Response:

To answer the request, REL West staff searched selected databases for relevant resources (see “Methods” section on the last page). The evidence on the effectiveness of coaching as a strategy for increasing the instructional quality of teaching and improving student learning is in its early stages. We include references from the literature on the topic of instructional coaching, specifically for math teachers. We organized the information we found into the following categories:

1. **Reports and articles**: Research reports and policy-oriented articles about coaching teachers, especially math teachers.
   - Citations include a link to a free online version when available.
   - Citations are accompanied by an abstract, excerpt, or summary written by the author or publisher of the article.

2. **Relevant organizations** that focus on coaching that may provide helpful information.

We have not done an evaluation of these resources or organizations, but rather provide them for your information only.

**Reports & Articles**


*Abstract*: Based on a statewide survey of professional learning activities among 577 middle school mathematics teachers in Missouri, this study examined two questions: 1) What professional learning activities do middle school math teachers participate in and how much time do they spend in these activities? and 2) How are teacher qualifications and contextual characteristics associated with the amount of their professional learning activities? The study examined seven types of formal and informal professional learning activities: 1) professional development programs, 2) teacher collaboration, 3) university courses, 4) professional conferences, 5) mentoring/coaching, 6) informal communications, and 7) individual learning activities. The study found that middle school mathematics teachers spend the greatest amount of time involved in teacher collaboration, professional development programs, and individual learning activities. In addition, mathematics teachers in high-poverty and ethnically diverse districts tend to spend more time in formal learning activities such as professional development programs, teacher collaboration, and...
mentoring/coaching than do mathematics teachers in wealthier and less diverse districts. To promote a greater level of teachers’ participation in shared learning activities, it is important for district and school administrators to offer professional learning activities that meet mathematics teachers’ learning needs for understanding students’ mathematical knowledge and thinking.


Excerpt: As coaching has emerged as an increasingly common component of systemic reform, the Annenberg Institute has had the opportunity to work with, learn from, and observe in districts that are considering or engaged in instructional coaching as part of their professional development systems. Over time and in varied settings, we have observed [strategies for supporting effective coaching and] some noteworthy challenges to effective coaching.


Abstract: Research for Action’s third and final report completes a three-year evaluation study of the Pennsylvania High School Coaching Initiative (PAHSCI). This report presents lessons from the PAHSCI model of school-based instructional coaching and mentoring as a vehicle for job-embedded professional learning. Reporting from an analysis using qualitative methods including interviews of teachers and coaches and observations of classroom lessons, the report examines the influence of coaching on the implementation of research-based literacy practices applicable across the content areas. It explores student engagement and coaching’s contribution to teachers’ ability to reflect on and change classroom practice. Finally, this report discusses the strengths and challenges of PAHSCI’s influence on the individual, the school, the district, and the state to link learning and build sustainability. The report consists of six sections. Section 1 revisits the PAHSCI vision, goals, and design and presents the PAHSCI Theory of Change. Section 2 focuses on the instructional coaches central to the PAHSCI model, including the evolution of the coach’s role over the three years, the challenges coaches faced, and how they and the Initiative responded. Section 3 takes the reader inside PAHSCI classrooms to examine how teachers’ instructional practices link to student engagement and learning. Section 4 identifies elements of the PAHSCI model that help sustain instructional change. Section 5 looks at the roles that have been played by individuals (teachers, coaches, mentors, administrators), organizations (Initiative partners, schools, districts), and the Pennsylvania Department of Education and advisory boards to both link and sustain PAHSCI learning and leadership. And finally, Section 6 provides a model showing the developmental stages of implementing PAHSCI, revisits the Theory of Change, and summarizes important lessons from this Initiative. Appended are: (1) Participating Districts and Schools 2007-2008; (2) Research Methodology, including Questionnaires and Event Observations and Evaluations; (3) Highlights from Years One and Two; (4) PLN [Penn Literacy Network] Strategies: Brief Descriptions; (5) Visitation Rubric; (6) English and Math Teachers’ Report of Weekly PLN Use; and (7) Participants’ List of Focus Areas.


Abstract: Elementary mathematics coaches are placed in schools to construct leadership roles and to provide on-site, collaborative professional development addressing mathematical content, pedagogy, and curriculum in an effort to enhance instruction and improve student achievement.
This 3-year randomized control study found that over time coaches positively affected student achievement in grades 3, 4, and 5. In these grades, this significant positive effect on student achievement was not evident at the conclusion of the first year of placement of a coach in a school but emerged as knowledgeable coaches gained experience and as a school’s instructional and administrative staffs learned and worked together. The coaches in this study engaged in a high degree of professional coursework addressing mathematics content, pedagogy, and coaching prior to and during at least their first year of placement. Findings should not be generalized to coaches with less expertise.


**Abstract:** “To whom do you turn in this school for advice or information about mathematics instruction?” (Spillane, Healey, & Parise, 2009, p. 413). When teachers in forty-four schools were asked this question, they were more likely to indicate a teacher leader in their school, rather than the school’s principal or any other administrator. Who are these teacher leaders for mathematics, and what do they do? In many schools, such leaders are knowledgeable, on-site teachers who support their colleagues’ efforts to interact about all facets of mathematics teaching—curriculum, lesson planning, student work, assessments, and school improvement. Because these teachers are facilitating on-site, job-embedded professional learning, many school districts are formalizing this practice and creating either elementary mathematics specialist or coaching positions with the hopes of developing these leaders. The two positions are somewhat different. Elementary school mathematics coaches focus on working with individual teachers to foster instructional change; specialists are also expected to advance a school’s mathematics program. Are mathematics specialists or coaches merely the latest “grand promise” in education, or do they really offer a path toward improved instruction in schools? For many readers, the answer to that question depends on whether these teacher leaders influence student achievement. A recent three-year study of elementary mathematics specialists examined that issue (Campbell & Malkus, 2011). A primary focus of this study was to determine the impact of mathematics specialists on student achievement (in grades 3, 4, and 5) as measured by the standardized assessments that were administered by one state to meet No Child Left Behind federal regulations.


**Book description:** Mathematics Coaching Handbook: Working with Teachers to Improve Instruction, written by Pia M. Hansen, argues that previous professional learning initiatives have failed because they focused on teaching a set of routines and techniques that alone are not enough to increase student achievement. Mathematics content coaching, as described in the book, goes deeper and promotes learning mathematics in ways that reflect a standards-based approach and therefore has the greatest potential of influencing classroom practice and student achievement. This book is an important reference for preparing mathematics content coaches for their work in supporting teachers to improve student achievement. Roles and responsibilities of mathematics content coaches are described and include:

- Increase mathematics content knowledge of teachers
- Enhance instruction
- Collaborate with individuals and teams
- Share research
- Facilitate understanding of standards
- Interpret data
- Examine assessments

**Book description:** Based on principles established by NCTM and NCSM, this resource outlines a coaching process for engaging math teachers and fostering productive collaborations that lead to better teaching practice and increased student achievement. Focusing on the role of the math coach in transforming mathematics classrooms and ensuring equity, the chapters help coaches:

- Collaborate with teachers to align and implement curriculum
- Build trust and rapport with hesitant or resistant teachers
- Develop collegial partnerships for planning, analyzing, and reflecting on instruction
- Support and sustain individual and institutional change


**Abstract:** The aim of this study was to analyze the process for changing values about teaching mathematics for teachers in a pilot school implementing Lesson Study and Open Approach. The study was structured through a questionnaire survey of 83 teachers in 4 pilot schools. Case studies were then conducted with 3 of the teachers and involved participatory observations and video recording in 3 phases of Lesson Study, interviews and document analysis. Theoretically, the conceptualization of professional development with Lesson Study and Open Approach, values change (Rescher, 1969, cited in Seah, 2004) and change process (Fullan, 1985; Joyce & Showers, 1980) helps to explain the process for changing values about teaching mathematics. The study shows that teachers in a pilot school implementing Lesson Study and Open Approach have developed a new view and values about teaching mathematics (e.g., values in designing lesson plans, values in teaching practice, values in classroom assessment). The components were essential for changing teachers values about teaching mathematics and consisted of 1) Teachers participating and learning about the underlying theoretical principles of Lesson Study and Open Approach, 2) Practicing weekly cycles of Lesson Study into school culture, 3) Seeing Lesson Study and Open Approach demonstrated from expert and Japanese teachers, 4) Ongoing coaching or support from the project, and 5) Obtaining feedback from outsiders such as educators, parents, school board members, etc.


**Abstract:** Professional development is important for all teachers, and in low socio-economic schools where the challenges of teaching are greater this need is crucial. A model involving a combination of one-on-one peer mentoring integrated with group peer mentoring was piloted with experienced mathematics teachers of senior students in low socio-economic schools. The results of the study highlight the benefits of this model and identify key factors necessary for successful implementation. In particular, these factors were selection of partners, time, trust, developing a clear structure around the goals, building a relationship, and meeting regularly as a collective group.


**Abstract:** Increasing the accurate use of research-based practices in classrooms is a critical issue. Professional development is one of the most practical ways to provide practicing teachers with
training related to research-based practices. This study examined the effects of in-service plus follow-up coaching on first grade teachers’ accurate delivery of three research-based strategies during math instruction. Teachers were trained to use a combination of whole-class instruction strategies, including model-lead-test for introducing new concepts and correcting errors, choral responding, and response cards. Results indicated that all teachers improved their delivery of the strategies after the in-service, with a second level of growth achieved after coaching. Improvements also generalized to untrained math sessions. Teachers reported very high levels of satisfaction with the training model.


**Abstract:** Mathematics classroom coaching is used across the United States as a means for improving instruction, with the ultimate goal of improving student learning. The job assignments of coaches can vary widely across schools and districts. Regardless of the various forms that coaching can take, there is the consistent expectation that a coach’s day-to-day work will positively influence classroom instruction. The study reported here attempts to gain a more complete picture of the job of an elementary mathematics coach based on the observation of seven coaches in five different districts for a day. We report the variety of ways we observed elementary mathematics coaches interact with teachers, and what roles and responsibilities they take on. Our analysis of these data led us to create a template for conducting observations of mathematics classroom coaching, which could be used by researchers seeking to conduct studies about coaching or by administrators seeking to document the day-to-day work of coaches.


**Excerpt:** This paper takes as its orientation the knowledge and skill that district leaders must draw on if they are to develop successful, system-wide approaches to coaching. However, the paper is also written to be of value to coaches, teachers, principals, and policymakers who can benefit from understanding what we call the promises and practicalities of coaching. Our analysis is based primarily on what we have learned from Education Matters’ longitudinal, qualitative studies of this professional development approach in Boston, Corpus Christi, Louisville, and San Diego. Over the last six years, we conducted hundreds of in-depth interviews with coaches, teachers who work with coaches, principals, and central office administrators in an effort to learn about the design, implementation, and influence of coaching on whole-school, instructionally focused reform. In addition, we observed district-provided coach professional development as well as school-based professional development provided by coaches, and we reviewed pertinent documents related to coaches’ work. During this time, we produced many reports on the progress of whole-school improvement in these districts with special attention to coaching and other learning opportunities for principals and teachers. This report reflects a synthesis of what we have learned.


**Excerpt:** The Silicon Valley Math Initiative’s work is based on the belief that the key to improving student achievement in math relies on improving teaching and learning in the classroom. SVMI sees pedagogical content coaching as a promising method for actually getting into the classroom and providing interventions to help teachers improve their instruction.
Relevant Organizations

American Institutes for Research: The Art of Coaching Better Math Instruction
http://www.air.org/resource/art-coaching-better-math-instruction

From the website: Instructional coaching can promote more effective and engaging learning in the classroom. In this video, Kirk Walters, AIR principal researcher and instructional math coach, shows how he supports teachers and helps students learn critical math skills. Walters, whose research primarily focuses on ways to improve K–12 math teaching, examines why it’s important to teach students not only how to do mathematical procedures but also to understand the concepts behind them.

The Art of Coaching Teachers (Teacher blogs in Edweek.org)
http://blogs.edweek.org/teachers/coaching_teachers/2013/01/coaching_towards_common_core_s.html

From the website: Elena Aguilar, an experienced K–12 educator, is a transformational leadership coach in the Oakland, Calif., school district. Her book The Art of Coaching, on transforming schools through instructional and leadership coaching, has been published by Jossey-Bass in spring 2013. REL West Note: The author writes blogs in Edweek.org on the subject of coaching teachers. The link we provided here leads to the page on “Coaching Towards Common Core State Standards.”

The Instructional Coaching Group (ICG)
http://instructionalcoaching.com

From the website: The Instructional Coaching Group (ICG) is committed to one goal: that every student receives excellent instruction, every day, in every class. We partner with schools, districts, states/provinces, and nations to achieve this goal in three ways: (a) sharing high-impact teaching strategies, (b) proven instructional coaching practices to support implementation of those practices, and (c) system change strategies to ensure teachers understand, agree with, and are committed to implementing strategies.
- High-impact teaching strategies
- Instructional coaching
- System change – creating impact schools

We help organizations implement High-Impact Instructional Strategies, Instructional Coaching, and System Change strategies in three ways: Workshops to introduce the ideas, Consulting to help educators take control of implementation of the practices and strategies, and Coaching to help educational leaders and instructional coaches become fluent at each of the practices.
- Workshops
- Consulting to help educators take control of implementation
- Coaching to support leaders and instructional coaches

Inside Mathematics: Tools for Coaches
http://www.insidemathematics.org/tools-for-educators/tools-for-coaches

From the website: The work of a content area coach or teacher leader addresses dilemmas of education reform, pedagogical change, relational and collaborative work, and reflective practice. If you work as a mentor, coach, department chair or district leader, you can find resources here to help teachers begin and sustain the work to improve math teaching and learning in their classrooms. The materials assembled here will help you lay out a year-long professional learning sequence, observe classroom practices and help educators reflect on their teaching, and work to support teachers in raising student learning outcomes. Inside Mathematics also gathered together
several experienced mathematics coaches to discuss signature elements of their practice in working with teachers.

**Kansas Coaching Project**  

*From the website:* The purpose of the Kansas Coaching Project is to study factors related to professional learning and how to improve academic outcomes for students through supports provided by instructional coaches. Instructional coaches are onsite professional developers who teach educators how to use evidence-based teaching practices and to support them in learning and applying these practices in a variety of educational settings. The Kansas Coaching Project has conducted a broad array of R&D initiatives in school districts in over 30 states and provinces. Instructional coaching variables and protocols that have been found to be most heavily related to improved academic outcomes have been incorporated into an array of professional development workshops and institutes.

**National Council of Supervisors of Mathematics: Coaching Corner**  
[http://www.mathedleadership.org/coaching/](http://www.mathedleadership.org/coaching/)

*From the website:* The purpose of the Coaching Corner is to support specialists, coaches, and leaders of coaching programs as they progress through the stages of leadership growth outlined in The PRIME Leadership Framework: Principles and Indicators for Mathematics Education Leaders and the new It’s TIME: Themes and Imperatives in Mathematics Education.

**Pennsylvania Institute for Instructional Coaching (PIIC)**  

*From the website:* PIIC's Mission is to support instructional coaching which helps teachers strengthen instructional practice, increase student engagement, and improve student learning. PIIC works to build teacher capacity as a means of increasing student engagement and improving student achievement.

**University of Louisville: Math Coaching Resources**  
[https://louisville.edu/education/mcr/math-coaching-resources](https://louisville.edu/education/mcr/math-coaching-resources)

*From the website:* The purpose of the Mathematics Coaching/Specialist Resources webpage is to provide coaching and mathematics resources along with opportunities for networking for those engaged in instructional coaching in mathematics.
Methods

Keywords and Search Strings Used in the Search
“Instructional coaching” AND “math/mathematics”; “math/mathematics coaching”; “coaching for math/mathematics teachers”

Search of Databases
ERIC, EBSCO, Google, and Google Scholar

Additional Organizations Searched
Institute of Education Sciences; Doing What Works/What Works Clearinghouse; Center on Great Teachers and Leaders; Center on School Turnaround

Criteria for Inclusion
When REL West staff review resources, they consider—among other things—four factors:

- **Date of the Publication**: The most current information is included, except in the case of nationally known seminal resources.

- **Source and Funder of the Report/Study/Brief/Article**: Priority is given to IES, nationally funded, and certain other vetted sources known for strict attention to research protocols.

- **Methodology**: Sources include randomized controlled trial studies, surveys, self-assessments, literature reviews, and policy briefs. Priority for inclusion generally is given to randomized controlled trial study findings, but the reader should note at least the following factors when basing decisions on these resources: numbers of participants (Just a few? Thousands?); selection (Did the participants volunteer for the study or were they chosen?); representation (Were findings generalized from a homogeneous or a diverse pool of participants? Was the study sample representative of the population as a whole?).

- **Existing Knowledge Base**: Although we strive to include vetted resources, there are times when the research base is limited or nonexistent. In these cases, we have included the best resources we could find, which may include newspaper articles, interviews with content specialists, organization websites, and other sources.

This memorandum is one in a series of quick-turnaround responses to specific questions posed by educators and policymakers in the West Region (Arizona, California, Nevada, Utah), which is served by the Regional Educational Laboratory West (REL West) at WestEd. This memorandum was prepared by REL West under a contract with the U.S. Department of Education’s Institute of Education Sciences (IES), Contract ED-IES-12-C-0002, administered by WestEd. Its content does not necessarily reflect the views or policies of IES or the U.S. Department of Education nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.