
Research Instruments for Measuring the Impact of School Libraries on Student Achievement and Motivation

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A two-year study of public school library programs was conducted in one of the largest and most diverse states in the USA---New York. This three-phase study extends previous statewide library impact studies by using multiple research methods with multiple stakeholders to investigate the school library's impact on: (1) student achievement, (2) motivation for learning, and (3) technology use, as well as a range of other variables (e.g., principal-librarian relationship, librarian-teacher collaboration, library services and resources for students with disabilities). This article describes the design, development, testing and validation of online survey instruments used in the first two phases of this research. The article concludes with a number of recommendations for ways in which these instruments might be used by school library professionals to assess the impact of their programs and services on students in their schools and districts.

Introduction

Over the past 15 years in the USA, a number of statewide research studies have been conducted to determine the impact of school libraries and their school librarians on student achievement (see, for example, Lance, Wellborn, & Hamilton-Pennell, 1993). Researchers have identified some best practices that correlate positively with and contribute to student achievement across studies. Significant research findings have clearly established the relationship between well-staffed, well-funded school libraries with active information literacy instructional programs, and state-wide standardized test scores (Tepe & Geitgey, 2002).

Building on this research, a two-year study by a research team from Syracuse University's Center for Digital Literacy was recently conducted in one of the largest and most diverse states in the nation--New York, a state that mandates certified school library professionals at the secondary level only and does not require its certified school librarians to have teaching credentials. This three-phase research study, funded by a National Leadership Grant from the U.S. Institute of Museum & Library Services, extended previous statewide library impact studies, using multiple research methods to investigate the impact of school library programs, services, and resources on New York State students' (1) achievement, (2)

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motivation for learning, and (3) technology use. It also explored the principal-librarian relationship and the extent of library services and resources for students with disabilities. The study included three phases; only the first two phases of the study are addressed in this article.

- Phase I: An online general survey for librarians and principals in New York State;
- Phase II: An online in-depth survey for librarians, classroom teachers, students, and principals in 47 selected schools; and
- Phase III: In-person and electronic focus groups and interviews with principals, librarians, classroom teachers, students, and parents in 10 selected schools and in-depth observations and interviews in two schools with exemplary library programs.

While there have been close to 20 state studies of school library impact, few have provided the opportunity for building-level and district-level library professionals to understand how the instruments were developed for those studies, or provided access to the instruments for use or adaption in evaluating their own library programs and services.

The purpose of this article is to provide a detailed description of the design, development, testing, and validation of the online surveys used in the first two phases of the New York State study, offering these validated measuring tools to the community at large in order to spread the impact of this research throughout and beyond our state (and national) borders. Sections of this article include prior research, theoretical foundations, research questions, and methods, followed by detailed descriptions of the instruments. The article concludes with a discussion of implications for researchers and school library professionals who seek to use the survey instruments for their own purposes, as well as a brief discussion about the potential impact of the dissemination of such validated instruments to the larger school library research community.

Prior Research on the Impact of School Libraries

There have been a number of researchers in the field of school librarianship who have contributed evidence of the worth of the school library and the school librarian. Over the past 15 years in the USA, almost 20 statewide research studies have been conducted to determine the impact of their library and librarian on student achievement and its best practice correlates. In 1993, Keith Curry Lance and others developed a methodological approach to investigate the impact of school libraries on student academic achievement. Using students' standardized test scores as a means of measuring student achievement, Lance successfully correlated quality school library programs with increased performance on standardized tests.

Lance conducted studies in seven states, and his methodological approach has been used in another six states. From Lance's studies in Colorado (Lance, Wellborn, & Hamilton-Pennell, 1993) to New Mexico (Lance, Rodney, & Hamilton-Pennell, 2002), these statewide assessments have provided data for comparison across schools and school districts. Aggregating the results from more than ten previous studies reveals a positive correlation between higher standardized achievement test scores and a number of library characteristics (e.g., size of the library staff, how often students use the library, whether the librarian teaches students). In seven state studies, higher test scores were positively correlated with such factors

as the presence of a trained librarian and cooperative lesson planning between the librarian and classroom teachers. Some of these factors were investigated in the New York State study and, as in previous studies, the New York study investigated the relationship of school library programs and services to student achievement.

In a statewide study conducted in Ohio, Todd and Kuhlthau (2004a; 2004b) explored how school libraries support academic achievement by asking students in 39 schools with designated “exemplary” libraries to rate 48 statements that differentiated ways in which the library may help them. Students rated each question on a Likert-type scale that varied from “the library helped me a little” to “the library was most helpful.” Ratings on a third of the statements indicated that 50% or more of the students thought that the library was “most helpful” or “quite helpful.” Since the statements asked students about how the library helped them do all aspects of their schoolwork, this demonstrates that the library is directly helping many students with a significant portion of their work. However, the cumulative results from this study are somewhat unclear because students were not offered the option of saying that the library *did not help* them, thereby positively skewing the results. Survey instruments used in the New York study were designed to include the full range of potential responses.

Students in the Ohio study were also given a critical incident question asking them to describe a situation in which they received help from the library. By asking students to express ways that the library has helped them with their schoolwork, the Ohio study initiated an exploration of a potentially causal relationship between students’ use of the library and their academic achievement. The New York study extended previous research by using multiple research methods to elicit data from multiple stakeholders (students, administrators, classroom teachers, parents, librarians), including use of a critical incident question similar to that used in the Ohio study.

Theoretical Foundations

The 1998 national information literacy standards as specified in *Information Power: Building Partnerships for Learning* (AASL/AECT, 1998) were used as an initial conceptual framework for the design of the survey scales. However, since one of the main differences between this study and other state impact studies was its focus on motivation issues, the overall theoretical framework included a well-researched motivation theory, self-determination theory (e.g., Deci & Ryan, 1985). Self-determination theory (SDT) states that *competence* (i.e., the need to feel effective), *autonomy* (i.e., the need to have choices and control over one’s life), and *relatedness* (i.e., the need to feel connected to others) are innate needs that underlie human behavior and that are essential to psychological growth and well-being (Deci & Ryan, 1985; Deci & Ryan, 2008). SDT suggests that intrinsic motivation (actions motivated by interest and enjoyment) and self-regulation will flourish if social conditions are conducive to it. The theory further indicates that such social conditions are critical for well-being and that non-conducive environments contribute to issues of alienation and ill-being (Crow, 2009; Ryan & Deci, 2000). It is, therefore, important for the librarian to perceive that his school is an autonomy-supportive work environment and for students to perceive that their library is an autonomy-supportive learning environment.

Self-determination theory has been applied to a variety of learning and work environments, e.g., education, health care, psychotherapy, sports. Recently, this theory was used in a study by Arnone, Reynolds and Marshall (2009) on 8th graders' perceived and actual competence in their digital and information literacy skills. They found that the relationship between the librarian and her students clearly contributes to student affect toward information skills, use, and research. They conclude, "(t)he school library is a social, interactive environment with immense possibilities for nurturing these needs, and for encouraging students' self-determination and intrinsic motivation towards inquiry and engagement with traditional and technological information resources" (Arnone et al., 2009, p. 130).

Research Questions

Based on prior research and using the study's theoretical framework, the following general research questions, focusing on New York State's school libraries, were explored:

1. Do school library programs, services and resources have an impact on the learning achievement of students?
2. Do school library services and programs affect the learning motivation of students?
3. Do librarians perceive their school administrators as autonomy supportive?
4. Do school libraries and librarians provide adequate services and resources to students with disabilities?
5. In what ways do librarians influence the use of technology by both students and teachers?

This article focuses on the design, development, testing and validation of the surveys used in Phases I and II of this research. For detailed information about the research findings resulting from these two phases of the study, see Small, Snyder, and Parker (2009) and Small and Snyder (2009).

Methods

Two sets of survey instruments were developed and pilot tested for Phases I and II of this study:

- A *broad, general survey* consisting of multiple choice, Likert-type items administered in its final form online to 1612 school librarians and 832 principals throughout New York State;
- An *in-depth, more focused survey* consisting of multiple choice, Likert-type items, a rating scale, and a critical incident question administered in its final form online to 47 school librarians, 134 classroom teachers, and 1153 students from 47 selected schools throughout New York State.

Phase I: The General Survey

Phase I of the research study used two versions of a general survey containing eight scales. These scales included Learning Environment, Diversity of Collection (e.g., cultural), Student Motivation (to learn), Work Climate Questionnaire (modified from Deci & Ryan, 2008),

Leadership (within school community), Information Literacy (for teaching and learning), Collaboration (with classroom teachers), and Guidance (reading and use of information). The instruments also included demographic questions and an optional open comment field.

Instrument design

The general survey was implemented online using SurveyMonkey, a commercial web-based survey software application. Two versions of this instrument were developed: one for school librarians and one for school principals. All questions, except demographic items, were similar in both instruments with slight wording changes depending on who was responding (e.g., “I plan...” “Our school librarian plans...”). A total of 65 multiple choices questions were included in the librarian’s instrument (56 in the principal’s version), including a series of 55 Likert-type items. The items included Deci & Ryan’s Work Climate Questionnaire (6 item short form), and an additional ten questions about the relative frequency of certain activities performed by the librarian were included in both the librarian’s and principal’s survey. Eleven demographic questions asked the librarian to provided information about themselves, followed by 14 questions about the school library program. Concluding both versions of the survey, an open-ended comment field provided respondents with an opportunity to share additional information. Two examples of items from two scales on both surveys appear in Figure 1.

Learning Environment	Librarian	Our school's library is a warm and friendly place where all students like to spend time.
	Principal	Our school's library is a warm and friendly place where all students like to spend time.
Guidance	Librarian	I provide all students with guidance in the selection of reading materials.
	Principal	Our librarian(s) provides all students with guidance in the selection of reading materials.

Figure 1. Examples of items from the Librarian and Principal Surveys.

Pre-testing

The pre-test group was comprised of 11 practitioners, certified school librarians from central New York State participating in the Onondaga-Madison-Cortland BOCES’ Partners in Achievement: Libraries & Students (PALS) project. Many suggestions regarding clarity of wording and extraneous or redundant questions were incorporated based on feedback gathered during this pre-testing.

Pilot Testing

The pilot study focused on testing the online survey software (SurveyMonkey) and establishing reliability and validity of scales within the instrument. Participants were school librarians outside New York State. Recruitment took place via Syracuse University’s alumni directory and the LM_NET (library media network) listserv. Sixty-five participants began the survey, resulting in 57 usable responses, i.e., respondents who completed at least the first two sections of the survey. Factor and reliability analyses were conducted using the statistical analysis software SPSS. Questions specifically referring to New York State programs and/or standards were excluded from this analysis because all respondents were from out-of-state. No significant usability problems related to the survey software were reported. Users reported slight confusion about some wording and had questions about appropriateness of answer scales provided, e.g., Likert vs. frequency. An exploratory factor analysis was performed on the

responses as well as a reliability analysis of identified factors. Ceiling and floor effects were noted on some questions and slight revisions were made based on this feedback. Additionally, items loading on multiple factors were revised in order to create more precise scale measurements.

Scales

Based on the final set of responses from 1612 school librarians and 832 principals from throughout New York State (total: 2444), the general survey instrument provides valid and reliable measurements for eight scales (see Table 1). Unless noted, all measures are constructed from groups of Likert-type items.

Table 1. Phase I General Survey Scales.

Scale name	Description of measurement	Reliability (Cronbach's Alpha)		Number of items
		Librarian	Principal	
Learning Environment	Measurement of the school librarian or principal's perception of the SLM center as a place with a positive atmosphere that encourages learning.	0.802	0.899	4 items (#1-4)
Diversity of Collection	Measurement of the importance school librarians place on selecting materials that support diversity.	0.737	0.768	3 items (#8-10)
Student Motivation	Measurement of school librarian or principal's perception of the ability of the SLM program to motivate students to learn	0.910	0.934	9 items (#20-28)
Work Climate Questionnaire (Deci & Ryan, 2008)	Measurement of the librarian or principal's perception of the level of supportiveness offered by his/her school's administration	0.950	0.885	7 items (#29-35)
Leadership	Measurement of the librarian's perception of his/her leadership presence within the school community.	0.843	0.913	7 items (#36-42)
Information Literacy	Measurement of the importance the librarian places on teaching information literacy skills to students	0.828	0.835	5 items (#43-45, 54-55)
Collaboration	Measurement of the importance the librarian places on collaborating with classroom teachers.	0.748	0.794	3 items (#46-48)
Guidance (Frequency scale)	Measurement of librarian's or principal's perception of the frequency that the librarian provides guidance to the school community in the selection of reading materials and the use of print and digital resources.	0.765	0.874	6 items (#56-61)

Phase II: In-Depth Survey

The in-depth survey was administered to 1334 respondents, representing three groups within the 47 schools included in Phase II of the study: librarians, classroom teachers, and students. The schools represented a cross-section of New York State's public schools by level, socio-economic status, geographic location within New York State and community type.

A core set of similar items was administered to all three groups, with some wording changes made. A total of 11 reliable scales, consisting of Likert-type, multiple choice items, formed the main part of the in-depth survey instrument. The librarian's instrument included ten of these scales (57 items); the classroom teacher instrument included seven of those scales (40 items); and the student instrument included six scales (36 items), including an adaptation of Deci

& Ryan's Learning Climate Questionnaire (6 item short form). In total, the in-depth survey instrument included:

- 84 Likert-type items for librarians (65 for teachers, 42 for students);
- Ten rating items requiring participant to rate each of ten typical librarian tasks or responsibilities;
- One open-ended critical incident question;
- Nine demographic questions;
- One open-ended comment field.

Likert-type Items

Likert-type items had consistent anchors across all three groups (the title "school librarian" was used consistently across all instruments as it was believed to be most understandable title by administrators, teachers, parents, and students). Respondents were asked to indicate their level of agreement to a number of statements, grouped by topic. Figure 2 provides an example of the type of statement that was used in the in-depth survey and the full range of responses from *always true* to *never true*, as well as "I don't know."

54. When teaching research skills, the school librarian describes their usefulness to my students.

- This is always true.
- This is usually true.
- This is sometimes true.
- This is rarely true.
- This is never true.
- I don't know.

Figure 2. Example of a Likert-type Item from the In-depth Survey.

Rating Items

The second section of the in-depth instrument included a rating exercise. Ten statements described a range of services provided by school librarians, from managing the facility ("Maintaining a neat and orderly collection of resources") to reading support ("Motivating students to read"), from librarian-teacher collaboration ("Working with teachers to teach research skills to students") to promoting technology use ("Helping students use computers responsibly"). Students, classroom teachers and librarians were asked to give each item a rating, with "1" indicating the least important and "10" indicating the most important, reflecting the importance of this task in the overall responsibilities of the librarian. Grammar was changed slightly for each audience, but the substance of each description was consistent across all groups. Figure 3 provides an example of a rating item from this section of the in-depth survey:

Please rate the importance of the following services provided by your school librarian from 1 (LEAST IMPORTANT) to 10 (MOST IMPORTANT).

6. Writing and enforcing policies on copyright and appropriate Internet usage.

Figure 3. Example of Item from Rating Section of In-depth Survey.

Critical Incident Question

An open-ended critical incident technique was first used by Todd and Kulthau in the State of Ohio school library impact study (e.g., Todd, 2006). All of the instruments used in this phase of the study included a critical incident short answer question, modified from the one used in the Ohio study, that asked the respondent to recall and describe a memorable incident in the school library. Librarians were asked to describe a time when they provided help, while classroom teachers were asked to recount a time when they saw the librarian help or excite their students. Students were asked to describe a time when they received help or were really excited about learning by the librarian. Wording on the critical incident question varied slightly, depending on audience. The critical incident question from the student survey may be found in Figure 4.

Tell us about a specific time when you received help in the school library.

- When did it happen?
- What was it that you needed or wanted to know or be able to do?
- What help did you get and from whom?
- What did you learn and what did it allow you to do?
- How did you feel about the experience?
- What else can you tell us about this event?

Figure 4. The Critical Incident Question for Students.

Pre-testing

Researchers conducted a workshop with participating members of the Onondaga-Madison-Cortland BOCES (Board of Cooperative Educational Services) PALS (Partners in Achievement: Libraries & Students) project, during which early versions of the questionnaires were provided for review and comment. In particular, these school librarians offered suggestions for revising the student version of the survey in order to make it more easily understood and completed by students at all three grade levels.

Pilot Testing

Pilot testing was conducted online with 33 out-of-state school librarians, two out-of-state classroom teachers and nine students (ranging from grades 3 to 11) from New York State schools *not* participating in the study. Additionally, approximately 60 students from PALS schools completed the survey on paper (these schools were exempt from the final study). Significant adjustments were made to content and phrasing of questions based on feedback from all three groups. Exploratory factor analyses and reliability tests were conducted using these pilot data.

Scales

A confirmatory factor analysis was conducted using the actual survey data. For scales loading on one factor, reliability was evaluated using Cronbach's alpha. There were a total of 11 reliable scales formed from the in-depth survey data (see Table 2). Five of these scales (Information Literacy-Finding Information, Information Literacy-Using Information, Information Literacy-Evaluating Information, Technology, Respect for Diversity) were administered to all three groups (librarians, teachers and students), two scales (Collaboration, Professional Development) were administered to librarians and teachers only, three scales (IEPs, Assistive Technology, Inclusion & Collection Development) to librarians only, and one scale (Learning Climate) was used only with students.

Table 2. Phase II In-Depth Survey Scales

Scale Name	Scale description	Reliability (Cronbach's Alpha)			Items Included
		Librarian	Teachers	Students	
Information Literacy-Finding Information	Measure of the perceived importance school librarians place on teaching students skills related to finding information from the perspective of the librarians, the students and teachers.	0.796	0.820	0.881	6 items (#1, 2, 4-7)
Information Literacy-Using Information	Measure of the importance the school librarian places on teaching students skills related to using information, from the perspective of the librarians, the students and teachers.	0.858	0.899	0.909	8 items (#8-15)
Information Literacy-Evaluating Information	Measure of the importance the school librarian places on teaching students skills related to evaluating information, from the perspective of the librarians, the students and teachers.	0.825	0.877	0.888	6 items (#16, 17, 19, 20, 22, 23)
Technology	Measure of the importance the school librarian places on teaching skills involving the use of computer, from the perspective of the librarians, the students and teachers.	0.849	0.862	0.866	6 items (#25, 27, 28, 29, 30, 31)
Respect for Diversity	Measure of the importance the school librarian places on teaching students respect for diversity, from the perspective of librarians, the students and teachers.	0.602	0.806	0.834	4 items (#32-35)
Collaboration	Measure of the importance the school librarian places on collaborating with other teachers, from the perspective of librarians and teachers.	0.875	0.848	N/A	7 items (#37, 39-44 on SLMS/ teacher Instruments)
Professional Development	Measure of the importance the school librarian places on being a leader within the school community, from the perspective of librarians and teachers.	0.744	0.870	N/A	3 items (#47-49 on librarian/teacher Instruments)
IEPs	Measure of the degree to which the school librarian is involved in creating and using IEPs for students with disabilities, from the perspective of the librarian.	0.880	N/A	N/A	4 items (72-75 on librarian instrument)
Assistive Technology	Measure of the level of responsibility the school librarian has for selecting and maintaining assistive technology for students with disabilities.	0.803	N/A	N/A	3 items (76-78 on librarian instrument)
Inclusion & Collection Development	Measure of the importance the school librarian places on selecting materials for their collection that address the needs of students with disabilities, from the perspective of the school librarian.	0.775	N/A	N/A	3 items (#82-84 on librarian instrument)
Learning Climate Questionnaire (Deci & Ryan, 2008)	An adaptation of Deci's Work Climate Survey, measure of students' perception of the supportiveness of the learning climate in their school library, from the perspective of student.	N/A	N/A	0.896	6 items (#37-42 on student instrument)

Discussion

The purpose of this article is to provide a detailed description of the design, development, testing, and validation of the general and in-depth online surveys used in the first two phases of the New York State impact study, which involved more than 3700 participating students and educators. By providing relevant background and offering these validated measuring tools to

the school library community at large, the authors hope to spread the impact of this research throughout and beyond our state (and national) borders.

Deploying the Instruments for Future Practitioner-Based Research

Practitioner-based research is typically small-scale and allows an individual researcher to focus on specific variables of interest. For example, the instruments described in this article and made available electronically may be used by the school librarian to assess attitudes toward specific or overall library programs or services by a range of stakeholders in his or her school, using the results to modify or enrich such programs or services. Similarly, a district library supervisor might administer the instruments to all schools in a district in order to identify various stakeholders' perceptions of library services and programs across schools, using the information to reassess resource allocation or to highlight model programs. School library professionals around the world now have access to a set of validated and reliable instruments that can be used for a range of purposes:

- To self-assess;
- To justify spending and budget allotments;
- To draw the attention of the greater school community to the role of the school library program in teaching and learning;
- To share results with the larger community in order to contribute stronger, national case for the importance of school libraries.

The Impact of Reliable Measurements

Use of common, validated and reliable instruments across schools, districts, states (and countries) to assess the school library's impact on student achievement and motivation can have a major impact on the perceptions of the value of school libraries and librarians nationwide and worldwide. Such impact has potential:

- To identify essential skills learned through school library programs;
- To raise awareness as to the range of impact of school library programs on students and staff;
- To affect legislation related to mandating of school library professionals;
- To strengthen the lobbying power of school libraries locally, nationally and worldwide;
- To build community support and awareness of the importance of school library program toward developing 21st century literacies;
- To contribute to a networked pool of data from across the country that could impact funding and services on a national level.

The current U.S. national standards for school library programs and services now include dispositions for learning, important behaviors and attitudes that affect learning, such as persistence and curiosity (both of which are motivational attributes). Although this study was conducted before the 2007 American Association of School Librarians' standards were published, the motivational attributes addressed in this study (e.g., choice, confidence) can be

directly linked to a number of dispositions currently articulated in *Standards for the 21st Century Learner* (AASL, 2009), such as:

- 1.2.1 Display *initiation* and *engagement* by posing questions and investigating the answers beyond the collection of superficial facts;
- 1.2.2 Demonstrate *confidence* and *self-direction* by making independent choices in the selection of resources and information;
- 1.2.7 Display *persistence* by continuing to pursue information to gain a broad perspective. (AASL, 2009, p. 13).
- 4.2.1 Display curiosity by pursuing interests through multiple resources.
- 4.2.2 Demonstrate motivation by seeking information to answer personal questions and interests, trying a variety of formats and genres, and displaying a willingness to go beyond academic requirements.
- 4.2.4 Show an appreciation for literature by electing to read for pleasure and expressing an interest in various literary genres. (AASL, 2009, p. 16).

Therefore, the instruments used in this study may provide additional value---guidance for assessment of some or all of these important dispositions. Links to some scales from the student surveys used in this research are being created on the Center for Digital Literacy at Syracuse University's Web site (<http://digital-literacy.syr.edu/site/view/80>) so that school library professionals nationwide may freely use them to assess the impact of their libraries on students and teachers in their schools and districts.

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