HAVES, HALVES, AND HAVE-NOTS: SCHOOL LIBRARIES AND STUDENT ACHIEVEMENT IN CALIFORNIA

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This descriptive, non-experimental study examines the strength of the relationship between California school library media programs and student achievement, using data from California criterion-referenced state-wide tests, publically available school and community demographic data, and a state survey of school library programs. Results indicate a substantial discrepancy in library staffing levels from the elementary grades through the high schools. Nevertheless, statistically significant correlations were found between certificated staffing levels and student achievement at each grade. Significant correlations persisted at the elementary and middle school when controlling for five of six school and community variables, and at the high school when controlling for all six of those variables. Bivariate correlations between total staffing and student achievement were significant at both the middle school and high school level when controlling for all school and community variables. Generally, the strength of the correlations between both certificated and total staffing tended to increase with grade level; at the high school level, correlations were among the strongest reported in any statewide study to date.

There was a significant positive relationship between a majority of the 21 library services regularly provided and student achievement at all levels. Total library services were significantly related to student achievement at all levels when controlling for all school and community variables. In multiple regression analyses, there was an increasingly stronger relationship between total library programs and student achievement by grade level when controlling for all school and community variables. At every level, certificated and total staffing levels were associated with the strength of library program elements.

The findings from this study confirm a host of prior research on the relationship between school libraries and student achievement and point to inequitable access to school library services in California. Results from this study might also provide a baseline of data for qualitative research that more deeply explores ways school library programs contribute to student achievement beyond ways measured by current standardized tests.

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CHAPTER 1

INTRODUCTION

Statement of the Problem

California has the worst ratio of school library media specialists to students in the United States—so poor, in fact, that the gap between California and the 49th state is greater than the gap between the 49th state and the 1st (Everhart, 2003). With just one library media specialist (LMS) for every 5,965 students, staffing ratios are almost 7 times below the national average ("Statistics about California School Libraries," 2007). After a 4-year period of unprecedented state funding for school library collections ended in 2001, collection budgets and per pupil expenditures on library programs in California are again among the lowest in the country (National Center for Education Statistics [NCES], 2007).

Ironically, during an era in which school officials scramble for ways to increase student achievement, funding for school library media programs has not gained favor (NCES, 2007), in spite of dozens of studies in the past two decades that have documented correlations between school library media programs and student achievement. Among these, the first Colorado study (Lance, Welborn & Hamilton-Pennell, 1993) established a methodology that has been replicated or adapted in at least 16 states (National Commission on Libraries and Information Science, 2006). While correlations vary from state to state, taken as a whole, these studies make a strong case for the positive influence of school library media programs on student achievement at the elementary, middle school and high school levels (Lance & Loertscher, 2005).

In California, Sinclair-Tarr and Tarr (2004) conducted a study that departed from this methodology in substantial ways and found few significant correlations between school library media programs and student achievement. In some cases, the researchers actually found

significant negative correlations between the level of services offered by the school library media program and student achievement (Sinclair-Tarr & Tarr, 2004). In other words, the more services offered through a school library, the lower that school's scores were likely to be. The authors concluded that either the factors identified as contributing to successful school library media programs were inaccurate, or that "there are few if any successful library programs in California"(p. 156).

There are, however, some important limitations to the Sinclair-Tarr and Tarr (2004) study. The first limitation is the choice of the key independent variable measured against student achievement: the presence or absence of certificated library staffing. This dichotomy does not account for the possibility, as research suggests, that there is a correlation between student achievement and *levels* of certificated staffing, that a positive correlation may depend on a combination of clerical and certificated staffing, or that positive correlations with student achievement may require threshold levels of both clerical and certificated staffing (Baumbach, 2003; Baxter & Smalley, 2003; Brandes, 1987; Burgin, Bracy & Brown, 2003; Callison, 2004; Hall-Ellis & Berry, 1995; Jenkins, 2000; Lance et al., 1993; Lance, Hamilton-Pennell & Rodney,2005; Lance, Hamilton-Pennell, Rodney, Petersen, & Sitter, 1999; Lance, Rodney & Hamilton-Pennell, 2000a, 2000b, 2001; Loertscher, Ho & Bowie, 1987; Loertscher & Land, 1975; Loertscher, 1973; Martin, 1996; Ontario Library Association, 2006; Rodney, Lance & Hamilton-Pennell, 2002; Smith, 2001).

A second limitation to the Sinclair-Tarr and Tarr study (2004) is that the control variable used, an index based upon an aggregate of school-wide indicators, does not adequately account for variances among the grade level and subject-specific test scores analyzed. This makes it difficult to draw conclusions about the correlations found when using this control. Finally, the

overall methodology of the Sinclair-Tarr and Tarr study (2004) deviates enough from other state-wide studies to make comparisons to those studies difficult. These limitations create the need for another California study that can establish a reliable baseline for examining the relationship between student achievement and elements of a school library program in California.

Research Questions

This descriptive, non-experimental study examines the correlations between California school library media programs and student achievement using a methodology that allows for easy comparisons to other state-wide studies. It provides an overview of the role of the LMS and the school library media program as articulated in the standards and guidelines of professional organizations and academic literature, followed by a review of the research that explores the relationships among the LMS, the school library media program, and student achievement. Specifically, this study uses data from California criterion-referenced state-wide tests, a state survey of school library programs, and publically available data on school and community factors to answer the following question: How does student achievement vary in relationship to the elements of a school library media program? This global question is addressed through a number of other questions that examine relationships between student achievement and specific school library media program elements:

1. How does student achievement vary, if at all, in relationship to the levels of certificated staffing in school library media programs?
2. How does student achievement vary, if at all, in relationship to the levels of combined certificated and clerical staffing in school library media programs?
3. How does student achievement vary, if at all, in relationship to library staff services provided, either independently or in combination?

4. How does student achievement vary, if at all, in relationship to other elements of the school library program?
5. What combination of school library media program factors, if any, contributes to a positive significant correlation with student achievement?
6. If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to certificated library staffing levels?
7. If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to overall library staffing levels?

These questions are explored at grades four, eight and eleven-- one grade each from elementary, middle school and high school, consistent with other studies of this type. Student achievement is measured through school-level mean scaled scores from California's Standardized Testing and Reporting (STAR) tests.

Significance of the Problem

Results from this study may be used by school districts, library media specialists and school library education programs in California as a baseline for examining the complex relationship between school library programs and student achievement and may provide some indications about the impact staffing levels have on the quality of school library programs and on student achievement. Such a baseline may provide researchers and library media specialists useful information about where to focus future research, whether in terms of best practice or areas for improvement related to school library media programs. Results from this study may also prove valuable to school and district officials in deciding how to allocate resources to school

library programs. Similar groups outside California may draw on the results in support or refutation of several previous studies using a similar methodology.

Assumptions and Limitations

This study uses publically available data from the criterion-referenced California Standards Tests (CST), school and community information from the state Academic Performance Index, and responses to the California Department of Education School Library Survey. Although schools are required to submit this survey, there are no consequences for noncompliance. According to Ed-Data (2008), there are 8,215 comprehensive public schools in California. It was anticipated that over 60% of these will have had data available that could be used in this study, which constitutes a sample size large enough—and diverse enough-- to counteract sample bias created by the self-selection of participants. Additionally, respondents to the survey do not identify themselves or their job titles. This study acknowledges that there may be some discrepancy in answers according to the positions of the people actually responding to the survey and the data available to them in providing their answers.

This study is conducted with the assumption, too, that the standardized tests to be used do, in fact, constitute some valid measure of student achievement. The criterion-referenced tests used in this study—English Language Arts and social studies-- assess mastery of specific standards in content areas that are commonly associated with library use at each grade level. It is also acknowledged, nevertheless, that such assessments describe a very narrow band of student achievement and so provide a similarly narrow view of the relationship between student achievement and school library media programs. It is hoped that the results of this study will provide promising avenues of research to pursue using other metrics for student achievement.

Definitions

For the purposes of this study, the terms "school librarian," "library media specialist" (LMS) and the title now used in California, "teacher librarian," shall be synonymous. According to the Commission on Teacher Credentialing (2007), in California, certification for the Teacher Librarian Services Credential requires an undergraduate degree, a valid teaching credential, a passing score on the California Test of Basic Skills, and completion of a Commission-approved library media teacher services program or a similar program in other states, also approved by the appropriate state agency. This credential authorizes the holder to perform duties that include

- Instructing pupils in the choice and use of library materials
- Planning and coordinating school library programs with the instructional programs of a school district
- Selecting materials for school and district libraries
- Coordinating or supervising library programs at the school district or county level
- Planning and conducting a course of instruction for those pupils who assist in the operation of school libraries
- Supervising classified personnel assigned school library duties
- Developing procedures for and management of the school and district libraries

As library media specialists require special certification as described above, they may also be referred to in this study as "certificated staffing." "Clerical staffing" includes paraprofessionals and others paid to assist in the day to day operations of a school library who hold neither teaching credentials nor LMS credentials. "Total staffing" and "total library staff" refer to the total number of hours of certificated and clerical staffing of the school library.

The California Education Code defines a school library as "a library that is established to support the curriculum-related research and instructional reading needs of pupils and teachers and provides the collections, related equipment, and instructional services of a staff for an elementary or secondary school" (Section 18810(U), 2007). Further, a school library is "an organized collection of printed and audiovisual materials" that is "administered as a unit…is located in a designated place…(and)makes printed, audiovisual, and other materials as well as necessary equipment and services of a staff accessible to elementary and secondary school pupils and teachers" (California Education Code, Section 18710(M), 2007). A school library program is defined as all the resources available through the school library, as well as all the elements that are required to maintain and administer those resources in service to the school community of which it is a part.

Description of this Dissertation

This dissertation is based upon a history of school library program elements whose practice can be traced back to the early 20th century. Chapter 2 traces the evolution of the school library and the LMS, including the expanding conceptions of the school library program's role in student achievement. Research on the growing instructional role of the LMS is reviewed, as are studies that specifically examine relationships between school library elements and student achievement. Chapter 2 concludes with the theoretical framework for this study, which derives from models of the school library program that account for both instructional and informational roles of the LMS. Chapter 3 presents the methodology of this study, including descriptions of the standardized tests to be used to measure student achievement, the school library survey instrument, and the statistical operations used in analyzing the data. The fourth chapter presents the results of the study, including statistical analysis of bivariate and partial correlations, as well

as multiple regression analysis, that address the central question of the relationship between library program variables and student achievement. This is followed by a discussion of those results. The final chapter provides a summary of the study's key findings, conclusions, implications, and recommendations for further research.

CHAPTER 2

LITERATURE REVIEW

The purpose of this study was to examine the relationship between school library programs and student achievement. This chapter explores the evolution of school library programs in the United States from their beginnings and reviews the research that has both informed and responded to that evolution. A separate section of this chapter looks specifically at research on school libraries in California. An analysis of major studies that examine correlations between school library programs and student achievement is presented, and a theoretical model of school library programs is offered as a means of interpreting the results of this study.

Evolution of School Library Programs

A cornerstone for this study is the American Association of School Librarians' (AASL) and the Association for Educational Communications and Technology's (AECT) *Information Power: Building Partnerships for Learning* (AASL & AECT, 1998), which articulates standards for library media specialists based on input from school library leaders and informed by decades of research. The importance of this document was reinforced in California by the publication of *Standards and Guidelines for Strong School Libraries* (California School Library Association, 2004), which uses the guiding principles of *Information Power* in recommending standards for all aspects of a school library media program, including the library media specialists, clerical support, library media resources, technology, and district and county support. *Information Power: Building Partnerships for Learning* (AASL & AECT 1998) establishes a set of nine information literacy standards for students, to be used in guiding library media specialists in implementation of three key facets of a school library program: information access, learning and teaching, and program administration.

Since the beginning of the twentieth century, school library leaders have articulated the goals of school library programs in instructional terms and in relation to student achievement. Although secondary school libraries did not begin to proliferate systematically until the mid-1920s (Woolls, 2005) this connection is reflected in the professional and academic literature much earlier. Of the school library program's contribution to developing lifelong readers, Ahern said, "Beyond and more important than the assistance which reading gives to the work of the school is the formation here of the reading habit. If the child leaves school acquainted with a number of good books and a love for good books, he has a precious possession worth more to him than any study in the curriculum; something that will not only help him in his daily work, but will throw a safeguard about his leisure" (1905, p.280). In the same year, Miner expressed her desire for large-scale funding of school libraries, saying, "We need a public school Carnegie. A book in the hand is worth two in the stack. A school library may increase tenfold the influence of the school upon the pupils' reading-a library with many duplicate copies, a loan library, with a librarian, and with easy reading in foreign languages, as well as our own" (p. 183).

Keyes (1914) recognized that the strength of a school library begins with its librarian in describing the scene at her school:

> At the desk a dozen are waiting in line for the librarian to help them in their reference work or to charge books for home use. We hear her say, "You read Howells' *Heroines of Fiction* and enjoyed it. Why not read *Pride and Prejudice* now to see whether you agree with Mr. Howells?" We wonder how she remembers the individuals in such a throng, but that she does is one of the secrets of the success of our library (p. 87).

Keyes' comments reflect an appreciation of the librarian's instructional role as well as her knowledge of the curriculum. Keyes called the library the "meeting-place of all currents of school thought" (p. 87) and likened the library to a laboratory in which students "perform

experiments under the eye of a trained teacher (p. 88)"—the librarian. About information access, Keyes made this point:

> Perhaps there was a time when nearly every high-school girl had access in her own home to a fairly well-selected library where she might browse; but today not only is it true that the high school reaches a class who cannot afford such a luxury, but even the homes of the well-to-do are less often stocked with books than formerly… The best means that I know for cultivating in our young people a desire for a private library is to surround them for four years with something approaching thereto-a place where they feel thoroughly at home, where they may wander from shelf to shelf, taking down a book here and there, freely consulting the librarians as to the meaning and value of this or that volume, and taking home any but those in greatest demand (p. 91).

And Breck (1916) had this to say about the importance of information access:

> Our books should be in the school building, not in a branch of the city library, no matter how conveniently located, not even if only across the street or next door. No fact is better established in high-school work today than that a well-equipped, well-administered library within the school building will be steadily and increasingly patronized. I myself can bear testimony as to the difficulty with which young people are driven to the city library, even when near at hand (p. 11).

About workload and staffing, Fletcher (1915), an Illinois high school librarian, remarked,

> The librarian has, of necessity, long hours. She begins work about eight o'clock, and has to evict tenants to get away by five. She has, in all probability, no vacant hour, and her forty-five-minute period for luncheon is often cut short by seekers for fact…With such handicaps, plus the large amount of routine clerical work she must perform, if there is no assistant-and even if there is-the average librarian cannot be the inspirational force she should be (p. 357).

Fletcher discussed the skill with which the librarian must work with teachers, guiding them in their use of instructional materials and strategies, and she predicted that as school leaders, they would "equal—or surpass—our best supervisors of today" (p. 361). Certain (1924) noted that the elementary school librarian gives instruction "in the use of the dictionary and the encyclopedia. She teaches the children how to read, how to skim, how to take notes, and how to

use the library catalogue or a table of contents. She directs the choice of books for pupils eager for sympathetic guidance and attention" (p. 362).

While American school libraries first materialized in the 1800s, most notably in New England (McCarthy, 2006), but also in New York and Michigan (Cecil & Heaps, 1940), growth of school libraries gained speed with the 1918 publication of *Standard Library Organization and Equipment for Secondary Schools of Different Sizes,* written by a committee chaired by Certain and subsequently endorsed and published by the American Library Association (ALA) in 1920 (Gann, 1998). While these standards are largely concerned with physical requirements and resources for school libraries, including collections, physical space and equipment, budgets, and oversight, this document also describes the instructional role of the librarian. The standards state emphatically that the librarian is not a clerk but a professional who "should have the ability to work for and with teachers (American Library Association [ALA], 1920, p.12). This document envisions the library as "the very heart of the high school" (p.4) in the achievement of both academic and social goals. Standards for staffing include a librarian with an undergraduate degree and at least one year of graduate work in library science, a year's work with young adults, and experience as a high school teacher desirable, although not required, with salary equal to that of a department chairperson (ALA, 1920, p. 18). From very early on, then, the school library community has stressed the importance of the school library program's role in academic achievement and insisted upon professional qualifications of staff in pursuit of that achievement.

Shortly after publication of the secondary school standards, regional accreditation bodies began to require that secondary schools have libraries with trained librarians in order to be accredited, which prompted further growth of school libraries in the nation's secondary schools (Woolls, 2005). A similar set of standards was developed for elementary schools. Certain again

chaired this committee, which was comprised of school principals from the National Education Association and members of the ALA's school library section (McCarthy, 2006). Notably included is the recommendation that the collection should include not only reference material, but recreational reading, duplicate copies of popular titles, books for teachers, and multi-media materials such as film, pictures, stereographs, and audio recordings (ALA, 1925).

The elementary standards, known together with the secondary standards as the Certain Reports after their chairman, took note of the evolving progressive philosophy in education and identified the school library program's role in that process, saying, "significant changes in methods of teaching require that the school library supplement the single textbook course of instruction and provide for the enrichment of the school curriculum" (ALA, 1925, p.1; McCarthy, 2006, p. 280). The strategy of moving away from the textbook as the sole source of information and the rise of the school library are inextricably linked (Cecil & Heaps, 1940; Davies, 1969; Roscello, 2004; Callison & Preddy, 2006). In 1915, Johnson (as cited in Davies, 1969) said, "a conviction has developed, especially during the last twenty years (1895-1915) that the textbook should be supplemented by collateral reading"(p. 323). In the same year, Bostwick said, "A library, used for teaching purposes in a school, is indeed a 'composite book.' It insures contact with a composite instead of a single mind" (1915, p. 403).

The implications of an educational system in which no single source is considered the final authority are clear. Says Bostwick, "This means a library at the very beginning, and at high school age it means a large library" (p. 404). Two years after the elementary standards were published, National Education Association president Morgan said in the preface to *School Library Yearbook—Number 1*, "The School Library lies at the very root of the new pedagogy of individual differences. It is the very heart of any program of socialized effort and individual

responsibility" (ALA Education Committee, 1927, p. 3). The importance of librarian as teacher in this pedagogy was articulated by Wilson (1928) in his review of Logasa's 1928 book, The *High School Library: Its Function in Education*: "The outstanding merit of the book is not that it presents a guide to effective library practice but that it attempts to correlate library practice with the underlying philosophy of education itself. The book is valuable because it reveals the librarian as a teacher, a vital member of the school staff. In this respect the book is a pioneer in its field" (p. 795).

Then as now, the publication and promotion of standards do not always translate into support. In fact, most elementary school libraries were generally either non-existent, haphazardly constructed and operated, or poorly funded up until at least the 1950s (Woolls, 2005). Nevertheless, the concept of the school library and the role of the school librarian made great strides between 1925 and the next published standards in 1945. The ALA Education Committee in 1928 published *School Library Yearbook-Number Two*, and in consideration of training for school library professionals, the committee states that a key part of the school librarian's background must be "an understanding of educational theory and practice, at present only to be obtained through the usual courses in education designed to prepare teachers, not librarians" (p. 81). The school library community would do much in the coming years to solidify the school librarian's role as both teacher and librarian.

As Lester and Latrobe (1999) point out, *School Library Yearbook-Number Two* raises the complexity of the dual role in a school setting and identified teachers' colleges and library schools that offer school library courses for public school administrators. "Where principal and superintendent are alertly aware of the possibilities in professional library service, there is no question of correct school library direction" (ALA, 1928, 82). This recognition of the need to

educate administrators to ensure their support is seen in recent guidelines for school library media programs today (AASL & AECT 1998).

In California, school library advocates expressed similar ideas about the importance of the school librarian to the overall activities of the school and of the need for the librarian to have a teaching background. In a 1933 reflection on the growing importance of the librarian in Los Angeles City schools, Dorsey says, "In time it became apparent that the status of the school librarian could be improved and stabilized by requiring a more extended preparation which should include some teacher training as well as that for library work and which should culminate in teacher-librarian certification" (Los Angeles City School District Librarians, 1933, p. 27). The superintendent of Los Angeles City schools expands on this idea in his own appreciation of the demanding nature of a school librarian's role:

> If one could secure his ideal for such a position she (the school librarian) would be worth more salary than any school system can afford to pay. The librarian contacts everybody in school, both in the student body and in the faculty. She has to be adaptable to all types of dispositions and all ages…Not only on the personal side are the demands upon the librarian very heavy. The demands in the way of training and continual self-development are equally exacting. In order to meet the demands which the continually changing and expanding curriculum of a modern secondary school puts upon the library, the librarian herself must be widely informed. This means that in the way of basic general education she needs more than does any other person in the school. ..Coupled with even the best of training there must be, first, a distinct understanding that the library is not a place where books are kept but where those who need help receive it and receive it promptly…No novice, either in library work or in teaching, can expect to come into the library of a large city school and start off with complete success. Undoubtedly, it would be better if the prospective librarian could have as much as four or five years' experience as a teacher in a high school or junior high before beginning her library work (Los Angeles City School District Librarians, 1933, p. 51).

In 1933, in fact, the California state education code reflected an understanding of the necessity of an education background for school librarians in its credentialing requirements for a school librarian, which included a four year undergraduate degree; twenty-four hours of training from

an ALA accredited library school; sixteen hours of work in English, science, social science and physical education; and fifteen semester hours of work in education, including the theory and practice for elementary and secondary school and "other courses in education organized for the training of public school teachers" (Los Angeles City School District Librarians, 1933, 59).

Beginning in the late 1930s, ALA published a series called *Experimenting Together*, with titles including *The Librarian and the Teacher of English* (Heller & Labrant, 1938), *The Librarian and the Teacher of Science* (Siebens & Bartlett, 1942), *The Librarian and the Teacher of Music* (Bowman & Dillon, 1942), *The Librarian and the Teacher of Home Economics* (Henne & Pritchard, 1945). Each of these was a reflection on the relationship between classroom teacher and school librarian, and the role of the school library in the total school program. Each of these, too, explores librarianship in a way that presages current philosophy about school library media programs. As an example, *The Librarian and the Teacher of English* (Heller & Labrant, 1938) examines access to information, teacher-librarian collaboration, the librarian's instructional role, leadership, and integration of library skills into the curriculum.

About access to information, for example, Heller and Labrant (1938) say, "When a school library has a large supply of books for its users and as good a collection as any available to them, these books, convenient to use, are the ones which are for the greater part read by the pupils" (p. 33). The authors describe a free voluntary reading program guided by both English teacher and librarian and advocate for the superiority of the school library over public libraries in providing materials to students at the point of need (Heller & Labrant, 1938). To provide the kind of integrated services the authors propose, the librarian needs to understand the educational philosophy and curriculum of the school and needs to play a leadership role, continually seeking professional development and serving on curriculum committees. Beyond that, she needs to be

"present in English classes when plans are developed" (p. 19) and be a "frequent visitor to the office of the English department" (p. 18). Heller and Labrant introduce a level of collaboration that suggests a different instructional role for the librarian. By being present not only in the library, but also in classrooms, and by helping to plan lessons, the librarian becomes an instructional partner. In this setting, "the library becomes at once, not a place where people are sent, but a means to a desired goal; the librarian is not the vendor of more-or-less superimposed books, but an individual who aids in the solution of a difficulty" (p. 19). As students progress through projects, they confer regularly with both teacher and librarian on all aspects of the project, not just about resources.

To Heller and Labrant (1938), the librarian's instructional role extends all the way to evaluation, helping students recognize ways to improve product and process, and working with the teacher to evaluate their own roles in the progress of the unit. In this model, "librarian and teacher participate in pupil planning of a unit and continue with the pupils throughout their study until the work is completed and evaluation is made" (Heller & Labrant, 1938, p. 26). Closely tied with this model of teacher-librarian collaboration is the philosophy of integrating information skills instruction seamlessly into the curriculum. In the case study presented in *The Librarian and the Teacher of English* (Heller & Labrant 1938), "pupils learn how to use the library, not through formal instruction but by actual experience" (p. 22). The authors argue against the library lesson disconnected from the content of the curriculum, saying such a lesson often "fails to carry over since there is no spark" (p. 23). The "spark" here is the motivation gained from engaging in actual course content, using new skills for a purpose. Significantly, the teacher and librarian share instructional responsibility for research and library skills. "Since the librarian is regarded as a good teacher and the teacher is recognized as an expert in the knowledge and use

of books, great value to pupils accrues from a combination of teacher-librarian efforts" (p. 24). Even before the publication in 1945 of the ALA sponsored *School Libraries for Today and Tomorrow* (Committees on Post-War Planning), the seeds of current approaches to school library programs had been planted, particularly in terms of access to information, collaboration, professional training, integration of information literacy into the curriculum, and leadership.

The 1945 standards actually do not reflect current positions on school library programs as strongly as did *The Librarian and the Teacher of English* (Heller & Labrant 1938). Nevertheless, they advanced the case for school library programs in several key ways. The purpose of the school library is "identical with the basic purpose of the school itself" (ALA Committees on Post-war Planning, 1945, p. 9), and as such, is placed under the responsibility of the local board of education, instead of under the domain of the public libraries. Consistent with this shift, the standards articulated functions of school librarians that were distinctly different from those of a public librarian, including providing support for guidance counselors' goals and working on curriculum development with teachers (Pond, 1998). The standards also affirmed the importance of cooperation among the superintendent, principals, classroom teachers and the school librarian in implementing library and school-wide goals (Committees on Post-War Planning, 1945). In addition to qualitative standards, this document provided quantitative standards for size of library, size of collection, and per-pupil certificated and clerical support, noting that student population growth should come with corresponding growth in the size of the collection and the amount of staffing to best meet student needs. The guiding principles and standards of a school library program, finally, were inclusive of both elementary and secondary schools.

Despite the evolving standards that reflect the profession's call for a more expansive instructional role for the school librarian, the school library was far from a firmly established, integral part of schools across the United States. In fact, as late as 1959, just over half the country's public schools with enrollment over 150 had libraries (Pender, 1984). Spurred by the Soviet Union's successful launch of the Sputnik in 1957 and widespread concern for the nation's ability to keep pace with its cold war rival, the U.S. congress passed the National Defense Education Act (NDEA) of 1959, which funded purchase of educational materials in science, math and foreign languages, and funded professional development and special programs for teachers (Woolls, 2005; Pender, 1984). Even though the NDEA reimbursed schools at 51 cents to the dollar, most of the materials purchased under this act were housed neither in secondary school libraries, which were often undersized, nor in elementary school libraries, which largely did not exist (Woolls, 2005).

A confluence of factors, though, led to unprecedented growth of school libraries in the 1960s: creation of influential new standards; a strengthening of the professional association and its corresponding efforts to promote and improve school libraries; and unprecedented public and private funding. At the start of the decade, The American Association of School Librarians (AASL) published its 1960 *Standards for School Library Programs*, which has been called the most influential standards document published up to that time (Gann, 1998; Jones, 1997; Pender, 1984; Saunders, 1975; Woolls, 2005). The standards asserted the library as the center for instructional materials of all types, broadening the school librarian's role as a multimedia specialist and describe the school librarian as a teacher who is jointly responsible, along with the classroom teacher, for integrating library skills into classroom instruction (AASL and AECT, 1988). Grazier (1979) also points out that this document recommended school librarians assume

leadership positions, including serving on curriculum committees and site and district committees involving policy-making.

Shortly after the 1960 standards were published, the School Library Development Project of the AASL was established "to promote wide knowledge and understanding of the national standards; demonstrate a team approach by librarians, other educations and citizens in implementing the standards; develop plans and techniques for use in school library development; and promote the adoption, in each state, of sound state standards for school libraries" (Kennon & Doyle, 1962). A $100,000 grant funded this push to develop quality school libraries nation-wide (Kennon & Doyle, 1962). The advisory board chairman of this group was M. Gaver, whose early research on the impact of school libraries on student achievement helped build support for school libraries throughout the decade.

While the standards and associated promotion of them helped "clarify the thinking of administrators, teachers and library/media personnel about their common goals and the best means of achieving these goals through the use of expanded library/media services" (Saunders, 1975, p. 2), substantial private and public funding became available to this end. In 1963, the Knapp Foundation financed a $1,130,000 demonstration grant that sought to illustrate the educational value of school library programs, promote understanding of school library programs to the broader educational community, and increase public and school support for school libraries in the process (Saunders, 1975). In 1965, the Elementary and Secondary Education Act (ESEA) targeted $100,000,000 for the purchase of library resources to raise the level of school library services described in the 1960 standards (Pender, 1984). During the first three years of ESEA, 12 % of all public schools—over 11,000 schools—established a school library (NCES, 2005). Standards emphasizing a greater instructional role for the librarian, then, were reinforced

by private and government-funded initiatives that helped expand the presence and awareness of school libraries nationwide.

The 1969 publication of *Standards for School Media Programs* (AASL & Department of Audiovisual Instruction of the National Education Association [DAVI]) reflected the increasingly important role multimedia resources began to play in education. In this document, all media were considered equally important sources of information, and the terms media specialist, media center, and media program were used to indicate the broadened focus of the library program beyond print materials in an attempt to unify school library and audiovisual programs (AASL and AECT, 1988). The instructional role of the librarian, now called a "media specialist" (AASL and AECT, 1988), was further developed in these standards, too. The media specialist works with teachers in curriculum planning, provides assistance with resources in classrooms, provides teachers with relevant information about students' progress as observed in the media center, and even serves as a full-time member on teaching teams where possible (AASL & DAVI 1969). The media specialist additionally provides in-service training on the full spectrum of media and their uses and acts as instructional consultant to teachers, keeping teachers apprised of recent educational trends and providing help with the analysis and design of the instructional program and activities (Gann 1998).

The 1975 standards expanded the instructional role of the media specialist even further, stressing the media specialist's involvement with classroom teachers in instructional design, moving the media program "from a support service to an integral part of the total instructional program of the school (AASL & AECT, 1988, p. 3).

Despite widespread funding and support for school libraries in the preceding decade, in the 1980s, the education community as a whole faced much criticism, perhaps no more strongly

than from the National Commission on Excellence in Education. This commission's report, *A Nation at Risk: The Imperative for Educational Reform* (1983), states, "If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war. As it stands, we have allowed this to happen to ourselves. We have even squandered the gains in student achievement made in the wake of the Sputnik challenge." The report describes the failures of American education entering the information age and calls for educational reform at all levels.

At the same time, the ESEA funding that fueled much expansion of school library programs was shifted into a block grant giving local districts more discretionary control over the money. By 1985, just 29 % of this money was going toward school libraries (NCES, 2005). Hopkins and Butler (as cited in NCES, 2005, p.6) say that the competition for funding at the local level "ended the consistent growth of library media programs throughout the nation. What has resulted is a 'haves' and 'have-nots' existence of programs."

In response to *A Nation at Risk* and the decline in federal support, the library community published *Alliance for Excellence: Librarians Respond to A Nation at Risk* (Libraries and the Learning Society Advisory Board, 1984). In their call for a new "Learning Society" (p. 4), the authors say that "school library media programs of the best quality directly help students take their place in the Learning Society" (p. 9). The authors caution that this can only happen "if students know how to find, evaluate and use the information stored there. This is a basic skill which all must acquire to function responsibly in a democratic society where more and more information is being harvested each year" (p. 9). The call in this document to respond to the information age in part through integrated information skills instruction in schools, with school library media specialists taking the lead, is a precursor to *Information Power: Guidelines for*

School Library Media Programs (AASL & AECT 1988), and contains the beginnings of a definition of information literacy that is more fully articulated in *Information Power: Building Partnerships for Learning* (AASL & AECT 1998), the last two major standards and guidelines documents produced for school library media programs.

The purpose for *Information Power: Guidelines for School Library Media Programs* (AASL & AECT 1988) is stated in its introduction:

> During the past decade, the proliferation of information resources and the development of new technologies have broadened and redefined the mission of the school library media program and the role of the library media specialist. AASL and AECT have worked together to prepare new guidelines that provide a sound philosophical basis for the continued development of school library media programs to meet the needs of students in the twenty-first century" (ix).

Information Power: Guidelines for School Library Media Programs (AASL & AECT, 1988) represented a departure from the previous standards in several important ways. As articulated in the mission statement, the library media program was to provide "intellectual and physical access to materials in all formats (AASL & AECT 1988, p. 1). While provision of physical access to materials is a traditional function of school library programs, intellectual access added the need for "systematic learning activities which develop cognitive strategies for selecting, retrieving, analyzing, evaluating, synthesizing and creating information at all age levels and in all curriculum areas" (p. 9). This additional focus on using information meant that the library media specialist's role in creating learning activities had expanded (Gann 1998). Another shift from the earlier standards was the forcefulness of the call for collaboration. A guiding principle of *Power: Guidelines for School Library Media Programs* is that teachers, principals and library media specialist must work as a team to design and implement the program that best meets the instructional needs of the school (Cleaver & Taylor, 1989). Separate sections describe the role of

principal, teacher and student in working with the library media specialist (AASL & AECT, 1988).

The library media specialist's role as teacher was more clearly defined than ever, as was his responsibility as instructional leader (Gann, 1998). With new technologies being introduced so frequently, it was now the library media specialist's responsibility to provide "leadership in assessing, evaluating, and following informational and instructional technologies" (AASL & AECT 1988, p. 26).

While there was a pronounced shift away from quantitative standards toward qualitative guidelines—a response to the rapid pace of change and a shifting philosophy about the role of the library media specialist (Gann, 1998)— quantitative recommendations were offered for high service school library programs regarding staffing, collection, technology, and budget (AASL & AECT, 1988, 113-139), suggesting that even as conceptions of school library programs evolved, some of the more traditional standards of quality still held sway.

Information Power: Building Partnerships for Learning (AASL & AECT, 1998) extends the basic principles of the 1988 version with the addition of the nine information literacy standards for student learning, organized around information literacy, independent learning and social responsibility. The focus on standards for the student is a significant change that reflects the nationwide trend toward student standards. Absent are the quantitative measures of earlier standards in favor of qualitative descriptions of the roles library media specialists play in supporting the student standards. Collaboration, leadership and technology underlie the vision of library media programs in this document (AASL & AECT, 1998), furnishing the "theoretical and practical grounding both for the program and for all the activities of the library media specialist; which include serving as an instructional partner in learning and teaching, providing information

access and delivery, and administering and managing the program" (AASL & AECT 1998, p. 49).

Some of the responsibilities of the library media specialist and the library media program are traditional and have been documented from the earliest standards. These include acting as information specialist, conducting readers' advisory, and maintaining and developing the collection and budget. Some responsibilities, such as collaborating with classroom teachers in instructional planning, teaching and evaluation; integrating new technologies and information literacy skills into the instructional program; and providing school leadership through staff training and participation on curriculum and leadership committees, have evolved in a progression since the beginning. In *Information Power: Building Partnerships for Learning* (AASL & AECT, 1998), each of these responsibilities is viewed through the lens of building students' information literacy skills as articulated in the standards above. Since work on this study began, AASL has published a new document, "Standards for the 21st Century Learner" (AASL, 2007), which focuses specifically on standards for skills, dispositions, responsibilities, and self-assessment strategies of students. Since the data from this study pre-date this latest AASL document, detailed discussion of those new standards is beyond the scope of this study.

As school libraries have adopted new standards in response to educational goals and technological advancements, federal support of school library programs has dwindled. The most recent data available for school library funding nationally shows that between 1994 and 2000, the percent of public schools with library media centers has fallen, the number of students in schools with library media centers has not kept pace with enrollment, the number of books per student has fallen, and library expenditures per student have remained flat, in spite of increased costs for books and periodicals (Michie & Holton, 2005). In 2001 Senators J. Reed and T.

Cochran authored a bill passed by the House and Senate allocating $500 million for school libraries. About this legislation, Reed (as cited in NCES, 2005) said,

> Too many books on school library shelves across the country contain harmful stereotypes and inaccurate material. The reason for this horrible state of affairs is the loss of targeted national funding for libraries—20 years ago dedicated school library funding was rolled into a block grant. By block granting funds to the states we abandoned a national commitment to improving school libraries (p.6).

It should be noted, though, that in 2002, the first year of the program, just $12.5 million was available for awards. If all of the over 76,000 school libraries divided that money equally, it would amount to about $164 per library.

Of the many elements that comprise a school library program, three are so fundamental that their status affects the success of virtually all other elements of the program: information access and delivery, staffing, and budget. The following sections will review the research on these three elements in terms of their relationships to learning and teaching elements such as information literacy instruction, integration of curriculum, and collaboration; to program administration elements such as scheduling and administrative support; and ultimately, to relationship of all these factors to student achievement.

Information Access and Delivery

For the purposes of this study, the idea of information access and delivery encompasses not only information resources, but the means by which those resources can come into the possession of students. Access includes the availability of print, audio, video, and digital materials to students and teachers; the amount of hours and the conditions under which the library is open and available to students; the availability of technology for student use, and the availability of staff to help in both retrieving and understanding information.

Historically, school libraries have been seen as a key to fostering the beneficial connection between access to print materials and the amount students read (Ahern,1905; Miner, 1905; Keyes, 1914; ALA, 1925; Heller & Labrant, 1938; Cecil & Heaps, 1940). Gaver (1962) found that elementary school children who have ongoing access to good school library collections and adequate, qualified library staff generally read two to three times as many items of all formats and genres as those children with access only to classroom collections or centralized collections with no professional personnel. Gaver also found that among sixth graders, this result was not affected by socioeconomic status (1963). Squire, Applebee and Lucas (1967) noted the increasing complexity of high school curriculum and suggested that expanding the hours school libraries were open was a logical response to students' need for more and better information. Rutler, et al. (1979, as cited in Bowie, 1984) found in their study of inner-city London schools that when school libraries stayed open after school, students used the library more, and that when students used the library more, they did better in school.

Hours Open

Statewide studies in Minnesota (Baxter & Smalley, 2003), Michigan (Rodney, Lance & Hamilton-Pennell, 2003), and North Carolina (Burgin, Bracy & Brown, 2003) reveal statistically significant correlations between the number of hours school libraries are open and achievement on standardized tests in reading and language arts. Michigan exhibited the strongest correlation, $r = .368$, at the seventh grade, and this state also showed persistent significant correlations across elementary, middle school and high school levels. The New Mexico (Lance, Rodney & Hamilton-Pennell, 2002) and Missouri (Miller, Want & Whitacre, 2003) studies did not yield statistically significant results at $p = .05$. Table 1 summarizes these results by grade level and state.

Table 1

State Test Scores and Hours Library Open: Bivariate Correlations

State	Grade	State Test	*r*	*p*
Minnesota (Baxter & Smalley, 2003)	3	Reading	.111**	.005
Wisconsin (Smith, 2006)	4	Reading	.114*	.016
Michigan (Rodney et al., 2003)	4	Reading	.257*	<.05
Minnesota (Baxter & Smalley, 2003)	5	Reading	.08*	.034
Michigan (Rodney et al., 2003)	7	Reading	.368**	<.01
New Mexico (Lance et al., 2002)	8	Language Arts	.196	.052
Wisconsin (Smith, 2006)	8	Reading	.268**	<.001
Wisconsin (Smith, 2006)	8	Language Arts	.302**	<.001
Michigan (Rodney et al., 2003)	11	Reading	.188**	<.01
North Carolina[a] (Burgin et al., 2003)	K-12	Language Arts/ Reading	.196**	.008
Missouri (Miller et al., 2003)	K-12	Weighted Average Map Index[b]	-.079	.219

a. Reading test for elementary and middle schools, language arts test for high school. Used z scores to standardize measure.

b. A formula that combines reading and non-reading test scores, weighted by the number of students eligible to take the test.

* p <.05, ** p <.01.

In Wisconsin (Smith, 2006), partial correlations were calculated; there was a positive correlation at the fourth grade between library hours and test scores when controlling for teacher/pupil ratio, with an r value of .115, (p = .014).

Library Visits

If there is a positive relationship between student achievement and the hours a library opens, one might expect a corresponding relationship between student achievement and the frequency of student visits to the library. Bivariate correlations from several studies, including Iowa (Rodney, Lance & Hamilton-Pennell, 2002), Michigan (Rodney, Lance & Hamilton-Pennell, 2003), Wisconsin (Smith, 206) and New Mexico (Lance, Rodney & Hamilton-Pennell, 2002), bear this out. Results from the Missouri (Miller, Want & Whitacre, 2003) study also show a positive but not statistically significant correlation. See Table 2 for a summary of results.

Table 2

State Test Scores and Library Visits per Student: Bivariate Correlations

State	Grade	State Test	*r*	*p*
Iowa (Rodney et al., 2002)	4	Reading	.188*	.018
Wisconsin (Smith, 2006)	4	Reading	.132**	.005
Michigan (Rodney et al., 2003)	7	Reading	.176 †	<.05
Iowa (Rodney et al., 2002)	8	Reading	.142†	.043
Wisconsin (Smith, 2006)	8	Reading	.182**	.006
New Mexico	10	Language Arts	.229	.058
Wisconsin (Smith, 2006)	10	Reading	.144*	.024
Wisconsin (Smith, 2006)	10	ACT English	.153*	.017
Michigan (Rodney et al., 2003)	11	Reading	.158†	<.05
Missouri (Miller et al., 2003)	K-12	Weighted Average Map Index[a]	.091	.159

a. A formula that combines reading and non-reading test scores, weighted by the number of students eligible to take the test.

* p <.05, two-tailed. ** p <.01, two-tailed † p <.05, one-tailed.

In Illinois (Lance, Hamilton-Pennell & Rodney, 2005), the researchers found significant positive correlations between library visits and writing scores at the middle school, and between visits and reading and ACT scores at the high school level. These correlations were significant in partial correlations controlling for four separate school and community variables, although no numerical data were reported. In Wisconsin, though, Smith (2006) found significant positive correlations at the fourth grade when controlling for limited English proficient (LEP) students and at the 10th grade when controlling for LEP students, teacher/pupil ratio, and percent minority students. See Table 3 for a summary of results.

Table 3

Wisconsin State Test Scores and Library Visits per Student: Partial Correlations (Smith, 2006)

Grade	State Test	Correlation	*p*	Covariable
4	Reading	.109*	.021	LEP students
10	Reading	.142*	.027	percent minority students
10	Reading	.141*	.028	teacher/pupil ratio
10	Reading	.153*	.017	LEP students

* $p < .05$

The Florida (Baumbach, 2003) study included library visits as a discrete independent variable in multiple regression analysis. Baumbach (2003) found significant correlations at the 10th grade level with both the state reading test (R^2 change = .020, standardized beta coefficient=.146) and ACT scores (R^2 change =.059, standardized beta coefficient = .222), using school factors as the other independent variables.

Collection Size

Other early studies reveal correlations between student achievement and both access to the library itself and to sizable collections. Flanagan (1962, as cited in Minor, 1985), gathered

data on a variety of elements of American high schools, with the goal of discovering those qualities that may contribute to the stimulation and development of young people's aptitudes and talents. The researchers found that the quality of the library correlated with students' achievement in English, and that the number of books in the school library was one of the top four strongest correlations with students' staying in school, going to college, and overall achievement. Squire et al. (1967) reported a comparison between the 10 school libraries with the lowest per capita book collections and the 10 highest, and noted that student visits to the library increased proportionally with the size of the collection. Access begets access, which results in higher student achievement.

Since the early 1990s, Krashen has written extensively on the connections among availability of print, how much students read, and ultimately, on student achievement. In *The Power of Reading*, Krashen (2004) documents the positive effects of free volunteer reading on literacy development. Krashen's research supports the idea that the more print resources available, the more students will read, and the more students read, the higher their academic achievement. "The most obvious step" toward successful implementation of free volunteer reading, says Krashen (2004), is "to provide access to books" (p. 57). A key to providing access, says Krashen, is the strength of the school library, including the size of the collection, the circulation policies, and the availability of the library resources and facilities for student use. In a study using National Assessment of Educational Progress (NAEP) reading comprehension test scores of fourth graders from 41 states, Krashen (1995) found that both the collection size of the school library and public library use were significant predictors of reading achievement, controlling for whole-school per pupil spending. McQuillan (1998) similarly found correlations

between NAEP reading scores and print access; these correlations remained strong when controlling for socioeconomic factors.

Krashen notes that California's scores on the 1992 NAEP reading test were among the nation's lowest, and lays the blame in part on the state's school libraries, which the author calls "among the worst in the United States, both in terms of books and staffing" (2004, p. 66). Today, the situation is unimproved. The 2005 NAEP scores show California outscoring only one other state and the District of Columbia on the reading portion of the test (Perie, Grigg, & Donahue, 2005), and library media specialist staffing ratios—the number of students per library media specialist—are so impoverished that the gap between the 49th state and California is greater than the gap between the 49th and 1st states (Everhart, 2003).

Krashen (2004) also notes the inequity in the levels of resources available to students from high and low socio-economic backgrounds, and points out that while students from wealthier parents generally have access to a print-rich environment at home and book stores, students from poorer backgrounds have no such access, making the role of the school library all the more crucial. Two studies of access to books in Los Angeles area communities of differing income levels support this position, finding statistically significant differences between high and low socioeconomic status for access to home, classroom and school library books. (Constantino, 2005; Smith, Constantino & Krashen, 1997). These studies are consistent with the findings of Neuman and Celano (2001), who found when comparing poor and middle-class neighborhoods in Philadelphia that poor neighborhoods were significantly less print-rich, and that the children in those neighborhoods therefore had many fewer opportunities to engage with text.

Not surprisingly, school libraries in poor neighborhoods often don't provide access to nearly as many resources as do those in wealthier areas. Neuman and Celano's (2001) analysis

included data on school libraries, revealing that elementary school children in the poorer neighborhoods had access to half as many books in their school libraries, had no school librarians, and had much more limited physical access to their school libraries when compared to those children in middle class neighborhoods. Duke (2000) investigated differences in print environments to children in 20 first grade classrooms from both high and low socioeconomic status and found that there are substantial differences in the amount, type and uses of print in those classrooms. One important difference in the descriptions of two typical classrooms was that the classroom from a high socioeconomic background took advantage of a rotating collection of books that children selected from the school library to be used in their own classroom each week.

McQuillan (1998) asserts that while socioeconomic status is a strong indicator of print access, it is not socioeconomic status that is the barrier to literacy development, since children in low socioeconomic areas who do have access to print materials and like to read are successful in school. Given students' propensity to use the school library over the public library (Clabo, 2002; Krashen, 2004), attention is drawn to the importance of access to the school library and its resources in addressing educational equity. DeSouza's study (2006) of academic achievement among Mexican-origin English learners bears out this point. DeSouza discovered that the library played an important role in his subjects' lives when several students mentioned that library books were the only reading materials available to them at home, and that access to a variety of books in English and Spanish helped them continue to develop literacy in both languages. Based on his own literature review, Bowie (1984) asserts the value of increased access to school libraries and library materials in helping minority students bridge the achievement gap, noting that the school

library media center is “often the only source to which these students can turn for a rich and varied learning experience” (p. 20).

In statewide studies, there is considerable evidence that the size of the collection may be related to student achievement. The Florida (Baumbach, 2003), Iowa (Rodney et al., 2002), and New Mexico (Lance et al., 2002) studies indicate a positive significant correlation at the elementary level; Wisconsin (Smith, 2006) study shows a significant correlation at both elementary and middle school levels, and the Michigan (Rodney et al., 2003) study shows a significant positive correlation at all three levels. The strongest correlations were found in the fourth grade in Michigan, weakening through the middle school and high school. A similar pattern of strongest correlation in the elementary school to weakest in the high school can be seen in the New Mexico (Lance et al, 2002) study. See Table 4.

Table 4

State Test Scores and Total Print Collection: Bivariate Correlations

State	Grade	State Test	*r*	*p*
Florida (Baumbach, 2003)	3	Reading	.098*	<.05
Iowa (Rodney et al., 2002)	4	Reading	.154*	.049
Michigan (Rodney et al., 2003)	4	Reading	.491*	<.05
New Mexico (Lance et al., 2002)	4	Language Arts	.332**	<.001
Wisconsin (Smith, 2006)	4	Language Arts	.126**	.007
Michigan (Rodney et al., 2003)	7	Reading	.321**	<.01

(*table continues*)

Table 4 (*continued*)

State	Grade	State Test	*r*	*p*
New Mexico (Lance et al., 2002)	8	Language Arts	.298**	.006
Wisconsin (Smith, 2006)	8	Reading	.242**	<.001
New Mexico (Lance et al., 2002)	10	Language Arts	.214	.092
Michigan (Rodney et al., 2003)	11	Reading	.132*	<.05

*p <.05, **p <.01.

In Wisconsin, Smith (2006) found significant correlations from elementary school to high school using a variety of community and school inputs as control variables. See Table 5 for a summary of these results. In the Illinois (Lance et al., 2005) study, actual numbers were not reported, but in partial correlations, size of the collection was significant at the high school level when controlling for household income, per pupil expenditures, teacher-pupil ratio, and student ethnicity; size of the collection was significant at the elementary and middle school levels for three of these four variables. While both bivariate and partial correlations show a positive relationship between the size of a library's collection and student achievement, there is no clear pattern in terms of the strength of that relationship vis-à-vis grade level.

Table 5

Wisconsin State Test Scores and Total Print Collection: Partial Correlations (Smith, 2006)

Grade	State Test	Correlation	*p*	Covariable
4	Reading	.115*	.014	LEP students[a]
4	Language Arts	.115*	.014	LEP students[a]
8	Reading	.205**	.002	LEP students[a]
8	Language Arts	.211**	.001	LEP students[a]
8	Reading	.173**	.009	percent minority students
8	Language Arts	.179**	.009	percent minority students
8	Reading	.156*	.039	percent free and reduced lunch
8	Reading	.185**	.005	teacher/pupil ratio
8	Language Arts	.196	.003	teacher/pupil ratio
10	Language Arts	.145*	.021	percent minority students
10	Reading ACT	.139*	.027	LEP students[a]
10	ACT English	.150*	.017	LEP students[a]
10	Reading ACT	.218**	<.001	percent minority students
10	ACT English	.240**	<.001	percent minority students
10	Reading ACT	.159*	.022	percent free and reduced lunch
10	ACT English	.166*	.017	percent free and reduced lunch

a. LEP: Limited English Proficient

*p <.05, **p <.01.

Technology

An increasingly important consideration about the role of a library media center is the technology to which it provides access and assistance in use. Clifton (2006) found that while the socio-economic gap in students' physical access to technology was shrinking, there was a persistent gap in students' ability to exploit technology for academic gain (See also Warschauer, 2000; Warschauer, Knobel, & Stone, 2004; Wenglinsky, 1998). One of Clifton's conclusions is that it is in our schools where this digital divide may be most effectively addressed.

Valenza (2007) details the active, critical role library media specialists play in mediating students' experiences in the virtual world. While the focus of her study is on the information-seeking behaviors of high school students, the successes students in this study experience may be attributed to the thoughtful construction of an information portal by an experienced library media specialist. As R. Todd says, "Improved learning outcomes through information technology do not happen by chance (1999, p. 4). Expanding on the part library media specialists play in improved outcomes, Warnken (2004) says, "Librarians will continue to adapt to new technologies and integrate them into instruction, recognizing that technology concepts and skills are critical to educating information literate students—a role that has always been the purview of the librarian" (p. 154).

There is some research to suggest school library media programs play an important role in the effective use of technology. In a comparative study of two elementary schools, one in a wealthy neighborhood and one in a poor neighborhood, Ryan (2006) reported that children's access to technology was directly affected by the condition of the library program. In the school with an library media specialist, students used computers more frequently, and used them to complete more academically rigorous tasks, including research, writing, and homework. Ryan

views the school library program as an effective means of addressing technology-related educational inequity.

Baule (1997) found that Illinois schools with exemplary instructional technology programs were more likely than other schools to have high quality school library media programs which helped integrate technology into the curriculum. Baule attributes this partly to teachers who are used to collaborating with the library media specialist being more willing to work on new projects than teachers without such experience. In a study of eight high school library media specialists' collaborations with classroom teachers to integrate computer technology into the school curriculum, Oliver (2003) found that it was generally the library media specialist who initiated efforts with the teacher to integrate technology, and that the assistance provided teachers included training about electronic resources available and introductions to software for creating and presenting student work, all within the context of the school curriculum. In each case, classroom teachers regarded the library media specialist as a leader and expert in technology use.

There is also evidence in statewide studies that student access to technology through the library media center may increase achievement. Several such studies have reported correlations between student achievement and access to computers in the library, whether stand-alone, networked, or Internet accessible. While most of these studies indicate significant correlations at one or two levels, the Michigan (Rodney et al., 2003) study indicates statistically significant correlations at the elementary, middle school and high school levels. See Table 6.

Table 6

State Test Scores and Library Computers: Bivariate Correlations

State	Grade	State Test	*r*	*p*
Michigan[a] (Rodney et al., 2003)	4	Reading	.280*	<.05
Michigan[a] (Rodney et al., 2003)	7	Reading	.230**	<.01
Florida[a] (Baumbach, 2003)	8	Reading	.113*	<.05
Wisconsin (Smith, 2006)	8	Reading	.127*	.05
Florida[a] (Baumbach, 2003)	10	Reading	.159*	<.05
Florida[b] (Baumbach, 2003)	10	Reading	.157*	<.05
New Mexico[a] (Lance et al., 2002)	10	Language Arts	.318**	.007
Wisconsin (Smith, 2006)	10	Language Arts	.124*	.049
Wisconsin (Smith, 2006)	10	Reading ACT	.176**	.005
Wisconsin (Smith, 2006)	10	ACT English	.149*	.018
Michigan[a] (Rodney et al., 2003)	11	Reading	.193**	<.01

a. Library computers with Internet access.

b. Library computers connected to a network.

*p <.05, **p <.01.

Partial correlations from the Wisconsin (Smith, 2006) study indicate significant positive correlations at all three levels using a variety of community and school control variables (see Table 7). In the Illinois study (Lance et al., 2005), again, actual numbers were not reported, but in partial correlations that included school and community variables, size of the collection was significant at the high school level with two of four of the control variables, and significant in grades 5 and 8 with three of the four control variables.

Table 7

Wisconsin State Test Scores and Library Computers: Partial Correlations (Smith, 2006)

Grade	State Test	Correlation	*p*	Covariable
4	Reading	.133**	.005	LEP students[a]
4	Language Arts	.13**	.006	LEP students[a]
10	Language Arts	.155*	.014	LEP students[a]
10	Language Arts	.148*	.019	percent minority students
10	Language Arts	.154*	.014	teacher/pupil ratio
10	Reading ACT	.188*	.003	LEP students[a]
10	ACT English	.163	.1	LEP students[a]
10	Reading ACT	.187**	.003	percent minority students
10	ACT English	.159*	.011	percent minority students
10	Reading ACT	.169**	.007	teacher/pupil ratio
10	ACT English	.145*	.022	teacher/pupil ratio

a. Limited English Proficient

*p <.05, **p <.01.

While most of the reported correlations involving access, collection size and technology are statistically significant, just a handful of the individual correlations from any of the studies mentioned is as strong as r =.3. The Michigan (Rodney et al., 2003) and Wisconsin (Smith, 2006) studies report stronger than .30 correlations involving hours open; the Michigan (Rodney et al., 2003) and New Mexico (Lance et al., 2002) studies report correlations over r = .30

involving size of print collection; and the New Mexico study indicates a correlation involving computers at $r = .32$.

Staffing

Although *Information Power: Building Partnerships for Learning* (AASL & AECT 1998) discusses facets of the school library program as separate components, information access, learning and teaching, and program administration are tightly interrelated. Budgets affect collection size and quality; flexible or scheduled visits affect collaboration; principal support affects budget. Staffing is arguably the facet that has the most far-reaching impact on the overall quality of the program. The first ALA school library standards called for a librarian with an undergraduate degree and at least one year of graduate work in library science, a year's work with young adults, and experience as a high school teacher desirable, although not required, with salary equal to that of a department chairperson. Even these first standards differentiated between the work of a school librarian and that of a clerk, noting that without clerical support, the school librarian cannot fill the educational roles demanded of the job (ALA, 1920, 18-19). Every subsequent set of standards and guidelines produced by ALA and affiliates has stressed the critical role professional library staff plays in educating students. Each set of standards and guidelines similarly suggests that library professionals can only fulfill their potential if clerical support is present (ALA, 1920; ALA, 1925; ALA Education Committee, 1928; ALA Committees on Post-war Planning, 1945; AASL 1960, AASL & DAVI 1969; AASL & AECT, 1975; AASL & AECT, 1988; ALA & AECT 1998). The current position statement on appropriate staffing for school library media centers states, "The success of any school library media program, no matter how well designed, depends ultimately on the quality and number of the personnel responsible for the program. A well-educated and highly motivated professional

staff, adequately supported by technical and clerical staff, is critical to the endeavor" (AASL 2006).

Access to Staff

One of the most fundamental effects of staffing levels is the amount of access students have to the library media center and its services. Gaver (1962) found that compared to elementary students in a school without a centralized library and a library media specialist, elementary students in a school with a library and a library media specialist are exposed to more library-related activities from both the library media specialist and the classroom teacher. In addition, these students have more access to materials and services within the classroom—an indication of the far-reaching impact of professional staff. In a study of 94 school districts in Michigan, Didier (1984) examined survey data from a statewide survey and found that at both the fourth and seventh grade levels, a significant positive correlation existed between student access to the library media center and the presence of library media specialists.

Loertscher and Land (1975) surveyed library media staff and principals from 199 Indiana elementary schools and followed up with visits to 32 of the schools to interview students and teachers and determined that full-time library media specialists have the most liberal policies in how many and what types of materials can be loaned to students. Furthermore, students with a full-time media specialist receive "more assistance at a more constant rate than those with other types of staff" (Loertscher & Land, 1975, 12), and "the full time media specialist does more to promote reading through displays and exhibits than other media center personnel and these efforts are noticed by teachers"(p.12). Nearly thirty years later, a state-wide study in Indiana reported full-time library media specialists involve over twice as many students and teachers in major reading promotion activities than do part-time certificated staff or clerical library staff

(Callison, 2004). The same study indicated that school libraries with full-time library media specialists and full-time clerical support were more likely than other school libraries to offer electronic connections to resources, maintain Websites with curricular links, and provide access to collections that are more current and relevant to the school's curriculum than are school libraries with lesser staffing (Callison, 2004).

In a statewide Minnesota study (Baxter & Smalley, 2003) that included survey responses from nearly 1,200 schools and site visits to 131 elementary and secondary schools, evaluators of library media centers without full-time library media specialists or adequate support staff noted poor collection development—including out-dated and poorly weeded collections-- lack of flexible and equitable access to the library media center, and a lack of access to technology and technology-based information resources. "Non-licensed staff may not know where to turn for information or how to evaluate materials for selection," say Baxter and Smalley (2003). "The result can be a collection that does not support the school curriculum or provide the resources students need for academic success" (p. 67).

In California as nowhere else in the United States, there is a tremendous disparity among schools simply regarding access to library media specialists and the programs they run (Everhart, 2003). In a survey of curriculum leaders from the largest 25 public school districts in California, Simonitus (2002) reported that inadequate staffing—with the resultant lack of access to library resources, including library media teachers-- was the library media center issue of highest priority. There is some indication that this lack of access to library programs is related to student achievement. Smalley (2004) followed the success of incoming freshman in an introductory library course at a community college in Santa Cruz county, sorting progress among students who had gone to the three school districts surrounding the college, only one of which provided

library media specialists at its schools. The author found that 66 % of students who had benefited from a library media specialist in high school earned an A in the course, while between 37 and 43 % of students from the two districts without library media specialists earned A's. Smalley concludes that students coming from high schools with library media specialists are "more familiar with basic library use concepts, fundamental ideas about how information is organized and made accessible, and how to use online catalogs to advantage…than are students from high schools without librarians" (p. 196).

Staffing and Reading Achievement

Many of the findings about school library staffing are related to students' reading. While some of these are partly a function of students' access to reading materials, others involve the connections between staffing and effective promotion of reading activities, students' attitudes toward reading, and reading achievement. Masterton's 1953 study (as cited in Gaver, 1963) of a Chicago elementary school found that students' improvement in reading scores is more pronounced when a full-time librarian supervises an active library program. In 1956, Monahan (as cited in Ireland, 2001) found in a comparison of two Indian elementary schools that in the elementary school with the professionally staffed central library, students read more books and of a greater variety than at the school without a professionally staffed library. *The Harvard Report on Reading in Elementary Schools* (Austin & Morrison, 1963) found that one of the greatest obstacles to effective school library programs in the promotion of reading was the pervasive lack of available trained librarians. In her landmark study, *Effectiveness of Centralized Library Services in Elementary Schools*, Gaver (1963) examined three levels of school library service: classroom collections without a librarian, centralized collections administered by a teacher who has teaching duties beyond the library or by a parent volunteer, and school libraries

with an organized central collection under the direction of a librarian. Gaver found that students with access to a school library read twice as many books as those with access to a centralized collection and nearly three times more than those with access only to a classroom collection.

McMillen (as cited in Didier, 1984) studied selected Ohio elementary schools in 1965 and found that where there was a full-time, professional librarian, students' reading scores and knowledge and use of reference materials was greater than in those libraries with lower levels of service. In 1965, Wilson (as cited in Haycock, 1992) looked at urban elementary school libraries in Detroit and found that in schools with centralized libraries and certified librarians, students grades four through six scored higher in general education gain, reading achievement, and reference skills on the Iowa Test of Basic Skills. Two longitudinal studies in the late 1960s by Thorne (1967, as cited in Marchant, Broadway, Robinson & Shields, 1984) and Yarling (1968, as cited in Aaron, 1972) noted the progress of students from Knapp Project schools in contrast to comparison schools with few library services and found that students exposed to the full library services of a professional staff scored higher in reading comprehension and library skills, and that those higher scores were statistically significant.

Didier (1982, 1984) found that seventh grade reading scores on a state objective-referenced test were significantly greater at schools with professional library media personnel than at those without such staff. While Lowe (1984) did not find significant correlations between professional school library staffing and achievement on standardized reading tests, the author did find that students at schools with centralized libraries and professional library staff, students read more books, read more books for school work, and read more books for general information and recreationally than did students at schools without centralized libraries and professional staff.

Voelker (2006) examined the way fourth graders experience and understand literacy events in a quality school library program. In a series of six case studies, Voelker looked at the nature of literacy events, the way children use texts during those events, the artifacts produced, and the role of social interaction in children's interpretations of those events. Although Voelker was generally critical of library media specialists' approach to literacy, the author nevertheless reaffirmed the importance of a high quality collection, both professional and clerical staff, and ample technology to fourth graders' literacy development.

Internationally, two studies in the past 10 years have noted statistically significant correlations between professional library staffing and students' reading. Using data from a representative sample of 9 and 14 year-old students from schools that took part in an international literacy study, Novljan (1998) found that Slovenian students at schools with a librarian scored significantly higher on a literacy test than students without a school librarian. An Ontario, Canada (Ontario Library Association 2006) study of third and sixth grade students from 880 schools, including schools from every district in the province, included reading assessment scores, responses to a questionnaire about attitudes toward reading, and survey data about staffing, hours open, budget, and collections from the province's school libraries. The researchers found that professional library staff was the strongest predictor of reading enjoyment at both grade levels. Library staffing was associated with an increase in grade 3 reading performance, and trained library staff was associated with higher reading scores for sixth graders (Ontario Library Association, 2006).

Support for the positive effects of adequate library staffing can be found in many statewide studies. Overall library media specialist staffing, including ratio of librarians to pupils, total hours, or numbers of librarians, represents one of the measures that has most frequently

demonstrated a significant correlation with standardized test scores—most commonly reading scores-- in statewide studies. Eight statewide studies include such correlations. The Florida (Baumbach, 2003), Iowa (Rodney et al., 2002) and Michigan (Rodney et al., 2003)studies included significant positive correlations between reading scores and library media specialist staffing at the elementary, middle school and high school levels. The Alaska (Lance, Hamilton-Pennell, Rodney, Peterson & Sitter, 1999) study reported significant positive correlations at the elementary and secondary levels, while data from North Carolina (Burgin et al., 2003) was reported cumulatively for grades K-12.

Again, no clear pattern emerged in terms of the strength of the association and grade level. Nevertheless, along with size of the print collection, LMS staffing was one of the library program variables that correlated most strongly with student achievement in the statewide studies. In three of the eight studies reporting significant correlations, those correlations were stronger than .30, and in two, Florida and Michigan, correlations were stronger that .40. See Table 8 for a summary of results.

Table 8

State Test Scores and LMS Staffing Levels: Bivariate Correlations

State	Grade	Library Measure	State Test	r	p
Florida (Baumbach, 2003)	3	Number of LMS	Reading	.221*	<.05
Minnesota (Baxter & Smalley, 2003)	3	LMS Total Hours	Reading	.115*	.018
Alaska (Lance et al., 1999)	4	LMS/Pupil Ratio	CAT5[a]	.310**	<.001
Iowa (Rodney et al., 2002)	4	LMS/Pupil Ratio	Reading	.178*	.021

(*table continues*)

Table 8 (*continued*)

State	Grade	Library Measure	State Test	r	p
Michigan (Rodney et al., 2003)	4	LMS Total Hours	Reading	.350*	<.05
Michigan (Rodney et al., 2003)	4	Number of LMS	Reading	.401*	<.05
Minnesota (Baxter & Smalley, 2003)	5	LMS Total Hours	Reading	.092*	.018
Michigan (Rodney et al., 2003)	7	LMS Total Hours	Reading	.341**	<.01
Michigan (Rodney et al., 2003)	7	Number of LMS	Reading	.344**	<.01
Florida (Baumbach, 2003)	8	LMS Total Hours	Reading	.109*	<.05
Florida (Baumbach, 2003)	8	Number of LMS	Reading	.354**	<.01
Iowa (Rodney et al., 2002)	8	LMS/Pupil Ratio	Reading	.130*	<.05
Wisconsin (Smith, 2006)	8	LMS/Pupil Ratio	Reading	.245**	<.001
Wisconsin (Smith, 2006)	8	LMS/Pupil Ratio	Language Arts	.278**	<.001
Wisconsin (Smith, 2006)	8	LMS Total Hours	Reading	.205**	.002
Wisconsin (Smith, 2006)	8	LMS Total Hours	Language Arts	.251**	<.001
Wisconsin (Smith, 2006)	8	Number of LMS	Reading	.191**	.004
Wisconsin (Smith, 2006)	8	Number of LMS	Language Arts	.179**	.007
Florida (Baumbach, 2003)	10	LMS Total Hours	Reading	.139*	<.05
Florida (Baumbach, 2003)	10	Number of LMS	Reading	.422**	<.01

(*table continues*)

Table 8 (*continued*)

State	Grade	Library Measure	State Test	r	p
New Mexico (Lance et al., 2002)	10	LMS/Pupil Ratio	Language Arts	.239*	.046
Wisconsin (Smith, 2006)	10	Number of LMS	Lang Arts	.152*	.015
Iowa (Rodney et al., 2002)	11	LMS/Pupil Ratio	Reading	.136*	.038
Michigan (Rodney et al., 2003)	11	LMS Total Hours	Reading	.159*	<.05
Alaska (Lance et al., 1999)	Second -ary	LMS/Pupil Ratio	CAT5[a]	.20*	<.05
North Carolina North Carolina (Burgin et al., 2003)	K-12	LMS Total Hours	Language Arts/ Reading[b]	.194*	.012

a. Includes mathematics, reading and language arts.

b. Reading test for elementary and middle schools, language arts test for high school. Used z scores to standardize measure.

*p <.05, **p <.01.

In partial correlations in Illinois (Lance et al., 2005), some correlations were noted between library media specialist staffing and student achievement. There was a significant correlation at the fifth grade and eight grade when three of four school and community variables-- household income, per pupil expenditure, teacher/pupil ratio and student ethnicity-- were used as the control variable. At the 11th grade there was a statistically significant correlation when all four school and community variables were included. No specific figures regarding these correlations were published.

In Alaska, Lance et al. (1999) found a significant correlation between library staffing and standardized tests in a regression analysis that included per pupil expenditures and teacher/pupil

ratio. In Michigan, Rodney et al. (2005) noted a statistically significant correlation between reading scores and library media specialist staffing at the 7th and 11th grade when including the percent eligible for free and reduced lunch, per pupil school expenditures, and the percent of minority students in the regression. In both studies, other school and community variables were excluded from the regression as part of factor analysis. See Table 9 for a summary of the data from Alaska and Michigan.

Table 9

State Test Scores and LMS to Pupil Ratio: Multiple regression analysis

State	Grade	State Test	ΔR^2	Beta	p	Co-variables
Alaska (Lance et al., 1999)	4	CAT5[a]	.089	---[b]	.001	Pupil expenditures, teacher/pupil ratio
Michigan (Rodney et al., 2003)	7	Reading	.008	.095	.001	percent eligible for free & reduced lunch, per pupil school expenditures, percent minority students
Michigan (Rodney et al., 2003)	11	Reading	.027	.166	.001	percent eligible for free & reduced lunch, per pupil school expenditures, percent minority students

a. Includes mathematics, reading and language arts.

b. Not reported.

Staffing and Other Measures of Student Achievement

Several studies demonstrate correlations between staffing and other measures of student of achievement beyond reading. Mancall's (1985) analysis of research from the previous 30 years led her to report that the presence of a library media program can be related to better library skills, overall achievement, and specific content area subjects. Haycock (1992) similarly reported a positive relationship between the level of service offered through a library program and overall

student achievement. Ainsworth (1969) found a statistically significant improvement in the mean scores of 5th and 6th grade students from pre-test to post-test measurements of library skills when those students attended a school with a professionally staffed library, and a statistically significant difference between these students' scores and those from a school with no professional library staff. Becker (as cited in Didier, 1984) used experimental and control groups of fifth graders in schools with and without librarians to examine the impact of librarians on social studies achievement and concluded that the presence of a librarian bore a significant positive relationship to students' skills in information gathering and in the reading of charts and graphs. Greve's (1977) study of 232 Iowa high schools yielded a positive significant correlation between overall achievement on the Iowa Tests of Educational Development and the level of school library services available. A study of 79 south Texas public schools concluded that among school and community predictors of academic achievement on state criteria-referenced tests, only the absence of at-risk conditions was stronger than the size of the library staff and collection (Hall-Ellis & Berry, 1995). Martin (1996) correlated survey responses from elementary, junior high and senior high school library media specialists throughout Georgia with both norm-referenced and criterion-referenced tests and found significant positive correlations between student achievement and library variables at the third, fifth and eleventh grades, although not at the eighth grade. Among all library variables considered, staffing was the best predictor of academic achievement. Jenkins (2000) correlated norm-referenced test scores at the elementary, middle and high school level in schools throughout Oklahoma with library-related survey results from those schools and found that schools employing library media specialists full-time tended to have higher scores, more academic all-state scholars, and larger book collections than schools without a library media specialist. In Indiana, Callison (2004) found that

"a higher achieving full-time school library media specialist and a larger than average group of high achieving students are likely to be found in the same elementary school."

Library Media Specialist Instructional Roles and Student Achievement

More available professional staffing suggests more time to carry out instructional roles that may have an impact on student achievement. The most obvious instructional role of the library media specialist is the direct instruction provided to students. In a mixed-methods study of the role of the library media program at three nationally recognized South Carolina Blue Ribbon schools, researchers analyzed data from site visits and interviews, questionnaires, and surveys of principals, teachers, and library media specialists and found that, according to students, the single most important service provided by the library program was help from the library media specialist (Gehlkin, 1994). Students at all three schools identified as either mostly or definitely true just three statements about the library program. Two of them involve the direct instructional role of the library media specialist: "The media specialist helps me evaluate the quality of information sources" (p. 81) and, "The media specialist helps me with difficult questions such as, 'I need to write a major paper on an American poet, and I have no idea where to begin. Will you help me get started?'" (p. 81). The third statement also involves both instruction and collaboration: "When my class goes to the library, the media specialist works with my teacher to help us" (81).

Faculty and students grades 3 through 10 from 39 schools identified by an international advisory panel as having effective school library programs participated in an Ohio study that articulates the multifaceted instructional role library media specialists perform with students (Todd & Kuhlthau, 2004). Two Web-based Likert-type surveys, one for students and a similar one for faculty, were used to collect data about "helps"—the aids used to help bridge information

gaps leading to new knowledge or sense-making—provided by the library program. 48 questions corresponded to seven different categories of helps provided, including location and access of information; use of information to complete school work; completion of school work in general; use of computers; reading and writing; influence of the school library program outside of school; and overall academic achievement. The number one ranked help by students was, "The school library has helped me know the different steps in finding and using information," an outcome related to information literacy. "Underpinning the students' value of instructional intervention in information literacy development," the authors concluded, "are school librarians who have a clearly defined role in information-centered pedagogy as information-learning specialists" (Todd & Kuhlthau, p. 22).

In a subsequent study that used the survey tool developed by Todd and Kuhlthau in the Ohio study (2004), Wisconsin students and teachers reported that library media specialists helped students gain skills they did not learn in the classroom, including how to search, review and synthesize information (Smith, 2006). This study also included case studies of five outstanding library programs, in which the researcher noted that the library media specialists in all five programs spent the majority of their time on instructional activities, including teaching collaboratively, teaching information literacy and technology literacy skills, and assisting students with their projects (Smith, 2006).

Much of the research conducted about the library media specialist's direct instruction of students involves library skills and, later, information literacy. Early research compared non-integrated library program instruction to a lack of instruction and supported the position that students who receive such instruction outperform those who do not (Didier, 1984; Haycock, 1992; Marchant et al., 1984). As the instructional role of the library media specialist finally

gained traction (see Cleaver & Taylor, 1989; Craver, 1986; Grazier, 1979), subsequent studies examined the effect of information skills instruction integrated into content area curriculum and found such integration to boost student achievement (Bingham, 1994; Broadway & Baldridge, 1988; DeBlauw, 1973; Farwell, 1998; Hara, 1996; Kirkland, 1993; Kreiser, 1991; Loertscher, Ho & Bowie, 1987; Rojtas-Milliner, 2006; Todd, 1999). Statewide studies showing significant positive correlations between information literacy instruction and standardized achievement scores include Alaska (Lance et al., 2000), Pennsylvania (Lance, Rodney & Hamilton-Pennell, 2000b), Massachusetts, (Baughman, 2000), New Mexico (Lance et al., 2002), Indiana (Callison, 2004), Illinois (Lance et al., 2005), and Wisconsin (Smith, 2006).

Collaboration between Library Media Specialists and Classroom Teachers

More broadly, successful integration of information literacy instruction requires collaboration with classroom teachers to plan and teach curriculum (AASL & AECT, 1998, 64). Professional and academic literature points to the benefits of such collaboration in terms of student achievement. Bell (1990) and Bell and Totten (1992) found that in academically effective schools, classroom teachers were more likely to choose school library media specialists to collaborate on instructional problems. Haycock (1992) concluded from his review of doctoral dissertations that students gain more competence in research and study skills when these skills are integrated into collaborative lesson plans created by classroom teachers and library media specialists. In a qualitative study of collaboration between classroom teachers and library media specialists at two elementary schools that used literature-based instruction, Jones (1994) observed that "purposeful partnerships"—deliberate curricular planning and team teaching between classroom teacher and library media specialist—resulted in a greater quantity of literature being read to students and a strengthened effort at literature-based instruction. Farwell

(1998) examined implementation of collaborative planning and teaching models as part of the Library Power Project in ten elementary and middle school schools and reported that students had more learning opportunities, and staff from successful schools attributed some of the increase in student achievement to the collaborative planning between library media specialists and classroom teachers. In a qualitative study examining the role of the library media specialist in the integration of technology into the curriculum, Oliver (2003) concluded, "Collaborative enterprises between the school library media specialists and teachers create opportunities to provide quality learning experiences for students" (p. 133). Rojtas-Milliner (2006), in a case study of a school implementing an integrated information literacy program, noted that one result of collaborative planning between the library media specialist and classroom teachers is that more students are engaged in critical thinking activities and authentic learning.

Several studies reveal correlations between LMS/classroom teacher collaboration and achievement on standardized tests. Farmer's (2006) study of Southern California schools revealed that collaborative planning and instruction accounted for over 17% of the variance in principles correlated with academic achievement. Hall-Ellis and Berry's (1995) south Texas public school study showed that higher criteria-referenced test scores tests correlated positively with collaborative planning between the library media specialist and classroom teachers. Among state studies examining bivariate correlations between collaboration and state reading test scores, Lance, Rodney & Hamilton-Pennell (2000a) found significant positive correlations between collaboration and student achievement at all grade levels tested. Significant positive correlations at the elementary level were found in Iowa (Rodney et al., 2002) and Minnesota (Baxter & Smalley, 2003), while there was a significant positive relationship at the middle school level in Wisconsin (Smith, 2006). In Michigan (Rodney et al., 2003), significant positive correlations

were found at the elementary and middle school levels, and the middle school and high school levels in New Mexico (Lance et al., 2002) . Table 10 summarizes the results.

Table 10

State Test Scores and Collaboration: Bivariate Correlations

State	Grade	Correlation	r	p
Colorado (Lance, et al., 2000a)	3	Collaboration	.198†	.015
Minnesota (Baxter & Smalley, 2003)	5	Planning w/Teachers	.078*	.039
Colorado (Lance, et al., 2000a)	4	Collaboration	.176 *,[a]	.025
Iowa (Rodney et al., 2002)	4	Co-Teaching	.129 †	.049
Iowa (Rodney et al., 2002)	4	Planning w/Teachers	.144 †	.032
Michigan (Rodney et al., 2003)	4	Planning w/Teachers	.153 †	<.05
Minnesota (Baxter & Smalley, 2003)	5	Planning w/Teachers	.078*	.039
Colorado (Lance, et al., 2000a)	7	Collaboration	.205†	.039
Michigan (Rodney et al., 2003)	7	Co-Teaching	.170 †	<.05
Michigan (Rodney et al., 2003)	7	Planning w/Teachers	.158 ††	<.01
New Mexico[a] (Lance et al., 2002)	8	Planning w/Teachers	.295*	.023
Wisconsin (Smith, 2006)	8	Planning w/Teachers	.146*	.027
Wisconsin[a] (Smith, 2006)	8	Planning w/Teachers	.210**	.001
New Mexico[a] (Lance et al., 2002)	10	Co-Teaching	.265*	.032

Note: Dependent variable for each correlation was state reading test scores unless otherwise indicated.

a. Dependent variable was the state language arts test.

* p <.05, two-tailed. ** p <.01, two-tailed † p <.05, one-tailed. †† p <.01, one-tailed.

In Illinois (2005), Lance et al., found some statistically significant correlations between collaboration and test scores when controlling for school and community variables in partial

correlations. At the elementary level and middle school levels, library staff's identifying materials for teachers significantly correlated with reading scores when controlling for three of four school and community variables. No other significant correlations were reported related to teacher/LMS collaboration at the elementary or middle school levels. At the high school level, a statistically significant correlation was found between LMS/teacher co-teaching and reading scores when accounting for four school and community control variables. No specific data were reported for any of these findings.

In Wisconsin, Smith (2006) found significant correlations between collaboration and state test results only at the middle school when examined without intervening variables (r =.171, p =.01). Significant correlations were found at both middle school and high school when controlling for free and reduced lunch, limited English proficient students, and ethnicity, the strongest correlation at the eighth grade when controlling for ethnicity at r =.214, p =.002. See Table 11 for results.

Table 11

Wisconsin State Test Scores and Collaboration: Partial Correlations (Smith, 2006)

Grade	State Test	Correlation	*p*	Covariable
8	Reading	.134*	.043	LEP students[a]
8	Language Arts	.202**	.002	LEP students[a]
8	Reading	.138*	.037	percent minority students
8	Language Arts	.214**	.002	percent minority students

(*table continues*)

Table 11 (*continued*)

Grade	State Test	Correlation	*p*	Covariable
8	Language Arts	.169*	.025	percent free and reduced lunch
10	Language Arts	.171	.057	LEP students[a]
10	Language Arts	.146*	.027	percent minority students
10	Reading ACT	.124*	.049	LEP students[a]
10	ACT English	.151*	.017	LEP students[a]
10	Reading ACT	.148*	.01	percent minority students
10	ACT English	.181**	.004	percent minority students

a. Limited English Proficient

*p <.05, **p <.01.

Staffing and Its Impact on Learning and Teaching

If, as the literature just reviewed suggests, the learning and teaching responsibilities of the library media specialist have an impact on student achievement, then it must also be established that the quality and amount of staffing, both certificated and clerical, have a direct impact on the ability of the library media specialist to carry out those responsibilities. Gaver (1963) found that students in a school with a centralized library and a certificated librarian have more access to the library, its resources, and its services than are students in a school lacking a certificated librarian or a centralized collection. Based on the results from interviews and surveys with elementary, middle and high school library media specialists, school principals and district superintendents, *The Millbrook Report* (1990) concluded that the amount and quality of curricular and instructional involvement by library media specialists may be directly related to their educational training in library science. This report also noted the clear division of labor

between library media specialists and clerical staff: professionals spend more time on curricular planning and implementation, materials selection, and acting directly as a student resource, while clerical staff spend the majority of their time on library management tasks, such as checking out and renewing books, issuing overdue notices, and other warehousing functions. In studies of Indiana elementary schools measuring the perceptions of library media staff, teachers and students regarding the services provided by the library media center, Loertscher and his colleagues (Loertscher, 1973; Loertscher & Land, 1975) concluded that full-time library media specialists provide a significantly greater number of services, both traditional and "cutting-edge" (Loertscher & Land, 1975, p.16), than do either part-time professionals or full-time clerical staff.

In a later study of 146 of the 209 exemplary elementary schools identified by the U.S. Department of Education during 1986, Loertscher, Ho & Bowie (1987) added evidence to the contributions made by library media specialists and to the impact staffing levels have on this contribution. Library media specialists responded to 19 Likert-scale statements about activities they engaged in regarding instructional development, services to teachers and students, and maintenance of the collection and answered three open-ended questions about their programs. The researchers also gathered data on the size and composition of the library staff, including number of full-time professionals, clerks and volunteers. This study confirmed earlier work which showed that the total full-time equivalency (FTE) of all staff and volunteers predicts the number and frequency of library services; and the FTE total of library media specialists predicts the frequency of "cutting-edge" services (Loertscher et al., 1987, p.152). The authors also noted that while integration of library media center materials into the curriculum was a prominent feature of fully staffed library media programs, those services declined as staff was reduced. Full-time library media specialists with adequate clerical support were able to integrate

instruction with library media center materials by taking advantage of flexible schedules that allowed individuals, small groups and whole classes to have access to the library all day long, but in schools with inadequate staffing, such integration of instruction was a remote possibility, not a reality. The authors offer this critical conclusion about staffing levels:

> There seems to be a threshold at which the library media program begins to pay the kinds of dividends expected from the investment made in it. This threshold is a staff consisting of a full-time professional and a full-time clerical person. This finding was not only statistically significant but was the single most important variable in an excellent library media program. Having a fine facility stocked with ample materials and equipment is essential, but without the critical staffing component, services suffer and the impact on education is drastically lowered (Loertscher et al., 1987, p.152).

Other studies support the conclusion that the library media specialist's involvement with learning and teaching is dependent on adequate staffing. In California, a survey study of library media programs throughout the state reported that the frequency and number of instructional services in school libraries were directly associated with the presence of certificated staff. (Brandes, 1987). 72 % of school libraries with certificated staff, for example, routinely offered a sequential program of library skills instruction, compared to 34 % of libraries without certificated staff; 65 % with certificated staff routinely coordinated library skills instruction with classroom instruction, while 30 % without certificated staff did so (Brandes, 1987). Based on her own dissertation work on staffing patterns for school librarians and her review of the relevant research, Aaron (1981) concluded, "The frequency with which the school library media special assumes an active role in curriculum and instruction is directly related to the size of the media staff" (p.281). Zweizig's 1999 review of Library Power schools includes the finding that elementary school libraries with fixed scheduling of classes, which restricts the library media specialist's instructional role and ability to respond to a range of demands (see Donham van

Deusen & Tallman, 1994), had significantly less support staff than did libraries with flexible scheduling.

In a self-sampling study in which eight elementary, middle and high school library media specialists collected data about their activities, McIntosh (1994) found that among study participants, the three who did not have clerical help showed a "marked decrease in the percentage of time spent in either the role of teacher or instructional consultant" (p. 107). Similarly, Farwell (1998) noted in a study of collaboration practices at elementary and middle schools that teachers, principals, and library media specialists all acknowledged collaborative planning can only happen in the presence of adequate clerical staff in the library media center. In Indiana (Callison, 2004), full-time library media specialists at all grade levels K-12 were more likely to participate in instructional planning than were part-time library media specialists. In a case study focusing on the leadership role of four library media specialists, Underwood (2004) observed that collaboration between library media specialists and classroom teachers often comes on top of all other roles and responsibilities, and that "without paraprofessional staffing, the collaborative programs are doomed to failure" (p.46). Beaird's (1999) study on collaboration practices of library media specialists included reflections from library media specialists about inhibitors to collaboration, including this representative comment: "For collaboration to work…I now believe an aide is necessary to maintain library services" (p. 92). McCracken (2001) reported from a survey of over 500 school library media specialists that they believe they are not able to fully implement their roles, and that one of the most frequent barriers to fully implementing their roles was the lack of clerical staff, resulting in professional staff having less time for activities such as partnering with classroom teachers to plan lessons and teaching information literacy skills. In a case study of the change process involved in one high school's

implementation of an integrated information literacy program, Rojtas-Milliner (2006) concluded that at schools like this one, with a population of just over 1,000 students, one full-time professional librarian and one full-time clerk may be inadequate for an integrated information literacy program.

The statewide studies below indicate statistically significant correlations between total staff hours and hours the library media specialist spends

- Planning instructional units with teachers and identifying materials for instructional units developed by teachers
    - Colorado (Lance, Welborn & Hamilton-Pennell, 1993)
    - Alaska (Lance et al., 1999)
    - Pennsylvania (Lance et al., 2000b)
    - Iowa (Rodney et al., 2002)
- Delivering information literacy
    - Alaska (Lance et al., 1999)
    - Pennsylvania (Lance et al., 2000b)
- Providing in-service training to teachers
    - Alaska (Lance et al., 1999)
    - Pennsylvania (Lance et al., 2000b)
    - Iowa (Rodney et al., 2002)
- Meeting with curriculum or standards committees
    - Pennsylvania (Lance et al., 2000b)
    - Iowa (Rodney et al., 2002)
- Managing information technology

    - Pennsylvania (Lance et al., 2000b)
    - Iowa (Rodney et al., 2002)
- Providing student access to the library media center
    - Alaska (Lance et al., 1999)
    - Pennsylvania (Lance et al., 2000b)
    - Iowa (Rodney et al., 2002)
- Teaching cooperatively with classroom teachers
    - Iowa (Rodney et al., 2002)
- Offering reading incentive activities (Lance et al., 2002)
    - Iowa (Rodney et al., 2002)
- Meeting with principal or other administrators (Lance et al., 2002)
    - Iowa (Rodney et al., 2002)

There is ample support in the literature that staffing correlates positively with reading achievement and other norm- and criterion-referenced measures of student achievement. Research cited here additionally indicates that staffing levels directly affect library media specialists' abilities to perform many of their instructional roles. The presence or absence of these instructional roles performed by the library media specialist has also been shown to correlate with student achievement.

It is not surprising, then, that total library staffing levels offer an indicator of student achievement in so many of the statewide studies. In bivariate correlations, four of six state studies-- Michigan (Rodney et al., 2003), North Carolina (Burgin et al., 2003), Pennsylvania (Lance et al., 2000b) and Wisconsin (Smith, 2006)—indicate positive significant correlations between total staffing and student achievement across all sampled grade levels. In New Mexico,

Lance, et al., (2002) found a significant positive correlation only at the elementary level, while in Florida, Baumbach (2003) found positive correlations at elementary and high school levels. Total staffing, LMS staffing, and print collections represent the strongest correlations between individual library program variables and student achievement in statewide studies. See Table 12 for a summary of these states' results.

Table 12

State Test Scores and Total Library Media Center Staffing Levels: Bivariate Correlations

State	Grade	Correlation	State Test	*r*
Florida (Baumbach, 2003)	3	Total No. Staff	Reading	.129**
Florida (Baumbach, 2003)	3	Total Staffing Hrs.	Reading	.130**
Michigan (Rodney et al., 2003)	4	Total No. Staff	Reading	.342*
Michigan (Rodney et al., 2003)	4	Total Staffing Hrs.	Reading	.298*
New Mexico (Lance et al., 2002)	4	Total No. Staff	Language Arts	.167*
Wisconsin (Smith, 2006)	4	Total No. Staff	Reading	.144**
Wisconsin (Smith, 2006)	4	Total No. Staff	Language Arts	.116*
Pennsylvania (Lance et al., 2000b)	5	Total Staffing Hrs.	Reading	.215*
Michigan (Rodney et al., 2003)	7	Total No. Staff	Reading	.324**
Michigan (Rodney et al., 2003)	7	Total Staffing Hrs.	Reading	.333**
Pennsylvania (Lance et al., 2000b)	8	Total Staffing Hrs.	Reading	.252*
Wisconsin (Smith, 2006)	8	Total No. Staff	Reading	.190**
Wisconsin (Smith, 2006)	8	Total No. Staff	Language Arts	.211**

(*table continues*)

Table 12 (*continued*)

State	Grade	Correlation	State Test	*r*
Wisconsin (Smith, 2006)	8	Total Staffing Hrs.	Reading	.226**
Florida (Baumbach, 2003)	10	Total No. Staff	Reading	.344**
Florida (Baumbach, 2003)	10	Total Staffing Hrs.	Reading	.265**
Wisconsin (Smith, 2006)	10	Total No. Staff	ACT English	.257**
Wisconsin (Smith, 2006)	10	Total No. Staff	ACT Reading	.255**
Michigan (Rodney et al., 2003)	11	Total No. Staff	Reading	.263**
Michigan (Rodney et al., 2003)	11	Total Staffing Hrs.	Reading	.275**
Pennsylvania (Lance et al., 2000b)	11	Total Staffing Hrs.	Reading	.274*
North Carolina (Burgin et al., 2003)	K-12	Total Staffing Hrs.	Language Arts and Reading[a]	.272**

a. Reading test for elementary and middle schools, language arts test for high school. Used z scores to standardize measure.

*p <.05, **p <.01.

Numerical data for partial correlation calculations were only reported in one study—Pennsylvania (Lance, Rodney & Hamilton-Pennell, 2000b)—and positive significant correlations remained at all sampled grade levels when controlling for community variables including income, education and ethnicity. In partial correlations between library staffing levels and reading scores using four school and community variables as controls, the authors of the Illinois (Lance et al., 2005) study reported a positive significant relationship between total staffing and student test scores in elementary, middle school and high school, although that relationship remained statistically significant with all four school and community variables in those correlations only at the high school level.

Program Administration: Staffing Levels, Administrative Support, and Scheduling

Three factors may explain some of the inconsistency in findings across grade levels: staffing levels, scheduling, and administrative support. First, there is evidence that both certificated and clerical staffing hours must be adequate for collaboration to take place (Beaird, 1999; Farwell, 1998; Lance et al., 1993; Lance, et al., 1999; Lance et al., 2000b; Lance et al., 2002; McCracken, 2001; Underwood, 2004).

Second, as Bell and Totten (1991) suggest in their study of school climate factors related to collaboration between classroom teachers and library media specialists at 39 elementary Texas elementary schools, the level of collaboration may be influenced by organizational and institutional characteristics that require the attention of the principal and other site and district level administrators and school board members. Since the early 1980s there have been several studies offering evidence that principals, in particular, exert a strong influence over the extent and quality of planning and teaching collaborations between classroom teachers and library media specialists (Aaron, 1981; Farwell, 1998; Gehlken, 1994; Hartzell, 2003; Haycock, 1995; Mocek, 2002; Slygh, 2000; Tallman & Donham van Deusen, 1994; Underwood, 2004; Yetter, 1994).

Finally, scheduling of library visits significantly affects the amount of collaboration. Flexible scheduling allows for scheduling of class visits to the library as the need arises, as opposed to fixed scheduling, in which the schedule is unvarying and regular, often once a week, or mixed scheduling, a combination that allows for some levels of both fixed and flexible scheduling (Holton, Bae, Baldridge, Brown & Heffron, 2004). The work of Donham van Deusen (1993; see also Donham van Deusen & Tallman, 1994; Putnam, 1996), which examined the relationship between the type of library scheduling employed and the activities of library

media specialists, provides significant evidence that fixed scheduling discourages classroom teacher/library media specialist collaboration in planning and teaching, whereas flexible or mixed schedules are more likely to result in these kinds of collaborations. In response to McCracken's (2001) survey, elementary library media specialists identified fixed scheduling as one of the major barriers to expanding their role of instructional partner. Over a decade after Tallman and Donham van Deusen's study (1994), McGregor (2006) notes that the number of elementary schools with flexible scheduling is still small, and that there has not been much movement from fixed to flexible scheduling in the past few years. Consistent with studies about the principal's support of teacher/library media specialist collaboration, McGregor also found that the principal's support is essential for flexible scheduling to be successful.

In Illinois (Lance et al., 2005), flexible scheduling correlated significantly with standardized test scores at the elementary, middle and high school levels; in Colorado (Lance et al., 2000b), this correlation held for middle school but not elementary; and in Michigan (Rodney et al., 2003), flexible scheduling positively correlated with test scores at the middle and high school levels.

Budget

Like staffing levels, budget affects all other areas of the library program. Quite simply, library programs cannot operate without money. Several studies link library expenditures to the overall quality of library programs or to overall quality of schools. Haycock (1992) found in his literature review that per student library expenditure affected size of the staff, the collection, and the services offered through the library media center. Loertscher et al. (1987) found in their examination of over 200 exemplary elementary schools that 87% of those schools maintained or increased library materials budgets in the year leading up to the study, and over half of those

schools reported increases in library materials spending. Yetter (1994), in a qualitative study of resource-based learning in Washington state, found that a baseline requirement for success using this educational strategy was adequate funding for library materials and technology. Callison (1990) reviewed data from a 1987 U.S. Department of Education report of 571 public schools (Williams, 1987) providing high service library media programs and noted that such programs also typically spent more than twice as much per student on library materials, facility and staff than did programs not offering high levels of service. Conversely, in a survey of over 500 library media specialists nationwide, McCracken (2001) reported that one of the most frequently cited barriers to library media specialists expanding their roles was a lack of funding for materials and equipment. The consequence of this funding shortfall was a lack of resources in all formats to adequately support curriculum.

In the late 1990s and early 2000s, California's public school libraries enjoyed unprecedented state funding that vaulted per pupil expenditures close to the national mean (Archon, 2003). Archon sought to determine the effect of that funding on school library programs in Fresno County. The author found this funding "substantially impacted" (p. 119) the quality and size of the collection, integration of library media center technology into the school site's technology plan, the library media specialist's ability to provide regular technology training to other teachers, and the library media specialist's ability to collaborate with classroom teachers in planning, teaching and evaluating lessons. Archon concluded, too, that while such funding helped move library media teachers "towards a more collaborative and partnership role with classroom teachers," paraprofessionals, many of whom work without professional staff, "have remained in the role of keeper of the books" (121).

Relationship between Library Expenditures and Student Achievement

Correlations between library expenditures and student achievement on state norm- and criterion-referenced tests abound. Greve's (1977) study found positive correlations between achievement on the Iowa Tests of Educational Development and library services, which included size of collection and per capita spending on the local public library, as well as size of the school library collection and per pupil expenditures for school library materials. A study of 79 south Texas study schools showed that student achievement on criterion-referenced tests tended to come from schools that spent more money on their school library media programs. (Hall-Ellis & Berry, 1995). In a study of 100 Ohio schools, half with the highest per pupil expenditures and half with the lowest, Bruning (1994) investigated the relationship among three variables: per pupil expenditure, library collection expenditures, and passing rates from each of the four parts of the state's ninth grade proficiency test. Bruning found weak to moderate significant relationships between library collection expenditures and three of the four portions of the proficiency test.

Bivariate correlations in five statewide studies show significant relationships between library expenditures and test scores. In Minnesota (Baxter & Smalley, 2003), significant correlations were found only at the elementary level; conversely, in New Mexico (Lance et al., 2002), significant correlations were only found at the high school level. In Michigan (Rodney et al., 2003), North Carolina (Burgin et al., 2003) and Wisconsin (Smith, 2006), those correlations were significant across the grade levels examined at elementary, middle school and high school. See Table 13 for specific data. Partial correlations from the Wisconsin (Smith, 2006) study are significant at all three levels with a variety of school and community variables as controls, as indicated in Table 14.

Table 13

State Test Scores and Total Library Expenditures: Bivariate Correlations

State	Grade	State Test	*r*	*p*
Minnesota (Baxter & Smalley, 2003)	3	Reading	.119**	.005
Michigan (Rodney et al., 2003)	4	Reading	.282**	<.01
Wisconsin (Smith, 2006)	4	Reading	.134**	.004
Wisconsin (Smith, 2006)	4	Language Arts	.126**	.007
Wisconsin (Smith, 2006)	4	Reading	.134**	.004
Minnesota (Baxter & Smalley, 2003)	5	Reading	.177**	<.001
Michigan (Rodney et al., 2003)	7	Reading	.258**	<.01
Wisconsin (Smith, 2006)	8	Reading	.215**	.001
Wisconsin (Smith, 2006)	8	Language Arts	.218**	.001
New Mexico (Lance et al., 2002)	10	Language Arts	.232	.057
Wisconsin (Smith, 2006)	10	ACT English	.148*	.018
Wisconsin (Smith, 2006)	10	ACT Reading	.154*	.014
Michigan (Rodney et al., 2003)	11	Reading	.273**	<.01
North Carolina[a] (Burgin et al., 2003)	K-12	Language Arts and Reading[b]	.196**	.008
North Carolina[c] (Burgin et al., 2003)	K-12	Language Arts and Reading[b]	.405*	.029

a. Spending on books and other print materials only.

b. Reading test for elementary and middle schools, language arts test for high school. Used z scores to standardize measure.

c. Expenditures on electronic access to information only

*p <.05, **p <.01.

Table 14

Wisconsin State Test Scores and Total Library Expenditures: Partial Correlations (Smith, 2006)

Grade	State Test	*r*	*p*	Control Variable
4	Language Arts	.135	.10	percent free and reduced lunch
4	Reading	.128*	.015	percent free and reduced lunch
4	Language Arts	.135*	.010	percent free and reduced lunch
4	Language Arts	.116*	.013	teacher/pupil ratio
10	Language Arts	.147	.09	percent LEP students[a]
10	Reading	.129*	.041	percent minority students
10	Language Arts	.170**	.007	percent minority students
10	Reading ACT	.200**	.001	percent LEP students[a]
10	ACT English	.203**	.001	percent LEP students[a]
10	Reading ACT	.234**	<.001	percent minority students
10	ACT English	.242**	<.001	percent minority students
10	Reading ACT	.173*	.013	percent free and reduced lunch
10	ACT English	.164*	.018	percent free and reduced lunch
10	Reading ACT	.137*	.029	teacher/pupil ratio
10	ACT English	.138*	.029	teacher/pupil ratio

a. Limited English Proficient

*p <.05, **p <.01

Leadership

The studies mentioned in the previous section suggest the importance of adequate funding for a successful school library program. Lance et al. (2002) suggest that the correlation between funding and professional staffing runs from staff to budget, not the other way around. These researchers reason that the correlations between staffing and funding exist because professional staff raise the profile of the library program and take a more active role in seeking out funding sources than does clerical staff (Lance et al., 2002).

One way library media specialists raise the profile of the school library program is through active leadership roles. School library research connects effective school library programs to library media specialists' active leadership in the school community, often in terms of facilitating change. In Yetter's (1994) case study of library media specialists' participation in the implementation of resource-based learning programs in Washington middle schools, effective library media specialists considered themselves to be instructional leaders in their schools, a view generally shared by administrative and teaching staff. Interviews from Yetter's study revealed agreement among these three groups that an important role of the library media specialist was as a teacher of teachers and a teacher of principals; they also viewed successful library media specialists as creators of vision and agents of change (1994).

In an examination of leadership in a case study of four Louisiana library media teachers, Underwood (2004) similarly reported that superintendents, principals, classroom teachers and library supervisors saw library media specialists as innovators, motivators, and agents of change. In Farwell's (1998) study of the collaborative process between library media specialists and elementary and middle school classroom teachers, classroom teachers identified training of classroom teachers as a critical role of the library media specialist; principals in the same study identified instructional leadership as one of the library media specialist's important roles as successful collaborators. Farwell (1998) concluded from this study that successful library media specialists not only needed background knowledge in the library science, pedagogy, and a school's curriculum, but also need to act as leaders and agents of change.

Other studies document leadership in terms of library media specialists' offers of training and expertise. Mosqueda (1999) reported in her study of school library programs at National Blue Ribbon schools in Florida that almost 90% of principals and library media specialists

believed the library media specialist was a leader and expert in terms of information issues, resources and technology. In McIntosh's (1994) self-sampling study of Kentucky library media specialists at the elementary, middle school and high school levels, the researcher noted numerous examples of expanded leadership roles in both instruction and technology use, and asserted that this leadership enabled more and better collaboration.

Some studies have drawn indirect or direct correlations between library media specialist leadership and student achievement. In the second Colorado study, which examined library program correlations with fourth and seventh grade state reading test scores, Lance et al. (2000a) found that there was a positive, statistically significant correlation between teacher/library media specialist collaboration and test scores, and that as the library media specialist's participation in leadership roles grew, so did the amount of collaboration with classroom teachers. While leadership roles did not correlate with test scores, they did significantly correlate with levels of collaboration. In an interview for *School Library Journal*, Lance expanded on the connection between leadership and collaboration, suggesting that activities such as meeting regularly with the principal, participating on curriculum committees, and conducting faculty in-services—all indicators of a leadership role—are precursors to collaboration. Said Lance, "You have to step into those leadership shoes first and establish yourself as a leader that somebody would want to collaborate with" (Achterman, 2007, p. 51).

Cross-tabulations in the Alaska study (Lance et al., 1999) revealed that over 80 % of the secondary level library media programs providing greater than average amounts of faculty in-service were at schools which scored above the mean on state reading tests. Similar comparisons in Pennsylvania between highest and lowest scoring schools showed that library media specialists in higher scoring schools spent more time providing in-service training to teachers

and serving on key school or district leadership committees (Lance et al., 2000b). In Illinois, the amount of time library media specialists devoted to serving on school committees positively correlated with high school students' performance on the ACT (Lance et al., 2005). In Oregon, eighth grade students tended to score higher on their state reading tests when their library media specialist provided in-service training to teachers (Lance, Rodney & Hamilton-Pennell, 2001). In Texas, leadership activities correlated with student achievement scores at the elementary, middle school, and most strongly, at the high school level (Smith, 2001).

The studies reviewed here suggest that leadership from library media specialists may be related to student achievement, and that the level of leadership may be influenced by a variety of factors, including staffing levels, library program budget, and support of the principal and school culture.

Total Library Program and Student Achievement

The variations within and across statewide studies in terms of the strength of correlations between school library program elements and test scores suggest the complexity of school library programs' influence on student achievement. If a program has a large budget for new materials but inadequate staff, the quality of the collection may suffer and so may not contribute to greater student achievement; if there is full-time professional staffing without adequate clerical support, the quality of collaborations with teachers may fall short, and consequently, so may student achievement. Studies in seven states include multiple regressions that combine staffing and other library media center variables into a single factor and are compared either to individual or grouped school and community variables. These statistics are difficult to compare, as the factor analysis in each study produced unique variables, and the multiple regression process leaves some school or community variables out of final regressions. In some states, there was too little

variation in staffing levels to produce statistically significant results when staffing levels were part of the overall library variable. In Missouri, for example, Miller et al. (2003) found no significant correlation between staffing levels and test scores in their regression analysis, but found that a combination of all LMC services accounted for over ten % of the variance in test scores. In any case, the overall library program variable in most of these studies accounted for anywhere between 1 and 21 % of the variance in student test scores, with five of the seven reporting changes in R^2 of 7.3% or higher. As these analyses generally account for the major school and community variables, they provide perhaps the strongest evidence of a link between student achievement and library programs. See Table 15 for a summary of these multiple regression analyses.

Table 15

State test scores and Total Library Media Center Factors, School and Community Variables: Multiple Regression

State	Grade	Library Measure	ΔR^2	*p*	Beta	Co-variables
Colorado (Lance, Welborn & Hamilton-Pennell, 1993)	1	LMC size: includes total staff hours/week, number of books, periodical subscriptions, videos.	.050*	<.05	.23	At Risk: a factor including free & reduced lunch, percent minority, percent parents high school graduates. LMC size
Colorado (Lance et al., 1993)	2	LMC size: includes total staff hours/week, number of books, periodical subscriptions, videos.	.150**	<.01	.39	At Risk: a factor including free & reduced lunch, percent minority, percent parents high school graduates.
Colorado (Lance et al., 1993)	4	LMC size: includes total staff hours/week, number of books, periodical subscriptions, videos.	.120**	<.01	.35	At Risk: a factor including free & reduced lunch, percent minority, percent parents high school graduates.
Colorado (Lance, et al., 2000a)	4	Staffing, collections and funding	.075*	<.05	.238	Percent students eligible for free and reduced lunch; percent minority students
Iowa (Rodney et al., 2002)	4	LM program development	.026**	<.001	.167	Percent students eligible for free and reduced lunch; percent minority student; percent adult high school graduate
Iowa (Rodney et al., 2002)	4	LM program development	.028**	<.001	.169	Per pupil expenditures

(*table continues)*

Table 15 (*continued*)

State	Grade	Library Measure	ΔR^2	*p*	Beta	Co-variables
Colorado (Lance et al., 1993)	5	LMC size: includes total staff hours/week, number of books, periodical subscriptions, videos.	.09**	<.01	.3	At Risk: a factor including free & reduced lunch, percent minority, percent parents high school graduates.
Massachusetts (Baughman, 2000) [a]	elem-entary	LM program development Includes books per pupil, full-time librarian, automation.	.073**	<.001	--- [e]	Percent students eligible for free and reduced lunch
Colorado (Lance et al., 1993)	7	LMC size: includes total staff hours/week, number of books, periodical subscriptions, videos.	.210**	<.01	.47	At Risk: a factor including free & reduced lunch, percent minority, percent parents high school graduates.
Colorado (Lance, et al., 2000a)	7	Staffing, Collections and Funding	.016*	<.05	.131	Percent students eligible for free and reduced lunch; percent minority students
Iowa (Rodney et al., 2002)	8	LM program development	.028**	<.001	.169	District expenditures per pupil
Massachusetts (Baughman, 2000) [a]	middle school	LM program development: includes books per pupil, full-time librarian	.045**	<.001	--- [e]	Percent students eligible for free and reduced lunch
Colorado (Lance et al., 1993)	10	LMC size: includes total staff hours/week, number of books, periodical subscriptions, videos.	.070*	<.05	.27	At Risk: a factor including free & reduced lunch, percent minority, percent parents high school graduates.

(*table continues*)

Table 15 (*continued*)

State	Grade	Library Measure	ΔR^2	*p*	Beta	Co-variables
New Mexico (Lance et al., 2002)[b]	10	School library development	.079*	.025	.281	Percent in poverty; percent minority, percent parents high school graduates
Texas (Smith, 2001)	10	Library staffing and print Resources	.048**	.001	.218	Student Ethnic and Economic Composition; Student Ethnic and Economic Composition
Iowa (Rodney et al., 2002)	11	LM program development	---[d]	---[e]	---[e]	---[e]
Massachusetts (Baughman, 2000) [a]	high school	LM program development: Includes books per pupil, full-time librarian, hours of paid support staff	.015**	<.001	---[e]	Percent students eligible for free and reduced lunch
Missouri (Miller et al., 2003)[c]	k-12	All LMC services	.106**	.003	---[e]	10 school variables and eight community variables.
Missouri (Miller et al., 2003)[c]	k-12	Total staffing hours	.000	.568	---[c]	10 school variables and eight community variables.

Note: Dependent variable is state reading test scores, unless otherwise indicated.

a. Dependent variable: state reading and math test scores.

b. Dependent variable: state English Language Arts test scores.

c. Dependent variable: Weighted average map index, a formula combining reading and non-reading state test scores, weighted by the number of students eligible to take the test.

d. Researchers reported there was too little variation in LMS staffing at high school level to demonstrate a significant correlation.

e. Not reported.

When examining data across studies, few patterns emerged in terms of the strength of correlations at specific grade levels. That is, with some library variables, an individual study might yield its strongest correlations at the elementary level, while the strongest correlations for other library variables in the same study might be found at the high school level. This lack of a pattern was exhibited both within and across studies. This may be due to the complex interrelationships among elements of a school library program, as well as the interaction between the library program and school and community variables.

On the other hand, analysis of these statewide studies collectively indicates persistent, if not strong, bivariate correlations between student achievement and school library program variables, most notably in size of print collections, library media specialist staffing levels, and total staffing levels. In the Wisconsin (Smith, 2006), Pennsylvania (Lance et al., 2000b) and Illinois (Lance et al., 2005) studies, when controlling for school and community variables in partial correlations, those correlations generally remained statistically significant. Similarly, multiple regressions that included factor analysis to combine LMC staffing with other program elements such as budget and collection size resulted in significant relationships between these factors and student achievement when school and community variables were included.

Recent History of California School Libraries

Of all states, California has fared worst in maintaining quality school library programs. Although earlier studies exist, the first comprehensive survey of the state's school libraries, published in 1968, reported that just 38% of elementary schools had a library, and just under 19% of those that had libraries were staffed with certificated librarians (Howell, 1968). Overall, just under 11% of elementary schools were staffed with certificated librarians, compared to over 50% nationally (Howell, 1968). And while 98% of secondary schools had libraries, just 64% of

those had certificated librarians, compared with 93% of all high schools nationally with certificated librarians (Howell, 1968). The report noted the challenges of keeping pace with the rapid population growth of that era but nevertheless included a host of recommendations about required staffing and budget levels to provide adequate library services to all public schools. "The results of this study make it apparent," wrote Superintendent of Public Instruction Max Rafferty in the foreword of the report, "that far too little has been done for the schools to have the library facilities, stock of library materials, and quality of library services they need and must have to maintain the quality of modern education programs that are required" (Howell, iii).

In spite of robust federal funding from ESEA, the California legislature did not mandate staffing or minimum per pupil expenditures. The California Media and Library Educators Association, though, did produce *Guidelines for California Library Media Programs: School, District, County, State*, which adapted the national standards of 1975 to California and articulated qualitative and quantitative guidelines to be used by schools and districts throughout the state in developing and maintaining quality school library programs (*Guidelines for California Media Programs*, 1977).

Just as the ESEA money was folded into an education block grant, Section 18100 of the California education code was passed, requiring school districts to maintain school libraries or enter into contracts with other agencies to do this, and directing the State Board of Education to adopt standards, rules and regulations for library services (Brandes, 1987). The State Board even made strong recommendations that districts assign certificated librarians to provide services to students in well-stocked school libraries. Unfortunately, because these recommendations and regulations carried no funding mechanisms or sanctions for enforcement, districts were free to carry out the Board's instructions to any degree they chose (Brandes, 1987).

In spite of the attention drawn to the need for improvement of essential school library services, funding in California was further squeezed by the passage in 1978 of Proposition 13, which limited the property taxes through which public education was funded. The drop in funding caused districts to cut discretionary spending, which, because there were no state mandates, included school library programs ("School Libraries Struggle," 1993). In the ten years prior to 1993, half the library media specialists in California were laid off ("School Libraries Struggle," 1993). Not surprisingly, during that same time period, California had had the worst funding for school libraries among the 50 states (Manzo, 1999).

Publication in 1987 of *The Crisis in California School Libraries* (Brandes) again focused attention on the poor condition of the state's school libraries, especially in comparison to those in the rest of the country, based on a national study using the same survey instrument. This study found that California school library staff performed significantly fewer services than did staff in schools nationally, had lower per student expenditures, and had the lowest certificated staffing ratios in the country. In the five years preceding the study, there was a decline of 23 % in certificated librarians employed in the state; at the elementary level, there was a decline of 36 %. Consistent with research already presented (See Aaron 1981; Callison, 2004; Farwell, 1998; Lance et al., 1999; Lance et al., 2000b; Lance et al., 2002; Lance et al., 1993; Loertscher, 1973; Loertscher & Land, 1975; Loertscher et al., 1987; McCracken, 2001; McIntosh, 1994) more than twice the number of certificated staff coordinated library skills instruction with classroom instruction than did non-certificated staff, and overall, the level of library services was directly linked to the presence of a certificated librarian on staff (Brandes, 1987).

In the 1990s, a concerted lobbying effort was led by, among others, state library consultant Barbara Jeffus and State assemblywoman Delaine Eastin—later to become the state's

superintendent of schools-- to secure steady funding for school libraries. Eastin would lobby for funding by carrying with her a copy of a book recently pulled from a school library's shelves which proclaimed, "Someday man will walk on the moon" (Jeffus, 2002). After a line-item donation on the state income tax form met with success, at a time of economic upswing, the California Public School Library Act was passed in 1998, allocating $158 million per year to school libraries, which averaged just over $28 per student.

During that time, long-neglected collections were weeded and average copyright dates climbed steadily upward, from 1972 in 1995 to 1991 by 2003 ("School Libraries," 2007). Not surprisingly, a principle finding from a study conducted on the effects of this funding on a central California school district was that adequate funding substantially enhanced both the availability of resources to students and the services provided to them (Archon, 2003). Archon also concluded from his study that in schools with library media specialists, the additional funding was more likely to result in the library media center playing a more significant role in the school's technology plan and with the provision by library staff of staff development and training. Archon found that more than three times as many library media specialists than classified staff reported that increased funding had a "substantial impact on their ability to meet with teachers to plan and teach lessons" (p.119).

The infusion of money revitalized school library programs across the state, and library leaders decided the time was right to develop a new set of standards and guidelines to help people at the county, district and site level in developing effective school library programs (California School Library Association [CSLA], 2004). *Standards and Guidelines for Strong School Libraries* (CSLA, 2004) is based upon the key tenets of *Information Power: Building Partnerships for Learning* (AASL & AECT, 1998) but is also aligned with the state's curriculum

frameworks and academic standards. It provides standards for library media specialists, district and county school library media supervisors, and guidelines for paraprofessionals. Unlike *Information Power: Building Partnerships for Learning* (AASL & AECT, 1998), it includes both qualitative and quantitative standards for these groups as well as for facilities, resources and technology, offering numerous indicators for each standard and overall indicators of school library programs that are exemplary, making progress, or at risk.

Unfortunately, at the same time that *Standards and Guidelines for Strong School Libraries* (CSLA, 2004) was being developed, the state faced budget shortfalls and consequently reduced appropriations from the California Public School Library Act to negligible levels. A typical district saw its appropriation fall from over twenty-eight dollars to just seventy-one cents *per student* (Mayer, 2006), and in 2005 state legislators folded funding for school libraries into an instructional materials block grant, which remains the primary source of funding for over half of California schools ("Statistics about California School Libraries," 2007). As part of a block grant, school library materials must compete with funding for textbooks, the need for which typically exceeds available allocations from the state (Jeffus, 2002). As is the case at the national level, block grant funding represents a retreat from the state's commitment to improving school libraries.

Nevertheless, *Standards and Guidelines for Strong School Libraries* (CSLA, 2004) remains an influential document for library media specialists in California, providing specific targets for staffing and provisioning school libraries and reiterating the fundamental principles of *Information Power: Building Partnerships for Learning* (AASL & AECT, 1998), both in the standards for student learning and in the library media specialist's attention to the elements of the school library program that may help students advance in those standards.

Previous California Study

There has been one state-wide California study examining the correlations between student achievement and school library media programs, but the results generally contradict the findings of the other state studies discussed in previous sections. Sinclair-Tarr and Tarr (2004) examined the correlations between school library programs and student achievement in California and found that there were significant positive correlations between the presence of a school library and student achievement at some levels. At the fourth grade, the researchers reported positive correlations on mathematics and English/language arts assessments and found the following elements of the library program to yield positive significant correlations: collection size, variety of technology resources, the presence of a video collection, library hours, access to the library at a variety of times, and skills-integrated instruction. However, the researchers also found statistically significant negative correlations between student achievement and the planning or conducting of workshops for teachers, providing information about new resources, and the level of classified staffing. There was an overall negative statistical relationship between level of services offered and student achievement.

At the middle school, Sinclair-Tarr and Tarr (2004) found a statistically significant positive correlation between the presence of a school library program and student achievement in mathematics but found no individual element or combination of elements within the school library program that produced a positive significant correlation. Again, contrary to expectation, video collections, access to the library in the afternoon, and reference services provided to students and teachers produced a significant negative correlation. In English/language arts, the researchers found no significant positive correlations with the presences of a library program,

and in fact found negative correlations between those scores and the presence of a school library, video collections, reference assistance, and access to libraries in the afternoons.

At the high school level, Sinclair-Tarr and Tarr (2004) found no statistically significant relationships between school library programs and student achievement in either mathematics or language arts.

There are a series of significant limitations to the Sinclair-Tarr and Tarr (2004) study that merit a second California study. Sinclair-Tarr and Tarr (2004) use the California education code section 188810(u) to define a school library as "any library that is established to support the curriculum-related research and instructional reading needs of pupils and teachers and provides the collections, related equipment, and instructional services of a staff for an elementary or secondary school." Sinclair-Tarr and Tarr (2004) add to their operational definition the presence of a certificated library media teacher. But as the literature suggests, it may not be merely the presence of certificated staff, but the level of that staffing which is the critical factor in a school library program's ability to offer meaningful services and create a positive significant correlation between that program and student achievement (Baumbach, 2003; Baxter & Smalley, 2003; Brandes, 1987; Burgin et al., 2003; Callison, 2004; Hall-Ellis & Berry, 1995; Jenkins, 2000; Lance et al., 1999; Lance, Hamilton-Pennell, & Rodney, 2005; Lance, Rodney, & Hamilton-Pennell, 2000a, 2000b, 2001; Lance, Welborn, & Hamilton-Pennell, 1993; ; Loertscher, 1972; Loertscher & Land, 1975; Loertscher et al., 1987; Martin, 1996; Ontario Library Association, 2006; Rodney et al., 2002; Smith, 2001).

Second, the Sinclair-Tarr and Tarr (2004) study does not account for interaction effects among the elements of a school library program that may need to be present for a positive statistical relationship between school libraries and student achievement to exist. Most notably,

previous studies suggest that the level of combined staffing—both classified and certificated—may be related to the level of services available and to student achievement (Aaron, 1981; Beaird, 1999; Farwell, 1998; Lance et al., 1999; Lance, Rodney, & Hamilton-Pennell, 2000b; Lance, Rodney, & Hamilton-Pennell, 2001; Lance, Rodney, & Hamilton-Pennell, 2002; Lance, Welborn, & Hamilton-Pennell, 1993; Loertscher et al., 1987; McCracken, 2001; McIntosh, 1994; Rojtas-Milliner, 2006; Underwood, 2004).

The third limitation to the Sinclair-Tarr and Tarr (2004) study is its use of the School Characteristics Index (SCI) as the variable to control for school and community factors. The SCI is based on a regression model derived not from the individual test scores used in the Sinclair-Tarr and Tarr study (2004), but on the base Academic Progress Index (API) score for the previous year, a weighted combination of overall school performance scores that include test results across all grade levels in English/language arts, mathematics, science, social science, and the California High School Exit Examination (CAHSEE) (California Department of Education, 2007; see also Technical Design Group, 2000); in several instances, the percentage of eligible students taking the test influences the overall score, as students not taking the test are assigned a minimal score. In a paper critical of the API and the ranking system derived from it, Russell (2002) points out that "aggregating scores at the school level masks the successes and failures at the grade and classroom levels" (ix). Russell concludes that aggregation of scores at the grade or classroom level might "promote a closer examination of practices and issues within these smaller operational units" (x), precisely because whole-school scores such as the API do not account for variances in scores within an individual test. In a paper about the reliability of overall school scores, Hill and DePascale (2002) additionally found that the average variance of student scores "were substantially different for different grade levels" (2002, p.4). While the merits of the SCI

in ranking schools might be debated, the problem with using it as the control variable in the Sinclair-Tarr and Tarr study (2004) is that, because it is based on the total API score, it cannot account for the variances in scores on the individual tests—CST Reading, English Language Arts, and Mathematics—which these researchers used as measures of student achievement.

A fourth limitation is that in examining performance on criterion-referenced tests, Sinclair-Tarr and Tarr (2004) looked for correlations between the presence of a school library—already a problematic measure—and the percentage of students at a school scoring proficient or above on a given test. The percentage of schools scoring proficient or above may have limited value when examining the overall effect of school library programs in California. In 2004-2005, an average of just 26% of students statewide scored proficient or above on the 11th grade ELA test, for example (Ed-Data, 2008). Looked at another way, over half of California's high schools had fewer than 25% of its students score advanced or proficient on this test, and 85% of the schools had fewer than half its students score advanced or proficient. At the eighth grade in 2004-2005, the school mean for students scoring proficient or advanced on all of the criterion-referenced tests was just over 27% (Ed-Data, 2008). Given these realities, this may not be the metric that best measures the effect of a school library program on all of California's students. The mean scaled score for each school, for each grade and content level test, provides a better measure of comparison, as results are not grouped into arbitrarily labeled proficiency ratings.

Finally, the limitations mentioned here all represent departures from a methodology that has been used and refined over the past fifteen years in no fewer than fourteen state studies (National Commission on Libraries and Information Science, 2006). A new California study would address the limitations of the Sinclair-Tarr and Tarr study and adopt a methodology consistent with these other studies, making the results easier to compare with those of other

states and providing a more nuanced picture of the correlations between school library programs and student achievement.

Theoretical Foundation

The theoretical foundation of this study derives from two models of the school library program that reflect the increasingly instructional role of the library media specialist, as reviewed earlier in this chapter. Loertscher's *Taxonomies of the School Library Media Program* (2000) describes a tiered library media program, with the information infrastructure—buildings, equipment, and the network-- followed by the basic direct services libraries traditionally provide, including reference, individual help, and provision of materials at a teacher's request. The next level identifies four key programmatic concerns for the library media specialist: collaboration, reading, enhancing learning through technology, and information literacy. The end result of these parts of a library program functioning well is increased student achievement. The visual model indicates clearly that the technical and paraprofessional support staff assumes the greater part maintaining the infrastructure and providing many direct services, while the LMS devotes most of his time to instructional roles: collaborating with teachers in the creation of meaningful learning experiences that build reading and information literacy skills and exploit technology to enhance learning. See figure 1.

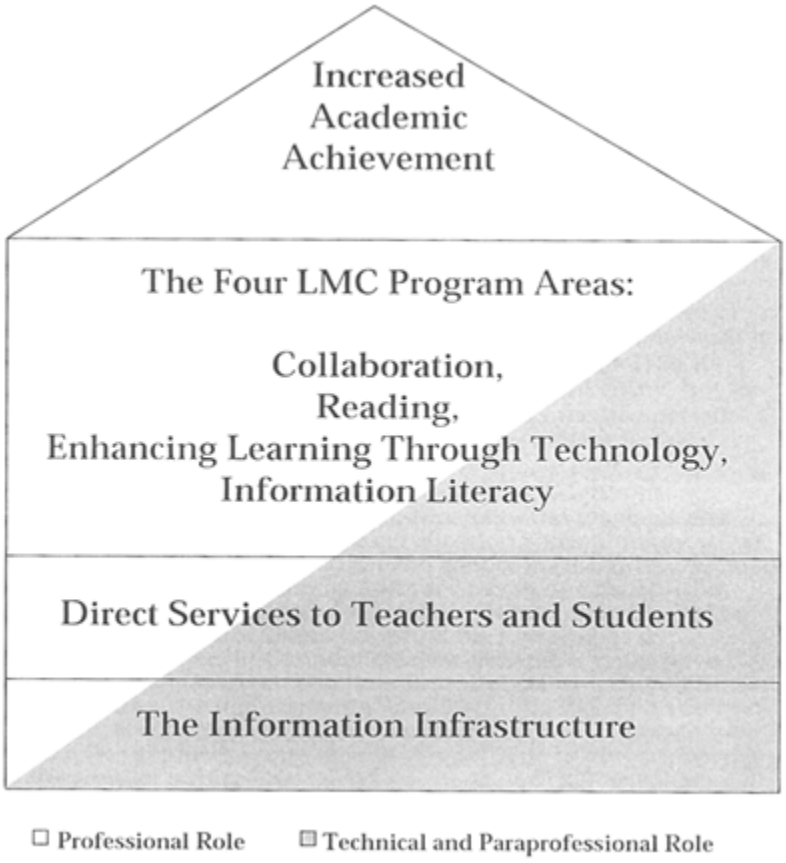

Figure 1. Loertscher's model of the school library media program. From Loertscher, D. (2000). *Taxonomies of the School Library Media Program.* 2nd edition. San Jose: Hi Willow Research and Publishing. Reproduced with permission.

The taxonomy for the library media specialist in Loertscher's model describes ten levels on a continuum of involvement by the LMS, moving from a complete lack of involvement to increasing collaboration and involvement with the entire school community. In the lower levels, traditional roles of the librarian predominate; the LMS manages a functional information infrastructure that includes access to physical and digital resources, equipment use, collection development, individual reference assistance, and the supply of resources by pre-arrangement and planning between the LMS and the classroom teacher.

It is only at the eighth level in Loertscher's taxonomy that the LMS begins to implement program elements that are included in what Loertscher calls the "academic achievement building block" (Loertscher, 2000, 21): collaboration, reading literacy, enhancing learning through technology, and information literacy. Through the intentional, deliberate collaboration between the LMS and classroom teachers to integrate reading, technology and information literacy goals into the classroom teacher's curriculum, the library media program can have a substantial impact on student achievement. The top level in this taxonomy indicates the library media specialist participating in school and district curriculum planning, providing instructional and resource expertise in the development of all types of curricula. See Figure 2 for Loertscher's library media specialist taxonomy.

The Library Media Specialist's Taxonomy for the Library Media Program

1. **NO INVOLVEMENT** -- The Library media center is bypassed entirely.
2. **SELF-HELP WAREHOUSE** -- Facilities and materials are available for the self-starter.
3. **INDIVIDUAL REFERENCE ASSISTANCE** -- Students or teachers retrieve requested information or materials for specific needs.
4. **SPONTANEOUS INTERACTION AND GATHERING** -- Spur-of-the-moment activities and gathering of materials occur with no advance notice.
5. **CURSORY PLANNING** -- Informal and brief planning with teachers and students for librarian and library media center involvement -- usually done in the hall, the teachers' lounge, the lunchroom, etc. (Ex., "Here's an idea for an activity and some materials to use." "Have you seen …?" "What are you doing with your 6th grade? Can I help?")
6. **PLANNED GATHERING** - Gathering of materials is done in advance of class project upon teacher request.
7. **EVANGELISTIC OUTREACH** -- A concerted effort is made to promote the philosophy of an integrated library media center program.
8. **IMPLEMENTATION OF 4 MAJOR PROGRAMMATIC ELEMENTS OF THE LMC PROGRAM**— The four elements--
    a. Collaboration
    b. Reading literacy
    c. Enhancing learning through technology
    d. Information literacy--

    are operational in the school. The LMC is on its way to achieving its goal of contributing to academic achievement.

9. **THE MATURE LMC PROGRAM**—The LMC program reaches the needs of every student and teacher who will accept its offerings in each of the four programmatic elements.
10. **CURRICULUM DEVELOPMENT** -- Along with other educators, the library media specialist contributes to the planning and structure of what will actually be taught in the school or district.

Figure 2. Loertscher's library media specialist's taxonomy. From Loertscher, D. (2000). *Taxonomies of the School Library Media Program.* 2nd edition. San Jose: Hi Willow Research and Publishing. Reproduced with permission.

Loertscher's model grew out of a history of professional and academic work that increasingly emphasizes the library media specialist's instructional role. Based on analysis of survey responses from faculty and students at 39 Ohio schools, Todd and Kuhlthau (2004) extend this model by further delineating the LMS's roles as informational and transformational. Figure 3 shows the traditional role of LMS as information specialist in tandem with the transformational roles as curriculum partner and leader acting on knowledge creation, increased problem solving skills, and higher academic achievement by students, so that the school library program becomes a "dynamic agent of learning." Todd and Kuhlthau identified eight roles the LMS plays in this learning:

- Resource Agent: Provide current and diverse resources for curricular and personal information needs; provide instruction in choosing resources and information technologies effectively.
- Information Literacy Agent: Instruct and guide students in the research process; help students become reflective researchers who make a connection between an effective search process and academic success.
- Knowledge construction agent: provide instructional interventions to build information literacy and help students construct and demonstrate new knowledge and understanding.
- Academic achievement agent: use expertise in the pedagogy of information literacy, team teaching and learning, learning styles, and individualized instruction in responding to the diverse needs of students to boost academic achievement.
- Independent reading and personal development agent: foster independent reading, plan and develop ways to promote and encourage reading for academic achievement, personal pleasure, and lifelong learning.

- Technological agent: provide information technology to access information; facilitate students' use of technology in the manipulation, production and presentation of ideas and information.
- Rescue agent: provide just-in-time resources, help with technology, interventions in creation of students' work, and address other student needs for last minute help.
- Individualized learning agent: use expertise in information-centered pedagogy and differentiated learning to provide the right intervention at the right time.

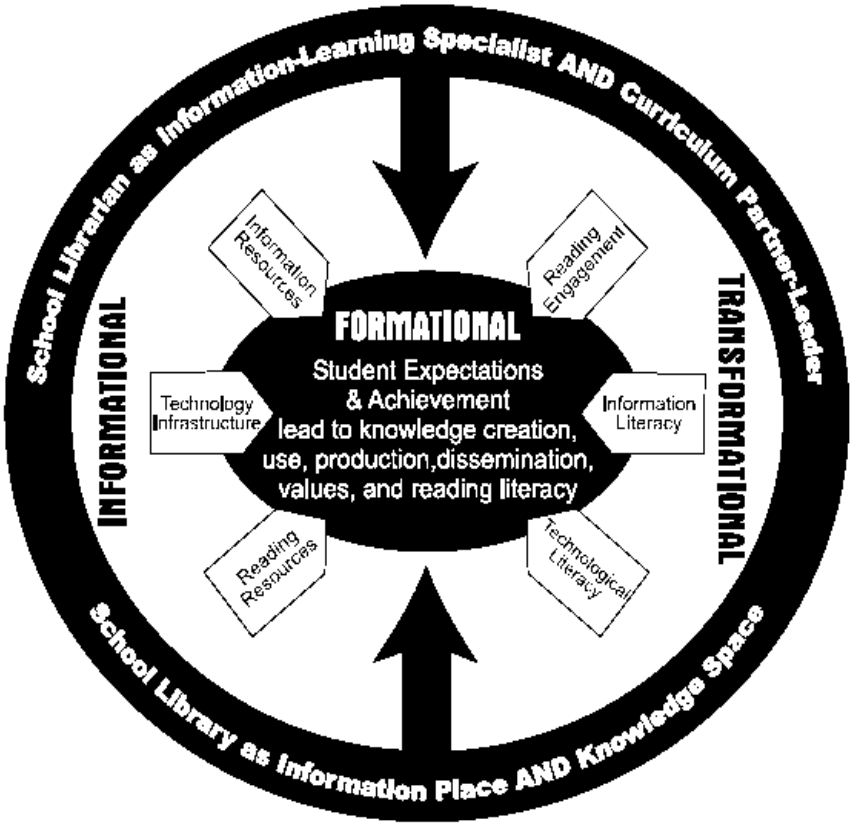

Figure 3. Todd & Kuhlthau's (2004) model of the school library as dynamic agent of learning. From "Student Learning through Ohio School Libraries: Background, Methodology and Report of Findings," available http://www.oelma.org/StudentLearning/documents/ OELMAReportofFindings.pdf. Reproduced with permission.

Todd and Kuhlthau's (2004) model more explicitly details the instructional roles of the LMS and suggests that those instructional roles are in play in the lower levels of Loertscher's (2000) taxonomy. Knowledge of differentiated learning and of learning styles, for example, may inform the LMS's interactions with students and teachers when providing individual reference assistance. Spontaneous interactions, cursory planning, and planned gatherings—also at the lower end of Loertscher's (2000) taxonomy--are all informed by the LMS's expertise in information literacy pedagogy, facility with information technologies, and knowledge of curriculum. Both models, though, do describe the library media specialist's dual role as manager of the information space, place and resources, and as instructional leader, partner, and resource to students and staff. Under both models, the most successful school library media programs are those in which the LMS attends to both roles.

Conclusion

This chapter has reviewed the evolution of the school library media program and the role of the library media specialist, examining the profession's standards, the research informing those standards, and the studies that indicate a positive relationship between school library programs and student achievement. In light of the limitations of the Sinclair-Tarr & Tarr (2004) study, the need for a new California study examining the relationship between student achievement and school library programs was argued. Theoretical models by Loertscher (2000) and Todd & Kuhlthau (2004) were presented that reflect the dual roles of the LMS as both manager of information space, place and resources and as instructional leader, partner and resource to students and staff. These theoretical models are in turn reflected in the survey instrument used in this study. That survey instrument is described in the proceeding chapter, which discusses the methodology of the study.

CHAPTER 3

METHODOLOGY

Research Questions

This descriptive, non-experimental study examines the relationships between school library media programs and student achievement in California's comprehensive public schools. Several data sources were used to examine the relationship between student achievement and school library programs. This relationship was explored through the following research questions:

1. How does student achievement vary, if at all, in relationship to the levels of certificated staffing in school library media programs?
2. How does student achievement vary, if at all, in relationship to the levels of combined certificated and clerical staffing in school library media programs?
3. How does student achievement vary, if at all, in relationship to library staff services offered, either independently or in combination?
4. How does student achievement vary, if at all, in relationship to other library program elements?
5. How does student achievement vary, if at all, in relationship to a combination of library program elements?
6. If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to certificated library staffing levels?

7. If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to overall library staffing levels?

Null Hypotheses

The following null hypotheses were formulated from the research questions:

H_{01}: Student achievement does not vary in relationship to the levels of certificated staffing in school library media programs.

H_{02}: Student achievement does not vary in relationship to the levels of combined certificated and clerical staffing in school library media programs.

H_{03}: Student achievement does not vary in relationship to library staff services offered, either independently or in combination.

H_{04}: Student achievement does not vary in relationship to other library program elements.

H_{05}: Student achievement does not vary in relationship to any combination of library staffing levels and other library program elements.

H_{06}: The level of school library services does not vary in relationship to certificated library staffing levels.

H_{07}: The level of school library services does not vary in relationship to overall library staffing levels.

Sources of Data

Student achievement—the dependent variable-- was measured by the school level mean scaled score on the 2006-2007 school year California Standards Tests (CSTs) and included criterion-referenced tests from grades four, eight and eleven-- grades appearing frequently in

other state-wide studies like this one. The English Language Arts test includes a reading comprehension component but also tests other state standards for this content area and is given at all three grade levels, so this was a good candidate for use as a dependent variable. At both the eighth and 11th grades, most students take a social studies test, affording another data analysis opportunity related to a content area frequently associated with support from school library programs.

School-level results for these tests are posted on the California Department of Education (CDE) Website annually and can be downloaded as comma delimited files. These scores are reported as both mean scale scores and by percentage of students who score at the advanced, proficient, basic, below basic, and far below basic levels. Cut-points for these levels are held constant from year to year for each grade level and content area, but the number or percent correct associated with each scaled score may vary. Using the mean scaled scores from a criterion-referenced test is a valid method of test analysis (Urbina, 2004) and on the CST, Standardized Testing and Reporting (STAR) officials say that these scores may be used to compare results within content area and grade level tests, both within a single year and across years (STAR Technical Assistance Center, 2006). Mean scaled scores were used for this study, as the number of students scoring at proficient or above on some tests is less than 30% of the total testing population (Ed-Data, 2008). Using the mean scaled score as the dependent variable allowed for a direct and accurate comparison between schools across the entire spectrum of performance.

The CST tests undergo content reviews by content-area experts at Educational Testing Service and the CDE, and all test items are subjected to a thorough review by a content-area Assessment Review Panel. This panel reviews items for accuracy, clarity, bias, and quality, and

it also determines if the items are measuring the content standards as appropriate for the testing population. Reliability analyses on the CSTs consistently yields reliability measures of between .91 and .95 for the English/language arts and social studies tests, considered highly reliable (Educational Testing Service, 2007).

The independent variables from school library media programs were taken from the California Department of Education School Library Survey, administered annually as an online survey by the state school library consultant, who works within the CDE. All public schools are required by California Education Code 18122 to respond annually to this survey, although there are no consequences for failing to respond. The survey includes 19 questions including type of library, hours the library is open, amount of certificated and clerical staff hours per week, number of books in the collection, average copyright date of books in a given section, technologies available in or through the school library, budget for print and non-print collection development, funding sources, type of scheduling, program services offered, and databases most frequently used by students. See Appendix A for the complete survey.

According to Barbara Jeffus, California's School Library Consultant to the CDE, and John McGinnis, the California School Library Association's Vice President of Governmental Relations, the survey was first administered for the 1998-1999 school year and was developed by the CDE, San Jose State University, and the California School Library Association, using many of the questions from Brandes' 1987 California study, which was itself based upon the U.S. Department of Education's Center for Statistics national library survey instrument (Brandes, 1987). The new survey instrument added questions based on the research by Miller and Shontz (1996, 1997, 1998) about indicators for successful school libraries (B. Jeffus & J. McGinnis, personal communication, November 17, 2007).

The purpose of this survey was to collect data about elements of a school library program in California, to measure school library media program progress, and to create a point of comparison with national statistics (B. Jeffus & J. McGinnis, personal communication, November 17, 2007). Jeffus and McGinnis noted that the survey was modified based on input from the CSLA curriculum committee, the CSLA governing board, David Loertscher from San Jose State University, and representatives from large California school districts. The second year of the survey replaced many of the fill-in items with multiple choice responses, which improved the reliability of the instrument (B. Jeffus & J. McGinnis, personal communication, November 17, 2007). In addition, survey participants were able to identify their county, district and school codes online, which made it easier to track who had responded and to more easily match this data set with other data collected by the state, including demographics and test results. Minor changes have been made to the test since that time based on feedback from survey participants and consultations with the California School Library Association and library leaders from major school districts throughout California. In 2005, data collection was taken over by the Technology Services Division of the CDE; changes to the online interface have made results more reliable. Data is now collected and validation statistics are run. Outlying data are identified by the Technology Services Division and verified by the School Library Consultant's office where possible; data from schools reporting anomalies that cannot be verified are discarded (B. Jeffus & J. McGinnis, personal communication, November 17, 2007). See Appendix A for the survey.

The CDE School Library Survey also reflects the theoretical models offered by Loertscher (2000) and Todd & Kuhlthau (2004). Figure 4 illustrates the survey's alignment with

the two models, particularly in terms of the types of services regularly offered by a school library media program.

CDE Library Survey	Todd & Kuhlthau (2004)	Loertscher (2000)
• Offered a program of curriculum-integrated information literacy instruction	**Literacy Development Agent:** LMS "engages students in an active and meaningful search process, enabling them to explore, formulate and focus their searches" **Knowledge Construction Agent:** LMS "develops information literacy scaffolds for engaging students with information in meaningful ways."	**Information literacy:** "As collaborative projects are planned with teachers…attention is given to providing research strategies at the time of need."
• Informally instructed students in the use of resources • Helped students and teachers find and use resources outside school library • Facilitated interlibrary loan for students and teachers	**Resource Agent:** "The teacher-librarian provides instructional interventions by guiding students in their information choices through the effective use of these resources." **Rescue Agent:** "The library is opportunistic, responding to the multiple needs that arise from learning."	**Individual reference assistance (Level 3):** The LMS "may at times deliver the information directly to the user but will continually work to help patrons gain the skills they need to find and use information themselves"
• Provided reading, listening, and viewing guidance for students	**Independent Reading and Personal Development Agent: "**The school library plays a role in fostering independent reading."	**Individual reference assistance (level 3) "**includes reading, viewing and listening advisory services for students and teachers."
• Provided instruction on Internet searching and research • Provided access to online library catalog and circulation • Provided Internet access for students in the library • Provided electronic access to a resource sharing network	**The library program provides students with** "up-to-date software across multiple media. Lessons must go beyond teaching the effective use of software to include technical troubleshooting (disk, printing, Internet access) and problem-solving skills."	**Enhancing Learning Through Technology (level 8): LMS** "realizes that networks and computers… (and) other technologies…only provide potential to enhance learning…(The LMS) demonstrates and encourages methods to exploit technology" to enhance teaching and learning.

Figure 4. Alignment of the CDE library survey and theoretical models.

California schools provide data for the Academic Performance Index annually, including the percentage of minority students, the percentage of students in the Free or Reduced Lunch

Program (a poverty indicator), percentage of students participating in migrant education, percentage of English learners, the average education level of parents, percentage of fully-credentialed teachers on staff, average class size, and the mobility of students (California Department of Education, 2006). Data from this source, which is publicly available as a comma-delimited file download from the CDE Website, was used to control for community and school-based influences on the dependent variables. Additionally, data from the School Accountability Report Card (SARC), also available each year as a comma-delimited filed download from the CDE, was used to determine and control for average teacher salary as an intervening variable.

Among the school level control variables not included in this study was average class size. Englehart (2007), in a comprehensive review of the literature on class size, concludes that the disparity of findings from the research makes drawing definitive conclusions about the effects of class size on student achievement difficult. Englehart suggests that the failure in this research stems from an inability to account for the interaction effects among the many variables that accompany class size, including socio-economic status, the size of a school district, the demographics of individual classes, teacher experience, and many others. Englehart's assertion of the inconclusiveness of research in the area is affirmed by several others in recent years who found either contradictory results or no significant relationship between class size and student achievement (see Akerhielm, 1995; Borland, Howsen & Trawick, 2005; Davis, 2007; Ready & Lee, 2006; Ross, 2007).

Another problematic school level control variable is student mobility. Nelson, Simoni & Adelman (1996) suggested in their three-year study of over 2,500 early elementary students that students who change schools are lower achieving to begin with. Mobility, in other words, may not be a cause, but a symptom of low achievement. Alexander, Entwisle & Dauber's (1996)

study affirms this claim. When tracked through five years of elementary school at twenty Baltimore city public schools, students who had moved had lower test scores, but when controlling for students' socio-economic status and prior academic performance, test score differences were no longer significant at $p < .05$. Wright's (1999) study of third and fourth graders in 33 Midwestern, urban schools concluded that, while mobility significantly correlates with student achievement, it is confounded with other much stronger predictors—specifically, ethnicity and poverty level—and that it therefore holds little predictive power. Heinlein and Shinn (2000) found that most student mobility studies did not control for prior student achievement. In their own study of 764 New York City sixth-grade students, Heinlein and Shinn (2000) found that, when controlling for students' achievement at the third grade, mobility after the third grade was not related to students' achievement scores in the sixth grade. There was a weak, though significant negative relationship between student achievement at the sixth grade and mobility before the third grade. The authors conclude from their study that early mobility is more disruptive to achievement than later mobility. The lack of consistent results from the studies mentioned suggested mobility would not be a reliable control for this study.

Data Collection and Human Subjects Considerations

This study used four sources of data: the California Department of Education School Library Survey results from 2006-2007; the 2007 CST scores for grades 4, 8 and 11; the demographic data available through the 2007 Academic Progress Index (API) scores, and school data from the School Accountability Report Card (SARC). The analysis unit was the California public school at the elementary, middle and high school levels. The targeted population was those schools for which a completed survey, the relevant CST mean scaled score, the demographic data from the API, and the school data from the SARC are available.

Data from the California Department of Education School Library Survey is available on school and county basis. The entire data file is available on request and was received as a comma-delimited (.csv) file. Data files of the entire battery of STAR test scores are publically available as either comma-delimited or ASCII downloads from the CDE Website, as are the demographic data from the API scores and school data from the SARC.

The California School Library Survey data does not include the names or positions of those who complete the survey, so no identification of individuals is possible. Data files for CST tests and the API are publically available; test scores are reported with the whole school as the principle analysis unit. Test scores and demographic data are available by subgroups such as ethnicity, English language fluency, gender, and other school and community subgroups; to safeguard students' identities, no scores are reported among subgroups of fewer than ten individuals. No individual data is reported.

The Institutional Review Board at the University of North Texas determined that, consistent with Department of Health and Human Service regulations at 45 CFR 46.101(b), this research study would be exempt from further review because it constituted "research, involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects" (IRB Guidelines, 2007).

Data Analysis

This study used four sources of data: the California Department of Education School Library Survey from 2006-2007; the CST scores for grades 4, 8 and 11; the demographic data available through the 2007 API scores, and the school data available through SARC. All four

data sources contain school level information identifiable by unique school codes. Data files for the CST scores were disaggregated first by grade and then by test; these disaggregated data were then combined with demographic data from the API scores and school data from SARC; these were then combined with data from the library survey, all matched by school code. The analysis unit was the California public school at the elementary, middle and high school levels. The targeted population was those schools for which a completed survey, the relevant CST mean scaled score, the demographic data from the API, and the school data from SARC was available. Schools that did not have data from all four sources were eliminated from the study.

This study employed both descriptive and inferential statistics. Bivariate correlation analysis was used to assess the direction and strength of relationship between pairs of variables (e.g., staffing levels and library services provided; mean scaled scores on English/Language Arts tests) and to assist in factor analysis used to combine variables for data reduction. For questions 1-4, bivariate correlations were used to determine the direction and strength of relationship between the dependent and independent variables. Where significant relationships were found, both partial correlation and hierarchical multiple regression analysis were used to examine the relationship between school library media program variables and student achievement when accounting for community and school variables. Partial correlations are useful because they provide a correlation between two variables with the influence of a third variable removed (Hinkle, Wiersma & Jurs, 2003). In this study, partial correlations and multiple regression were used to account for the following community and school variables: education level of parents, percent of students eligible for the free and reduced lunch program, ethnicity, percentage of English learners, average salary of teachers, and percentage of teachers fully credentialed.

Prior to multiple regression, factor analysis was used to combine variables within each of three areas: school library media program elements such as staffing, budget, and services available; school variables such as average teacher salary, percent of teachers fully credentialed, and percentage of English language learners; and community variables such as parent education level and percent of students eligible for free and reduced lunch**.** In a hierarchical solution, predictor variables are entered in a series of groups, allowing the researcher to determine if each new group of variables adds predictive value. The hierarchical model is frequently used to control for one set of variables while determining the effect of another set of variables on the dependent variable (Pedhazur, 1982). In this study, school and community variables were entered in the first step, followed by library variables. Each regression was examined to make sure assumptions about linearity, normality and multicollinearity were met. Linearity was tested by examining plots of standardized residuals against standardized estimates of the dependent variable to see if the pattern was random. In addition, each regression was checked to see that the standard deviation of the residuals exceeded the standard deviation of the dependent variable (Hutcheson & Sofroniou, 1999). Normality was tested by inspecting histograms of the residuals and values of skewness and kurtosis (Hutcheson & Sofroniou, 1999). Multicollinearity was tested through inspection of tolerance and variance inflation factor (VIF) values (Leech, 2005).

When statistically significant correlations were found between specific library services and student achievement in either partial correlations or multiple regression, bivariate correlations were also used to determine the relationship between that particular service and the level of both certificated and total library staffing .n For the purposes of this study, statistical significance was set at $p < .05$. Data was gathered and analyzed using the Statistical Package for the Social Sciences (SPSS 14.0).

Assumptions and Limitations

This study used publically available data from the criterion-referenced CST's, school and community information from the state API and SARC reports, and responses to the California School Library Survey. Although schools are required to submit this survey, there are no consequences for noncompliance. According to Ed-Data (2008), there were 8,215 comprehensive public schools in California in 2007. Close to 70% of these schools reported data from all four sources. This constitutes a sample size large enough—and diverse enough-- to counteract sample bias created by the self-selection of participants. Additionally, respondents to the survey do not identify themselves or their job titles. This study acknowledges that there may be some discrepancy in answers according to the positions of the people actually responding to the survey and the data available to them in providing their answers.

This study was conducted with the assumption, too, that the standardized tests to be used do, in fact, constitute some valid measure of student achievement. The criterion-referenced tests used in this study—English Language Arts and social studies-- assess mastery of specific standards in content areas that are commonly associated with library use at each grade level. It is also acknowledged, nevertheless, that such assessments describe a very narrow band of student achievement and so provide a similarly narrow view of the relationship between student achievement and school library media programs.

CHAPTER 4

RESULTS

Purpose

The purpose of this descriptive, non-experimental study was to examine the relationships between school library media programs and student achievement in California's comprehensive public schools. Student achievement was measured by the school level mean scaled scores on the California Standards Tests (CST) in English Language Arts at grades 4, 8 and 11; in Social Studies in grade 8; and in U.S. History in grade 11. Data about school library media programs was obtained through the California Department of Education School Library Survey, a 19 question survey completed online by a majority of the state's public schools. Data about community and school variables, including education level of parents, percent of students eligible for the free and reduced lunch program, ethnicity, percentage of English learners, average salary of teachers, and percentage of teachers fully credentialed, were obtained from the Academic Performance Index and the School Accountability Report Card, for which public schools are required to submit information annually.

Research questions were considered in the form of null hypotheses as follows:

H_{01}: Student achievement does not vary in relationship to the levels of certificated staffing in school library media programs.

H_{02}: Student achievement does not vary in relationship to the levels of combined certificated and clerical staffing in school library media programs.

H_{03}: Student achievement does not vary in relationship to library staff services offered, either independently or in combination.

H_{04}: Student achievement does not vary in relationship to other library program elements.

H_{05}: Student achievement does not vary in relationship to any combination of library staffing levels and other library program elements.

H_{06}: The level of school library services does not vary in relationship to certificated library staffing levels.

H_{07}: The level of school library services does not vary in relationship to overall library staffing levels.

This chapter reviews the population used for the study, then presents the results of research questions one through seven by grade level 4, 8 and 11. A summary of results for each question is provided, followed by a review of the major findings for all seven questions.

Populations

Grade 4

For the school year 2006-2007, there were 5714 public elementary schools in California (Ed-Data, 2008). Of these, 3,528, or 61.7%, had data from all four sources required for this study. Nearly all—98.3%-- of the 3,528 schools reported they had a space they called a library (see Table 16). Just 4.4% of these schools reported having at least 1 full-time library media specialist; 84.6% reported having no library media specialist staffing at all (see Table 17). Schools reporting both a full-time library media specialist and full-time clerical staffing amounted to 1.2%, just 43 schools out of 3528 in the population sample.

Table 16

California Elementary School Libraries with Responses to Library Survey

Type of Library	Number	Percent
School Library	3469	98.3
Joint Use Library	7	0.2
Use an adjacent library	8	0.2
No library	44	1.2
Total	3528	100.0

Table 17

Certificated Library Staff Hours, Grade 4

Certificated Staffing Level	Number	Percent
No certificated staff	2986	84.6
Less than half-time	206	5.8
Half-time or more, but not full-time	180	5.1
1 FTE	138	3.9
More than 1 FTE	18	0.5
Total	3528	100.0

The mean English Language Arts CST score was 354.44, with a standard deviation of 29.02, n = 3528 in a normal distribution.

Grade 8

There were 1,257 California public middle schools during 2006-2007 (Ed-Data, 2008). 1,197 of these schools, or 95.2%, had data from all four sources used for this study. Of these,

6.2% reported having no library at all, while 91.9 % report having a school library (see Table 18). 27.3% report having at least one full-time library media specialist, while 63.2% report having no library media specialist staffing at all. 8.5% of middle schools report having full-time staffing for both LMS and clerical positions (see Table 19).

Table 18

California Middle School Libraries with Responses to Library Survey

Type of Library	Number	Percent
School Library	1100	91.9
Joint Use Library	6	0.5
Use an adjacent library	17	1.4
No library	74	6.2
Total	1197	100.0

Table 19

Certificated Library Staff Hours, Grade 8

Certificated Staffing Level	Number	Percent
No certificated staff	757	63.2
Less than half-time	49	4.1
Half-time or more, but not full-time	64	5.3
1 FTE	280	23.4
More than 1 FTE	47	3.9
Total	1197	100.0

The mean English Language Arts CST score was 341.01, with a standard deviation of 28.27, n = 1,197; the mean Social Studies CST score was 330.56, with a standard deviation of 30.49, n = 1, 195, both scores normally distributed.

Grade 11

There were 1,182 California comprehensive public high schools during the 2006-2007 school year (Ed-Data, 2008). 987 had data from the four required sources for this study, with slightly fewer—965—with data available for U.S. history CST scores. 19.6% of high schools in the sample had no library at all, while 76.1% had a school library (see Table 20). At this level, 44.1% reported having no LMS staffing at all, with 47.8% reporting having at least one full-time LMS (see table 21). In addition, 30.3% of high schools in the sample reported having full-time support of both LMS and clerical staff.

Table 20

California High School Libraries Responding to Library Survey

Type of Library	Number	Percent
School Library	751	76.1
Joint Use Library	9	0.9
Use an adjacent library	34	3.4
No library	193	19.6
Total	965	100.0

Table 21

Certificated Library Staff Hours, Grade 11

Certificated Staffing Level	Number	Percent
No certificated staff	435	44.1
Less than half-time	34	3.4
Half-time or more, but not full-time	46	4.7
1 FTE	402	40.7
More than 1 FTE	70	7.1
Total	987	100.0

The mean English Language Arts CST score was 316.60, with a standard deviation of 37.41, n = 987; the mean U.S. History CST score was 320.02, with a standard deviation of 31.57, n = 965, both scores normally distributed.

H01: Student Achievement and Certificated Staffing

The first research questioned examined was, "How does student achievement vary, if at all, in relationship to the levels of certificated staffing in school library media programs?" The null hypothesis *H01* is that student achievement does not vary in relationship to the levels of certificated staffing in school library media programs.

Grade 4

At the fourth grade level, there was a statistically significant but weak positive correlation between certificated staffing levels and English Language Arts CST scores at $r = .06$ and $p < .001$. When community and school independent variables were used as controls in partial correlations, the strength of this association did not vary greatly; controlling for ethnicity produced the strongest association at $r = .11$, $p < .001$, while the relationship when controlling for parent education level was not statistically significant. See Table 22 for a summary of results.

Table 22

Partial Correlation, Certificated Staff Hours, English Language Arts CST Scores, and School and Community Variables, Grade 4

Control	*r*
Parent Education Level	.02
Free and Reduced Lunch	.10**
Ethnicity	.11**
Percentage English Learners	.09**
Avg. Teacher Salary	.04*
Percentage Fully Credentialed Teachers	.06**

*$p < .05$, **$p < .001$.

Grade 8

At the eighth grade level, the relationship between certificated staffing and English Language Arts scores was not statistically significant (r =.00, p=.99). As seen in Table 23, a positive significant relationship was shown when controlling for free and reduced lunch at r = .10, p < .001, and for ethnicity, r = .16, p < .001. The relationship between ELA scores and certificated staffing was not significant when controlling for the other four school and community variables.

Table 23

Partial Correlation, Certificated Staff Hours, English Language Arts CST Scores, and School and Community Variables, Grade 8

Control	*r*
Parent Education Level	.01
Free and Reduced Lunch	.10**
Ethnicity	.16**
Percentage English Learners	.04
Avg. Teacher Salary	-.04
Percentage Fully Credentialed Teachers	.01

**p <.001

There was, however, a weak but significant positive relationship between certificated staffing and social studies CST scores at the middle school level, with r = .07, p =.001. When controlling for school and community variables, the association strengthened in every case except for average teacher salary, which was not statistically significant. Controlling for ethnicity

again produced the strongest association at $r = .22$, followed by controlling for free and reduced lunch at $r = .20$. In both cases, $p < .001$. See Table 24 for a summary of these results.

Table 24

Partial Correlation, Certificated Staff Hours, Social Studies CST Scores, and School and Community Variables, Grade 8

Control	*r*
Parent Education Level	.09**
Free and Reduced Lunch	.20**
Ethnicity	.22**
Percentage English Learners	.12**
Avg. Teacher Salary	.03
Percentage Fully Credentialed Teachers	.08**

**p <.001

Grade 11

At the high school level, all bivariate correlations and partial correlations were significant between LMS staffing and test scores. The relationship between certificated staffing and ELA scores was significant at $r = .44$, $p < .001$. When controlling for school and community variables in separate partial correlations, the relationship between English Language Arts scores and LMS staffing did not substantially change. Average teacher salary weakened the relationship slightly to $r = .41$, $p < .001$; in all other cases, the control variable strengthened the relationship. See Table 25 for a summary of these results.

Table 25

Partial Correlation, Certificated Staff Hours, English Language Arts CST Scores, and School and Community Variables, Grade 11

Control	*r*
Parent Education Level	.46**
Free and Reduced Lunch	.48**
Ethnicity	.52**
Percentage English Learners	.51**
Avg. Teacher Salary	.41**
Percentage Fully Credentialed Teachers	.45**

**p <.001

The relationship between LMS staffing and U.S. history CST scores was similar, at r = .45, p <.001. Controlling for school and community variables generally strengthened the relationship, average teacher salary at r = .41 and parent education level at r = .44 being the exceptions. In each case, the value of p was less than .001. See Table 26 for results.

Table 26

Partial Correlation, Certificated Staff Hours, U.S. History CST Scores, and School and Community Variables, Grade 11

Control	*r*
Parent Education Level	.44**
Free and Reduced Lunch	.48**
Ethnicity	.52**
Percentage English Learners	.51**
Avg. Teacher Salary	.41**
Percentage Fully Credentialed Teachers	.46**

**p <.001

Summary and Discussion for Research Question 1

In all but one case, there was a statistically significant correlation between CST scores and certificated LMS staffing (See Table 27). Partial correlations between CST scores and LMS staffing using school and community variables as controls generally strengthened or did not change those relationships. These positive correlations are consistent with results of prior studies in Illinois (Lance, Hamilton-Pennell & Rodney, 2005), Florida (Baumbach, 2003), Iowa (Rodney, Lance & Hamilton-Pennell, 2002), Michigan (Rodney, Lance & Hamilton-Pennell, 2003), Alaska (Lance et al., 1999), North Carolina (Burgin, Bracy & Brown, 2003), Ontario (Ontario Library Association, 2006), Minnesota (Baxter & Smalley, 2003), and Wisconsin (Smith, 2006). While the correlations are weak at both the elementary and middle school, the bivariate and partial correlations found at the high school level were stronger than those in any of the other studies mentioned here. These findings also support the models of school library programs proposed by Loertscher (2000) and Todd & Kuhlthau (2004), which emphasize the presence of certificated library staff in support of school-wide student achievement.

The null hypothesis that student achievement does not vary in relationship to the levels of certificated staffing in school library media programs is rejected.

Table 27

Summary of Bivariate Correlations, CST Scores and LMS Staffing

Grade	Test	*r*
4	English Language Arts	.06**
8	English Language Arts	.00
8	Social Studies	.07 *
11	English Language Arts	.44**
11	U.S. History	.45**

*p <.05, **p <.001

H02: Student Achievement and Combined Staffing Levels

The second research question was, "How does student achievement vary, if at all, in relationship to the levels of combined certificated and clerical staffing in school library media programs?" This question formed the null hypothesis *H02*, that student achievement does not vary in relationship to the levels of combined certificated and clerical staffing in school library media programs, for the next analysis.

Grade 4

At the fourth grade, the bivariate correlation between English Language Arts and total staffing hours was statistically significant but weak, at $r = -.04$, $p = .02$. The significant negative correlation remained when controlling for average teacher salary at $r = -.06$, $p < .001$, and for percent of teachers fully credentialed, at $r = -.04$, $p < .03$. This relationship was no longer significant when factoring for parent education level and was positive at $r = .12$, $p < .001$ when controlling for percent of students eligible for free and reduced lunch and percent of English learners at $r = .04$, $p = .04$. See table 28 a summary of these results.

Table 28

Partial Correlation, Total Staff Hours, English Language Arts CST Scores, and School and Community Variables, Grade 4

Control	*r*
Parent Education Level	.00
Free and Reduced Lunch	.12**
Ethnicity	.02
Percentage English Learners	.04*
Avg. Teacher Salary	-.06**
Percentage Fully Credentialed Teachers	-.04*

*$p < .05$, **$p < .001$

Grade 8

At the eighth grade level, the relationship between English Language Arts CST scores and total staffing was significant at $r = .12$, $p < .001$. This relationship remained significant in partial correlations with all school and community variables used as controls. The relationship was strongest when controlling for ethnicity at $r = .22$, $p < .001$. Table 29 summarizes the results.

Table 29

Partial Correlation, Total Staff Hours, English Language Arts CST Scores, and School and Community Variables, Grade 8

Control	*r*
Parent Education Level	.09**
Free and Reduced Lunch	.18**
Ethnicity	.22**
Percentage English Learners	.19**
Avg. Teacher Salary	.07*
Percentage Fully Credentialed Teachers	.09**

*p <.05, **p <.001

Correlations between social studies CST scores and total staffing hours at the eighth grade level were significant at $r = .19$, $p < .001$. This positive relationship persisted in all partial correlations using school and community variables. All of the community variables strengthened the relationship, the strongest of these being ethnicity, at $r = .28$, $p < .001$. Both average teacher salary and percent fully credentialed teachers weakened the relationship, the weakest being average teacher salary at $r = .12$, $p < .001$. See table 30 for a summary of results.

Table 30

Partial Correlation, Total Staff Hours, Social Studies CST Scores, and School and Community Variables, Grade 8

Control	*r*
Parent Education Level	.17**
Free and Reduced Lunch	.26**
Ethnicity	.28**
Percentage English Learners	.26**
Avg. Teacher Salary	.12**
Percentage Fully Credentialed Teachers	.06**

**p <.001

Grade 11

At the eleventh grade level, the bivariate correlation of English Language Arts and total staffing hours yielded $r = .54$, with $p < .001$. As seen in Table 31, the strength of that correlation remained generally the same in partial correlations with school and community control variables, with a range of $r = .49$, $p < .001$, for average teacher salary to $r = .59$, $p < .001$, for English learners as the control.

Table 31

Partial Correlation, Total Staff Hours, English Language Arts CST Scores, and School and Community Variables, Grade 11

Control	*r*
Parent Education Level	.53**
Free and Reduced Lunch	.53**
Ethnicity	.57**
Percentage English Learners	.59**
Avg. Teacher Salary	.49**
Percentage Fully Credentialed Teachers	.54**

**p <.001

The correlation between eleventh grade U.S. History CST scores and total staffing hours was similarly strong at r = .56, p <.001, and the relationship followed a similar pattern when controlling for school and community variables in partial correlations, which ranged from r = .52 when controlling for average teacher salary to r = .60 when controlling for percentage of English learners, both at p <.001. See table 32 for results.

Table 32

Partial Correlation, Total Staff Hours, U.S. History CST Scores, and School and Community Variables, Grade 11

Control	*r*
Parent Education Level	.56**
Free and Reduced Lunch	.56**
Ethnicity	.59**
Percentage English Learners	.60**
Avg. Teacher Salary	.52**
Percentage Fully Credentialed Teachers	.57**

**$p < .001$

Summary and Discussion for Research Question 2

Overall results indicate a positive significant relationship between total staffing levels and student achievement, indicating a rejection of the null hypothesis. At the fourth grade level, there was a significant negative correlation between English Language Arts CST scores and total staffing, $r = -.04$, $p = .02$, but the significance of the correlation disappeared or the direction of the relationship became positive in partial correlations controlling for community variables, the strongest positive value being $r = .12$, $p < .001$, when controlling for parent education. All of these correlations were very weak and would not alone lead to a rejection of the null hypothesis that student achievement does not vary in relationship to total library staffing levels.

At the eighth grade level, though, bivariate correlations between total library staffing and both English Language Arts and social studies CST scores were significant at $r = .12$, $p < .001$ and $r = .19$, $p < .001$ respectively. The strength of these relationships tended to increase with partial correlations controlling for school and community variables. The strongest partial correlations for both English Language Arts and social studies controlled for ethnicity, at $r = .22$, $p < .001$ and $r = .28$, $p < .001$ respectively.

At the eleventh grade, bivariate correlations between total library staffing levels and CST scores were again stronger than at middle or elementary levels at $r = .54$, $p < .001$ for English Language Arts CST scores and $r = .56$, $p < .001$ for U.S. History scores. The strength of those associations remained in partial correlations with school and community variables. For English Language Arts, those correlations ranged from $r = .49$, $p < .001$ when controlling for average teacher salary to $r = .59$, $p < .001$ when controlling for percentage of English learners. For U.S. History, those partial correlations ranged from $r = .52$, $p < .001$ when controlling for average

teacher salary to r =.60, p <.001 when controlling for percentage of English learners. A summary of the bivariate correlations from all three levels can be seen in Table 33.

Table 33

Bivariate Correlations, LMS Staffing and Total Staffing, Grades 4, 8 and 11

Grade	CST Test	LMS Staffing	Total Staffing
4	English Language Arts	.06**	-.04*
8	English Language Arts	.00	.12**
8	Social Studies	.07*	.19**
11	English Language Arts	.44**	.54**
11	U.S. History	.45**	.56**

*p <.05, **p <.001.

Consistent with results from question 1, the strength of correlations tended to increase with grade level. Additionally, a comparison of correlations indicated at the middle and high school level that total staffing accounted for more of the variance in scores than did certificated staffing alone. Results from this question are supported by previous studies linking total staffing to higher test scores, including studies from Illinois (Lance et al., 2005), Florida (Baumbach , 2003), Michigan (Rodney et al., 2003), New Mexico. (Lance, Rodney & Hamilton-Pennell, 2002), North Carolina (Burgin et al., 2003), Pennsylvania (Lance et al., 2000b), and Wisconsin (Smith, 2006).

The similarities between English Language Arts and social studies CST score correlations with staffing levels at the eighth grade, and English Language Arts and U.S. History CST scores and staffing levels at the eleventh grade are also consistent with previous studies showing positive correlations between library staffing and measures of student achievement

other than reading scores (see Greve, 1977; Hall-Ellis & Berry, 1995; Jenkins, 2000; Mancall, 1985; Martin, 1996).

This finding also supports the research (Loertscher, Ho & Bowie, 1987) and theoretical model proposed by Loertscher (2000), which indicate that for a school library program to have a significant impact on student achievement, adequate levels of both clerical and certificated staff are essential (see also Beaird, 1999; Callison, 2004; Didier, 1984; Farwell, 1998; Gaver, 1962; Lance et al., 1999; Lance, Rodney & Hamilton-Pennell, 2000b, 2002; Lance, Welborn & Hamilton-Pennell, 1993; Loertscher & Land, 1975; McCracken, 2001; Underwood, 2004). Results from this study indicate that as certificated library staff increases, test scores tend to increase. But in the absence of clerical support, certificated staff is left to run the warehouse functions of the library and has little or no time to collaborate with teachers on lessons and activities that raise achievement. This study also indicates that at the middle school and high school level, as total library staffing increased, test scores tended to increase.

H03: Student Achievement and Library Staff Services Offered

The third research question, "How does student achievement vary, if at all, in relationship to library staff services offered, either independently or in combination?" formed the null hypothesis *H03*: Student achievement does not vary in relationship to library staff services offered, either independently or in combination.

In the California Department of Education school library survey, two multi-part questions assess staff services. Question 18 asks, "Which of the following services and/or programs were regularly provided in the 2006-2007 school year?" Twenty-one services are described, as listed in Figure 5.

Question #18:
Which of the following services and/or programs were regularly provided in the 2006-2007 school year?

(A) Offered a program of curriculum-integrated information literacy instruction.
(B) Informally instructed students in the use of resources.
(C) Planned or conducted workshops for teachers.
(D) Assisted school curriculum committee with recommendations.
(E) Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week.
(F) Provided teachers with information about new resources.
(G) Provided reference assistance to students and teachers.
(H) Helped students and teachers find and use resources outside school library.
(I) Facilitated interlibrary loan for students and teachers.
(J) Provided reading, listening, and viewing guidance for students.
(K) Helped parents realize importance of lifelong learning.
(L) Coordinated in-school production of materials.
(M) Coordinated video production and dissemination activities.
(N) Coordinated cable TV, distance education, and related activities.
(O) Coordinated school or library computer networks.
(P) Provided access to online library catalog and circulation.
(Q) Provided Internet access for students in the library.
(R) Provided instruction on Internet searching and research.
(S) Provided electronic access to a resource sharing network.
(T) Communicated proactively with principal.
(U) Attended meetings of school site council, two or more times per school year.
(V) None of the above.

Figure 5. California Department of Education school library question #18. Used with permission.

Results to this question were re-coded into separate variables; when the service was regularly provided, the appropriate variable would be coded "1;" when the service was not indicated, it would be coded with a "0." An additional variable, "total services," added together all the "service" variable scores, A through U in Figure 5, to provide a total number of services regularly provided.

Grade 4

At the fourth grade level, there were significant positive correlations between English Language Arts CST scores and fourteen library staff services. The two strongest associations were with choice B, "Informally instructed students in the use of resources," at $r = .16$ ($p < .001$) and choice T, "Communicated proactively with principal" at $r = .15$, $p < .001$. Total services correlated with the English Language Arts CST scores at $r = .14$, $p < .001$. Table 34 lists all results. Of the fourteen with significant correlations, seven remained significant in partial correlations with all school and community variables used as controls:

- Offered a program of curriculum-integrated information literacy instruction
- Informally instructed students in the use of resources
- Provided teachers with information about new resources
- Provided reference assistance to students and teachers
- Helped students and teachers find and use resources outside school library
- Helped parents realize importance of lifelong learning
- Communicated proactively with principal

In addition, total services remained significant in partial correlations controlling for each of the school and community variables, as shown in Table 35.

Table 34
Bivariate Correlation, English Language Arts CST and Library Services, Grade 4

Library Service	*r*
Offered a program of curriculum-integrated information literacy instruction	.12**
Informally instructed students in the use of resources	.16**
Planned or conducted workshops for teachers	.01
Assisted school curriculum committee with recommendations	.00
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	.00
Provided teachers with information about new resources	.09**
Provided reference assistance to students and teachers	.11**
Helped students and teachers find and use resources outside school library	.05**
Facilitated interlibrary loan for students and teachers	.07**
Provided reading, listening, and viewing guidance for students	.09**
Helped parents realize importance of lifelong learning	.10**
Coordinated in-school production of materials	-.03
Coordinated video production and dissemination activities	-.03
Coordinated cable TV, distance education, and related activities	-.01
Coordinated school or library computer networks	.05**
Provided access to online library catalog and circulation	.14**
Provided Internet access for students in the library	.08**
Provided instruction on Internet searching and research	.06**
Provided electronic access to a resource sharing network	.02
Communicated proactively with principal	.15**
Attended meetings of school site council, two or more times per school year	.07**
Total Services	.14**

**$p < .001$

Table 35

Partial Correlation, Total Library Services, English Language Arts CST Scores, and School and Community Variables, Grade 4

Control	*r*
Parent Education Level	.08**
Free and Reduced Lunch	.13**
Ethnicity	.10**
Percentage English Learners	.13**
Avg. Teacher Salary	.12**
Percentage Fully Credentialed Teachers	.13**

**$p < .001$

Grade 8

At the eighth grade level, there were also fourteen services that were significantly related to English Language Arts CST scores, with the three strongest being "Communicated proactively with principal" , "Offered a program of curriculum-integrated information literacy instruction," and Total services, all at $r = .19$, $p < .001$ (see Table 36).

Table 36

Bivariate Correlation, English Language Arts CST and Library Services, Grade 8

Library Service	*r*
Offered a program of curriculum-integrated information literacy instruction	.09**
Informally instructed students in the use of resources	.19**
Planned or conducted workshops for teachers	.00
Assisted school curriculum committee with recommendations	.02
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	.04
Provided teachers with information about new resources	.18**
Provided reference assistance to students and teachers	.19**
Helped students and teachers find and use resources outside school library	.11**
Facilitated interlibrary loan for students and teachers	.14**
Provided reading, listening, and viewing guidance for students	.12**
Helped parents realize importance of lifelong learning	.11**
Coordinated in-school production of materials	.04
Coordinated video production and dissemination activities	.03
Coordinated cable TV, distance education, and related activities	.01
Coordinated school or library computer networks	.10**
Provided access to online library catalog and circulation	.16**
Provided Internet access for students in the library	.18**
Provided instruction on Internet searching and research	.13**
Provided electronic access to a resource sharing network	.06*
Communicated proactively with principal	.19**
Attended meetings of school site council, two or more times per school year	.05
Total Services	.19**

*p <.05, **p <.001.

Of the fourteen services that significantly correlated with English Language Arts CST scores, just one, "Provided electronic access to a resource sharing network," did not remain significant in relation to those scores when factoring for school and community variables in partial correlations. Total services also remained statistically significant in each partial correlation, strengthened by some controls and weakened by others, as indicated in Table 37.

Table 37

Partial Correlation, Total Library Services, English Language Arts CST Scores, and School and Community Variables, Grade 8

Control	*r*
Parent Education Level	.14**
Free and Reduced Lunch	.21**
Ethnicity	.23**
Percentage English Learners	.21**
Avg. Teacher Salary	.15**
Percentage Fully Credentialed Teachers	.15**

**$p < .001$

When correlated with eighth grade social studies CST scores, sixteen of the library services were statistically significant, and total services were significant at $r = .24$, $p < .001$. Among these sixteen, all but two remained statistically significant in partial correlations with all community and school control variables, and those two lost significance only when controlling for average teacher salary. In this partial correlation, "Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week" correlated at $r = .05$, $p = .120$, and "Attended meetings of school site council, two or more times per school year" correlated at $r = .05$, $p = .075$. See table 38 for bivariate correlations for all services.

Table 38

Partial Correlation, Total Library Services, Social Studies CST Scores, and School and Community Variables, Grade 8

Library Service	*r*
Offered a program of curriculum-integrated information literacy instruction	.14**
Informally instructed students in the use of resources	.22**
Planned or conducted workshops for teachers	.04
Assisted school curriculum committee with recommendations	.05
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	.08**
Provided teachers with information about new resources	.21**
Provided reference assistance to students and teachers	.22**
Helped students and teachers find and use resources outside school library	.14**
Facilitated interlibrary loan for students and teachers	.15**
Provided reading, listening, and viewing guidance for students	.14**
Helped parents realize importance of lifelong learning	.14**
Coordinated in-school production of materials	.07
Coordinated video production and dissemination activities	.05
Coordinated cable TV, distance education, and related activities	.020
Coordinated school or library computer networks	.14**
Provided access to online library catalog and circulation	.20**
Provided Internet access for students in the library	.22**
Provided instruction on Internet searching and research	.17**
Provided electronic access to a resource sharing network	.10**
Communicated proactively with principal	.21**
Attended meetings of school site council, two or more times per school year	.07**
Total Services	.24**

**$p < .001$

Total services remained statistically significant when controlling for each of the school and community variables in partial correlations, too. These correlations ranged in strength from $r = .20$, $p < .001$, when controlling for average teacher salary, to $r = .28$, $p < .001$, when controlling for ethnicity. See Table 39 for complete results.

Table 39

Partial Correlation, Total Library Services, Social Studies CST Scores, and School and Community Variables, Grade 8

Control	*r*
Parent Education Level	.21**
Free and Reduced Lunch	.27**
Ethnicity	.28**
Percentage English Learners	.27**
Avg. Teacher Salary	.20**
Percentage Fully Credentialed Teachers	.21**

**$p < .001$

Grade 11

In bivariate correlations between English Language Arts CST scores and each library service, there was statistically positive relationship with each service except "Coordinated cable TV, distance education, and related activities," at $r = .05$, $p = .14$. As was the case for research questions one and two, the strength of these bivariate relationships was greatest at the high school level. Total services correlated most strongly at $r = .49$, $p < .001$, followed by "Provided teachers with information about new resources" at $r = .48$, $p < .001$, and "Informally instructed students in the use of resources," at $r = .47$, $p < .001$. In partial correlations using each community and school variable as a control, only "Coordinated video production and dissemination activities" did not retain statistical significance in relationship to English Language Arts CST scores. See Table 40 for a summary of bivariate correlation results.

Table 40

Bivariate Correlation, English Language Arts CST and Library Services, Grade 11

Library Service	*r*
Offered a program of curriculum-integrated information literacy instruction	.38**
Informally instructed students in the use of resources	.47**
Planned or conducted workshops for teachers	.22**
Assisted school curriculum committee with recommendations	.23**
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	.28**
Provided teachers with information about new resources	.48**
Provided reference assistance to students and teachers	.47**
Helped students and teachers find and use resources outside school library	.41**
Facilitated interlibrary loan for students and teachers	.17**
Provided reading, listening, and viewing guidance for students	.34**
Helped parents realize importance of lifelong learning	.20**
Coordinated in-school production of materials	.16**
Coordinated video production and dissemination activities	.07*
Coordinated cable TV, distance education, and related activities	.05
Coordinated school or library computer networks	.27**
Provided access to online library catalog and circulation	.45**
Provided Internet access for students in the library	.46**
Provided instruction on Internet searching and research	.43**
Provided electronic access to a resource sharing network	.30**
Communicated proactively with principal	.44**
Attended meetings of school site council, two or more times per school year	.31**
Total Services	.49**

*p <.05, **p <.001

Total services remained statistically significant in all partial correlations using school and community controls as well; as seen in Table 41, these correlations ranged from r = .45 when controlling for average teacher salary to .53 when controlling for the percent of English learners.

Table 41

Partial Correlation, Total Library Services, English Language Arts CST Scores, and School and Community Variables, Grade 11

Control	*r*
Parent Education Level	.48**
Free and Reduced Lunch	.48**
Ethnicity	.51**
Percentage English Learners	.53**
Avg. Teacher Salary	.45**
Percentage Fully Credentialed Teachers	.49**

**$p < .001$

Bivariate correlations between U.S. History CST scores and library services produced similar results when compared to the correlations between English Language Arts CST scores and library services. As shown in Table 42, of the 21 library service variables, only "Coordinated cable TV, distance education, and related activities," at $r = .04$, $p = .254$, was not statistically significant. And as with the previous results, only "Coordinated video production and dissemination activities" did not remain statistically significant in partial correlations with each of the school and community variables.

Table 42

Bivariate Correlation, U.S. History CST Scores and Library Services, Grade 11

Library Service	*r*
Offered a program of curriculum-integrated information literacy instruction	.39**
Informally instructed students in the use of resources	.47**
Planned or conducted workshops for teachers	.22**
Assisted school curriculum committee with recommendations	.25**
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	.29**
Provided teachers with information about new resources	.49**
Provided reference assistance to students and teachers	.47**
Helped students and teachers find and use resources outside school library	.41**
Facilitated interlibrary loan for students and teachers	.20**
Provided reading, listening, and viewing guidance for students	.35**
Helped parents realize importance of lifelong learning	.22**
Coordinated in-school production of materials	.17**
Coordinated video production and dissemination activities	.08*
Coordinated cable TV, distance education, and related activities	.04
Coordinated school or library computer networks	.28**
Provided access to online library catalog and circulation	.46**
Provided Internet access for students in the library	.47**
Provided instruction on Internet searching and research	.44**
Provided electronic access to a resource sharing network	.29**
Communicated proactively with principal	.45**
Attended meetings of school site council, two or more times per school year	.31**
Total Services	.51**

*p <.05, **p <.001.

Partial correlations between total services and U.S. History CST scores remained significant when controlling for each school and community variable, ranging in strength from *r*

= .46, $p < .001$, controlling for average teacher salary and $r = .53$, $p < .001$ when controlling for percentage of English learners. See Table 43.

Table 43

Partial Correlation, Total Library Services, U.S. History CST Scores, and School and Community Variables, Grade 11

Control	*r*
Parent Education Level	.50**
Free and Reduced Lunch	.50**
Ethnicity	.52**
Percentage English Learners	.53**
Avg. Teacher Salary	.46**
Percentage Fully Credentialed Teachers	.51**

**$p < .001$

Summary and Discussion of Response to Research Question 3

Total library services were significantly related to student achievement at each level in all bivariate and partial correlations, and the strength of those correlations increased with grade level. At the fourth grade level, there were significant positive correlations between English Language Arts CST scores and 14 library staff services. The two strongest associations were with informally instructing students in the use of resources, at $r = .16$ ($p < .001$), and communicating proactively with principal, at $r = .15$, $p < .001$. Total services correlated with the English Language Arts CST scores at $r = .14$, $p < .001$.

Of the 14 with significant correlations, seven remained significant in partial correlations with all school and community variables used as controls; the strongest of these were offering a program of curriculum-integrated information literacy instruction, at $r = .18$, $p < .001$ and providing reference assistance to students and teachers, at $r = .17$, $p < .001$, both controlling for

the percent of teachers fully credentialed. Total library services correlated significantly bivariate correlation with English Language Arts scores at r =.14, p <.001, and with partial correlations when controlling for each of the school and community variables. The strength of these scores ranged from r =.08, p <.001, when controlling for parent education level to r =.13, p <.001 when controlling for free and reduced lunch.

Again, the correlations between library services and student achievement were stronger at the middle school than at the elementary school level. At the eighth grade level, there were also fourteen services that were significantly related to English Language Arts CST scores, with the three strongest being communicating proactively with principal , offering a program of curriculum-integrated information literacy instruction, and total services, all at r = .19, p <.001. Just one of the fourteen services did not remain significant in relationship to English Language Arts CST scores when controlling for school and community variables in partial correlations. Total services remained significant in all partial correlations, the strongest when controlling for ethnicity at r =.23, p <.001.

Slightly stronger bivariate correlations between social studies CST scores and library services were seen, the strongest being total services at r =.24, p <.001, and informally instructing students in the use of resources and providing reference assistance to students and teachers, both at r =.22, p <.001. All but two of sixteen services remained statistically significant in partial correlations with each school and community variable as a control, and library services remained significant in these partial correlations with r values ranging from .20 to .28, p <.001.

At the high school level, in 21 of 22 categories there was a statistically significant relationship between library services and student achievement. The relationship between

English Language Arts CST scores and library services was very similar in strength to that of U.S. History CST scores, which will be summarized here. The strongest bivariate correlations included total services at r =.51, p <.001, providing teachers with information about new resources, r = .49, p <.001, and informally instructed students in the use of resources, r = .47, p <.001. Partial correlations between total services and U.S. History CST scores remained significant when controlling for each school and community variable, ranging in strength from r = .46, p < .001, controlling for average teacher salary and r = .53, p < .001 when controlling for percentage of English learners.

The null hypothesis that student achievement does not vary in relationship to library staff services offered, either independently or in combination, was rejected.

In Loertscher's (2000) model, the activities that the school librarian engages in related to collaboration, reading, information literacy, and enhancing learning through technology are instrumental in the library program's contribution to student achievement. At the high school level, where nearly half the schools have a full-time, certificated librarian, the correlations between student achievement and these activities ranged from r =.22 to r =.49. See Appendix C for a summary of the correlations between school library elements from Loertscher's model and 11th grade student achievement scores.

Todd and Kuhlthau's (2004) model identifies these roles in terms of "dynamic agents of learning, " and include resource agent, information literacy agent, knowledge construction agent, academic achievement agent, independent reading and personal development agent, technological agent, rescue agent, and individualized learning agent. Todd and Kuhlthau's model suggests that activities lower in Loertscher's taxonomy also critically contribute to student achievement, and this study supports that assertion. The correlations between activities

connected to Todd and Kuhlthau's model and student achievement at the high school level range from $r = .20$ $p < .001$ to $r = .49$, $p < .001$. See Appendix D for a summary of correlations between elements of Todd and Kuhlthau's model and 11th grade student achievement scores.

With Loertscher's (2000) and Todd and Kuhlthau's (2004) models in mind, the entire range of services the school library program provides contributes to student achievement. At the high school level, the correlation between student achievement and total services was $r = .51$, $p < .001$. Although correlations with other services were weak at both elementary and middle school, the total services correlation for elementary was $r = .14$ $p < .0$, and $r = .24$, $p < .001$ at the middle school level. Although correlations do not indicate causality, the evidence is consistent with the assertion that the instructional role of the school librarian contributes to student achievement and lends support to a host of prior research (see Baughman, 2000; Callison, 2004; Gehlkin, 1994; Didier, 1984; Haycock, 1992; Marchant, Broadway, Robinson & Shields., 1984; Lance, Rodney & Hamilton-Pennell, 2000a, 2000b, 2002; Lance et al., 2005 Smith, 2006;).

H04: Student Achievement and Other Library Program Elements.

The fourth research question states, "How does student achievement vary, if at all, in relationship to other library program elements?" The null hypothesis *H04* was derived from this question as follows: student achievement does not vary in relationship to other library program elements.

Remaining library program elements for which there was data from the library survey included hours open, collection size, budget, and technology available in the library. Data for technology available in the library was taken from question 11 on the library survey (see Appendix A), which asks, "Check one or more of the following technologies available in or

through the school library." Twelve technologies were listed as choices, including online databases, library Web pages, Internet access, automated catalog and circulation, DVD's, audio books, video collections, and integrated search tools. The total number of technologies indicated on the original response was coded into a new category called "total technology," which was used as a measure of overall technology in the library.

Grade 4

At the fourth grade, there were significant but weak correlations between English Language Arts CST scores and all other library program elements, including hours open, collection size, budget, and total technology. Though weak, the significance persisted when partial correlations using school and community control variables were calculated. See Table 44.

Table 44

Bivariate and Partial Correlations, Library Program Elements and English Language Arts CST Scores, Grade 4

Control	Hours Open	Collection Size	Budget	Total Technology
None (bivariate correlation)	.08**	.08**	.07**	.11**
Parent education	.09**	.05**	.04*	.04*
Free and reduced lunch	.08**	.07**	.05**	.08**
Ethnicity	.06**	.07**	.06**	.08**
Percent English learners	.11**	.13**	.08**	.09**
Average teacher salary	.05**	.04*	.06**	.09**
Percent teachers fully credentialed	.08**	.07**	.10**	.09**

*$p < .05$, **$p < .001$.

Grade 8

At the eighth grade level, each library program element was significantly related to English Language Arts CST scores in bivariate correlations. Significance persisted using each of the six school and community controls in partial correlations involving both hours open and total technology. Partial correlations with hours open ranged from $r = .11$ to $r = .25$. Partial correlations with total technology ranged from $r = .12$ to $r = .24$. Significance values in each of these correlations were less than .001. With collection size and budget, bivariate correlations were significant but very weak (.05 and .06 respectively, $p < .001$); relationships to English Language Arts CST scores strengthen in some partial correlations and fell to insignificance with others. See Table 45 for results.

Table 45
Bivariate and Partial Correlations, Library Program Elements and English Language Arts CST Scores, Grade 8

Control	Hours Open	Collection Size	Budget	Total Technology
None (bivariate correlation)	.16**	.05**	.06**	.19**
Parent education	.17**	.07**	.05	.12**
Free and reduced lunch	.20**	.20**	.09**	.21**
Ethnicity	.23**	.15**	.12**	.24**
Percent English learners	.25**	.15**	.10**	.22**
Average teacher salary	.11**	.00	.03	.14**
Percent teachers fully credentialed	.14**	.02	.06	.15**

**$p < .001$

In bivariate correlations with eighth grade social studies CST scores, each library program again yielded significant results. Both hours open and total technology remained

significant in all the partial correlations. Partial correlations between social studies scores and hours open ranged from $r = .13$ to $r = .28$, $p < .001$. Partial correlations with total technology ranged in value from $r = .17$ to $r = .27$, $p < .001$. Both collection size and budget were significant in each partial correlation except the one controlling for average teacher salary. Significant partial correlations with collection size ranged from $r = .08$ to $r = .25$, $p < .001$. Significant partial correlations with budget ranged from $r = .09$ to $r = .15$, $p < .001$ (see Table 46).

Table 46

Bivariate and Partial Correlations, Library Program Elements and Social Studies CST Scores, Grade 8

Control	Hours Open	Collection Size	Budget	Total Technology
None (bivariate correlation)	.20**	.10**	.09**	.22**
Parent education	.21**	.13**	.09**	.17**
Free and reduced lunch	.24**	.25**	.13**	.25**
Ethnicity	. 25**	.19**	.15**	.27**
Percent English learners	.28**	.19**	.13**	.26**
Average teacher salary	.13**	.04	.05	.17**
Percent teachers fully credentialed	.18**	.08**	.09**	.20**

**$p < .001$

Grade 11

In all categories, there were significant correlations between English Language Arts CST scores and library program elements at grade 11. All relationships remained significant in partial correlations with each of the school and community variables. Not only were there more

significant correlations at the high school level, but the strength of these correlations was greater for each library program element. The strongest correlation was between English Language Arts CST scores and hours open; five of the six partial correlations had *r* values greater than .50; the sixth had a value of $r = .49$, $p < .001$. See Table 47 for a summary of results.

Table 47

Bivariate and Partial Correlations, Library Program Elements and English Language Arts CST Scores, Grade 11

Control	Hours Open	Collection Size	Budget	Total Technology
None (bivariate correlation)	.52**	.44**	.36**	.49**
Parent education	.52**	.47**	.36**	.49**
Free and reduced lunch	.52**	.47**	.37**	.49**
Ethnicity	.55**	.52**	.39**	.52**
Percent English learners	.57**	.51**	.40**	.53**
Average teacher salary	.49**	.40**	.32**	.46**
Percent teachers fully credentialed	.53**	.45**	.37**	.50**

**$p < .001$

Results were similar in correlations between U.S. History CST scores and library program elements at grade 11, with each library program element significantly correlated to the CST score in all bivariate and partial correlations. As in the correlations with English Language Arts CST scores, the strongest relationship was between test scores and hours open; partial correlations using each of the six school and community controls resulted in *r* values greater than .50, the highest being $r = .57$, $p < .001$. As shown in Table 48, Total technology partial

correlations exceeded $r = .50$ in five of six cases, with a range of $r = .48$ to $r = .54$, $p < .001$.

Table 48

Bivariate and Partial Correlations, Library Program Elements and U.S. History CST Scores, Grade 11

Control	Hours Open	Collection Size	Budget	Total Technology
None (bivariate correlation)	.54**	.46**	.36**	.51**
Parent education	.53**	.49**	.37**	.50**
Free and reduced lunch	.54**	.49**	.38**	.51**
Ethnicity	.56**	.53**	.40**	.53**
Percent English learners	.57**	.52**	.40**	.54**
Average teacher salary	.51**	.42**	.33**	.48**
Percent teachers fully credentialed	.55**	.47**	.38**	.51**

**$p < .001$

Summary and Discussion of Response to Research Question 4

In grades 4, 8 and 11, student achievement was significantly related to other library program elements beyond staffing and services. As was the case with total staffing and library services, as the grade level rose, the strength of the correlations increased. At the fourth grade level, all bivariate and partial correlations were significant between English Language Arts CST scores and the four library program elements. Although statistically significant, these correlations were very weak, the strongest being a partial correlation between English Language Arts CST scores and collection size, controlling for percent of English learners, at $r = .13$, $p < .001$.

At the eighth grade level, all bivariate correlations between English Language Arts CST scores and library program elements were significant. With each of the six partial correlations controlling for school and community variables, significance remained for hours open and total technology. The relationships with these two library variables were stronger than at the fourth grade level; hours open *r* values ranged from .11 to .29; total technology *r* values ranged from .12 to .24, $p < .001$. Collection size was significant in four of six partial correlations, while budget was significant in three of six partial correlations. The strength of the significant correlations for both these variables, though, was generally weak. For collection size, the r value ranged from .07 to .20; for budget, r ranged from .09 to .12, $p < .001$.

Relationships between eighth grade social studies CST scores and library elements were somewhat stronger. Each library program element was again significantly related to test scores in bivariate correlations. Hours open and total technology were significant in all partial correlations; *r* values for hours open ranged from .13 to .28, $p < .001$, and *r* values for total technology ranged from .17 to .27, $p < .001$. Collection size and budget were significant in five of six partial correlations; both were insignificant when controlling for average teacher salary.

Again, results were markedly different at the high school level. In all categories, there were significant bivariate correlations between CST scores and library program elements at grade 11, and significance remained when controlling for each of the school and community variables in partial correlations. The strongest relationships were again in hours open and total technology in correlations with both English Language Arts and U.S. History CST scores. In all but one case, *r* values for hours open were above .50 across both tests in bivariate and partial correlations; total technology *r* values ranged from .46 to .54, $p < .001$. There was a stronger relationship between CST scores and collection size, with *r* values ranging from .40 to .53, $p <$

.001, across correlations with both English Language Arts and U.S. History CST scores. The relationship between budget and test scores strengthened, too, with *r* values ranging from .33 to .40, $p < .001$, across correlations with English Language Arts and U.S. History CST scores.

Across grade levels, there were consistent, statistically significant correlations between test scores and the remaining library program elements, and the strength of those correlations generally increased with grade level. The null hypothesis that student achievement does not vary in relationship to other library program elements is rejected.

At the elementary level, the lack of certificated staff may account for some of the weakness in correlations. As will be discussed later, there was a persistent correlation between all library elements and staffing levels. The presence of a professional may have an impact on all of the variables investigated here: the hours a library is open also depends on the activities that occur and the help with students that transpires during open hours. The size of the collection is not an indication of quality, and the presence of a professional in collection development may have an impact on whether that collection contributes to student achievement. Similarly, the presence of a certificated librarian in allocating budget priorities may be the key to budget size as an indicator of student achievement. And technology in the library may become more significant as a professional facilitates its best use with students and staff.

The greater presence of certificated staff at the middle school level bears out this contention. Collection size and budget—related items—are still only weakly correlated with student achievement, but hours open and total technology exhibit *r* values in partial correlations of up to .28 and .27, $p < .001$, respectively. At the high school level, where professional staffing is strongest, so are the correlations between these library elements and student achievement. No bivariate or partial correlation between these library elements and either English Language Arts

or U.S. History CST scores had an r value of less than .32, $p < .001$, and only budget had r values of less than .40. These results support previous research that these library elements contribute to student achievement:

- Hours open (Baxter & Smalley, 2003; Burgin et al., 2003; Gaver, 1962; Rodney et al., 2003; Smith, 2006)
- Collection size (Baumbach, 2003; Krashen, 1995; Krashen, 2004; Lance, Hamilton-Pennell & Rodney, 2005; Lance, Rodney & Hamilton-Pennell, 2002; McQuillan, 1998; Rodney et al., 2002, 2003; Smith, 2006; Squire, Applebee & Lucas, 1967)
- Budget size (Baxter & Smalley, 2003; Bruning, 1994; Burgin et al., 2003; Greve, 1977; Hall-Ellis & Berry, 1995; Lance et al., 2002; Rodney et al., 2003; Smith, 2006)
- Technology available in the library (Baule, 1997; Lance et al., 2005; Oliver, 2003; Rodney et al., 2003; Ryan, 2006; Smith, 2006).

H_{05}: Student Achievement, Staffing Levels and Other Library Program Elements

The fifth research question asks how student achievement varies, if at all, in relationship to a combination of library program elements. The null hypothesis for this question, *H_{05}*, is that student achievement does not vary in relationship to any combination of library staffing levels and other library program elements.

Grade 4

To reduce the overall number of variables and address possible issues of multicollinearity, all school and community variables were entered into a factor analysis with

varimax rotation. This procedure was also used to identify variables that correlated highly with one another and formed factors (Leech, Barrett, & Morgan, 2005). Only factor loadings greater than .600 were considered for inclusion in groupings, and only groupings with an eigenvalue of at least 1 were retained. After rotation, the first factor accounted for 53.8% of the variance; the second factor accounted for 17.8%, for a total of 71.6%. Table 49 displays the items and factor loadings for the rotated factors, with loadings less than .40 omitted for clarity.

Table 49

Component Matrix for Factor Analysis of School and Community Variables, Grade 4

Variable	Factor 1	Factor 2
Average Parent Education	.843	
Free and Reduced Lunch	-.910	
Ethnicity	.885	
Percentage English Learners	-.910	
Average Teacher Salary		.817
Percent Teachers Fully Credentialed		.641

Note: Extraction method was principal component analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 3 iterations.

Although percentage of English Learners is part of factor 1, this factor largely represents community factors, while factor 2, average teacher salary and percent of teachers fully credentialed, represents school factors.

A similar procedure was used to combine library variables. In the first factoring, budget and collection size were eliminated for not loading at .600; all remaining variables loaded on a single factor accounting for just 55.98% of the variance. Hours open was dropped as it had the

lowest communality and loading values of the remaining variables. The remaining three variables accounted for 62.97% of the variance. Table 50 displays the final factor loadings.

Table 50

Component Matrix for Factor Analysis of Library Variables, Grade 4

Variable	Factor 1[a]
Total Staff Hours	.71
Total Services	.83
Total Technology	.83

Note: Extraction method was principal component analysis.

a. Only one component was extracted.

The school and community factors were then entered into the first step of a hierarchical multiple regression, followed by the library factor added in the second step. Assumptions of linearity, normality and multicollinearity were met in tests outlined in the previous chapter. Together, the school, community and library factors produced an adjusted R^2 of .70 ($F(3, 3452) = 2619.63$, $p < .001$) for the prediction of English Language Arts CST scores. The library factor produced a ΔR^2 of just .002. Beta weights indicated that the strongest predictor was the community factor (.80), followed by school (.23) and library factors(.04). See Table 51 for unstandardized and standardized betas and standard error.

Table 51

Summary of Hierarchical Regression Analysis for Variables Predicting English Language Arts CST Scores, Grade 4

Variable	*B*	*SE B*	β
Step 1			
(Constant)	354.37	0.27	--
Community factor	23.15	0.27	.80**
School factor	23.15	0.27	.23**
Step 2			
(Constant)	354.36	0.27	--
Community factor	23.10	0.27	.80**
School factor	6.60	.27	.23**
Library factor	1.23	.28	.04**

Note: R^2 = .69 for Step 1; ΔR^2 =.002 for Step 2 (p <.001).

**p <.001

Grade 8 English Language Arts

Factor analysis with varimax rotation was again performed for the library, school and community. Again, only factor loadings greater than .600 were considered for inclusion in groupings, and only groupings with an eigenvalue of at least 1 were retained. For library program elements, all variables loaded on a single factor accounting for 57.66% of the variance. Budget loaded at .54 and was dropped. A second factor analysis accounted for 64.68% of the variance with factor loadings indicated in Table 52.

Table 52

Component Matrix for Factor Analysis of Library Variables, Grade 8

Variable	Factor 1[a]
Hours Open	.811
Collection Size	.705
Total Staff Hours	.831
Total Services	.819
Total Technology	.831

Note: Extraction method was principal component analysis.

a. Only one component was extracted.

In the first factor analysis for school and community variables, percent of teachers fully credentialed was eliminated with a loading of .35. A second factor analysis resulted in two factors that accounted for 82.46% of the variance; the first includes the strongest loadings for parent education, free and reduced lunch, ethnicity, and percentage English Learners, and this factor accounted for 61.78% of the variance. As with fourth grade, this factor was largely associated with community variables. The second factor, accounting for 20.68% of the variance, most strongly loaded on average teacher salary, a school variable. See Table 53 for the factor matrix and Table 54 for the total variances explained.

Table 53

Rotated Component Matrix for Factor Analysis of School and Community Variables, Grade 8

Variable	Factor 1	Factor 2
Average Parent Education	-.83	.18
Free and Reduced Lunch	.89	-.22
Ethnicity	-.88	-.09
Percentage English Learners	.86	.06
Average Teacher Salary	-.05	.987

Note: Extraction method was principal component analysis. Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 3 iterations.

The school and community factors were then entered into the first step of a hierarchical multiple regression, followed by the library factor added in the second step. Assumptions of linearity, normality and multicollinearity were met in tests outlined in the previous chapter. Together, the school, community and library factors produced an adjusted R^2 of .64 ($F(3, 1143) = 688.44$, $p < .001$) for the prediction of English Language Arts CST scores. Beta weights indicated that the strongest predictor was the community factor (-.76), followed by school (.17) and library factors(.13). The library factor produced a ΔR^2 of .02, meaning that it accounted for 2% of the variance in 8th grade English Language Arts CST scores. See Table 54 for unstandardized and standardized betas and standard error.

Table 54

Summary of Hierarchical Regression Analysis for Variables Predicting English Language Arts CST Scores, Grade 8

Variable	*B*	*SE B*	β
Step 1			
(Constant)	340.72	0.511	--
Community factor	-21.64	0.511	-.76**
School factor	5.94	0.511	.21**
Step 2			
(Constant)	340.66	0.50	--
Community factor	-21.65	0.50	.76**
School factor	4.86	0.52	.17**
Library factor	3.75	0.52	.13**

Note. R^2 = .62 for Step 1; ΔR^2 =.02 for Step 2 (p <.001).

**p <.001

Grade 8 Social Studies

As with the previous data set for eighth grade English Language Arts, library, school and community variables were combined in a factor analysis with varimax rotation using the same criteria mentioned earlier. As with data for the eighth grade ELA CST scores, the percentage of fully credentialed teachers did not load at .600—the rotated factor value was .419—and so was eliminated. The second factor analysis resulted in groupings like those from English Language Arts, with the first factor most strongly representing parent education, free and reduced lunch, ethnicity, and percentage English Learners and the second factor most strongly representing average teacher salary, both factors together accounting for 82.51% of the variance. The first

factor, which will be called "Community factor," accounted for 61.82% of the variance, while the second factor, called "school factor," accounted for 20.69% of the variance. See Table 55 for the factor matrix.

Table 55

Rotated Component Matrix for Factor Analysis of School and Community Variables, Grade 8 English Language Arts

Variable	Factor 1	Factor 2
Average Parent Education	-.83	.18
Free and Reduced Lunch	.893	-.22
Ethnicity	-.88	-.09
Percentage English Learners	.88	.06
Average Teacher Salary	-.05	.98

Note: Extraction method was principal component analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 3 iterations.

The first factor analysis for library variables resulted in the creation of two factors with an Eigenvalue of greater than 1; however, the total variance of those two factors was just 54.31%. Because collection size had the lowest extraction commonality—the amount of the variance in the variable accounted for by the components—as well as the lowest rotated loading factor, this variable was eliminated next. Removing collection size resulted in two factors that accounted for just 59% of the variance. Budget total was eliminated next because it loaded most weakly and had the lowest extraction communality among remaining variables. Remaining variables loaded on a single factor; the loading value for average copyright was .18; this was removed for a final,

single factor for library variables consisting of total services, total technology, total staff hours, and hours open.

The library factor accounted for 70.57% of the variance. See Table 56 for the factor matrix.

Table 56

Component Matrix for Factor Analysis of Library Variables, Grade 8 Social Studies

Variable	Factor 1[a]
Hours Open	.82
Total Staff Hours	.83
Total Services	.85
Total Technology	.87

Note: Extraction method was principal component analysis.

a. Only one component was extracted.

The school and community factors were then entered into the first step of a hierarchical multiple regression, followed by the library factor added in the second step. Assumptions of linearity, normality and multicollinearity were met in tests outlined in the previous chapter. Together, the school, community and library factors produced an adjusted R^2 of .60 ($F(3, 1141) = 574.16$, $p < .001$) for the prediction of eighth grade Social Studies CST scores. Consistent with the other eighth grade regression, Beta weights indicated that the strongest predictor was the community factor (-.70), followed by school (.24) and library factors(.17). The library factor produced a ΔR^2 of .03, meaning that it accounted for 3% of the variance in 8th grade Social Studies CST scores. See Table 57 for unstandardized and standardized betas and standard error.

Table 57

Summary of Hierarchical Regression Analysis for Variables Predicting Social Studies CST Scores, Grade 8

Variable	*B*	*SE B*	β
Step 1			
(Constant)	330.50	0.59	--
Community factor	-21.48	0.59	-.70**
School factor	8.63	0.59	.28**
Step 2			
(Constant)	330.40	0.57	--
Community factor	-21.34	0.57	.70**
School factor	7.24	0.59	.24**
Library factor	5.02	0.59	.17**

Note. R^2 = .57 for Step 1; ΔR^2 =.03 for Step 2 (p <.001).

**p <.001

Grade 11 English Language Arts

Factor analysis of school and community variables resulted in similar groupings of the variables as indicated earlier; the percentage of teachers fully credentialed was eliminated for not loading to at least .600. In the final factor analysis, two factors were produced, accounting for 83.00% of the variance, as shown in Table 58.

Table 58

Rotated Component Matrix for Factor Analysis of School and Community Variables, Grade 11

Variable	Factor 1	Factor 2
Average Parent Education	.86	.24
Free and Reduced Lunch	-.86	-.27
Ethnicity	.89	-.05
Percentage English Learners	-.87	.08
Average Teacher Salary	.06	.98

Note: Extraction method was principal component analysis. Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 3 iterations.

All library variables loaded on a single factor that accounted for 74.95% of the variance, as indicated in Table 59.

Table 59

Component Matrix for Factor Analysis of Library Variables, Grade 11

Variable	Factor 1[a]
Hours Open	.88
Collection Size	.82
Budget	.73
Total Staff Hours	.92
Total Services	.90
Total Technology	.92

Note: Extraction method was principal component analysis.

a. Only one component was extracted.

In a hierarchical regression with school and community factors entered in the first step, followed by the addition of the library factor in the second step, the adjusted R^2 was .57 (F(3, 953) = 423.49, p <.001) for the prediction of eleventh grade English Language Arts CST scores. Assumptions of linearity, normality and multicollinearity again were met in tests outlined in the previous chapter. Like regressions for previous grades, Beta weights indicated that the strongest predictor was the community factor (.51). Unlike previous regressions, this was followed by the library factor (.46) and school factor (.14) last. The library factor produced a ΔR^2 of .19, meaning that it accounted for 19% of the variance in 11th grade English Language Arts CST scores, a much stronger relationship than those exhibited at the middle and elementary school levels. See Table 60 for unstandardized and standardized betas and standard error.

Table 60

Summary of Hierarchical Regression Analysis for Variables Predicting English Language Arts CST Scores, Grade 11

Variable	*B*	*SE B*	β
Step 1			
(Constant)	316.63	0.95	--
Community factor	20.87	0.95	.55**
School factor	10.43	0.95	.28**
Step 2			
(Constant)	316.51	0.80	--
Community factor	19.28	0.80	.51**
School factor	5.33	.83	.14**
Library factor	17.20	.84	.46**

Note. R^2 = .38 for Step 1; ΔR^2 =.19 for Step 2 (p <.001).

**p <.001

Grade 11 U.S. History

Factor analysis of school and community and library variables resulted in the same groupings of the variables as indicated for English Language Arts with similar factor loadings; the percentage of teachers fully credentialed was eliminated for not loading to at least .600. In the final factor analysis, two factors were produced, accounting for 83.32% of the variance. The first factor accounted for 62.60% and largely represented community variables. The second factor accounted for 20.72% of the variance and loaded most heavily on average teacher salary, a school variable. See Table 61 for the factor matrix.

Table 61

Rotated Component Matrix for Factor Analysis of School and Community Variables, Grade 11 U.S. History

Variable	Factor 1	Factor 2
Average Parent Education	.86	.24
Free and Reduced Lunch	-.86	-.27
Ethnicity	.89	-.06
Percentage English Learners	-.87	.08
Average Teacher Salary	.06	.98

Note: Extraction method was principal component analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 3 iterations.

All library variables loaded on a single factor that accounted for 74.34% of the variance, as indicated in Table 62.

Table 62

Component Matrix for Factor Analysis of Library Variables, Grade 11 U.S. History

Variable	Factor 1[a]
Hours Open	.88
Collection Size	.82
Budget	.72
Total Staff Hours	.92
Total Services	.90
Total Technology	.92

Note: Extraction method was principal component analysis.

a. Only one component was extracted.

Results of the hierarchical regression were similar to those with eleventh grade English Language Arts CST scores. Entering community and school and community factors in the first step, followed by all three factors in the second step, produced an adjusted R^2 of .56 ($F(3, 931) = 395.47$, $p < .001$) for the prediction of eleventh grade U.S. History CST scores. Assumptions of linearity, normality and multicollinearity were met in tests outlined in the previous chapter. Unlike other regressions performed, however, Beta weights indicated that the library factor was the strongest predictor of U.S. History CST scores (.48), followed by community (.47) and school (.16) factors. The addition of the library factor produced a ΔR^2 of .21; 21% of the variance in U.S. History Scores was accounted for by the library factor. See Table 63 for unstandardized and standardized betas and standard error.

Table 63

Summary of Hierarchical Regression Analysis for Variables Predicting U.S. History CST Scores, Grade 11

Variable	*B*	*SE B*	β
Step 1			
(Constant)	320.23	0.84	--
Community factor	16.26	0.84	.55**
School factor	9.34	0.84	.28**
Step 2			
(Constant)	320.11	0.69	--
Community factor	15.08	0.69	.47**
School factor	4.99	0.72	.16**
Library factor	15.24	0.72	.48**

Note. R^2 = .35 for Step 1; ΔR^2 =.21 for Step 2 (p <.001).

**p <.001

Summary and Discussion of Results for Research Question 5

Results to this question followed the established pattern. There was a statistically significant but very weak effect at the elementary level; combined library elements accounted for just 0.2% of the variance in English Language Arts CST scores when community and school factors were controlled for in a hierarchical regression. At the middle school level, the library factor accounted for 2% of the variance in English Language Arts CST scores and 3% of the variance in social studies CST scores. At the high school level, the library factor accounted for 19% of the variance in English Language Arts CST scores and 21% of the variance in U.S.

History CST scores. In both cases, Beta weights indicated that the library factor was a stronger predictor of scores than other school variables; in fact, the library factor was stronger than either school or community factors in predicting U.S. History CST scores. Table 64 provides a summary of the R^2 values in multiple regressions at each grade level.

Table 64

ΔR^2 Produced by Addition of Library Factor in Multiple Regressions

Grade	Dependent Variable	ΔR^2
3	English Language Arts	.002**
8	English Language Arts	.02**
8	Social Studies	.03**
11	English Language Arts	.19**
11	U.S. History	.21**

**$p < .001$

The null hypothesis, that student achievement does not vary in relationship to any combination of library staffing levels and other library program elements, is rejected.

Statistically significant relationships in this study support earlier studies in which the overall library program accounted for between 1 and 21% of the variance in test scores (see Baughman, 2000; Lance et al., 2000a, 2002; Lance, Welborn & Hamilton-Pennell, 1993; Miller et al., 2003; Rodney et al., 2002; Smith, 2001). At the middle school level, the change in R^2 values with the addition of library factors into multiple regressions including school and community variables produced results similar to those in Iowa (Rodney et al., 2002) and Colorado (Lance et al., 2000a). The R^2 values at the high school level are among the highest reported in studies of this kind.

H06 and *H07*: School Library Services, Certificated Staffing and Total Staffing

The rejection of all null hypotheses for research questions 1 through 5 leads naturally to the final two research questions. If there is a relationship between staffing levels and student achievement on the one hand, and a relationship between library services and student achievement on the other, it is reasonable to explore the connection between library staffing levels and the services that staff provides. The sixth research question asks, "If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to certificated library staffing levels?" This question forms the null hypothesis *H06*, that the level of school library services does not vary in relationship to certificated library staffing levels. The final research question asks, "If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to overall library staffing levels?" From this question is derived the null hypothesis *H07*, that the level of school library services does not vary in relationship to overall library staffing levels.

Grade 4

At the fourth grade, there was a weak but statistically significant correlation between certificated staffing levels and English Language Arts scores. In bivariate correlations between certificated staffing levels and services provided to staff and students on a regular basis, twenty-two of twenty-seven services were significantly related to certificated staffing levels, although most were related weakly at under $r = .10$. Strongest significant correlations were with offering a program of curriculum-integrated information literacy instruction ($r = .3$, $p < .001$) and collaboration with teachers to develop student learning ($r = .23$, $p < .001$). There was also a

significant negative relationship between certificated staffing levels and clerical staffing hours with an r value of -.27 (p <.001).

In bivariate correlations between library services and total library staffing, all relationships were statistically significant at p <.001. Those relationships also tended to be stronger than library services and certificated staffing hours, most notably in library hours (r =.47), total technology (r = .38) and total services (r =.38). At the fourth grade level, data support the idea that there is a positive relationship between staffing levels and library services regularly offered. This data also supports the notion that total staffing levels are more strongly associated with the level of services provided than solely certificated staffing levels. Table 65 provides a summary of results.

Table 65

Comparison of Bivariate Correlations, Certificated Staffing Levels and Total Staffing Levels with Regularly Provided Library Services, Grade 4.

Library Service	Certificated Staff Level	Total Staffing Level
Hours open	.13**	.47**
Offered a program of curriculum-integrated information literacy instruction	.31**	.21**
Informally instructed students in the use of resources	.03	.17**
Planned or conducted workshops for teachers	.20**	.18**
Assisted school curriculum committee with recommendations	.13**	.15**
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	.23**	.19**

(*table continues*)

Table 65 (*continued)*

Library Service	Certificated Staff Level	Total Staffing Level
Provided teachers with information about new resources	.07**	.22**
Provided reference assistance to students and teachers	.04*	.23**
Helped students and teachers find and use resources outside school library	.09**	.21**
Facilitated interlibrary loan for students and teachers	.04**	.17**
Provided reading, listening, and viewing guidance for students	.07**	.20**
Helped parents realize importance of lifelong learning	.09**	.22**
Coordinated in-school production of materials	.05**	.13**
Coordinated video production and dissemination activities	.02	.09**
Coordinated cable TV, distance education, and related activities	.02	.07**
Coordinated school or library computer networks	.02	.13**
Provided access to online library catalog and circulation	.06**	.22**
Provided Internet access for students in the library	.06**	.27**
Provided instruction on Internet searching and research	.15**	.27**
Provided electronic access to a resource sharing network	.04**	.12**
Communicated proactively with principal	.03	.15**

(*table continues*)

Table 65 (*continued)*

Library Service	Certificated Staff Level	Total Staffing Level
Attended meetings of school site council, two or more times per school year	.04*	.16**
Budget	.05**	.18**
Total Technology	.09**	.38**
Print Collection Size	.07**	.23**
Clerical Staff Hours	-.27**	.72**
Total Library Services	.18**	.38**

*$p < .05$, ** $p < .001$.

Grade 8

All correlations between library services and certificated library staffing levels at the middle school level were significant except one—coordination of cable TV, distance education, and related activities-- and those correlations were typically stronger than at the elementary level. Correlations were strongest among the following services: offering a program of curriculum-integrated information literacy instruction ($r = .52$, $p < .001$), total library services ($r = .46$, $p < .001$), planning or conducting workshops for teachers total library services ($r = .44$, $p < .001$), collaboration with teachers to develop student learning ($r = .41$, $p < .001$and total technology ($r = .39$, $p < .001$). Again, there was a significant negative correlation with clerical staffing, $r = -.20$, $p < .001$.

All correlations between library services and total library staffing levels at the middle school were significant; these correlations were stronger than those with certificated library staffing in twenty-two of twenty-seven services, most notably in hours open ($r = .68$, $p < .001$), total technology ($r = .60$, $p < .001$), and total library services ($r = .59$, $p < .001$). Data from middle school more strongly demonstrate a relationship between the level of certificated staffing

and library services provided and suggest that total staffing is an even better indicator of services provided than solely certificated staffing. See Table 66 for a summary.

Table 66:

Comparison of Bivariate Correlations, Certificated Staffing Levels and Total Staffing Levels with Regularly Provided Library Services, Grade 8

Library Service	Certificated Staff Level	Total Staffing Level
Hours open	.32**	.68**
Offered a program of curriculum-integrated information literacy instruction	.52**	.39**
Informally instructed students in the use of resources	.24**	.47**
Planned or conducted workshops for teachers	.44**	.32**
Assisted school curriculum committee with recommendations	.31**	.27**
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	.41**	.33**
Provided teachers with information about new resources	.26**	.43**
Provided reference assistance to students and teachers	.23**	.46**
Helped students and teachers find and use resources outside school library	.27**	.34**
Facilitated interlibrary loan for students and teachers	.06	.17**
Provided reading, listening, and viewing guidance for students	.27**	.35**
Helped parents realize importance of lifelong learning	.21**	.28**

(*table continues*)

Table 66: (*continued*)

Library Service	Certificated Staff Level	Total Staffing Level
Coordinated in-school production of materials	.12**	.19**
Coordinated video production and dissemination activities	.07**	.09**
Coordinated cable TV, distance education, and related activities	.02	.08**
Coordinated school or library computer networks	.17**	.22**
Provided access to online library catalog and circulation	.25**	.41**
Provided Internet access for students in the library	.26**	.46**
Provided instruction on Internet searching and research	.36**	.48**
Provided electronic access to a resource sharing network	.26**	.29**
Communicated proactively with principal	.19**	.37**
Attended meetings of school site council, two or more times per school year	.29**	.33**
Budget	.26**	.34**
Total Technology	.39**	.60**
Print Collection Size	.36**	.53**
Clerical Staff Hours	-.20**	.57**
Total Library Services	.46**	.59**

*$p < .05$, ** $p < .001$.

Grade 11

Consistent with earlier findings, the correlations between certificated library staff and library services at the high school level were uniformly stronger than at elementary or middle

school levels. All correlations were significant at p=.001; eight library services had Pearson *r* values of greater than .60. Total library services correlated with certificated library staffing levels at *r* = .70. At the high school level, in contrast to middle and elementary school, there was a positive correlation between certificated and clerical staffing levels (*r* = .40).

In twenty-four of twenty-seven cases, library services correlated more strongly with total library staffing than with certificated library staffing, and all library services correlated significantly at p=.001. Three services--total library services, hours open, and total technology--correlated with total staffing at or near *r* =.80; nine services correlated at *r* values greater than .70. In the correlations between certificated library staff and library services, only total library services reached an r value.70. See Table 67 for a summary.

Table 67

Comparison of Bivariate Correlations, Certificated Staffing Levels and Total Staffing Levels with Regularly Provided Library Services, Grade 11

Library Service	Certificated Staff Level	Total Staffing Level
Hours open	.64**	.80**
Offered a program of curriculum-integrated information literacy instruction	.63**	.61**
Informally instructed students in the use of resources	.61**	.75**
Planned or conducted workshops for teachers	.42**	.41**
Assisted school curriculum committee with recommendations	.39**	.42**

(*table continues*)

Table 67

Library Service	Certificated Staff Level	Total Staffing Level
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	<.51**	.49**

Provided teachers with information about new resources	.61**	.74**
Provided reference assistance to students and teachers	.59**	.73**
Helped students and teachers find and use resources outside school library	.53**	.61**
Facilitated interlibrary loan for students and teachers	.20**	.31**
Provided reading, listening, and viewing guidance for students	.54**	.61**
Helped parents realize importance of lifelong learning	.29**	.31**
Coordinated in-school production of materials	.26**	.29**
Coordinated video production and dissemination activities	.11**	.13**
Coordinated cable TV, distance education, and related activities	.08**	.12**
Coordinated school or library computer networks	.37**	.41**
Provided access to online library catalog and circulation	.57**	.69**
Provided Internet access for students in the library	.58**	.73**
Provided instruction on Internet searching and research	.64**	.71**
Provided electronic access to a resource sharing network	.36**	.38**
Communicated proactively with principal	.58**	.68**
Attended meetings of school site council, two or more times per school year	.47**	.50**
Budget	.56**	.62**
Total Technology	.67**	.80**
Print Collection Size	.65**	.74**
Clerical Staff Hours	.40**	.84**
Total Library Services	.70**	.79**

** $p < .001$

Summary and Discussion of Responses to Research Questions 6 and 7

Correlations between certificated library staff and library services were significant at every grade level; as with other relationships examined earlier in this chapter, those relationships grew stronger as the grade level increased. The null hypothesis for research question 6, that the

level of school library services does not vary in relationship to certificated library staffing levels, was rejected.

At each of the three grade levels, all bivariate correlations between total library staffing levels and library services were also statistically significant; these correlations were generally stronger than those between certificated staffing levels and library services at each level, too. These correlations increased in strength with grade level, grade 4 exhibiting the weakest correlations and grade 11 exhibiting the strongest. The null hypothesis for research question 7, that the level of school library services does not vary in relationship to total library staffing levels, was thus rejected.

At the elementary level, while there was not a positive significant relationship between total staffing levels and student achievement, there was a positive correlation between the services the library provided and student achievement. The consistently positive significant correlations between total staffing levels and services provided appears to contradict the lack of positively significant correlation between total staffing and student achievement. What can be concluded, though, is that total staffing tends to correlate more strongly with services offered than does certificated staff alone. This is seen most starkly in the differences in *r* values between certificated staffing and total staffing levels in correlations with hours open, total technology, and total services, as indicated in table 68.

Table 68

Comparison of Bivariate Correlations, Certificated Staffing Levels and Total Staffing Levels with Regularly Provided Library Services, Grade 4.

Library Service	Certificated Staff Level Pearson r	Total Staffing Level Pearson r
Hours open	.13**	.47**
Total Technology	.09**	.38**
Total Library Services	.18**	.38**

**Correlation is significant at the .001 level

The consistent, positive correlations between staffing and services were seen at all three grade levels, and at each level, total staffing levels tended to correlate more strongly with services than did certificated staff levels, although those correlations were generally significant, too.

This trend did not hold at any grade level, though, for three services, which correlated more strongly with certificated staffing levels than with total staffing levels: offering a program of curriculum-integrated information literacy instruction; planning or conducting workshops for teachers; and collaborating with teachers to develop, implement, and evaluate student learning. One possible interpretation of this result is that these are all activities requiring professional training and experience; in this case, the certificated staff hours are a more critical component than the total staff hours in providing the service. Nevertheless, the significant correlations at all three levels in both certificated and total staffing support previous research which shows that as staffing levels rise, there tends to be a corresponding increase in the services the library program provides (see Brandes, 1987; Didier, 1984; Gaver, 1962; Lance et al., 1999; Lance et al., 2000b; Lance, Welborn & Hamilton-Pennell, 1993; Loertscher & Land, 1975; Loertscher et al., 1987; McCracken, 2001; Rodney et al., 2002).

Summary of Chapter 4

Research questions 1-7 were stated in the form of null hypotheses. Questions 1-4 were addressed through bivariate and partial correlations and in each case, the null hypothesis was rejected. For each question, bivariate correlations and partial correlations accounting for school and community variables produced positive, statistically significant results. In addition, the strength of the bivariate and partial correlations increased with grade level. That is, middle school staffing and services were more strongly related to student achievement than at the elementary level, and high school staffing and services were more strongly related to student achievement than at the middle school level.

In addressing research question 5, library variables were combined in a factor analysis, as were school and community variables. These factors were entered into hierarchical multiple regressions, entering school and community variables first as controls, then determining the ΔR^2 produced by the addition of the library factor. At each level, there was a statistically significant positive result, which was very weak ($\Delta R^2 = .002$, $p < .001$) at the elementary level, somewhat stronger ($\Delta R^2 = .02$, $p < .001$ for English Language Arts, $\Delta R^2 = .03$, $p < .001$ for Social Studies CST scores) at the eighth grade, and considerably stronger at the high school level ($\Delta R^2 = .19$, $p < .001$ for English Language Arts, $\Delta R^2 = .21$, $p < .001$ for U.S. History).

Research questions 1 and 2 investigated the relationship between staffing levels and student achievement; questions 3 and 4 investigated the relationship between library elements and student achievement, and question 5 investigated the way a combination of library elements may be related to student achievement. Rejection of the null hypothesis for each of these questions led to an investigation in research questions six and seven of the relationship between staffing levels and library services.

All bivariate correlations between certificated library staffing and library services regularly provided were statistically significant; the same was true for correlations between total library staffing levels—a combination of certificated and clerical staffing—and library services provided. Two trends emerged from these calculations: the correlations grew stronger with grade level, and within grade level, student achievement tended to correlate more strongly with total staffing than with certificated staffing alone. The null hypotheses for research questions 6 and 7 were also rejected.

CHAPTER 5

SUMMARY AND CONCLUSIONS

The purpose of this study was to examine the relationship between school library programs and student achievement. The independent variables for school library programs included level of certificated library staff, levels of total library staffing, number and types of services regularly provided, amount of technology available through the library, hours open, collection size, and budget. Data for these were derived from the California Department of Education School Library Survey. The dependent variables were the standardized test scores from the California Standards Tests (CST) in English Language Arts for grades 4, 8 and 11, social studies at grade 8, and U.S. History at grade 11.

A review of the relevant literature detailed the evolving instructional role of the library media specialist and the studies indicating a significant relationship between school library programs and student achievement. Theoretical models by Loertscher (2000) and Todd & Kuhlthau (2006) posit that a successful library media program includes adequate certificated and clerical staffing, and that the library media specialist provides critical instructional roles that contribute significantly to student achievement. This review of the literature further noted that while California school libraries have enjoyed occasional budget windfalls for materials purchases, their current status as last among all states in certificated and clerical staffing levels is not a recent development. California has had woefully inadequate staffing levels dating back at least forty years (Howell, 1968), levels that have been in steady decline at least since 1986 (Brandes, 1987). A 2004 study by Sinclair-Tarr and Tarr reported significant but very weak relationships between some aspects of school library programs and student achievement in

California's elementary and middle schools; at the high school level, a significant negative relationship was found between school library programs and student achievement.

This study was undertaken with a methodology more like that used in other state-wide studies (see Lance et al., 2000b). The relationship between school library programs and student achievement was explored through the following seven research questions:

1. How does student achievement vary, if at all, in relationship to the levels of certificated staffing in school library media programs?
2. How does student achievement vary, if at all, in relationship to the levels of combined certificated and clerical staffing in school library media programs?
3. How does student achievement vary, if at all, in relationship to library staff services offered, either independently or in combination?
4. How does student achievement vary, if at all, in relationship to other library program elements?
5. How does student achievement vary, if at all, in relationship to a combination of library program elements?
6. If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to certificated library staffing levels?
7. If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to overall library staffing levels?

For research questions 1-4, bivariate correlations were used to assess the significance and strength of the relationships. Separate partial correlations controlled for school and community

factors, including average parent education level, percent of students eligible for free and reduced lunch, ethnicity, percentage of English learners, average teacher salary, and percentage of teachers fully credentialed. For question 5, a combination of library variables were then entered into hierarchical multiple regressions, school and community factors entered first as controls. Questions 6 and 7 then used bivariate correlations to assess the significance and strength of relationships between staffing levels and services library programs provided.

Summary of Results

Research Question 1

Research Question 1: How does student achievement vary, if at all, in relationship to the levels of certificated staffing in school library media programs?

At the elementary level, there was a weak but statistically significant positive correlation between certificated staffing and English Language Arts CST scores, r =.06, p <.001. The strongest partial correlation controlled for ethnicity at r = .11, p <.001. At the middle school level, the relationship between English Languages Arts CST scores and certificated staffing only became significant in partial correlations, the strongest controlled for ethnicity, at r =.16, p <.001. The bivariate correlation between Social Studies CST scores and certificated staffing was weak but significant at r = .07, p <.001. Partial correlations generally increased the strength of this relationship, the strongest control variable again being ethnicity at r =.22, p <.001. At the high school level, the correlations were much stronger, at r =.44, p <.001 for English Language Arts and r =.45, p <.001 for U.S. History CST scores. Partial correlations again typically increased the strength of these relationships; the strongest for both English Language Arts and U.S. History controlled for ethnicity at r =.52, p <.001.

Research Question 2

Research Question 2: How does student achievement vary, if at all, in relationship to the levels of combined certificated and clerical staffing in school library media programs?

Overall results indicate a positive significant relationship between total staffing levels and student achievement. At the fourth grade level, there was a significant negative correlation between English Language Arts CST scores and total staffing, r =-.04, p =.02, but the significance of the correlation disappeared or the direction of the relationship became positive in partial correlations controlling for community variables, the strongest positive value being r =.12, p <.001, when controlling for parent education. All of these correlations were very weak and would not alone lead to a rejection of the null hypothesis that student achievement does not vary in relationship to total library staffing levels.

At the eighth grade level, though, bivariate correlations between total library staffing and both English Language Arts and social studies CST scores were significant at r =.12, p <.001 and r =.19, p <.001 respectively. The strength of these relationships tended to increase with partial correlations controlling for school and community variables. The strongest partial correlations for both English Language Arts and social studies controlled for ethnicity, at r = .22, p <.001 and r = .28, p <.001 respectively.

At the eleventh grade, bivariate correlations between total library staffing levels and CST scores were again stronger than at middle or elementary levels at r = .54, p <.001 for English Language Arts CST scores and r = .56, p <.001 for U.S. History scores. The strength of those associations remained in partial correlations with school and community variables. For English Language Arts, those correlations ranged from r =.49, p <.001 when controlling for average teacher salary to r = .59, p <.001 when controlling for percentage of English learners. For U.S.

History, those partial correlations ranged from r =.52, p <.001 when controlling for average teacher salary to r =.60, p <.001 when controlling for percentage of English learners.

-Research Question 3

Research Question 3: How does student achievement vary, if at all, in relationship to library staff services offered, either independently or in combination?

At the fourth grade level, there were significant positive correlations between English Language Arts CST scores and fourteen library staff services. The two strongest associations were with informal instructing students in the use of resources, at r = .16 (p < .001), and communicating proactively with principal, at r = .15, p < .001. Total services correlated with the English Language Arts CST scores at r = .14, p < .001. Of the fourteen with significant correlations, seven remained significant in partial correlations with all school and community variables used as controls; the strongest of these were offering a program of curriculum-integrated information literacy instruction, at r =.18, p <.001 and providing reference assistance to students and teachers, at r =.17, p <.001, both controlling for the percent of teachers fully credentialed. Total library services correlated significantly bivariate correlation with English Language Arts scores at r =.14, p <.001, and with partial correlations when controlling for each of the school and community variables. The strength of these scores ranged from r =.08, p <.001, when controlling for parent education level to r =.13, p <.001 when controlling for free and reduced lunch.

Again, the correlations between library services and student achievement were stronger at the middle school than at the elementary school level. At the eighth grade level, there were also fourteen services that were significantly related to English Language Arts CST scores, with the three strongest being communicating proactively with principal, offering a program of

curriculum-integrated information literacy instruction, and total services, all at $r = .19$, $p < .001$. Just one of the fourteen services did not remain significant in relationship to English Language Arts CST scores when controlling for school and community variables in partial correlations. Total services remained significant in all partial correlations, the strongest when controlling for ethnicity at $r = .23$, $p < .001$.

Slightly stronger bivariate correlations between social studies CST scores and library services were seen, the strongest being total services at $r = .24$, $p < .001$, and informally instructing students in the use of resources and providing reference assistance to students and teachers, both at $r = .22$, $p < .001$. All but two of sixteen services remained statistically significant in partial correlations with each school and community variable as a control, and library services remained significant in these partial correlations with r values ranging from .20 to .28, $p < .001$.

At the high school level, in 21 of 22 categories there was a statistically significant relationship between library services and student achievement. The relationship between English Language Arts CST scores and library services was very similar in strength to that of U.S. History CST scores, which will be summarized here. The strongest bivariate correlations included total services at $r = .51$, $p < .001$, providing teachers with information about new resources, $r = .49$, $p < .001$, and informally instructed students in the use of resources, $r = .47$, $p < .001$. Partial correlations between total services and U.S. History CST scores remained significant when controlling for each school and community variable, ranging in strength from $r = .46$, $p < .001$, controlling for average teacher salary and $r = .53$, $p < .001$ when controlling for percentage of English learners.

Research Question 4

Research Question 4: How does student achievement vary, if at all, in relationship to other library program elements?

The patterns for correlations in answer to this question were the same as on prior questions; the strength of correlations increased with grade level. At the elementary level, all other library program elements—hours open, collection size, budget, and total technology—were significantly, though weakly, related to English Language Arts CST scores in all bivariate and partial correlations.

At the middle school level, collection size and budget—related items—were still only weakly correlated with student achievement, but hours open and total technology exhibited *r* values in partial correlations of up to .28 and .27, $p < .001$, respectively.

At the high school level, where professional staffing was strongest, so were the correlations between these library elements and student achievement. No bivariate or partial correlation between these library elements and either English Language Arts or U.S. History CST scores had an r value of less than .32, $p < .001$, and only budget had *r* values of less than .40.

Research Question 5

Research Question 5: How does student achievement vary, if at all, in relationship to a combination of library program elements?

Results to this question followed the established pattern. There was a statistically significant but very weak effect at the elementary level; combined library elements accounted for just 0.2% of the variance in English Language Arts CST scores when community and school factors were controlled for in a hierarchical regression. At the middle school level, the library factor accounted for 2% of the variance in English Language Arts CST scores and 3% of the variance in social studies CST scores. At the high school level, the library factor accounted for 19% of the variance in English Language Arts CST scores and 21% of the variance in U.S. History CST scores. In both cases, Beta weights indicated that the library factor was a stronger predictor of scores than other school variables; in fact, the library factor was stronger than either school or community factors in predicting U.S. History CST scores.

Research Questions 6 and 7

Research Question #6: If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to certificated library staffing levels?

Research Question 7: If student achievement significantly correlates with school library staff services, how does the level of these services vary, if at all, in relationship to overall library staffing levels?

At the elementary level, while there was not a positive significant relationship between total staffing levels and student achievement, there was a positive correlation between the services the library provided and student achievement. The consistently positive significant

correlations between total staffing levels and services provided appears to contradict the lack of positively significant correlation between total staffing and student achievement. What can be concluded, though, is that total staffing tended to correlate more strongly with services offered than did certificated staffing alone. For example, the r value for the correlation between hours open and certificated staffing was .13, p <.001, versus .47 for the correlation between library hours and total staffing. r values increased similarly in total technology (from r =.09 to r =.38, p <.001) and total library services (from r = .18 to .38, p <.001).

All correlations between library services and certificated library staffing levels at the middle school level were significant except one—coordination of cable TV, distance education, and related activities-- and those correlations were typically stronger than at the elementary level. Correlations were strongest among the following services: offering a program of curriculum-integrated information literacy instruction (r = .52, p <.001), total library services (r = .46, p <.001), planning or conducting workshops for teachers total library services (r = .44, p <.001), collaboration with teachers to develop student learning (r = .41, p <.001) and total technology (r = .39, p <.001).

All correlations between library services and total library staffing levels at the middle school were significant; these correlations were stronger than those with certificated library staffing in twenty-two of twenty-seven services, most notably in hours open (r = .68, p <.001), total technology (r = .60, p <.001), and total library services (r = .59, p <.001). Data from middle school more strongly demonstrate a relationship between the level of certificated staffing and library services provided and suggest that total staffing is an even better indicator of services provided than solely certificated staffing.

At the high school level, the correlations between certificated library staff and library services at the high school level were uniformly stronger than at elementary or middle school levels. All correlations were significant at p=.001; eight library services had Pearson *r* values of greater than .60. Total library services correlated with certificated library staffing levels at *r* = .70. At the high school level, in contrast to middle and elementary school, there was a positive correlation between certificated and clerical staffing levels (*r* = .40).

In twenty-four of twenty-seven cases, library services correlated more strongly with total library staffing than with certificated library staffing, and all library services correlated significantly at p=.001. Three services--total library services, hours open, and total technology--correlated with total staffing at or near *r* =.80; nine services correlated at *r* values greater than .70. In the correlations between certificated library staff and library services, only total library services reached an r value.70.

Key Findings

Several key findings emerged from this study in the areas of staffing levels, library services, library program elements, and the total library program.

Staffing Levels

1. There was a great discrepancy in library staffing levels from the elementary grades through high schools. At the elementary level, just 1.2% of schools had both a full time library media specialist and a full time clerk, compared to 8.5% at the middle school, and 30.3% at the high school level.
2. There was a weak but statistically significant correlation between certificated staffing levels and student achievement on California Standards Tests (CST) at the elementary school level.

That correlation remained significant when controlling for five of six school and community variables. Certificated staffing levels were not significantly related to English Language Arts CST scores in the middle school, but they were significantly related to social studies CST scores, a correlation that persisted when controlling for five of six community variables. At the high school level, certificated staffing levels were significantly related to both English Language Arts and U.S. History CST scores, with *r* values of .44 and .45, $p < .001$, respectively. Those correlations persisted and were generally strengthened when controlling for all school and community variables.

3. The correlation between total staffing levels and student achievement strengthened as total staffing levels increased from elementary through high school. At the elementary level, where just over 1% of schools had both full time certificated librarians and clerks, results were inconclusive, ranging from very weak negative to very weak positive partial and bivariate correlations. At the middle school level, with 8.5% of schools employing full time certificated librarians and clerks, there was a statistically significant relationship between total staffing and student achievement in both English Language Arts and social studies CST scores, and that relationship remained significant when controlling for all school and community variables. At the high school level, where over 30% of schools have full time certificated librarians and clerks, there was a significant correlation between total staffing and both English Language Arts and U.S. History CST scores, with *r* values ranging from .49 to .60, $p < .001$.

Table 69

Bivariate and Partial Correlations, Total Staffing and Student Achievement, Grades 4, 8, 11

Control	Grade 4 ELA	Grade 8 ELA	Grade 8 Social Studies	Grade 11 ELA	Grade 11 U.S. History
None (bivariate correlation)	-.04*	.12**	.19**	.54**	.56**
Parent Education Level	.00	.09**	.17**	.53**	.56**
Free and Reduced Lunch	.12**	.18**	.26**	.53**	.56**
Ethnicity	.02	.22**	.28**	.57**	.59**
Percentage English Learners	.04*	.19**	.26**	.59**	.60**
Avg. Teacher Salary	-.06**	.07*	.12**	.49**	.52**
Percentage Fully Credentialed Teachers	-.04*	.09**	.06**	.54**	.57**

*p <.05, **p <.001.

The summary of bivariate and partial correlations across grade level show in Table 69 suggests that the lack of correlation at the elementary level may have been due to an overall paucity of credentialed and clerical staffing; as the overall staffing levels increased in middle school and high school, so did the strength of correlations between staffing and student achievement.

Library Services

1. At the fourth and eighth grade level, there were significant positive correlations between English Language Arts CST scores and fourteen library staff services. Also at the middle school level, social studies CST scores were significantly related to 16 library services. At the high school level, 20 of 21 library services were significantly related to both English Language Arts and U.S. History test scores.

2. Total library services were significantly related to student achievement at all levels, and this relationship persisted when controlling for all school and community variables.

Library Program Elements

1. At the elementary level, English Language Arts CST scores were significantly related to hours open, collection size, library budget, and total technology available through the library. Correlations persisted when controlling for all school and community variables.
2. At the middle school level, English Language Arts and social studies CST scores tended to rise as both the hours open and the total amount of technology available increased. These correlations were significant when controlling for all school and community variables. In bivariate correlations, collection size and library budget were significantly related to test scores; these correlations remained significant when controlling for four of six school and community variables with English Language Arts and five of six school and community variables with social studies CST scores.
3. At the high school level, English Language Arts and U.S. History CST scores were significantly correlated with hours open, collection size, library budget, and total technology available in the library. These correlations remained significant when controlling for all school and community variables. As library hours, collection size, budget, and technology in the library increased, there tended to be a corresponding increase in both English Language Arts and U.S. History CST scores.

Total Library Program

Consistent with the overall percentages of fully staffed schools from elementary through high school, there was an increasingly stronger relationship between total library programs and student achievement when controlling for all school and community variables. At the elementary

level, the overall school library program accounted for less than 1% of the variance in test scores. That number increased to as much as 3% in middle school and to 21% at the high school level.

Library Services and Staffing

At elementary, middle and high school levels, the certificated and total staffing levels were generally associated with the strength of library program elements. The strength of those associations increased with each grade level, and at the 11th grade, there was a significant correlation between both certificated and total staffing levels and every library service regularly provided.

Assumptions and Limitations

The data for this study came from four publically available sources within the California Department of Education (CDE): school and community information from the state Academic Progress Index (API), school information from the School Accountability Report Card (SARC), test scores from the criterion-referenced California Standards Tests (CST), and the CDE School Library Survey. This study assumed that school and community information from the API and SARC were accurate. It was also conducted with the assumption that the CST scores are a valid measure of student achievement; however, the CST scores in English Language Arts and social studies--chosen because these courses of study are commonly associated with library use--represent a very narrow band of student achievement and therefore provide a correspondingly narrow view of the relationship between student achievement and school library media programs.

In addition, while schools are required to submit a completed CDE School Library Survey annually, there is no consequence for noncompliance. Therefore, this population was technically self-selected. Nevertheless, 61% of elementary schools, 95% of middle schools, and

84% of high schools, for a total of 5690 schools, had data available from all four sources, which constitutes a robust sample size.

Another limitation to this study was that respondents to the library survey identified neither themselves nor their job titles. This allows for the possibility that there may be some discrepancy in answers based upon positions of the people responding and the data available to them in providing their answers.

Another variable that was unaccounted for in this study was the operation of reading intervention programs such as Reading First, Accelerated Reader, and Read 180 through the library program. Similarly, a great number of library employees are responsible for managing textbook distribution and collection, a duty that requires significant time away from library responsibilities. School library programs that must administer reading programs or manage textbooks may not be able to offer the range of services to students and teachers that other school library programs can.

The paucity of full-time certificated staffing at the elementary level, particularly the small numbers of full-time library media specialists working with full-time clerical assistants, raises questions about unaccounted-for intervening variables at the elementary school. While there were enough full-time library media specialists at the elementary level to establish a statistically significant result, other factors may have been at play to obscure results. First, the lack of a sizable community of elementary level library media specialists may be inhibiting the establishment of best practice in school librarianship at that level. Second, the very lack of library media specialists suggests a widespread lack of administrative and district level support of school library programs at the elementary level.

Conclusions

In 1968, the publication of *School Libraries in California* (Howell) brought attention to the inadequacies of this state's school libraries. Nationally, 93% of high schools employed certificated librarians, compared to 64% in California. At the elementary level, just 38% of schools had libraries at all. Less than 11% of schools had any certificated library staffing, and just 4.1% had full-time certificated staff, compared to over 50% nationally. The first recommendation in that report was for legislative action to ensure adequate staffing of school libraries at all levels. While there was a substantial response to this report through state and federal funding, no staffing levels were mandated by the state. When the economic tide turned in the late 1970s, library programs were decimated, so that by the 1987 publication of *The Crisis in California School Libraries* (Brandes), California once again had the lowest certificated staffing ratios in the country. After a major push through the 1990s for state level funding of school libraries, for four years the California Public School Library Act provided dedicated funding at a level of over $28 per student. While this funding revitalized many school libraries, the state legislature made no efforts to mandate certificated staffing levels. When funding dried up, California regained its spot at the bottom of all 50 states in certificated library staffing (Everhart, 2003).

Successful school library programs are much more than books, bytes and buildings. As results from this study demonstrate, the level of library staffing, both certificated and clerical, is directly related to the kinds and number of services such programs provide. And at the middle and high school level, where there is at least a critical mass of professional staffing, the levels of staffing are directly related to student achievement. At all grade levels, the levels of services regularly provided by the library program are significantly related to student achievement. As an

indirect indicator of student achievement, the services a school library program provides is significantly related to the levels of both certificated and total staffing levels. These findings confirm a host of prior research on the relationship between school libraries and student achievement.

It is more than ironic that school districts are willing to spend hundreds of thousands of dollars on reading programs and staff development which have had limited success in boosting test scores, but are unwilling to invest in school library programs that show such direct correlations to student success. It is, in fact, an inequity to the California students who are deprived of such programs.

There is only one sustainable way to advocate for support of school library programs, and that is through success. School library programs must contribute to student success as defined by the larger school communities of which they are a part. It is hoped that this study will serve efforts to garner support for more staffing of all types in California's school libraries. But the impact of school library programs on standardized test scores is just one measure of such success, and in the opinion of many educators, not the most important. The professional and academic communities are just at the beginning in their efforts to demonstrate just how critical school libraries are to student success.

Implications

The results of this study differ markedly from those of the Sinclair-Tarr and Tarr study (2004). External factors as well as study design may account for the contrast. Sinclair-Tarr and Tarr's most recent data were from the 2001-2002 school year, five years older than the data used in this study. While school library programs' efforts prior to No Child Left Behind may have contributed to increased test scores, those increases may have been a byproduct of an emphasis

on other learning goals. In the interim between the Sinclair-Tarr and Tarr study and now, school library programs have increasingly focused on ways to facilitate increases in test scores. In addition, the design of this study differed from the earlier study in some key ways. The authors of the previous study (Sinclair-Tarr & Tarr, 2004) only examined the absence or presence of the certificated librarian, rather than the levels of such staffing; nor were total staffing levels considered as a variable. Furthermore, the control variable used, the School Characteristics Index, did not, as a school-wide metric, account for the variances in the individual grade level test scores used to measure student achievement. In addition to including levels of certificated and total staffing as independent variables, the design of the current study also employs more traditionally utilized school and community control variables.

In this study, the level of total staffing increased substantially by grade level. Out of 3,528 elementary schools participating in this study, just 43, or 1.2%, had at least full-time staffing for both a clerk and a certificated school librarian. Out of 1095 middle school libraries, 102,or 8.5%, reported a full-time librarian and a full-time clerk. At the high school level, out of 987 school libraries, 299, or 30.3%--reported both positions filled full-time. The discrepancy in these numbers suggests there is almost non-existent support for professional staffing at the elementary level, and only poor support at the middle school level. The ability of a library media specialist to be effective at an individual site depends upon more than just his own skills. He must also work in a setting that values the role of the school library. Bell and Totten (1991), in their study of school climate factors related to collaboration between classroom teachers and library media specialists, provide evidence to suggest that the effectiveness of library media specialists may be influenced by organizational and institutional characteristics that require the attention of the principal and other site and district level administrators and school board

members. Since the early 1980s there have been several studies offering evidence that principals, in particular, exert a strong influence over the extent and quality of planning and teaching collaborations between classroom teachers and library media specialists (Aaron, 1981; Farwell, 1998; Gehlken, 1994; Hartzell, 2003; Haycock, 1995; Mocek, 2002; Slygh, 2000; Tallman & Donham van Deusen, 1994; Underwood, 2004; Yetter, 1994). In his 1995 literature review, "Research in Teacher-Librarianship and the Institutionalization of Change," Haycock states that "the role of the principal is the key factor in the development of an effective school library media program" (p. 231). Yet a recent Indiana study (Lance, Rodney & Russell, 2007) about principals' perceptions of library media specialists' roles indicate from survey data that nearly 90% of principals' knowledge of what library media specialists do comes from their experience on the job, and just 7% of principals reported learning about school libraries through their own coursework. At the high school level in California, the sheer number of library media specialists, as well as the overall percentage, provides opportunities for many more principals and other administrators to experience the beneficial effects of a well-run program first-hand, and so may come to a school with a predisposition to support adequate staffing levels. But just 4% of this state's elementary school principals even have an opportunity to see a full-time library media specialist in action, and just over 1% have an opportunity to observe a library media specialist in action with a full-time clerical assistant. Elementary school principals cannot support what they have not seen.

In spite of the low staffing levels at the elementary and middle school levels, results of this study indicate that as the overall percentage of library media specialists at a grade level increases, so does the strength of the association between school library program elements and student achievement. The same trend holds for total staffing levels.

At the high school level, implications for policy makers are clear. At a time when achievement on standardized tests is so strongly weighted in assessing the overall success of schools, investment in a robust school library program should be a primary goal. Certificated staffing levels, total staffing levels, total budgets, collection sizes, and total technology available in the library all correlated with test scores with *r* values between .32 and .60, $p < .001$ when controlling for school and community variables, and the library factor was a better predictor of test scores than other school variables. Any school or district that decides not to invest in school library programs must account for that decision in terms of the public charge of equitable access to a quality education for all public school students.

Strong correlations between test scores and the instructional roles regularly provided by library media specialists at the high school level also offer some indicators for certificated staff and their administrative supervisors about how to allocate library work time. Providing reference assistance; instructing students in research strategies, use of resources and information literacy; and communicating proactively with the principal were among those activities that were most strongly related to student achievement. Library media specialists who develop methods to describe and measure these activities and share them with school leadership can help the larger school community build understanding about the library program's critical instructional role.

At the middle school level, the implications are less clear, but results of this study suggest that investment in a school library program may lead to increased student achievement. School and district officials, as well as library media specialists, may seek to investigate best practice at schools with successful school library media programs; implementation of such programs holds great potential for higher student achievement. While correlations were weakest at the elementary level, a similar investigation of best practice among successful school library

programs would constitute a positive first step in creating school libraries that are truly viable with the elementary population.

In the absence of strong correlations to test scores at the elementary school level, the connection between staffing levels and activities like the following may inform the decisions of school board members, district and school administrators, and school site council members in setting budget priorities:

- Instructing students in the use of resources
- Providing reference assistance
- Providing reading, listening and viewing guidance for students
- Providing instruction on Internet searching and research
- Offering curriculum-integrated information literacy instruction

At all levels, including elementary, the services that the library program regularly provided its school community were directly related to the amounts of both certificated and total library staffing, and with few exceptions, total staffing more strongly correlated with delivery of those services than did certificated staffing alone.

Library media specialists and the academic community must lead the effort to identify the best practices which connect school library programs at the high school level so strongly to student achievement. They must lead parallel efforts at the elementary and middle school, where a critical mass of successful school library programs does not appear to exist. The best practices of successful school library programs at all levels must also be shared with pre-service teachers and administrators in their credential programs. Because there are so few certificated library professional grades k-8, many teachers and administrators will never have the opportunity to experience the benefits of a strong library program first-hand unless that happens as part of their

formal training. Schools of library and information science must create partnerships with pre-service programs to accomplish this goal. Practitioners can join this partnership by working with pre-service teachers to plan model units and with pre-service administrators to develop educational visions that takes advantage of the school library in facilitating student success.

Recommendations for Further Research

There are several questions that remain to be explored with the data sources used in this study. CST scores can be disaggregated by ethnicity, and in California, where Hispanic and African-American students' scores lag behind that of the general population, it would be useful to know if there is a relationship between achievement in these sub-groups and school library media programs. Another avenue for exploration available through this data is the relationship between school library programs and drop-out rates; California recently changed the process for tracking students, and this new method is said to provide a considerably more reliable drop-out statistic than was previously possible. This particular issue is one way to use a quantitative methodology to broaden the investigation of the relationship between school library programs and the overall success of schools.

Fundamentally, though, this study provides a baseline of data that can be used to pursue qualitative research about school library programs. This study highlights the disparity in the strength of relationships between California's school library media programs and test scores from elementary through high school levels. It is truly a story of the haves, the halves, and the have-nots. Research is recommended to examine the reasons for this disparity, which may include investigations into the role of administrative leadership at schools whose school library programs contribute to higher academic achievement, whether best practice looks the same at all

levels, and whether developmental differences in students or structural differences in the organization of schools may require different emphases for school library programs at different grade levels.

The American Association of School Librarians' (AASL) "Standards for the 21st Century Learner" (2007) describes a range of real-world problem-solving abilities students need to develop, including locating, evaluating, and synthesizing information from a variety of sources, considering problems from a variety of perspectives, using technology tools to organize and analyze data and present information, and maintaining the resiliency and intrinsic motivation to complete lengthy and complex tasks. The shift in focus from what the library media specialist does to what the student should accomplish necessitates measurement tools that better capture how well students meet these standards than do the current standardized tests. Results from this study might also serve as a starting point for qualitative research that more deeply explores ways school library programs contribute to student achievement in these areas.

APPENDIX A

SCHOOL LIBRARY SURVEY 2006-2007

(Reproduced with permission from the California Department of Education)

Printable version

CALIFORNIA DEPARTMENT OF EDUCATION

School Library Survey Collecting Information from the 2006-2007 Academic Year

This printable-version of the CDE Library Survey is available for use as a worksheet before going online, for your files, and for use in training. The online version shows only one question per screen. The online survey is located at http://www.cde.ca.gov/ci/cr/lb and for the first time is password protected. Call Barbara Jeffus at 916-319-0445 for password information.

To reach the record for your school, select the correct *county*, *district*, and then *school* using the pull-down menus. Information collected here should reflect the library situation at the close of the 2006-2007 academic year. Contact Barbara Jeffus at 916-319-0445 for assistance.

1. Do you have a dedicated common area in your school designated as the library?
   If "Yes", continue filling out the survey. Please answer every question.
   If "No", go to the bottom of this survey page and submit the survey now.
   - O Yes, our school has a library located on campus
   - O Yes, our school has a joint-use school library and public library on campus
   - O No, we use a library on an adjacent school campus. (This response will take you to a pull down menu where you can select the school library used by your students. After you select the adjacent library, you will be taken to the end of the survey.)
   - O No (This response will take you to the close of the survey. New school libraries that weren't open in 2006-2007 should use this response.)

2. During a normal school **week** (not summer or vacations), how many hours is the school library open for students?

O 0	O 26-30
O 1-5	O 31-35
O 6-10	O 36-40
O 11-15	O 41-45
O 16-20	O 46-50
O 21-25	O 51 or more

3. Based upon when the school library is open for students, either on their own, with passes, or with classes, check one or more of the following to indicate when students can access the library:
   - ☐ (A) Before classes start
   - ☐ (B) During class time
   - ☐ (C) During breaks (for example, nutrition)
   - ☐ (D) During lunch
   - ☐ (E) After school
   - ☐ (F) Some evenings
   - ☐ (G) On weekends
   - ☐ (H) Summer school
   - ☐ (I) None of the above

4. Do you have at least one of the following paid credentialed staff working in the school library?
   - O Credentialed library media teacher
   - O Emergency-credentialed library media teacher
   - O Credentialed teacher without a library media teacher credential
   - O None of the above (This response will take you immediately to question 6.)

5. Select the phrase below that best describes the hours worked by the credentialed staff.
   - O More than one full-time equivalent
   - O Full-time equivalent
   - O Half-time or more, but not full-time equivalent
   - O Less than half-time equivalent

6. Do you have at least one paid classified employee working in the school library?
   - O Yes
   - O No (This response will take you immediately to question 8.)

7. Select the phrase below that best describes the hours worked by the classified library employee(s).
   - O More than one full-time equivalent
   - O Full-time equivalent
   - O Half-time or more, but not full-time equivalent
   - O Less than half-time equivalent

8. Is the school library staffed by volunteers only?
   - O Yes
   - O No (If you answered "Yes" to either question 4 or question 6, this answer must be "No")

9. Enter the number of books in the school library collection at the end of the 2006-2007 school year. Include reference books in your count, both print and digital books (eBooks) and count each reference volume as one.
   - O 2,499 or less
   - O 2,500 - 4,999
   - O 5,000 - 7,499
   - O 7,500 - 9,999
   - O 10,000 - 12,499
   - O 12,500 – 14,999
   - O 15,000 – 17,499
   - O 17,500 – 19,999
   - O 20,000 – 22,499
   - O 22,500 – 24,999
   - O 25,000 – 27,499
   - O 27,500 – 29,999
   - O 30,000 – 32,499
   - O 32,500 – 34,999
   - O 35,000 – 37,499
   - O 37,500 – 39,999
   - O 40,000 – 42,499
   - O 42,500 – 44,999
   - O 45,000 – 47,499
   - O 47,500 – 50,000
   - O 50,001 or more

10. Enter the average copyright date of the books in the school library's 520 section. Include books in both the 520 circulating and 520 reference sections.
    PROCEDURE:
    - Count the number of books in the 520s (from 520 to 520.999, Dewey Decimal Classification).
    - Next add up the copyright dates of all the books in the 520s. Divide the sum of the copyright dates by the total number of books in the 520s.
    - **Example:** Assuming you have only 3 books in the 520s and their copyright dates are 1984, 1992, & 2001, then: 1984 + 1992 + 2001 = 5977, divided by 3 = 1992 (rounded off to a whole number).
    - Enter whole numbers only. Do not use letters, words, or any form of punctuation.

    Correct entry: 1992
    Incorrect entries: "92", "approx. 1992", "1992.333", or "1992+".
    Enter "none" in the box if the library has no books in the 520 Dewey section.

    Average copyright date of books in Dewey section 520. Round off to a four-digit year.

11. Check one or more of the following technologies available in or through the school library:
    - ☐ (A) Automated catalog
    - ☐ (B) Library web site with access to online library catalog
    - ☐ (C) Library web site **without** access to online library catalog
    - ☐ (D) Automated library circulation
    - ☐ (E) Automated textbook circulation
    - ☐ (F) Internet access for students
    - ☐ (G) Paid online access to full-text periodicals, full-text reference books, primary sources or other subscription databases in the library
    - ☐ (H) Remote access to paid online full-text periodicals, full-text reference books, primary sources or other subscription databases
    - ☐ (I) Video collection and/or video streaming
    - ☐ (J) DVDs or laser disks
    - ☐ (K) Audio books (in any format, e.g. for MP3 player)

- ☐ (L) Integrated online information searching that includes your library catalog, paid access databases, and open web resources.
- ☐ (M) None

12. How much money was spent in the school library for the **purchase of library books** during the 2006-2007 academic year? **Include both print titles and digital titles (eBooks).** Include processing costs if purchased with library books. (Any answer other than "$100,000 or greater" will take you to question 14)

○ No Budget	
○ Less than $ 2,000	○ $ 50,000 - $ 54,999
○ Less than $ 5,000	○ $ 55,000 - $ 59,999
○ $ 5,000 – $ 9,999	○ $ 60,000 - $ 64,999
○ $ 10,000 - $ 14,999	○ $ 65,000 - $ 69,999
○ $ 15,000 - $ 19,999	○ $ 70,000 - $ 74,999
○ $ 20,000 - $ 24,999	○ $ 75,000 - $ 79,999
○ $ 25,000 - $ 29,999	○ $ 80,000 - $ 84,999
○ $ 30,000 - $ 34,999	○ $ 85,000 - $ 89,999
○ $ 35,000 - $ 39,999	○ $ 90,000 - $ 94,999
○ $ 40,000 - $ 44,999	○ $ 95,000 - $ 99,999
○ $ 45,000 - $ 49,999	○ $100,000 or more

13. If you spent more than $100,000 on books, enter the amount here.
PLEASE NOTE: Enter whole numbers only. Do not use letters, words, or any form of punctuation.
Correct entry: 150000.
Incorrect entries: "approx. 150,000", "one hundred fifty thousand", "150,000+".

[ ]

14. How much money was spent in the school library for the purchase of library materials **other than books** during the 2006-2007 academic year? Include periodicals (paper or electronic), technology and media resources, and related equipment. Do not include salaries, conference expenses, routine supplies, maintenance agreements, district purchases of shared electronic databases, etc. (Any answer other than "$100,000 or greater" will take you to question 16)

○ No Budget	
○ Less than $ 2,000	○ $ 50,000 - $ 54,999
○ Less than $ 5,000	○ $ 55,000 - $ 59,999
○ $ 5,000 - $ 9,999	○ $ 60,000 - $ 64,999
○ $ 10,000 - $ 14,999	○ $ 65,000 - $ 69,999
○ $ 15,000 - $ 19,999	○ $ 70,000 - $ 74,999
○ $ 20,000 - $ 24,999	○ $ 75,000 - $ 79,999
○ $ 25,000 - $ 29,999	○ $ 80,000 - $ 84,999
○ $ 30,000 - $ 34,999	○ $ 85,000 - $ 89,999
○ $ 35,000 - $ 39,999	○ $ 90,000 - $ 94,999
○ $ 40,000 - $ 44,999	○ $ 95,000 - $ 99,999
○ $ 45,000 - $ 49,999	○ $100,000 or more

(This response will take you to question 15 in the online survey)

15. If you spent more than $100,000 on materials other than books, enter the amount here.
PLEASE NOTE: Enter whole numbers only. Do not use letters, words, or any form of punctuation.
Correct entry: 150000.
Incorrect entries: "approx. 150,000", "one hundred fifty thousand", "150,000+".

[ ]

16. Check one or more of the following funds used to purchase library materials during the 2006-2007 academic year. While some of these funds are no longer available, it is possible they were available to use in 2006-2007.
- ☐ (A) California School Library Act Funds (last apportionment to schools in 2004-2005)
- ☐ (B) Instructional Materials Fund (IMFRP)
- ☐ (C) State Lottery Funds
- ☐ (D) Per Pupil Allotment (district or site)
- ☐ (E) General Fund (district or site)
- ☐ (F) School and Library Improvement Block Grant
- ☐ (G) Fund-raising (parent groups, book fairs, etc.)
- ☐ (H) Title I (federal)
- ☐ (I) Title V (federal)
- ☐ (J) Local Bond Measure
- ☐ (K) *Improving Literacy through School Libraries* Grant (federal)
- ☐ (L) Start-up Funds
- ☐ (M) Other (For example, one-time discretionary grants to districts)
- ☐ (N) None of the above

17. Which of the following terms best describes the method used to schedule classes in the school library?
- o Fixed/Block (classes scheduled at regularly specified times)
- o Flexible (open schedule, i.e. scheduled visits at varying times according to need)
- o Mixed (some classes block-scheduled, some flexibly-scheduled)
- o No class visits

18. Which of the following services and/or programs were regularly provided in the 2006-2007 school year?
- ☐ (A) Offered a program of curriculum-integrated information literacy instruction
- ☐ (B) Informally instructed students in the use of resources
- ☐ (C) Planned or conducted workshops for teachers
- ☐ (D) Assisted school curriculum committee with recommendations
- ☐ (E) Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week
- ☐ (F) Provided teachers with information about new resources
- ☐ (G) Provided reference assistance to students and teachers
- ☐ (H) Helped students and teachers find and use resources outside school library
- ☐ (I) Facilitated interlibrary loan for students and teachers
- ☐ (J) Provided reading, listening, and viewing guidance for students
- ☐ (K) Helped parents realize importance of lifelong learning
- ☐ (L) Coordinated in-school production of materials
- ☐ (M) Coordinated video production and dissemination activities
- ☐ (N) Coordinated cable TV, distance education, and related activities
- ☐ (O) Coordinated school or library computer networks
- ☐ (P) Provided access to online library catalog and circulation
- ☐ (Q) Provided Internet access for students in the library
- ☐ (R) Provided instruction on Internet searching and research
- ☐ (S) Provided electronic access to a resource sharing network
- ☐ (T) Communicated proactively with principal
- ☐ (U) Attended meetings of school site council, two or more times per school year
- ☐ (V) None of the above

19. Select the **two** library online subscription information databases most often used by the students in or through your school's library. This question does not apply to databases provided by the local public library, CD-ROM databases, or search engines.

- ☐ (A) Career Cruising
- ☐ (B) College Source
- ☐ (C) EBSCO Kids Search – Middle and Elementary School K-6
- ☐ (D) EBSCO Literary Reference Center
- ☐ (E) EBSCO Points of View
- ☐ (F) EBSCO Student Research Center – High School and Middle School
- ☐ (G) Encyclopedia Americana
- ☐ (H) Encyclopedia Britannica Online Encyclopedia
- ☐ (I) Facts on File Online Reference Databases
- ☐ (J) Gale Biography Resource Center (formerly Thomson Gale)
- ☐ (K) Gale History Resource Center
- ☐ (L) Gale Science Resource Center
- ☐ (M) Gale Student Resource Center
- ☐ (N) Grolier Online (Scholastic)
- ☐ (O) Grove Dictionary of Art
- ☐ (P) H. W. Wilson Applied Science and Technology
- ☐ (Q) H. W. Wilson Biography Indexes
- ☐ (R) H. W. Wilson Reader's Guide
- ☐ (S) NewsBank grade level or subject-related database
- ☐ (T) ProQuest CultureGrams
- ☐ (U) ProQuest eLibrary
- ☐ (V) ProQuest SIRS
- ☐ (W) Teen Health and Wellness Database (Rosen Publishing)
- ☐ (X) World Book Online
- ☐ (Y) None

APPENDIX B

LETTER FROM CALIFORNIA DEPARTMENT OF EDUCATION

CALIFORNIA
DEPARTMENT OF
EDUCATION

JACK O'CONNELL
STATE SUPERINTENDENT OF PUBLIC INSTRUCTION

June 18, 2008

Douglas Achterman
7395 Leafwood Drive
Prunedale, CA 93907

Dear Mr. Achterman:

This letter confirms your ability to access and reprint materials developed on school libraries by this office at the California Department of Education (CDE). All copyright and administrative use fees have been waived for this request.

The California School Library Survey questions are publically available online from the 2001-2002 school year forward through an interactive web page at http://www.cde.ca.gov/ci/cr/lb . The most recent printable version of the survey, from 2006-2007, is publically available from the California Department of Education Web site. Previous versions are available upon request from this office. These survey questions may be reprinted in their entirety in your appendix, citing the California Department of Education, Curriculum Frameworks and Instructional Resources Division as the source.

Data files for each year of the California School Library Survey are available to any researcher who makes a reasonable request. No special permission is needed for you to use these electronic files.

If you have any questions regarding the CDE School Library Survey, please contact me at 916-319-0445 or by e-mail at bjeffus@cde.ca.gov.

Sincerely,

Barbara H. Jeffus
School Library Consultant

APPENDIX C

ELEMENTS OF LOERTSCHER'S TAXONOMY OF SCHOOL LIBRARIES AND BIVARIATE CORRELATIONS, LIBRARY SERVICES AND U.S. HISTORY SCORES, GRADE 11.

Table 70

Elements of Loertscher's Taxonomy of School Libraries and Bivariate Correlations, Library Services and U.S. History Scores, Grade 11.

Collaboration	r
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	.29**
Provided teachers with information about new resources	.49**
Provided reference assistance to students and teachers	.47**
Planned or conducted workshops for teachers	.22**
Assisted school curriculum committee with recommendations	.25**
Reading	
Provided reading, listening, and viewing guidance for students	.35**
Information Literacy	
Offered a program of curriculum-integrated information literacy instruction	.39**
Provided instruction on Internet searching and research	.44**
Enhancing learning through technology	
Provided access to online library catalog and circulation	.46**
Provided Internet access for students in the library	.47**
Provided instruction on Internet searching and research	.44**
Coordinated school or library computer networks	.28**
Provided electronic access to a resource sharing network	.29**

**$p < .001$

APPENDIX D
ELEMENTS OF TODD & KULTHAU'S MODEL OF THE SCHOOL LIBRARY AS DYNAMIC AGENT OF LEARNING AND BIVARIATE CORRELATIONS, LIBRARY SERVICES AND U.S. HISTORY SCORES, GRADE 11

Table 71

Elements of Todd & Kulthau's Model of the School Library as Dynamic Agent of Learning and Bivariate Correlations, Library Services and U.S. History Scores, Grade 11

Resource Agent	r
Informally instructed students in the use of resources	.47**
Provided teachers with information about new resources	.49**
Provided reference assistance to students and teachers	.47**
Helped students & teachers find and use resources outside school library	.41**
Facilitated interlibrary loan for students and teachers	.20**
Information Literacy Agent	
Offered a program of curriculum-integrated information literacy instruction	.39**
Provided instruction on Internet searching and research	.44**
Knowledge Construction Agent, Academic Achievement Agent	
Collaborated with teachers to develop, implement, and evaluate student learning two or more hours per week	.29**
Independent Reading and Personal Development Agent:	
Provided reading, listening, and viewing guidance for students	.34**
Helped parents realize importance of lifelong learning	.20**
Provided teachers with information about new resources	.49**
Technological Agent	
Provided access to online library catalog and circulation	.46**
Provided Internet access for students in the library	.47**
Provided instruction on Internet searching and research	.44**
Coordinated school or library computer networks	.28**
Provided electronic access to a resource sharing network	.29**

**$p < .001$

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