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Abstract

Numerous authors in the library and information science (LIS) field have called for more
authentic collaborative study described below-1(m)2o1m-iteration, design-
a project, a collaborative science-focused lesson plan assignment
ry school teachers (PSTs) and pre-service school librarians (PSLs)
outheastern United States. Specifically, this paper explores the
ol library students' understanding of collaboration between
s, particularly science-focused collaboration, and examines the
at either facilitated or hindered their progress toward improved
results of this project, we provide recommendations for school
d in designing and implementing similar projects.

Introduction

Both the K–12 education community and the school library community emphasize the critical
role that collaboration among educators can plaion con am2.cbre4(ol)-2-2(.2(y)20fa)-6(m)T.2(y)2(y)20u 2(.2(y)

Professional Learning Communities (PLCs), team teaching, and the small-schools movement (Supovitz and Christman 2005; Vescio, Ross, and Adams 2008). In the school library field, teacher-librarian collaboration (TLC) across subject areas and across all roles of the school librarian is heavily emphasized in the most recent set of national professional standards (AASL 2009), which mentions collaboration roughly fifty times.

Literature Review

Collaboration Defined

Unlike in the general education field, where no single definition of teacher collaboration has been dominant (Friend 2000; Schmoker 2004; Welch 1998), in the school library field there is fairly widespread agreement about what instructional collaboration between teachers and school librarians is and what it looks like in practice. Patricia Montiel-Overall's definition of TLC is often cited:

> a trusting, working relationship between two or more equal participants involved in *shared thinking, shared planning*, and *shared creation of innovative integrated instruction*. Through a shared vision and shared objectives, student learning opportunities are created that integrate subject content and information literacy by co-planning, co-implementing, and co-evaluating students' progress throughout the instructional process in order to improve student learning in all areas of the curriculum. (2005a, 32, emphasis in original)

Several models have been proposed to delineate different types or levels of collaboration, acknowledging that the intensity, duration, and nature of individual collaborative partnerships may vary (Dickinson 2006; Loertscher 2000; Marcoux 2007; Montiel-Overall 2005a). These models lack a consistent terminology for different levels or forms of collaboration; for example, "coordination" is the term applied to the lowest (least intense) level of TLC in Montiel-Overall's model but to the second-highest level in Marcoux's model. Despite these differences of vocabulary, the similarity of these models in terms of their organization and how they describe the lowest and highest levels of collaboration between teachers and school librarians testifies to the relative uniformity of the concept of collaboration in school library literature as compared to education literature. To maintain internal consistency, Montiel-Overall's model of TLC and its corresponding terminology is used in this study and discussed in more detail below.

In addition to sharing a fairly consistent conceptual understanding of what teacher-librarian collaboration is, researchers and policymakers in the school library field also share a conviction, supported by empirical research, that collaboration is beneficial for student achievement, for teachers' and librarians' professional development, and for the school library program in general. Among other benefits, researchers have posited that collaboration among educators (including school librarians) can:

- help reduce the complexity of teaching and learning (Darling-Hammond 2006; Friend 2000; Little 1990; Montiel-Overall 2005a),

- create a sense of community within a school (Barlow 1991; Evans-Stout 1998; Schmoker 2004),

- build individual teachers' knowledge and be an effective method of professional development (Moolenaar 2012; Vescio, Ross, and Adams 2008),

- provide students with models of the collaborative process, which may help students develop 21st-century skills that effectively transfer from school to the workplace (Montiel-Overall 2005a; *American Libraries* 2014),

- increase student learning and student achievement (Goddard, Goddard, and Tschannen-Moran 2007; Moolenaar, Sleegers, and Daly 2012; Van Garderen, Stormont, and Goel

> 2012; Lance, Rodney, and Schwartz 2010; Rodney, Lance, and Hamilton-Pennell 2002), and

- create advocates for the school library program among teachers, students, and parents who have experienced positive impacts of teacher-librarian collaboration (*American Libraries* 2014).

Despite these and other posited benefits, collaboration between teachers and school librarians is not universally practiced, due, in part, to a number of barriers affecting practitioners at all grade levels and in all content areas. Time constraints on teachers and school librarians (Lindsay 2005) and the longstanding culture of isolation and autonomy among teachers (Hartzell 1999) are frequently cited as impediments. Another often-cited obstacle to teacher-librarian collaboration is teachers' and administrators' lack of understanding of school librarians' instructional and teaching roles (Hartzell 2002; O'Neal 2004; Miller 2005; Kimmel 2011). In addition to these general barriers to TLC, grade-level or subject-specific barriers have also been investigated, including those that may act to prevent or limit science-focused TLC.

TLC in Science

Although many leaders in the LIS field have presented compelling rationales for school librarians to improve the quality and quantity of their collaborations with science teachers, science-focused instructional collaboration between school librarians and teachers remains rare (Hoffman and Mardis 2008; Schultz-Jones and Ledbetter 2009). Marcia A. Mardis stated, "No other context is as underappreciated as a revolutionizing force in science learning as school libraries," noting that despite high-profile national efforts to improve science education in the United States, "we cannot educate enough scientists to meet our national needs, our children are not inspired to learn about science, and [school librarians] lack the collections and collaborations to motivate more and better science learning" (2009, 10).

Many authors and organizations have enumerated reasons for school librarians to attend to this issue. Chief among these reasons is the emphasis that national standards for school librarians now place on collaboration with classroom teachers in all subject areas as the primary way for school librarians to teach the information-literacy curriculum (AASL 2009). Thus, it is a professional expectation that school librarians work with science and math teachers in addition to teachers in the humanities and social sciences. Second, several authors have noted strong similarities between science and information literacy (e.g., Abilock 2003; Schultz-Jones 2010; Young 2013), observing that both disciplines emphasize discovery and inquiry, teach similar process and research skills, and encourage the development of student dispositions such as resilience, critical stance, curiosity, and social responsibility.

School librarians and classroom teachers share responsibility for the general absence of science-focused TLC. On the school library side, many school librarians come from humanities backgrounds and may lack science content knowledge, and, therefore, may feel unprepared to collaborate with teachers in science content areas (Mardis 2005; Hoffman and Mardis 2008). Contributing to this lack of science knowledge and confidence among school librarians is the fact that professional journals in the school library field rarely publish substantive articles related to science (Mardis 2006). School librarians may also perceive among science teachers a lack of interest in collaboration with librarians (Schultz-Jones and Ledbetter 2009). On the teacher side of the spectrum, secondary science teachers may be particularly reluctant to invest time in collaborative efforts because a comparatively high percentage of them are teaching out-of-field (meaning that they do not hold a degree or full credential in the subject they are teaching) or

2001; Tilley and Callison 2001; Moreillon, Kimmel, and Gavigan 2014). One notable finding of these studies is that school library programs are typically self-contained and offer little interdisciplinary coursework, such as courses cross-listed with schools of education or assignments that partner school library students with education students for collaborative work (Latham, Gross, and Witte 2013; Neuman 2001; Tilley and Callison 2001).

Theoretical Framework

The design of this study and of the students' assignment itself was informed primarily by Montiel-Overall's theory of teacher-librarian collaboration (TLC) (2005a; 2005b). The TLC model proposes four levels or "facets" (Montiel-Overall 2007) of collaboration between teachers and school librarians, levels that vary in terms of intensity, effects on student achievement, purpose, types of activities involved, and requirements for success. These four levels, in order from least to most intense, are Coordination, Cooperation, Integrated Instruction, and Integrated Curriculum. As a way to help students understand the variety of forms that TLC might take in practice, this model was introduced to school library students at the beginning of the project described in this paper.

Montiel-Overall applied TLC Theory in a case-study examination of teachers, university educators, and school librarians who worked together to create professional development workshops for cohorts of elementary school teachers and librarians (Montiel-Overall 2010). Her work resulted in an extension of the TLC Theory: a model of the collaboration process itself, shown in figure 1. This process model, while not taught to the school library students, was used to interpret study findings.

As shown in figure 1, TLC starts with a beginning phase that lays the groundwork for higher-level collaboration. In the next phase relationship-building activities lead to the development of trust and respect; these activities allow collaborative partners to enter the iterative productive phase of their partnership. In this phase participants share knowledge and expertise and work to build consensus related to their shared goals. This process continues until a final outcome is reached. The diagram in figure 1, based on two figures in Montiel-Overall's 2010 paper, was created by one of the researchers for this paper.
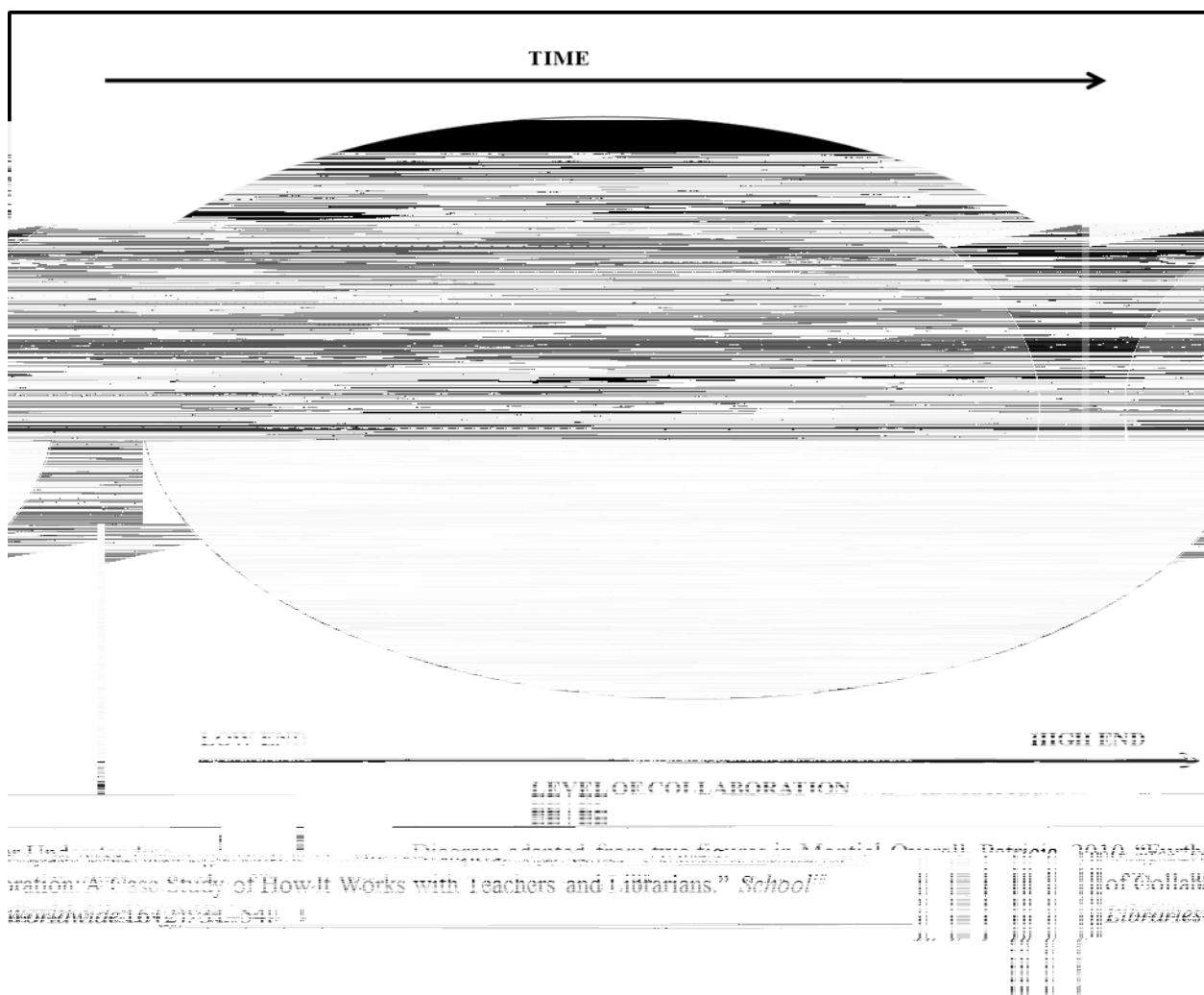
Figure 1. The process of teacher-librarian collaboration (TLC).

Methods

Design-Based Research

This study reported here represents the first iteration of the design-based research cycle. Based on findings from this study, successive iterations of this project will refine the design of the assignment as well as the study itself. Design-based research (DBR) was developed in the field of education and is based on the work of Ann L. Brown (1992) and Allan Collins (1992). DBR emphasizes the role of context, and design-based studies typically implement an instructional intervention in a naturalistic setting over successive iterations. The results include both tangible products (in the form of refined interventions, typically lesson or unit plans) and new theoretical knowledge (Hoadley 2004; Barab and Squire 2009). In contrast to either laboratory experiments or ethnographic research, DBR studies in education involve simultaneously implementing, modifying, and studying an instructional intervention along with the associated learning and cognition that the intervention produces in students (Bell 2004; Sandoval and Bell 2004). In design-based research, the researcher is often a participant-observer (Lincoln and Guba 1985). The design-based approach has been successfully implemented by researchers from a wide

one question from these surveys (an open-response item asking participants about their strengths and weaknesses as a science teacher) is relevant to the issues considered here.

Data Analysis

All data were analyzed using the concurrent mixed-methods triangulation design (Creswell 2008; Tashakkori and Teddlie 2003), in which qualitative and quantitative data collection occur simultaneously and each data set is given equal weight, consideration, and priority in the final analysis. (Although only qualitative data are considered here, the full study employed mixed methods; quantitative data in the form of survey responses is not included in this article as it does not pertain to the research questions addressed here.) To assist with confirmation, cross-validation, and corroboration of the findings, each research question was addressed by multiple data sources, providing triangulation of the conclusions (Tashakkori and Teddlie 2003). Qualitative data were analyzed following the grounded theory approach (Glaser and Strauss 1967; Corbin and Strauss 1990) and the constant comparative-coding method in which data are analyzed as collected as well as at the end of the project (Creswell 2004). The constant comparative method involves the inductive development of codes from raw data (open coding), interconnection of codes into categories (axial coding), and connection of categories to themes to create a coherent narrative (selective coding). Authors 1 and 2 independently coded all qualitative data and met several times to compare codes and emerging themes, define and collapse codes and themes, and discuss conclusions emerging from the data.

Findings

Findings are reported below and organized by research question.

Research Question 1: How Does the Collaborative Lesson Plan Design Project Change Pre-service School Librarians' Understanding of Teacher-Librarian Collaboration, Especially Science-Focused Teacher-Librarian Collaboration, and What Specific Features of the Project Contribute to These Changes?

At the beginning of the semester, school library students had limited conceptions of collaboration between teachers and school librarians and of the instructional role of the librarian. In pre-project interviews, when asked to describe school librarians' expertise, only one student mentioned collaboration by name and three others mentioned teaching—specifically, teaching research skills. Rebecca noted that prior to the first class session, she never realized the extent of the school librarian's teaching role because as a K–12 student she had not personally observed this role being practiced by her own school librarians. When asked about their comfort level with TLC, most school library students said that they felt comfortable with the idea of collaboration, but none provided details or examples about what TLC might look like in practice. Jennifer said that she felt like she would be able to collaborate with teachers in any content area, "but I just don't really know yet. I just haven't… studied enough of it so I feel like I'm not prepared in any way yet."

In the pre-project interviews no school library students expressed discomfort with science-focused TLC. Three students did mention math as an area where they might feel less confident, not because of a lack of personal knowledge but because it was more difficult to think of ways that the school librarian could add value to math lessons.

Work session observations and instructor notes showed that in general, school library students seemed well prepared for each work session. Each PSL brought instructor-supplied collaborative planning worksheets to the first work session, and all but one was observed using these sheets to frame discussions with their group members. Following the first work session, school library students debriefed with Author 1 in class and shared how the experience differed from what they had expected. (See discussion of RQ2 for more about expectations and whether they were met.) Between the first and second work sessions, most PSLs had collected resources, written preliminary plans, and/or researched their group members' topics and brought this material with them to share with the PSTs.

In their presentations and post-project interviews, PSLs who participated in the study expressed that the assignment gave them a more-realistic view of collaboration between teachers and school librarians. Several students described TLC as leveled, in line with models of collaboration such as Marcoux's pyramid (Marcoux 2007), which had been discussed in class. Mandy explained that working with a group of PSTs instead of with one individual teacher allowed her to experience first-hand varying levels of collaboration; one of the lesson plans she worked on represented low-level resource sharing and the other represented collaboration at the integrated instruction level with a clear teaching role for the school librarian. In some cases, due mainly to challenging issues of communication, preparation, and PSTs' lack of knowledge about the school librarian's instructional role (see next section), library science students lowered their expectations about the types of collaborations that might be feasible for them as beginning school librarians. In her post-project interview, Jane defined TLC as "any time that you can get a teacher to come and talk to you about their lesson" and noted:

> I think a lot of us came in thinking we're gonna be great; we're gonna be super-awesome at this; all of our collaboration is gonna be at that top level of the pyramid, and I think that this really was a really good practical lesson in bringing our expectations down for what it's really gonna look like.

Jennifer and Rachel noted that the project made them more likely to approach beginning teachers as potential collaborative partners, "because it's like they don't know yet either" (Jennifer, post-project interview). Specifically, Jennifer noted that the fact that PSTs in her group did not come into the first work session with firm plans for their units made her realize the opportunities involved with working with new teachers who don't already have established unit plans in place for the year. Rachel commented in her class presentation that she "can't imagine new teachers turning us down…. 'cause they're gonna be feeling overwhelmed."

Despite the fact that before the project began no PSLs expressed apprehension about the science focus of the lesson plan, several of them found this focus to be more challenging than they had initially assumed. (See subquestion 1 section below for more detail.) Nearly all school library students reported that they felt it would have been easier to work with teachers on a language arts lesson versus a science lesson because both they and the PSTs might have had more and better ideas for how to integrate library content into this subject. However, several participants noted that, although collaborating on a language arts lesson may have been easier, it would not necessarily have been more valuable. For example, Mark noted:

> I definitely think that I could have done a better job, even for the lower grades, if it had been language arts. But… I liked the project, from that standpoint…. I definitely see that I'd need to… train a little more for, like, the science and math type of collaboration.

He went on to note that the numerous examples of science-focused collaborative lesson plans provided or discussed in class helped him to broaden his conception of the possibilities of science-focused TLC. Similarly, Jane stated:

> I mean, I didn't see it at the beginning of the semester, but I think science is actually a much more natural fit for libraries than you think. So on my end, definitely as we progressed through the semester it became easier for me to see how we could fit in.

Research Question 2: What Issues Emerge During the Collaborative Process, and How Do Participants Address Those Issues?

Themes

Three themes emerged from the data related to this research question: communication, preparation, and knowledge of school librarians' roles.

Communication

All school library student participants reported that they had little or no contact with their PST group members outside of the two in-class work sessions. What communication did occur was limited to brief e-mails exchanging materials, information, or lesson plans (completed or partially completed). Lisa's post-interview comment was typical: "Outside of the class I had—I had no real communication with my student teachers. I just was kind of sending out this lesson plan, hoping that it worked out okay for them."

The course wiki, which included private pages for each group, was introduced to all students at the beginning of the project, but no students used this site. Several school library students independently set up a Google document and/or sent out a group e-mail at the beginning of the project to attempt to initiate out-of-class communication with their PSTs; however, in most cases these efforts did not bear fruit. In at least two cases, lack of communication led to school library students not receiving necessary information or materials to complete their project until just days before the project's due date. In her post-project presentation, delivered one week before the due date, Mandy remarked, "I still haven't gotten anything from them, so I'm gonna send that kind of 'Mom' e-mail of 'I need your things!' like, this afternoon after class."

One exception to the generally negative data about communication within student groups was Rachel, who described in her post-project presentation how she was able to establish a sense of camaraderie with her group members by using education terms discussed in the school library course. "I felt like I was speaking their teacherly language. They were like 'oh, you know standards!'… and I thought, 'OK, this is how they communicate.' I was glad that I did that." However, while this student was able to establish positive and productive communication with her group members during the work sessions, like the other school library students she reported that her group "didn't collaborate outside of our meeting time."

Preparation

In addition to communication, preparation (of both sets of students) emerged as a second issue that impeded progress for some groups. The education students' mentor teachers at their placement schools were supposed to assign each student a topic for their unit plan (for example, weather or ecosystems). In a few cases, students had not been given their topic assignments by the first work session. In many other cases, students had not yet spent any time looking into

Discussion   **TJebs   .boce.**   **A0TJt**

- Provide multiple opportunities for students to work together face-to-face.

- Allow students to create lessons representing any level of TLC.

- Have each school library student work with multiple PSTs or develop multiple lessons with the same PST to encourage experience with multiple levels of TLC within the same project.

- Debrief following each work session to gauge students' progress and address any emerging issues.

- Situate students' lesson or unit plans within an existing local school, preferably the one where PSTs will be completing their student teaching, so that collaborating PSTs and PSLs can access that school's library catalog and use the school's actual resources in their lessons.

- Provide school library students with collaborative planning sheets or similar organizing documents to help frame the first work session.

- Provide multiple examples of collaborative lesson plans, especially science-focused lesson plans, to school library participants (and, ideally, all participants) prior to the beginning of the project.

Further Research

A number of other research avenues might be pursued based on the results of this study. As noted in the results section, Rachel was the only participant who valued content knowledge as vital to successful collaboration between teachers and school librarians, and she also reported having the most-effective communication and camaraderie with her group members. Future research might investigate whether there is a relationship between these variables.

The findings related to pre-service school librarians' initial lack of understanding of the instructional role and TLC present another opportunity for study. Research might address whether and how various instructional approaches used in pre-service programs for school librarians develop their students' knowledge of these roles and processes.

Additional studies may investigate similar assignments designed with content areas other than science as the focus; for example, pre-service school librarians might partner with pre-service teachers to design a math lesson or unit plan. Such a project might extend the findings of this study to address collaboration in STEM (Science, Technology, Engineering, and Math) broadly versus only in science, the focus here.

Conclusion

Don Latham, Melissa Gross, and Shelbie Witte (2013) noted the logistical difficulties of

Hayden, Janice Theresa Wool. 2000. "Perceptions, Beliefs, and Expectations of Experienced and Preservice Middle School Teachers Regarding the Roles of School Library Media Specialists." PhD diss., Georgia State University, Atlanta.

Hoadley, Christopher M. 2004. "Methodological Alignment in Design-Based Research." *Educational Psychologist* 39 (4): 203–212.

Hoffman, Ellen S., and Marcia Mardis. 2008. "The Status of Technology, Science and Mathematics in U.S. Middle School Media Centers: A National Survey." In *Proceedings of the International Association of School Librarianship 37th Annual Conference*, *Berkeley, CA*. Chicago: IASL

Kimmel, Sue C. 2011. "'Consider with Whom You Are Working': Discourse Models of School Librarianship in Collaboration." *School Library Research* 14. <www.ala.org/aasl/sites/ala.org.aasl/files/content/aaslpubsandjournals/slr/vol14/SLR_ConsiderwithWhom_V14.pdf> (accessed February 4, 2015).

Lance, Keith Curry, Marcia J Rodney, and Bill Schwarz. 2010. "Collaboration Works—When It Happens! The Idaho School Library Impact Study." *Teacher Librarian* 37 (5): 30–36.

Montiel-Overall, Patricia. 2005a. "Toward a Theory of Collaboration for Teachers and Librarians." *School Library Research* 8. <www.ala.org/aasl/sites/ala.org.aasl/files/content/aaslpubsandjournals/slr/vol8/SLMR_TheoryofCollaboration_V8.pdf> (accessed February 5, 2015).

———. 2005b. "A Theoretical Understanding of Teacher and Librarian Collaboration (TLC)." *School Libraries Worldwide* 11 (2): 24–48.

———. 2007. "Research on Teacher and Librarian Collaboration: An Examination of Underlying Structures of Models." *Library & Information Science Research* 29 (2): 277–92.

———. 2010. "Further Understanding of Collaboration: A Case Study of How It W   T*   2(i)-2(on:)-2(A)2(C)

<www2.ed.gov/documents/respect/blueprint-for-respect.pdf> (accessed February 6, 2015).

Van Garderen, Delinda, Melissa Stormont, and Nidhi Goel. 2012. "Collaboration between General and Special Educators and Student Outcomes: A Need for More Research." *Psychology in the Schools* 49 (5): 483–97.

Vescio, Vicki, Dorene Ross, and Alyson Adams. 2008. "A Review of Research on the Impact of Professional Learning Communities on Teaching Practice and Student Learning." *Teaching and Teacher Education* 24 (1): 80–91.

Wallin, Margie, and Jann Small. 2012. "What Your Teacher Librarian Can Do for You." *Access* 26 (3): 18–21.

Welch, Marshall. 1998. "Collaboration: Staying on the Bandwagon." *Journal of Teacher Education* 49 (1): 26–37.

Wiggins, Grant, and Jay McTighe. 1998. *Understanding by Design*. Alexandria, VA: Association for Supervision and Curriculum Development.

Young, Terrence E., Jr. 2013. "24/7 STEMulation: Reinventing Discovery." *Library Media Connection* 31 (6): 20–22.

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