over a nine-year period. The analysis utilized ANOVA and post-hoc tests to compare proficiency rates across FTE levels (no librarian, part-time librarian, and full-time librarian) for each school level and content area. Results indicated that schools with full-time librarians had significantly higher proficiency rates compared to schools with part-time or no librarians. Furthermore, the effect sizes demonstrated the positive impact of having a school librarian on student achievement across school levels and content areas. This study provides evidence supporting the importance of school librarians in enhancing student performance on state-level assessments.

Introduction

For over 50 years, research that demonstrates school librarians have a positive impact on student achievement has been published. Nearly 60 different studies in 22 states have found statistically significant results, indicating similar findings (Scholastic, 2016). One of the first studies completed was by Gaver. Gaver (1963) compared test scores in schools with classroom libraries, schools with libraries run by someone without librarian training, and schools with libraries run by trained librarians. Gaver's study of 13 states and 271 schools found that students had higher achievement in schools with trained school librarians. Doubters may insist that these results are correlated with economically stronger school districts, where schools have larger budgets and access to more resources. However, past research has been careful to control for variables and has repeatedly found that ...the presence or absence of a school librarian does, in fact, make a difference in student achievement.

Theoretical framework and purpose of study

It is important in society that researchers identify what factors in the educational system can have a positive impact on student learning. One way school leaders can do this is by using data-driven decision making (DDDM) models when determining what positions and programs make the biggest impact. Bigner (2017) defines DDDM as the 'systematic application

of data analysis to guide the selection and implementation of instructional practices that are expected to improve student achievement' (p. 14). Mandinach et al. (2006) proposed a conceptual model called framework for Data-Driven Decision Making. Their framework uses data, information, and knowledge as three terms in a continuum. Data in their raw states are transformed into information. Data with meaning and context becomes information. The collection of information used to guide action and decision is knowledge. Furthermore, data are seen as hierarchical in structure. There are classroom-level, school-level, and district-level data as well as state and federal data. Mandinach (2012) further explains that the framework identifies six skills associated with the points along the continuum. Those are collect, organize, analyze, summarize, synthesize, and prioritize. First users collect and organize data. Raw data must be arranged and sorted so that it is not just a random collection of numbers. Spreadsheets and databases can help users organize raw data. Next users analyze and summarize by examining multiple sources of data. Users may look at trends and patterns in data to make sense of what the data is showing. This allows summaries to emerge. Finally, users synthesize the information and prioritize knowledge. Synthesis allows the user to gain an understanding of the possible steps that can be taken. Users can then prioritize knowledge to make a decision. Once a decision is made and implemented, the impact of the decision can be examined. His framework can be used to examine whether a state or school district uses data to make decisions about the FTE requirements of school librarians.

...the presence or absence of a school librarian does, in fact, make a difference in student achievement.

The purpose of this study was to examine school librarian full-time equivalent (FTE) and student data on state tests and determine if the FTE had a statistically significant positive impact on student achievement in Missouri. Johnston and Green (2018) noted the importance of the school librarian profession demonstrating its contributions to student learning and for school library researchers to collect empirical data demonstrating such. The last time Missouri studied the impact of school librarians was in 2003. The Missouri Department of Elementary and Secondary Education (MO DESE) and the Missouri State Library requested a research study to determine whether school library services in Missouri had a measurable impact on student achievement. Statistically significant results related to student achievement were found among three components of school libraries and services. Where library usage, summer reading programs, and greater library access were available, student achievement was higher (Quantitative Resources, 2003). MO DESE did little with the results of this study. In fact, in 2008, the position at MO DESE that oversaw school librarians throughout the state was eliminated. In the past two decades the Missouri Association of School Librarians (MASL) and educator preparation providers (EPPs), such as the American Association of School Librarians (AASL) nationally recognized preparation program at the University of Central Missouri (UCM), have taken the lead on expectations for school library programming and the training and preparing of high-quality school librarians throughout the state. Using data from MO DESE,

faculty at UCM sought to determine if current data still supports the positive impact school librarians in Missouri have on student achievement.

Literature review

As society has changed and evolved, so have the expectations for school librarians. National and state standards address how school librarians teach information literacy to students (AASL, 2018). School librarians become highly qualified to provide these services to their schools by taking coursework in library science and attending ongoing professional development for school librarians. School librarians collaborate with teachers to provide instruction, resources, and support to enable high student achievement. As teachers, school librarians use a variety of instructional strategies, including inquiry-learning to create meaningful lessons and activities for students and assess the impact of their instruction. School librarians also are technology leaders, knowledgeable about emerging technologies and how to use various technologies appropriately during instruction. As leaders in their school buildings, school librarians know the school's curriculum and curate a collection of resources in the school library that covers all content areas. School librarians are able to provide professional development to educators on topics such as technology, information literacy, curriculum resources, and more.

It is important in society that researchers identify what factors in the educational system can have a positive impact on student learning.

Research studies

The following studies demonstrate the breadth of the literature that has found school librarians positively impact student achievement. Haycock (2011) conducted a Canadian-based study that examined findings from previous school library impact studies. The data revealed that higher standardized test scores for students were associated with school libraries that were more accessible, better funded, professionally staffed, and with more resources. Results pointed to higher student achievement in those schools where greater resources, from the same limited allocation, were assigned to school libraries.

Wine et al. (2023) examined four years of fourth-grade student test scores in reading and mathematics from North Carolina. In each of the four years, students who were in schools with a full-time certified librarian had statistically significantly higher test scores than students attending schools without full-time certified librarians.

The New Jersey Association of school librarians commissioned a study to learn more about school libraries in New Jersey. A two-phase study was completed. Phase 1 examined survey data completed by New Jersey school librarians. Phase 1 findings indicated that New Jersey school librarians contribute to student learning outcomes by contributing to the development of curriculum standards; resource-based competencies; research process and learning management competencies; thinking-based competencies; affective, personal, and

interpersonal competencies; and outcomes related to the development of reading (Todd et al., 2010). Phase 2 of the study included 12 New Jersey schools whose school librarians reported high levels of collaboration with teachers in the survey data collected in Phase 1 of the study. Focus groups in the schools consisted of the school principal, the school librarian, and classroom teachers, including specialists such as special needs and literacy teachers (Todd et al., 2011). The narratives from the focus groups portrayed the school library and the work of school librarians as essential to learning in information and technology intense environments.

The Washington Office of Superintendent of Public Instruction and Washington Library Media Association co-sponsored a study. The goal of the study was to describe the current conditions of school libraries in Washington State schools and to evaluate the relationship between quality school library programs staffed by certified teacher-librarians and student achievement. Controlling for school size and student income level, findings indicated that students who attend schools with certified teacher-librarians and quality library facilities performed better on standardized tests and were more likely to graduate (Coker, 2015).

As society has changed and evolved, so have the expectations for school librarians.

Dow et al. (2012) used analysis of covariance (ANCOVA) to examine school librarian staffing levels and student achievement in Kansas. Student achievement was measured as recorded in Kansas Annual Yearly Progress (AYP) data at the school level. Two general models for analysis were developed. In one model, the dependent variable was proficiency rate; the independent variable was FTE allocation; and the covariates were modified test takers and percent alternate test takers. In the other model, the dependent variable was proficiency rate that changes over time; the independent variable was trend (changes in FTE allocation from 2006 through 2009); and it used the same covariates. Five subject areas (reading, mathematics, science, social studies, and writing) were examined over a four-year period (2006-2009).

Overall, the study examined 2.5 million individual assessment results from all 1,389 Kansas schools. Schools, not students, served as the unit of analysis. The results of overall findings show that with at least a part-time school library (and preferably, a full-time school librarian), there are notable higher AYP proficiency rates in schools in all five subject areas (reading, mathematics, science, government/history, and writing) than in schools having no school librarian (Dow et al., 2012).

Highly qualified school librarians

Through the Council of Accreditation of Educator Preparation (CAEP), AASL provides a national program review system for master's degree programs in library science that prepare educators to work as school librarians. Faculty from AASL-CAEP EPPs and current school librarians serve on review teams, reviewing program assignments and assessment data to ensure the program meets AASL-CAEP standards for school librarian preparation (AASL,

2017). Graduates of these programs are considered highly qualified school librarians, ready to fulfill the roles and expectations that AASL has for 21st century school librarians as defined by AASL standards (2018) and fully prepared to make a significant contribution to student achievement in their schools.

The AASL (2016) position statement on the preparation of school librarians, states,

'in addition to meeting state certification requirements, school librarians hold a master's degree or equivalent from a program that combines academic and professional preparation in library and information science, education, and technology' (para 2).

However, each state has different requirements for school librarian certification. Many states require school librarians to have coursework in librarianship in order to work as a school librarian. For example, Alabama, Arkansas, Kansas, Kentucky, Tennessee, Texas, and many other states require a master's degree, plus a content test to become a school librarian (EveryLibrary, 2023).

Until the 2022-2023 school year, MO DESE did not require school librarians to have any coursework to become certified. Prior to 2022 certified educators could become certified school librarians by taking the Missouri Content Exam for library science and achieving a passing score. The steps made by MO DESE in 2022 are important as more school librarians in Missouri will be highly qualified and not just certified to do the job.

School librarians collaborate with teachers to provide instruction, resources, and support to enable high student achievement.

Background on student assessment in Missouri public schools

The Missouri Assessment Program (MAP) began in 1993 with the Outstanding Schools Act. As a result of this legislation, students in Missouri were tested in grades 3, 7, and 11 in English Language Arts (ELA), grades 4, 8, and 10 for mathematics, and grades 3, 7, and 11 for science. The tests were, and still are based on the originally developed Show-Me Standards. Missouri first administered End of Course Exams (EOC) for high school students in the 2008-2009 school year. EOCs in ELA II, Algebra 1, and Science replaced the initial grade span content tests the state originally developed. These are knowledge and performance standards that are desired for every graduate to possess. These broad-based standards have been used various times as revised content standards have been developed and updated.

In 2001 the No Child Left Behind (NCLB) legislation was passed. As a result of this legislation, Missouri moved from assessing students one time in elementary, middle, and high school to assessing all students in grades 3-8 and once again in high school in ELA, mathematics, and science. There was also a focus on moving from the average of all students in a given grade level or school to breaking the results down by demographic data. These groups were special

education, black, Hispanic, Pacific Islander, and free and reduced lunch. The results were then used through NCLB to determine if a school or district was failing.

School librarians are able to provide professional development to educators on topics such as technology, information literacy, curriculum resources, and more.

Missouri MAP and EOC student performance scores fall into one of four categories: basic, below basic, proficient, or advanced. Students scoring at the proficient level are considered to be performing at grade level while those scoring in the advanced category are considered to be performing above grade level on the assessments.

The Missouri School Improvement Program (SIP) was established in 1990 and in 2023 is in its 6th version (MO DESE, 2022). It is the process MO-DESE uses to determine accreditation recommendations for all public-school districts in Missouri. Under the effective teaching and learning standards of MSIP 6, staffing ratios are addressed for various school and district positions. These ratios help schools and districts determine and advocate for the staffing levels of each position. The state has two levels of staffing ratios. One is the minimum level of staffing and the second is the recommended level of staffing. School librarian staffing ratios are one position that is included. The ratios currently do not recommend a full-time school librarian in every school, which allows districts the choice to have school librarians in FTEs as low as .2 or even choose not to have a school librarian at all.

The studies over the past two decades demonstrate that significant efforts have been made to study the impact of school librarians on student achievement. Research indicates (Coker, 2015; Dow et al., 2012; Haycock, 2011; Todd et al., 2011; Wine et al., 2023) that pre-k through 12th grade students benefit from the expertise of school librarians who lead effective school library programs.

Method

Research design

This study, using data from 2011-2019, sought to discover if the FTE of school librarians had a statistically significant impact on student achievement on the MAP and EOC state assessments in Missouri. Methodologies from Dow et al. (2012) were attempted to be replicated, however due to limitations in MO DESE's data sharing practices, researchers were unable to complete an exact replication.

Research question

Does school librarian full-time equivalency (FTE) have a positive impact on student achievement on state-level assessments in Missouri?

Data collection

The purpose of this research was to determine the relationship between school librarian FTE and student achievement on state-level assessments. All data for this study was provided by MO DESE. This data is publicly available, as disaggregated data by school district and year, on the MO DESE website. However, the researchers requested aggregated data directly from MO DESE in order to run statistical analyses for many districts over multiple years and for the four different content areas assessed (ELA, mathematics, science, and social studies). The original data from MO DESE came in multiple files and included over 5 million points of data. Data collected included district and building names, district and building codes, state-level exam performance percentages for four content areas, and information regarding librarian FTE status for the years 2011 to 2019. Data included all public schools in Missouri. State schools such as the School for the Blind, hospitals, and juvenile detention centers were excluded from the study. Student test data is not collected in Missouri for private schools or homeschooled students.

Schools with full-time school librarians had significantly higher proficiency rates than schools with part-time or no school librarian.

For the purpose of this study, proficiency rate was defined as the combined percentages of proficient and advanced performance on the state-level exams. The school was removed from the study if the proficiency rate could not be determined due to limitations in MO DESE reporting practices. These limitations prevented an exact replication of Dow et al. (2012). Limitations are further detailed in the limitations section of the paper.

After processing all the data given by MO DESE into one database in Microsoft SQL Server, which included merging certain data points and removing unusable data, researchers were able to use 18,398 school librarian FTE levels, 54,855 points of high-stakes performance percentages for over 17,500 (approximately 1900 schools per year) Missouri PreK-12 schools across a period of nine years. These performance percentages included MAP and EOC results for ELA, mathematics, science, and social studies. Table 1 displays the number of high stakes test results included each year at each school level and for each content area along with the overall totals for each. Due to pilot testing, the science exam was either not administered in 2018 and the social studies exam was not administered in 2019, data was not included for those years.

To determine the relationship between FTE of school librarians and student performance on high stakes state-level exams, FTE status along with MAP and EOC proficiency rates were examined. The schools' reported performance rates were used as the unit of analysis, rather than individual student data. Proficiency rates were calculated by merging the percent of students performing at the advanced level with the percent performing at the proficient level. For example, a school with 10% advanced and 23% proficient was reported to have a 33% proficiency rate.

Table 1

Number of High-Stakes Test Results by School Level, Subject Area, and Year of Assessment

School Level	Subject	Year of Assessment									Total Count
		2011	2012	2013	2014	2015	2016	2017	2018	2019	
Elementary	Math	1162	1161	1159	1158	1166	1164	1165	1168	1166	10469
	ELA	1163	1161	1158	1159	1166	1164	1165	1169	1167	10472
	Science	964	976	973	961	969	969	967	0	991	7770
	Total Count	3289	3298	3290	3278	3301	3297	3297	2337	3324	28711
Middle	Math	349	355	350	346	345	349	351	350	354	3149
	ELA	349	355	350	346	345	349	351	350	354	3149
	Science	335	341	337	339	337	341	345	0	347	2722
	Total Count	1033	1051	1037	1031	1027	1039	1047	700	1055	9020
High School	Math	518	518	517	520	522	516	425	519	518	4573
	ELA	521	520	519	521	517	517	287	519	518	4439
	Science	507	511	508	509	509	512	517	0	516	4089
	Social Studies	513	511	515	513	481	489	493	508	0	4023
	Total Count	2059	2060	2059	2063	2029	2034	1722	1546	1552	17124
Grand Total		6381	6409	6386	6372	6357	6370	6066	4583	5931	54855

The magnitude and direction of the relationship between FTE of school librarians and school proficiency rate were calculated using the Statistical Package for the Social Sciences (SPSS). A significant correlation between FTE of school librarians and school assessment proficiency rate was found at each school level and for each subject area, indicating a significant linear relationship between the two variables. Using an alpha level of $p < 0.01$, the direction of each relationship was found to be significantly positive though the strengths might be considered less than moderate (Sullivan, 2013). However, the context of this study must be considered when analyzing the results. As the FTE of school librarians' status increased, the school proficiency rate also increased.

Stronger library programs are positively correlated with greater student success...

The elementary school librarian staffing level was positively correlated with school proficiency rates for ELA ($r (10470) = .177$, $p < .001$), science ($r = 7768) = .150$, $p < .001$), and mathematics ($r (10467) = .171$, $p < .001$). The middle school librarian staffing level was also positively correlated with school assessment proficiency rates for ELA ($r (3147) = .223$, $p < .001$), science ($r (2720) = .200$, $p < .001$), and mathematics ($r (3147) = .203$, $p < .001$). High school librarian staffing levels

were also positively correlated with school assessment proficiency rates in ELA ($r(4437) = .243$, $p < .001$), science ($r(4087) = .238$, $p < .001$), mathematics ($r(4571) = .193$, $p < .001$), and social studies ($r(4021) = .217$, $p < .001$).

Having found a significant positive correlation between FTE of school librarians and school proficiency rate, an Analysis of Variance (ANOVA) was conducted to determine if significant differences between FTE groups existed. FTE of school librarian data was disaggregated into three groups: no school librarian, part-time school librarian, and full-time school librarian. Part-time school librarian was determined to be FTEs greater than zero but less than or equal to .99. Full-time school librarian was determined to be an FTE greater than or equal to 1. Table 2 displays the number and percent of each FTE group at each school level across the nine years examined.

Table 2
School Library Staffing from 2011 to 2019

Grade span	FTE Staffing Levels of school librarian	Count	Percent
Elementary	No school librarian	2245	21%
	Part-time school librarian	4212	40%
	Full-time school librarian	4077	39%
	Total	10534	
Middle School	No school librarian	427	14%
	Part-time school librarian	964	30%
	Full-time school librarian	1770	56%
	Total	3161	
High School	No school librarian	708	15%
	Part-time school librarian	2089	44%
	Full-time school librarian	1906	41%
	Total	4703	

A significant difference was found among the three school librarian staffing level groups at each school level and for each subject area. There is a significant difference, in elementary ELA proficiency rates, between staffing levels ($F(2, 10469) = 243.924$, $p < .01$). Tukey's HSD, a post hoc test, was used to determine the nature of the differences between FTE groups. Schools with no school librarians show proficiency rates lower ($M = 46.0423$, $sd = 18.85886$) than those with part-time school librarians ($M = 53.2140$, $sd = 15.38067$). Both are lower than those with full-time school librarians ($M = 55.3768$, $sd = 15.49526$). There is a significant difference, in elementary science proficiency rates, between FTE staffing levels ($F(2, 7767) = 137.583$, $p < .01$). Tukey's HSD was used to determine the nature of the difference between staffing level groups. Schools with no school librarians show proficiency rates lower ($M = 39.8348$, $sd = 21.69559$) than those with part-time school librarians ($M = 47.7923$, $sd = 19.28176$). Both are lower than those with full-time school librarians ($M = 49.5530$, $sd = 18.54318$). There was also a significant difference, in elementary

mathematics proficiency rates, between staffing levels (F (2, 10466) = 244.018, p < .01). Schools with no school librarians show proficiency rates lower (M = 41.8319, sd = 19.43878) than those with part-time school librarians (M = 49.7453, sd = 16.8161). Both are lower than those with full-time school librarians (M= 51.6098, sd = 16.1358).

School librarians work with every student and every teacher in the school… they can have a significant impact on student learning.

Middle school results also indicated significant differences in staffing level group proficiency means. There was a significant difference, in middle school ELA proficiency rates, between FTE staffing levels (F (2, 3146) = 115.116, p < .001). Tukey's HSD was again used to determine the nature of the difference between staffing level groups. Schools having no school librarians demonstrated proficiency rates lower (M = 43.66, sd = 16.85) than those with part-time school librarians (M = 52.68, sd = 11.67). Both were lower than those with full-time school librarians (M= 54.80, sd = 13.47). There is a significant difference, in middle school science proficiency rates, between FTE staffing levels (F (2, 2719) = 78.613, p < .001). Tukey's HSD was used to determine the nature of the difference between staffing level groups. Schools that had no school librarians demonstrated proficiency rates lower (M = 38.91, sd = 19.89) than those with part-time school librarians (M = 48.60, sd = 15.12). Both were lower than those with full-time school librarians (M= 50.97, sd = 15.75). Middle school mathematics proficiency rates were also significant between school librarian levels (F (2, 3146) = 82.337, p < .001). Tukey's HSD indicated schools that had no school librarians demonstrated proficiency rates lower (M = 36.68, sd = 18.62) than those with part-time school librarians (M = 45.18, sd = 15.42). Both were lower than those with full-time school librarians (M= 48.10, sd = 16.35).

Results were similar for the high schools with a significant difference found in high school ELA proficiency rates, between FTE staffing levels (F (2, 4436) = 101.44, p < .01). Tukey's HSD was used to determine the nature of the difference between FTE groups. Schools with no school librarians show proficiency rates lower (M = 55.9, sd = 17.5) than those with part-time school librarians (M = 61.1, sd = 13.7). Both are lower than those with full-time school librarians (M= 65.5, sd = 16.2). There was a significant difference, in high school science proficiency rates (F (2, 4086) = 100.80, p < .01) with Tukey's HSD indicating schools with no school librarians show proficiency rates lower (M = 48.9, sd = 21.0) than those with part-time school librarians (M = 57.0, sd = 17.7). Both are lower than those with full-time school librarians (M= 61.7, sd = 19.5). A significant difference was also found, in high school mathematics proficiency rates, between FTE staffing levels (F (2, 4570) = 63.780, p < .001). Again, Tukey's HSD was used to determine the nature of the difference between staffing level groups. Schools that had no school librarians demonstrated proficiency rates lower (M = 43.7, sd = 20.0) than those with part-time school librarians (M = 49.0, sd = 17.6). Both were lower than those with full-time school librarians (M= 53.0, sd = 19.5). Figures 1, 2, and 3 provide a visual representation of the mean proficiency rates for each school level and subject area.

Figure 1

Elementary Content Proficiency Rate by LMS FTE

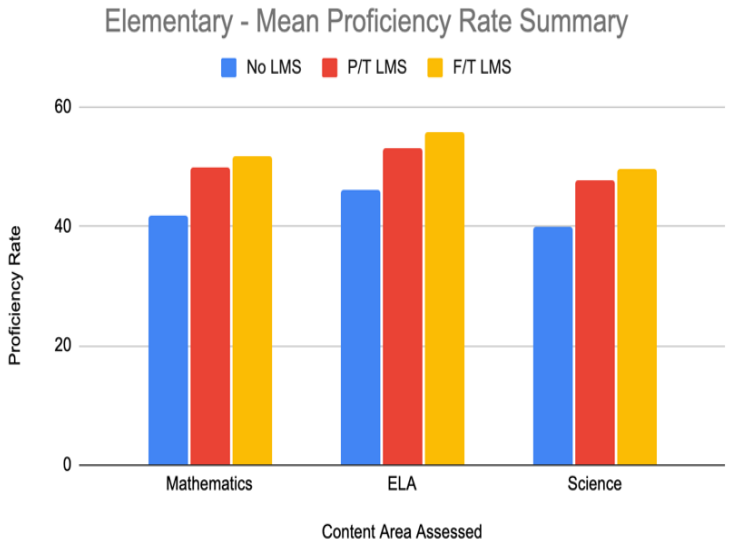


Figure 2

Middle School Content Proficiency Rate by LMS FTE

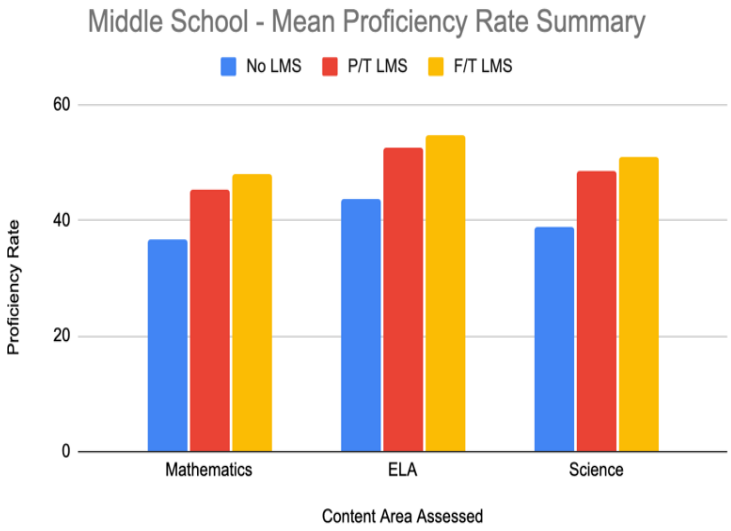
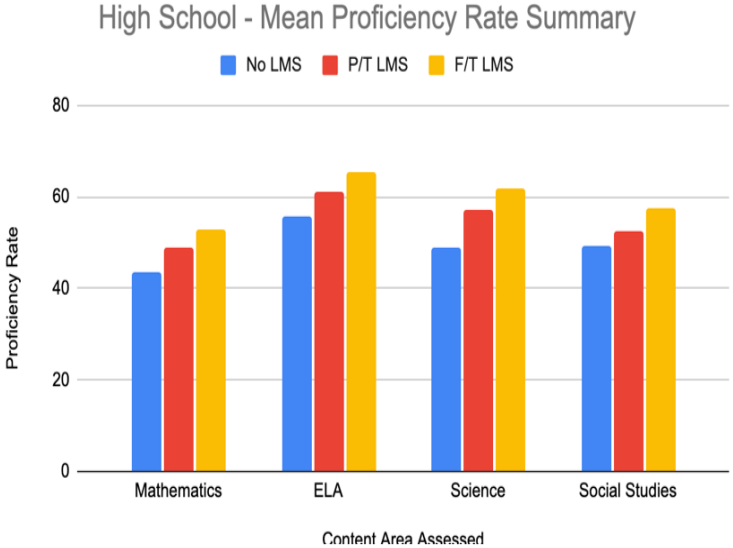


Figure 3

High School Content Proficiency Rate by LMS FTE



In addition to correlation analyses and analysis of variance for the three FTE groups, the researchers also examined proficiency differences for schools with a school librarian and those without a school librarian. The findings are consistent with Dow et al.'s (2012) prior research in all school levels and subject areas. Table 3 displays the mean proficiency rates and observed differences.

Table 3

Mean Proficiency Rates and Observed Differences for School Librarian vs No School Librarian

	Sample Size	Mean Proficiency Rate	School Librarian vs No School Librarian Mean Proficiency Rate Difference Observed	Effect Size
Math				
Elementary	10469	48.79	8.83	.042
Middle	3149	45.7	10.39	.044
High School	4573	49.86	7.21	.018
ELA				
Elementary	10472	52.5312	8.24	.041
Middle	3149	52.68	10.39	.064
High School	4439	62.12	7.31	.027
Science				
Elementary	7770	46.7859	8.81	.033
Middle	2722	48.69	11.2	.051
High School	4089	57.79	10.3	.034
Social Studies				
High School	4023	54.18	5.63	.012

Note. Missouri does not adminster a scoial studies exam at the elementary or middle school level.

Findings

Results of this study indicate that, regardless of grade level or content area, schools with a greater school librarian FTE tend to have higher state-assessment proficiency rates than schools with lower school librarian FTE. This finding is consistent with prior research on the impacts of school librarians on student achievement (Dow et al., 2012; Francis et al., 2010). Stronger library programs are positively correlated with greater student success on high-

stakes statewide assessments in ELA, mathematics, science, and social studies. Students with greater access to school librarians are more likely to perform at the proficient or advanced levels on the Missouri MAP and EOC exams.

A correlation analysis was conducted to determine the strength and direction of the relationship between school librarian FTE and school proficiency rates over a period of nine years. Proficiency rates were calculated using the combined percentage of students scoring in the proficient or advanced level on the state assessment. A significant correlation (alpha level of .001) was found for each content area and at each school level, indicating a positive linear relationship between school librarian FTE and student performance. Stronger correlations were noted for ELA at each school level.

An ANOVA, followed by a post-hoc test, was used to determine the proportion of variability attributed to each of three school librarian FTE levels (No school librarian, part-time school librarian, and full-time school librarian) across each school level and content area. This analysis also found significant differences between groups. Schools with full-time school librarians had significantly higher proficiency rates than schools with part-time or no school librarian. Schools with part-time school librarians had significantly higher proficiency rates than schools with no school librarian. This was true at each school level and for each content area.

School librarians can make the greatest impact when they are highly qualified.

Finally, researchers examined the importance of the relationship between school librarian FTE and student achievement by examining the effect size. Again, it was found that students positively benefited from having a school librarian, regardless of school level or content area. When considering content areas, effect size was greater for middle school ELA (.064), mathematics (.044), and science (.051). When considering school level, effect sizes were greater for elementary mathematics (.042), middle school ELA (.064), and high school science (.034).

Study findings confirm that school librarian FTE does have a positive impact on student achievement on state-level assessments in Missouri. This is true across school levels and the four content areas examined. The data show that students enrolled in schools with a part-time school librarian have a learning advantage over those enrolled in schools with no school librarian. And students enrolled in schools with a full-time school librarian have a learning advantage over students in schools with only part-time or no school librarian.

Discussion

While districts cannot control free and reduced lunch, ELL, or IEP occurrences, they can control the FTE of school librarians. The school librarian is a good choice for an FTE position based on the impact shown in the data above and because the school librarian works with every student in the entire school. Prior to the summer of 2022, Missouri has long allowed classroom

teachers to 'test-in' to school librarian jobs without any coursework. Many administrators have misperceptions on the role of a 21st century school librarian, based on their own childhood and previous teaching experiences with school librarians whose main role was to check books in and out. Many administrators do not realize what they can and should expect out of school librarians who have completed their master's in library science such as instructional leaders who are curricular partners and can collaborate with classroom and content area teachers for student academic success, technology leaders who can recommend instructional technology resources not just for purpose but for deep learning experiences, and research partners who can help the school seek out external funding opportunities and more.

...schools with a greater school librarian FTE tend to have higher state-assessment proficiency rates than schools with lower school librarian FTE.

School librarians can make the greatest impact when they are highly qualified. Some states will need additional advocacy efforts in order to ensure highly qualified school librarians are in their schools. An example of this is recent advocacy efforts led by MASL and EPPs in Missouri that led to the recent change in requirements for school librarian certification. Prior to 2022 certified school teachers could become certified school librarians by taking a Missouri Content Exam for library science and achieving a passing score. The change effort began in 2017, with MASL requesting a seat on the Missouri Advisory Council of Certification for Educators (MACCE), an advisory group to MO DESE. MACCE makes recommendations to the Missouri State Board of Education including but not limited to making recommendations for the requirements for the certification of public-school teachers and administrators. MACCE is composed of 25 members including representatives from EPPs, MNEA, school counselors, and school administrators. It had never had school librarian representation. In 2017, a UCM faculty member who was also an EPP representative on MACCE provided guidance to MASL's then-president on the steps required to request a seat on MACCE. A seat was awarded to MASL in December 2017, and MASL's seat began in Fall 2018. During 2018-2019 the MASL representative spent time learning MACCE and asking questions about certification requirements for school librarians. It quickly became apparent that school administrator representatives on MACCE would block any master's degree requirement for school librarian certification but would support a requirement of several library science courses in addition to the test. A MASL task force was formed to determine the best courses for certification. The four courses were determined to be Foundations of Librarianship, Collections, Organizing Information, and Library Administration. During the 2019-2020 school year at a MACCE meeting on February 4th, 2020, the MACCE board approved recommending the four course option to the State Board (MO DESE, 2020). COVID delayed the recommendation from getting to the State Board until March of 2021. A rule change required a 30-day public comment period which was held May 3, 2021 - June 23, 2021. The rule was finalized and became effective on September 1, 2021 (Missouri Secretary of State, 2023). This allows a superintendent or administrator to select any certified educator, have them complete four courses online, pass the Missouri Content exam, and gain certification as a school librarian for their school or school district.

Recommendations

MSIP 6 currently includes the staffing ratios recommended for full-time school librarians when there are over 600 students in the school (MO DESE, 2022). Of the 2,221 schools listed with students enrolled in K-12 in 2022, 1,879 schools have a student enrollment of 600 students or less. Based on the current recommended FTE staffing level only 15.4% of the schools would be expected to have a full-time librarian. At the minimum level, only 178 schools, or 8% would need a full-time librarian. MSIP 7 should remove the chart about minimums and recommendations for school librarians and instead require all schools to have a full-time school librarian. If the Missouri Department of Elementary and Secondary Education is not able to require all schools to have a full-time school librarian, they should provide guidance to districts with high free and reduced lunch, high IEP, and high ELL about the benefits a full-time certified school librarian can offer in terms of increasing student achievement.

Based on the data in this study, school districts should increase the FTE of certified school librarians and ensure that the certified school librarians they hire are highly qualified. Many states require a master's degree to work in school libraries, including states that neighbor Missouri including Kansas, Kentucky, Tennessee, and Arkansas (EveryLibrary, 2023). MO DESE should be a leader of the Midwest and make this change as well. Until this is changed at the state level, school districts should choose to hire school librarians who have at least the minimum required coursework in library science and encourage them to finish their master's degree in library science, so they can be highly qualified and have the biggest impact on student achievement. Coursework prepares school librarians to teach information literacy skills to K-12 students such as how to conduct research, access database information, be good consumers of information, how to problem-solve, and how to think critically. Coursework also highlights the importance of the school librarian collaborating with other teachers to extend learning going on in the classroom, and how to assess student learning in the library. Finally, coursework teaches school librarians how to organize library materials so students can find what they need quickly, and how to wisely spend the school library budget and purchase resources based on the school curriculum that maximizes student learning.

School librarian leaders including school library associations, educators of school librarians, district library administrators, and school librarians should train district administrators on the best practices of libraries and librarians, so they can have renewed perceptions and expectations. These opportunities vary but can include visiting principal and superintendent meetings and conferences, school board public comment periods, school board association conferences, individual meetings with administrators, end-of-the-year reports from district librarian administrators and librarians to principals and superintendents that detail the impact school librarians have had on student achievement. District and school administrators should be taught and reminded that highly qualified school librarians can do everything they are taught in coursework above, plus serve in leadership capacities such as school/district improvement teams, curriculum, budget, technology, and diversity committees, IEP meetings

and more. School librarians work with every student and every teacher in the school and when highly qualified for the position, they can have a significant impact on student learning.

State departments of education should ensure there is someone at the state level who oversees school librarians and school libraries and the data collected within. This person should hold a master's degree in library science. This person can keep accurate, yearly records about libraries, librarians, spending, grant opportunities, librarian coursework, and training. They can work closely with associations and EPPs to provide updates about school libraries and school librarian impact in their state.

Future studies

While working on this study researchers often wondered about additional aspects of influence on school libraries, one was funding, one was rural vs urban locations, and finally school size. Rural areas, especially in Missouri where this study was done, have less funding overall and are more likely to have a lower FTE (ex: part-time in multiple schools, no librarian at all, or a librarian who also has other duties such as art teacher, A+ coordinator, etc.). If data were available, a study could be done that compares student achievement with school librarian FTE and funding between rural and urban areas of given states.

In Missouri and other states, school size (total enrollment of students) can at times dictate the FTE of the school librarian. Some school districts in suburban Missouri even have two school librarians due to the size of their enrollments. A study comparing school size with librarian FTE could provide additional insight into the impact highly qualified school librarians can have on a school.

A study could be conducted to compare the results of student achievement under librarians who have coursework in library science compared to those who do not. In Missouri, it is difficult to get this data, as once MO DESE issues a certificate, there is no way to know how an individual received it. Studies would have to rely on the self-reporting of school librarians to learn about whether or not they had coursework.

Finally, school library researchers in the state of Missouri should complete a follow-up replicated study in 2029 with data from 2022-2028 which would allow researchers to examine the impact of the coursework requirement for school librarian certification on student achievement.

Limitations

Reporting practices of MO DESE created several limitations for researchers. Researchers were not able to run covariant statistical analysis (ANCOVA) with free and reduced lunch, ELL, and IEP. When a district is either below 5% or above 95% in either of these categories, MO DESE (C. Atkins, personal communication, September 22, 2022) reports the data as an asterisk. MO DESE (C. Atkins, personal communication, September 22, 2022) stated this is due to the Family Educational Rights and Privacy Act. However, having no way of knowing if the number was

closer to 0 or closer to 100 skewed the data in early normative tests that were run, causing researchers to remove the data necessary to run ANCOVA.

Conclusions

This research found statistically significant evidence on the impact of full-time certified school librarians on students' achievement in ELA, mathematics, social studies, and science. This new Missouri study and previous studies confirm that school library programs with full-time, certified highly qualified school librarians have a positive impact on student achievement. School libraries serve all students in the school and can assist with closing the achievement gap. Highly qualified school librarians teach information literacy skills and collaborate with educators in the schools. State education officers, school leaders, teachers, and school librarians can use DDDM to embrace the research provided in this study. Using Mandinach et al. (2006) DDDM continuum, a variety of data points representing nine years of student test data and school librarian FTE has been collected and organized. The information provided has been analyzed and summarized. The analysis utilized ANOVA and post-hoc tests to compare proficiency rates across FTE levels (no librarian, part-time librarian, and full-time librarian) for each school level and content area. Results of this study indicate at every grade level and in every content area, schools with a greater school librarian FTE tend to have higher state-assessment proficiency rates than schools with lower school librarians. Couple the results of this study with information available on highly qualified school librarians who have taken proper coursework to prepare them to work with K-12 students and the end result is the power a highly qualieschool librarian can have on student achievement in Missouri and beyond. It is now up to state, district, and school leaders to use these pieces of knowledge for good. Having a better understanding of the impact a school librarian can have, leaders should determine which steps to take at the state level and within districts and schools to increase the FTE of librarians in Missouri until all Missouri students have access to a highly qualified school librarian. Once these decisions have been made, the state should examine the impact of the changes made to ensure continuous improvement.

References

AASL. (2016). *Preparation of school librarians*. https://www.ala.org/aasl/sites/ala.org.aasl/files/content/advocacy/statements/docs/AASL_Position%20Statement_Preparation%20of%20School%20Librarians_2016-06-25.pdf

AASL. (2017). *ALA and AASL: Assuring quality in school librarianship education programs*. http://www.ala.org/aasl/about/ed/caep

AASL. (2018). *National school library standards for learners, school librarians, and school libraries*. Chicago: ALA.

Bigner, S. (2017). *Teacher and principal experiences with data-driven decision making, school improvement plan quality, and academic growth*. [Doctoral dissertation, University of Houston, Clear Lake]. Alfred R. Neumann Library Institutional Repository. https://uhcl-ir.tdl.org/handle/10657.1/728

Coker, E. (2015). *Certified teacher-librarians, library quality and student achievement in Washington state public schools*. Edmonds: WA: Washington Library Media Association. https://wala.memberclicks.net/assets/WLMA/Advocacy/wslitreport_final%20revised7_14_15.pdf

Dow, M. J., Lakin, J. M. & Court, S. C. (2012). 'School librarian staffing levels and student achievement as represented in 2006-2009 Kansas annual yearly progress data'. *School Library Research*, 15, 1-15. https://www.ala.org/aasl/pubs/slr/vol15

EveryLibrary. (2023). 'Requirements to become a school librarian by-state'. https://www.everylibraryinstitute.org/requirements_to_become_a_school_librarian_by_state

Francis, B. H., Lance, K. C. & Lietzau, Z. (2010). *School librarians continue to help students achieve standards: The third Colorado study*. Colorado State Library, Library Research Services.

Gaver, M. V. (1963). *Effectiveness of centralized library service in elementary schools*. New Brunswick, N.J: Rutgers University Press.

Haycock, K. (2011). 'Connecting British Columbia (Canada) school libraries and student achievement: A comparison of higher and lower performing schools with similar overall funding'. *School Libraries Worldwide*, 17(1), 37-50.

Johnston, M. P., & Green, L. S. (2018). 'Still polishing the diamond: School library research over the last decade'. http://www.ala.org/aasl/slr/volume21/johnston-g

Mandinach. (2012). 'A perfect time for data use: Using data-driven decision making to inform practice'. *Educational Psychologist*, 47(2), 71–85. https://doi.org/10.1080/00461520.2012.667064

Mandinach, E. B., Honey, M., & Light, D. (2006). 'A theoretical framework for data-driven decision making'. Paper presented at the Annual Conference of the American Educational Research Association, San Francisco, CA.

Missouri Secretary of State. (2023). *Code of State Regulations*. 5 CSR 20-400.500. https://www.sos.mo.gov/cmsimages/adrules/csr/current/5csr/5c20-400.pdf

MO DESE (2020). Missouri Advisory Council of Certification for Educators meeting agenda. https://dese.mo.gov/media/pdf/oeq-cert-macce-agenda-feb2020

MO DESE. (2022). *Comprehensive guide to MSIP 6*. https://dese.mo.gov/media/pdf/msip-6-comprehensive-guide

Scholastic Library Publishing. (2016). *School libraries work!: A compendium of research supporting the effectiveness of school libraries*. New York: Scholastic Library Publishing

Sullivan, M. (2013). *Statistics: Informed decisions using data* (4th. ed.). Pearson.

Todd, R. J., Gordon, C. A. &. Lu, Y –L. (2010). 'Report of findings and recommendations of the New Jersey school library survey phase 1: One common goal: Student learning'. Piscataway, NJ: Rutgers School of Communication and Information. http://www.njasl.info/cissl-study/

Todd, R. J., Gordon, C. A. &. Lu, Y –L. (2011). 'One common goal: Student learning: Report of findings and recommendations of the New Jersey school library survey phase 2'. Piscataway, NJ: Rutgers School of Communication and Information. http://www.njasl.info/cissl-study

Quantitative Resources, LLC. (2003). *Show-me connection: How school library media services impact student achievement, 2002-2003*. Jefferson City, MO: Missouri State Library.

Wine, L.D., Pribesh, S., Kimmel, S.C., Dickinson, G. & Church, A. P. (2023). 'Impact of school librarians on elementary student achievement in reading and mathematics: A propensity score analysis'. *Library & Information Science Research*, 45 (3). 1-10. https://doi.org/10.1016/j.lisr.2023.101252

Editor's Note: This article was first published in School Libraries Worldwide Volume 28, Number 2, October 2023. It is reprinted here with the kind permission of the editors.

Rene Burress *(burress@ucmo.edu) is an associate professor of library science and department chair at the University of Central Missouri. Her research interests focus on library advocacy and assessment of teaching and learning in libraries.*

Charlene Atkins *(catkins@ucmo.edu) is a professor and data analyst in the College of Education at University of Central Missouri. Her teaching, research, and service foci encompass the intersections of mathematics education, instructional technologies, and pedagogical practices.*

Bryan McDonald *(bmcdonald@ucmo.edu) is an associate professor in the Educational Leadership program at the University of Central Missouri. His focus is teaching and supporting aspiring and beginning school leaders.*

Darrell Burress *(darrellburress@gmail.com) is the data quality manager at the University of Central Missouri. As an experienced software engineer, he enjoys working with big data sets and making them manageable.*