To Whom It May Concern,

Dr. Marcia A. Mardis' chapter, "Do School Librarians Cause Learning? Probing What School Librarians Do and What Learners Gain in School Libraries," has been accepted as part of the edited book published by Routledge, *Reconceptualizing Libraries: Perspectives from the Information and Learning Sciences.* I serve as the co-editor along with Dr. Victor R Lee. We anticipate the book will be published late next month.

Thank you,

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RECONCEPTUALIZING LIBRARIES

Perspectives from the Information and Learning Sciences

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PROBING CAUSAL RELATIONSHIPS BETWEEN WHAT SCHOOL LIBRARIANS DO AND WHAT LEARNERS GAIN IN SCHOOL LIBRARIES

A Reconceptualization of the Profession's Research Agenda

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Introduction

Learning is a self-directed, ongoing, transferrable, and social process of applying understanding; information, a core element of this process, is reported to be a significant contributing cause of learning (National Research Council [NRC], 2000). Like nurses (e.g., Spence Laschinger, 2008) and social workers (e.g., Rubin & Parrish, 2012), school librarians contribute to learners' outcomes through direct and indirect contact and collaborative relationships with other professionals; as with these fields, school librarianship has a strong anecdotal evidence base, but few researchers have attempted to document causal relationships between what professionals do and what beneficiaries gain (Morris & Cahill, 2016). Numerous local, state, and federal education policies tie educators' financial and technical support to their abilities to document cause/effect relationships between their practice and learner outcomes. For the school librarianship community, then, a high priority is to reconceptualize the profession's research agenda toward one which builds causal understanding. However, this shift may be daunting because, as Morrison and van der Werf (2016) pointed out, "To search for causality in educational research is to search for the holy grail. Causality is elusive" (p. 1). In this chapter, we share the foundation and current state of school librarianship as well as the research agenda we developed and have begun to enact. We conclude with a look into future research directions, potential challenges, and implications for researchers, practitioners, and policy makers.

CLASS II. Best Practices Identification

CLASS III. Best Practices Testing

CLASS IV. Impact Research

Current Research Project

Foundational Research

Exploratory Research

Future Research Projects

Design and Development Research

Efficacy/Effectiveness/ Scale Up Research

Phase I. Build Theory

- Meta-synthesis of causal teacher/ classroom best practice research
- Determine potential school librarian best practices
- Generate theory to test using causal research questions

Phase II. Test Theory

- Test theory in small field study
- Refine best practice inventory
- Determine internal and external factors
- Refine theory

Plan Initial Study

- Prioritize research questions
- Determine best practice combinations
- Determine priority sites for initial research
- Determine appropriate methods
- Design initial study

Deploy Initial Study

- Review and iterate study
- Determine limitations
- Determine implications for scaling
- Identify methods and priorities for scaling up and out

Determine Causal Relationships

- Deploy larger studies
- Refine study designs
- Set priorities for ongoing research
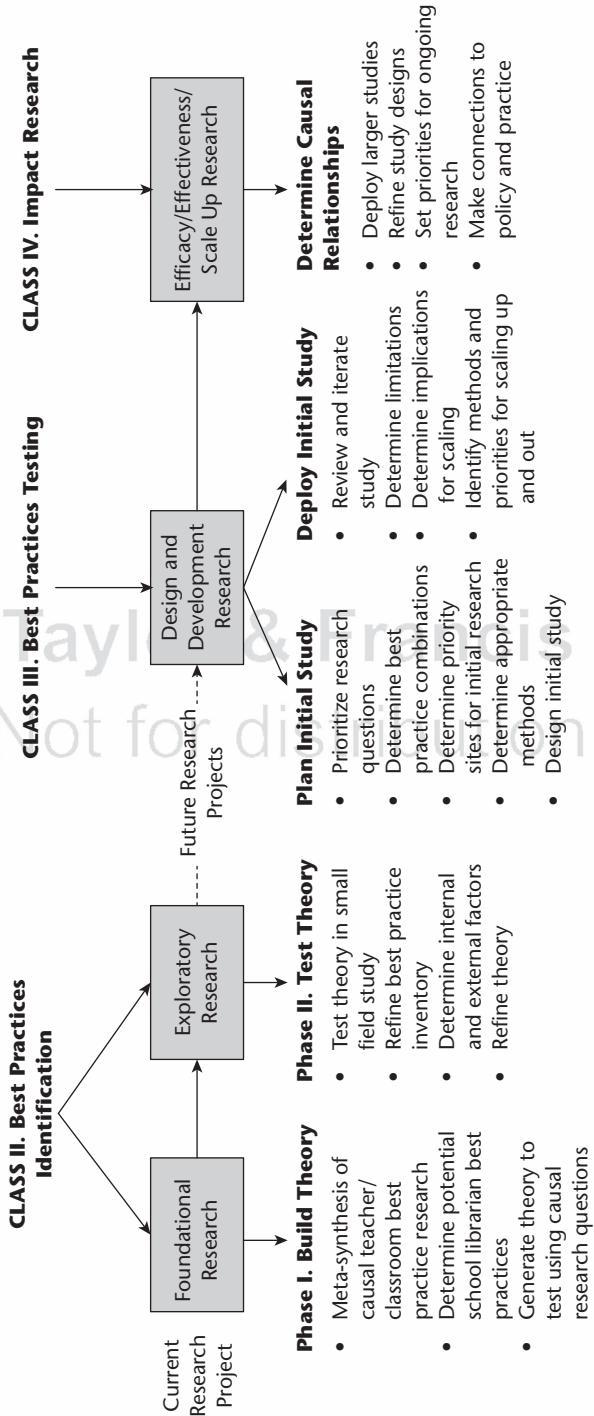- Make connections to policy and practice

FIGURE 12.1 CLASS research phases

Research Heritage

In 2014, the American Association of School Librarians (AASL) was awarded Causality: School Libraries and Student Success (CLASS), an Institute of Museum and Library Services (IMLS) National Forum grant. The purpose of the CLASS forum was to bring together leaders in school library research and related fields to build consensus on a national agenda for school library researchers to move to from correlational studies conducted by a variety of research teams and individual researchers to a planned and coordinated causal research agenda for the profession. CLASS was highly successful in outlining next steps for a decade of progressive research, as Figure 12.1 shows.

Figure 12.1 illustrates the causal evidence development process outlined in *Common Guidelines for Education Research and Development* (Institute of Education Sciences & National Science Foundation, 2013) and affirmed by the CLASS forum participants (AASL, 2014). This agenda builds carefully toward a thorough and elaborate approach to causal research that will ultimately place school library research in line with federally recognized scientifically based empirical research. Each part of the research agenda builds on the one before, all leading to the ultimate goal of research that documents the causal implications of school library practice.

The purpose of Phase I of the CLASS research trajectory illustrated in Figure 12.1 is to generate theory about how school librarians relate to learners' outcomes; this process is designed to be initially operationalized through rigorous meta-analysis of best practice research relating to educators and student achievement. To conduct the research specified in Phase I of Figure 12.1, AASL engaged the CLASS II research team, that is, the chapter authors from Florida State University (FSU), Old Dominion University (ODU), and University of North Texas (UNT). In the research presented in this chapter, we addressed the first part of Phase I of that agenda by using meta-syntheses; our goal was to distill a working theory that will be tested and refined through the second part of Phase I, field studies that are currently underway.

Research Purpose and Question

The purpose of the research described in this chapter was to employ meta-synthesis to surface educators' effective practices that school librarians can also use to benefit learners. We pursued this objective in the context of the research question "What causal relationships between school-based malleable factors and student learning are present in published research?" We defined "school-based factors" as learning activities that occur within a school, such as aspects of classroom instruction or other malleable factors.

To provide a foundation upon which to understand this work, in this chapter, we begin by exploring the challenges of causal research in education as well as

the correlational research relating to school librarians, school libraries, and student learning. Then we describe our process for identifying best practices by exploring previous research connecting what teachers do, the contexts in which they engage with learners, and student learning outcomes. We conclude by outlining our research in process and the next steps for the CLASS research agenda.

Literature Review

Today's students must navigate an information terrain that demands sophisticated information discovery, creation, and communication skills. To be prepared for the demands of tomorrow's workforce and higher education, learners must make many ethical and safety decisions related to information and technology (Cooper & Bray, 2011). Myriad forces such as the common standards movement's emphasis on conceptual application; growing global needs for dynamic, innovative, and flexible workplace readiness skills; and ubiquitous information and technology heighten the demands on educators responsible for students' success (AASL, 2016).

School librarians are educators, information specialists, and leaders. They possess the expertise, knowledge, and influence to ensure students' mastery of a wide range of cognitive, interpersonal, and intrapersonal skills (AASL, 2009; AASL, 2018). However, some states have fewer than half of the schools with a full-time certified school librarian, and the library field has made little progress in changing that, despite active support in some areas (United States Department of Education, National Center for Education Statistics, 2016). Research is needed to demonstrate what kinds of effects a quality school library program, defined as a fully funded and fully staffed learning space led by a state-certified school librarian, has on student learning and success.

Causality in Education Research

An intervention such as a curricular innovation can be viewed as the cause of an effect, such as improved student learning, according to philosopher John Locke: "A cause is that which makes any other thing, either simple idea, substance, or mode, begin to be; and an effect is that which had its beginning from some other thing" (as quoted in Yolton, 1977, p. 325). As Shadish, Cook, and Campbell (2002) observed, we rarely know all of the causes of observed effects or how they relate to one another. Holland (1986) pointed out that a definite cause cannot be determined unequivocally; rather, causal studies establish the probability that an effect will occur.

The strongest ~~such~~ research design, theoretically, is an experimental design such as a randomized control trial (RCT) (Morgan & Winship, 2014; Murnane & Willett, 2011), in which units are randomly assigned to either a treatment or a control condition. Random assignment probabilistically controls for confounding

variables other than the presence/absence of the treatment. However, randomized control trial studies both are expensive and have major feasibility problems in education research; randomly assigning learners to educational interventions is difficult and even undesirable to implement (Thomas, 2016). The alternative would be to use one of the stronger, viable nonrandomized experimental designs, generally known as quasi–experimental designs, such as a time–series design or matched samples design (Shadish et al., 2002).

While experimental and quasi–experimental designs are optimal for summative evaluation (determining *whether* the intervention had an effect), they are not as useful for formative assessment (understanding how to *improve* existing programs). As Pawson (2006) argued,

> The nature of causality in social programmes is such that any synthesis of evidence on whether they work will need to investigate how they work. This requires unearthing information on mechanisms, contexts, and outcomes. The central quest is to understand the conditions of programme efficacy and this will involve the synthesis in investigating for whom, in what circumstances, and in what respects a family of programmes work.
>
> *(p. 25)*

Building these connections requires using methods that can elucidate contextual influences and the processes by which these operate. These are particular strengths of qualitative, rather than quantitative, research. However, in the current policy landscape, qualitative and descriptive studies are not as valued as sources of evidence for education intervention choices (U.S. Department of Education, 2016).

Current Social and Education Challenges Demand Causal Research

Causal research is also warranted by two intertwined current trends:

Broadening Ideas of Student Learning

While standardized test scores dominate the current discourse surrounding measuring student achievement, current federal education policy allows for the consideration of discipline referrals, attendance, parental involvement, graduation rates, and college application rates—as long as these considerations can be measured and their use is evidence based. Other areas of education have already moved to causal studies focusing on the degree to which educational practices, policies, teaching interventions, or out–of–school factors relate to student achievement. Examples of these recent studies include the effects of class size reductions (Shin & Raudenbush, 2011); home environment disruption (Hanscombe, Haworth, Davis,

Jaffee & Plimin, 2011); socio–economic status (Schubert & Becker, 2010); family involvement (Evans, Kelley, Sikora, & Trieman, 2010), and principal leadership (Tubin, 2011). Because students' in-school and out-of-school learning experiences include the school library, education research that does not consider the school library's contribution is providing an incomplete, and possibly misleading, view of student learning.

Every Student Succeeds Act and Evidence-Based Interventions

The major federal funding bill for public education, the Every Student Succeeds Act (ESSA), was signed into law on December 10, 2015 (United States Department of Education, 2016). As state education policy makers consider accessing ESSA funds for public education, they must prepare an implementation plan that includes proposed interventions for student improvement that are evidence-based. These interventions must demonstrate a statistically significant effect on improving student outcomes or other relevant outcomes based on strong evidence from at least one well–designed and well–implemented experimental study; moderate evidence from at least one well–designed and well–implemented quasi-experimental study; or promising evidence from at least one well–designed and well–implemented correlational study with statistical controls for selection bias. Policy makers may also select interventions that have been proven to demonstrate a rationale based on high–quality research findings or positive evaluation that such activity, strategy, or intervention is likely to improve student outcomes or other relevant outcomes; and includes ongoing efforts to examine the effects of such activity, strategy, or intervention.

Foundational Research on School Librarians' Effectiveness

For decades, researchers interested in school libraries have explored the relationship of school-level characteristics of libraries, such as the size of school library collections or the qualifications of school library staff, and student achievement. Additionally, there have been numerous case studies examining various aspects of school library practice.

Researchers began undertaking studies designed to measure the impact of school libraries and school librarians on student performance as early as the 1960s, when Gaver (1963) found higher average test score gains among students in elementary schools with centralized school libraries staffed by certified school librarians than in the other groups. In the five decades since Gaver's (1963) study, several researchers have suggested correlational relationships between school library program elements and academic achievement. Lance and a team of researchers (Lance, Wellborn, & Hamilton–Pennell, 1993) published the first study that reported a correlation between school library program components and student achievement in Colorado; this study has become known as the "Colorado Study."

In the ensuing correlational studies, researchers consistently reported a significant positive correlation between reading test achievement and particular elements of school library programs (Scholastic, 2016). These studies used factor analysis and regression modeling to isolate external variables, such as poverty and parental educational attainment, that related to student achievement to claim statistical significance about the school library–related results.

In the Colorado Study and its replications, researchers reported significant correlational relationships between reading test scores and:

1. School library staff size (Baxter & Smalley, 2003; Baumbach, 2002; Lance, Rodney, & Hamilton-Pennell, 2001; Smith, 2001; Lance, Rodney, & Hamilton–Pennell, 2000; Lance et al., 1999);
2. Presence of full-time, certified school librarians (Callison, 2004; Rodney, Lance, Hamilton-Pennell, & Center, 2002; Lance et al., 1999, 2000);
3. Frequency of library–centered instruction (Lance et al., 1999) and collaborative instruction between school librarians and teachers (Lance, Rodney, & Hamilton–Pennell, 2001, 2005; Lance et al., 2000);
4. Size and currency of library collections (Burgin, Bracy, & Brown, 2003; Smith, 2001; Lance et al., 2000);
5. Networked library access to licensed databases (Lance, Rodney, & Hamilton–Pennell, 2002);
6. Flexible scheduling (Lance et al., 2005; Rodney, Lance, & Hamilton–Pennell, 2003); and
7. School library budget size (Baxter & Smalley, 2003; Lance et al., 2001).

Education researchers have expressed caution concerning the over-interpretation of correlational studies, finding that readers often mistake correlation for causation when interpreting findings (Bleske-Rechek, Morrison, & Heidtke, 2015). However, the correlational findings strongly suggest that evolving research to focus on specific professional activities, program elements, and learning outcomes unique to the school library is a promising direction and one that requires testing causal structures that explain correlational data (Russo, 2011). Although these studies' correlational approaches have failed to isolate the effects of school libraries, in the same manner that experimental and quasi–experimental methods may allow, they do warrant causal investigation. As Mardis (2007) suggested, "Correlation should be the starting point, not the focus of advocacy since it is so often misinterpreted or over–claimed" (p. 25).

Challenges to Causally Linking School Librarianship and Student Learning

While existing correlational studies are valuable in identifying possible effects and the features of school libraries and school librarians that may cause them, they are

not able to credibly rule out plausible alternative explanations. Strong causal stud-ies partnered with the existing body of correlational research would strengthen claims about the influence of school libraries and school librarians on student learning, but several challenges remain.

Interlocking and Overlapping Roles

School librarians' roles are teacher, instructional partner, leader, information spe-cialist and program administrator (AASL, 2009). In these roles, the school librarian works with everyone in the school and in learning spaces that are inclusive but not limited to the designated school library facility. The school library is an open learning space in which school librarians, through their various roles, directly or indirectly affect student learning. The school librarian also frequently works with other educators including teachers and administrators through instructional or institutional planning, coteaching, or the identification and provision of high-quality resources.

Isolating the school librarian's direct effect on learning is therefore challenging; the interconnected nature of school librarianship makes it difficult to separate the actions of effective school librarians from the organizational function of effective school library programs. Without a clear distinction between the two areas, causal researchers are challenged to determine what phenomena to study, or to put it simply, for what school librarians should be held accountable or given credit for (DiScala & Subramaniam, 2011; Zmuda & Harada, 2008).

Common Standards

Recent standards for college and career readiness including the Common Core State Standards (CCSS) and the Next Generation Science Standards (NGSS) (Achieve & NRC, 2013) aim to more closely connect the relationship between education and student learning by emphasizing the discovery of causal relation-ships. Current common standards–based school reform efforts often include strong emphases on information literacy skills, knowledge, dispositions, and self-assessments that ensure college and career readiness. Qualities such as curiosity, creativity, and persistence that appear in college and career readiness standards (National Governors' Association & Council of State School Officers, 2010; National Research Council, 2013) and the National School Library Standards (AASL, 2018) are vital skills in which the school librarian may play a significant role in imparting and are not necessarily reflected by standardized tests.

Information literacy, a particular concern of school librarians in their intended outcomes, includes "including digital, visual, textual, and technological" (AASL, 2007, n.p.) competencies reflected in the CCSS and NGSS. The NRC (2013) maintained that children will meet future challenges and achieve their potential as

adults only if they develop a range of transferable skills and knowledge that prepare them to use information, connect information to prior knowledge, ask questions about what is not known, investigate answers, construct new understandings, and communicate with others to share those new understandings. However, methods of reliably measuring school librarians' role in imparting information literacy skills have yet to be developed (Neumann, Finger, & Neumann, 2017).

Method

In line with the theory-building process outlined in the *Common Guidelines for Educational Research* and levels of evidence specified by ESSA, CLASS II researchers identified activities and characteristics that showed strong relationships with student learning using three independent concurrent syntheses of current education policy, theory, and best practices research. We integrated the syntheses results and refined a list of possible causal features that may be present in school librarians' actions and activities that occur within the school library.

Mixed Research Synthesis

For this study, researchers from FSU, ODU, and UNT looked to the causal determination efforts in parallel fields in which professionals perform their duties as well as collaborate with other professionals. We opted to use mixed research synthesis (MRS), a method often used in nursing and social work research (Sandelowski, Voils, & Barroso, 2006) to determine the contributions of independent professional actions as well as the effects of professionals working together. "Mixed" are the objects of studies (i.e., the findings appearing in empirical qualitative, quantitative, and mixed-methods studies) as well as the methods (i.e., the qualitative and quantitative approaches). The researchers chose MRS because it is a useful method to develop evidence summaries and to determine key factors in an implementation chain of interventions, programs, and policies (Pawson, 2006).

MRS Step 1. Aggregation

In this step, each team reviewed a different corpus of peer-reviewed published research on causes of student learning published between 1985 and 2015. Per the *Common Guidelines for Educational Research* (IES & NSF, 2013) section on foundational research, we conducted searches of periodical databases to identify relevant empirical research. To compile the initial corpus, we agreed upon an initial Boolean search phrase such as "cause and student and (learning or achievement)." Researchers kept track of the searches conducted by recording date, source, search string and filters, citation, and number of results. Publications were then reviewed for relevancy to the research question.

FSU Aggregation Data Collection and Analysis

The FSU team examined practice guides and studies included in the What Works Clearinghouse (WWC) database. Established in 2002, the Institute of Education Sciences (IES) oversees the WWC within the U.S. Department of Education. WWC staff conduct ongoing searches of education research sources to identify studies that use an eligible design (i.e., randomized controlled trial, quasi-experimental design, regression-discontinuity designs, or single-case design) (IES, 2014). WWC staff assess the quality of evidence the study provides on the effectiveness of an intervention and determine whether it "Meets WWC Design Standards Without Reservations," "Meets WWC Design Standards With Reservations," or "Does Not Meet WWC Design Standards" (IES, 2014). WWC staff then assign the study an ESSA level of evidence (i.e., strong, moderate, or promising).

The FSU team also examined the WWC Practice Guides as of July 2016 (N = 19), which provide topical syntheses of studies with a special emphasis on educator agency and actions that have been proven to have a positive effect on a range of student outcomes (IES, n.d.). Panels of education researchers conducted the syntheses and developed the practice guides. The practice guides available in July 2016 were:

- *Assisting Students Struggling with Mathematics* (Gersten et al., 2009)
- *Assisting Students Struggling with Reading* (Gersten et al., 2009)
- *Developing Effective Fractions Instruction for Kindergarten Through 8th Grade* (Siegler et al., 2010)
- *Dropout Prevention* (Dynarski et al., 2008)
- *Effective Literacy and English Language Instruction for English Learners in the Elementary Grades* (Gersten et al., 2007)
- *Encouraging Girls in Math and Science* (Halpern et al., 2007)
- *Helping Students Navigate the Path to College* (Tierney et al., 2009)
- *Improving Adolescent Literacy: Effective Classroom and Intervention Practices* (Kamil et al., 2008)
- *Improving Mathematical Problem Solving in Grades 4 Through 8* (Woodward et al., 2012)
- *Improving Reading Comprehension in Kindergarten Through 3rd Grade* (Shanahan et al., 2010)
- *Organizing Instruction and Study to Improve Student Learning* (Pashler et al., 2007)
- *Reducing Behavior Problems in the Elementary School Classroom* (Epstein et al., 2008)
- *Structuring Out-of-School Time to Improve Academic Achievement* (Beckett et al., 2009)

- *Teaching Academic Content and Literacy to English Learners in Elementary and Middle School* (Baker et al., 2014)
- *Teaching Elementary School Students to Be Effective Writers* (Graham et al., 2012)
- *Teaching Math to Young Children* (Frye et al., 2013)
- *Teaching Strategies for Improving Algebra Knowledge in Middle and High School Students* (Star et al., 2015)
- *Turning Around Chronically Low-Performing Schools* (Herman et al., 2008)
- *Using Student Achievement Data to Support Instructional Decision Making* (Hamilton et al., 2009)

For each WWC study and practice guide, the FSU researchers extracted the statistically significant effective practices noted in the studies. For this research, the FSU researchers only considered WWC studies that not only met the design standards without reservations but also constituted, according to the WWC, strong or moderate evidence of effectiveness. In all, FSU retrieved 407 unique studies, 168 of which were included in the team's analysis.

ODU Aggregation Data Collection and Analysis

ODU researchers created a conceptual map, based on the work of Hattie (2008) that illustrated the various broad domains that influence student achievement, and each domain was synthesized independently. To identify pertinent literature, the team first searched prominent databases that catalog peer-reviewed literature about educational issues such as EBSCO, Scopus, Google Scholar, and JSTOR. Selected articles had to meet certain criteria: available in English, peer reviewed, published after 1985, ~~center~~ on school-aged children but not ~~concentrate~~ on students with disabilities. Using the ESSA guidance on using evidence to strengthen education investments (United States Department of Education, 2016), the ODU team members read each article and assigned an ESSA level. As an investigation into causal research, the team was most interested in randomized controlled trials; however, team members recognized the rigor of matching designs, propensity score matching, regression discontinuity, and other strong correlational designs. Meta-analyses that included correlational studies but use the power of aggregation to locate effective educational practices were culled from Hattie's (2008) *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. An initial search resulted in approximately 159 articles from the databases as well as articles located through lists found in Hattie (2008). The team used these results to snowball—searching the reference lists for additional literature that added another 200 articles. Upon close examination, the team excluded articles that did not fit the inclusion criteria. Of the final 245 articles, 107 provided strong evidence, 135 provided moderate or promising evidence, and 3 demonstrated a rationale applying the ESSA levels of evidence criteria.

UNT Aggregation Data Collection and Analysis

UNT researchers conducted a literature discovery search using the Scopus database, the largest abstract and citation database of peer-reviewed literature: scientific journals, books, and conference proceedings. The team searched Scopus with a search string of

librar* AND caus* AND (school* OR learn* OR achiev*)

to retrieve 514 articles. From this initial search, the team conducted 89 separate searches using keyword "school librar*" with the relevant codes (n = 105) and themes (n = 18) related to school learning and/or achievement from the broad Scopus search. To be included in the corpus, each identified document was: focused on school libraries; reported empirical research; published in a peer-reviewed journal or in conference proceedings; published or available online as in press between January 1985 and March 2016; and written in English. The team defined empirical papers as those that gathered and analyzed primary or secondary data in their investigation. Conceptual and theoretical publications did not meet the inclusion criteria. The majority of the publications discovered in the literature search were not empirical and were excluded. Out of 330 results returned, 264 fit the inclusion criteria.

Following the ESSA standards, the UNT researchers kept seventy-six studies, with just over half (56.6%) published 2010–2016. The majority were journal articles, as only 2 studies were from conference proceedings. The academic disciplines were limited to education (n = 8) and library and information sciences (n = 68); however, 22% (n = 17) included technology as a means for intervention for school librarians. The majority of the papers, 65.8% (n = 50) represented studies involving school librarians based in the United States. The papers that remained and added to the larger corpus included 1article (Shoham, 2001) that met ESSA's level of "strong evidence," 9 papers that reflected moderate evidence, 27 papers that had promising evidence, and 39 papers demonstrated a rationale.

MRS Step 2. Synthesis

To identify possible learning outcomes that directly result from library learning space activities, the researchers reviewed the corpus of studies aggregated in MRS Step 1 and applied the integrated MRS design with a top-down configuration synthesis method. In an integrated MRS, studies in a targeted domain are grouped by findings viewed as answering the same research questions or addressing the same aspects of a target phenomenon (Sandelowski et al., 2006). This MRS approach included top-down configuration such as counting, tabulating, diagramming, and narrating thematically diverse individual findings, or sets of aggregated findings, into a coherent theoretical rendering. Figure 12.2 depicts a sample analysis conducted with an Integrated MRS.
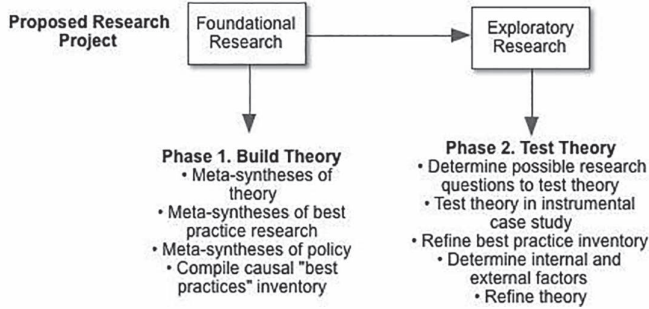
FIGURE 12.2   Sample integrated MRS with top–down configuration[1]

Findings in configuration syntheses may contradict, extend, explain, or other–wise modify each other. In configuration synthesis, researchers link findings, even though these links may not have been addressed in any of the primary studies reviewed. This particular approach is well suited for the proposed study because it can identify promising causal relationships that must be extrapolated from the original study context (Sandelowski, Voils, Leeman, & Crandell, 2012). This list will provide a foundation for subsequent systematic, causal investigations of school libraries as learning spaces. The meta–syntheses also screen for methodologies for discovering and documenting what works for the school library learning space.

Individual Team Synthesis Results

In this section, we present the results of each team's synthesis.

FSU Synthesis

As the FSU researchers examined their 168 studies that included strong evidence of the relationship between educational interventions and student learning, they distilled the following fifteen educator-led practices that related specifically to positive learner outcomes:

1. Linking new knowledge to prior knowledge;
2. Blending direct, explicit, and systematic instruction on new material with strategically timed small–group reinforcement activities;
3. Using hands-on experiences to connect learning with real-world or familiar content and experiences;
4. Employing contextual instruction in questioning and other metacognitive skills;
5. Providing formative, corrective feedback, including quizzes, which promotes and reinforces learning;
6. Exposing learners to vocabulary through reading and listening as well as explicit vocabulary instruction and acquisition strategies;

7. Prioritizing frequency of instruction over the total amount of instruction time;
8. Personalizing the amount and type of intervention or teaching to meet individual needs;
9. Modifying the learning environment to decrease problem behavior, although a positive learning environment may not be sufficient;
10. Using instructional prompts that encourage students to pose and answer deep questions;
11. Assisting students in monitoring and reflecting on the problem–solving processes;
12. Teaching students how to use visual representations;
13. Providing direct and explicit reading comprehension strategies;
14. Making available intensive and individualized interventions for struggling readers; and
15. Explicitly intensively teaching academic vocabulary words across several days using a variety of instructional activities.

In addition to these practices, the FSU researchers also noted that their body of reviewed literature consistently noted that teachers are most effective when they had advanced degrees, particularly in mathematics, followed traditional preparation paths, and had two to five years of teaching experience.

ODU Synthesis

After reviewing the 245 articles, the ODU researchers surfaced three educator best practices supported by strong evidence:

1. Teaching practices and strategies that include direct, explicit instruction;
2. Focusing on inquiry or questioning; and
3. Creating situations in which learners apply real–world content, materials or tasks.

In addition to these practices, the ODU also identified teacher characteristics that provided strong evidence of a relationship with student outcomes. The research in their corpus indicated that well–prepared teachers were especially important and had lasting effects for at–risk children. Principals appeared to have weak, indirect effects on student achievement, but embracing a constructivist approach in a learning environment is more important than teacher race or gender. The ODU corpus also indicated that while types of teacher preparation programs and certification paths suggested some links to student outcomes, teachers with Master's degrees only appeared to relate to student achievement in mathematics.

UNT Synthesis

Though the UNT team only identified one article that met the ESSA standard for strong evidence, their corpus ($N = 76$) indicated contextual considerations for translating educator practices to a school library environment in the following domains:

1. Learner Needs: Target demographics, characteristics, or perceptions of learners such as personal qualities (e.g., age, special needs) or contextual qualities (e.g., low socioeconomic status, rural/urban setting)
2. Learning Environment: Qualities of the context in which learning, intervention, or interactions take place, such as physical space and climate (e.g., libraries, classrooms, online) programs or services (e.g., disability accessibility, services, accelerated reading); types of collections; and workflow and policy (e.g., automated systems, staffing, circulation)
3. School Librarian: Perceptions of the school librarian role as they interact with professional identity or practice in contextual areas (e.g., school level, collaboration, staff/administrative interactions); behaviors and outcomes (e.g., self-censorship, technology use, reflective practice); perceptions of personal leadership skills, professional role, effectiveness, and student learning
4. Strategy: Includes pedagogical/theoretical frameworks (e.g., problem-based learning, inquiry-based learning, universal design for learning), practices or approaches, resources (e.g., audiobooks, consultations, workshops), and interventions (e.g., testing/surveys, professional development, evaluation, and action research)
5. Subject Area/Purpose: Relates to the content, area, or discipline of the intervention or program with a focus on biology, reading, and/or science; programs include professional development, research, evaluation and collaborative practices, disability education, information literacy, and digital/technology literacy
6. Nonschool Library Faculty and Administration: Target demographics, characteristics, or perceptions of nonschool library staff include personal qualities, professional identification (mainly teachers and administrators), community context, and strategic planning initiatives

Preliminary Integrated Syntheses Discussion

In response to widespread calls among the school librarian (AASL, 2014) and education policy maker (US Department of Education, 2016) communities to guide educator actions with evidence derived from causal studies, three teams of researchers investigated "What causal relationships between school-based malleable factors and student learning are present in published research?" We pursued this question by examining the combined corpus of empirical research ($N = 496$)

and synthesizing promising educator practices that not only appeared to have strong causal relationships with learner outcomes but that were also possible for school librarians to enact.

At the conclusion of each team's aggregation and review process, the three teams compared the results of the team syntheses and created an integrated synthesis. Through the integrated synthesis review, all researchers considered whether the educator practices common to the syntheses reflected activities that school librarians could:

1. *Lead or conduct individually.* In this instance, leadership is defined as "coaching others to do for themselves, acting as a sounding board for decision-makers bringing people together, and taking the risk of leading when the opportunity arises" (DiScala & Subramaniam, 2011, p. 60). Leadership is linked to accountability, and school librarians are best positioned to lead activities for which they are accountable (DiScala & Subramaniam, 2011), especially because they fall within their job roles.
2. *Participate and/or collaborate.* For these activities, school librarians are not positioned to colead or partner but are positioned to participate in a larger group that is conducting the activity. School librarians would not have accountability or get credit for these activities because they are tangentially related to their roles.
3. *Not be involved.* These are activities that fall outside of a school librarian's role and are the duties of other school personnel.

The integrated synthesis thus far suggests that school librarians have the potential to impact a causal relationship with student learning when they engage in:

*   Direct, explicit, and systematic instruction on new material blended with strategically timed small-group reinforcement activities;
*   Hands-on experiences in science and mathematics that connect learning with real-world or familiar content and experiences;
*   Contextual instruction in questioning, problem-solving strategies, and other metacognitive skills;
*   Formative, corrective feedback, including quizzes, that promotes and reinforces learning;
*   Exposure to vocabulary through reading and listening as well as explicit vocabulary instruction and acquisition strategies;
*   Frequent, short-burst instruction;
*   Modifying the learning environment to decrease problem behavior, although a positive learning environment alone may not be sufficient;
*   Creating visual representations; and
*   Intensive and individualized interventions for struggling readers.

The research results included in each of the three data corpi also suggest that the amount and type of intervention or teaching is personalized to meet individual needs, and this tailored approach may have a causal effect on student learning, especially when instruction is conducted by teachers with two or more years of teaching experience.

Conclusion

The teams are still working together to distill themes that reflect activities that school librarians can lead or in which they can participate to positively affect student outcomes. Reviews to date suggest that these areas of classroom-based research are particularly promising for school librarians to identify practices that appear to have a causal relationship with learner outcomes. Our next steps are to have school librarians test the efficacy of the practices identified in this study in small scale causal design field studies which were initiated in fall 2017.

The purpose of the CLASS project (AASL, 2014) was to provide school library researchers with a new trajectory, from correlational studies conducted by a variety of research teams and individual researchers to a planned and coordinated causal research agenda for the profession. The national school library research agenda outlined in Figure 12.1 was designed to enable researchers to move toward the causal analyses that will elaborate and quantify the differences that certified school librarians could make for students from diverse backgrounds, in poverty, and with special needs (Pribesh, Gavigan, & Dickinson, 2011). Recent economic crises have devastated school libraries with job loss, the trend to measure teacher effectiveness by test scores, and several states' reclassification of librarians to support, not instructional, staff (United States Department of Education, National Center for Education Statistics, 2016). These factors point to the immediate need to understand, demonstrate, and promote the causal relationships between strong school libraries and measurable student achievement.

This study is a first step toward providing school librarians, at all levels and in all types of schools, with a voice, amplified by evidence-based and generalizable proof to advocate for adequate resources and equitable access to school library programs to help students be academically successful. Increasing the proliferation of causal school library research will provide cause–effect inferences to decision makers at all levels and will delineate the evidence that points to the causal effectiveness of the school library program. Through an examination of the methodological strengths and weaknesses of the studies, we have begun to surface evidence that will inform the next steps in evaluating the impact of school libraries on student achievement and help to determine what works for whom and under what conditions.

Acknowledgment

Note

1 Example findings from Herrera, Grossman, & Linden (2013) and Schlosser & Balzano (2014).

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