
Thank you for your request to our REL Reference Desk regarding factors that differentiate a high quality mathematics coach and math change agent in the elementary level. Ask A REL is a collaborative reference desk service provided by the ten regional educational laboratories (REL) that, by design, functions much in the same way as a technical reference library. It provides references, referrals, and brief responses in the form of citations on research based education questions.

The information below represents the most rigorous research available. Researchers consider the type of methodology and give priority to research reports that employ well described and thorough methods. The resources were also selected based on the date of the publication with a preference for research from the last ten years. Additional criteria for inclusion include the source and funder of the resource.

Question: *What factors differentiate a high quality mathematics coach and math change agent in the elementary level?*

Key words and search strings used in the search: *math OR achievement AND job-embedded professional development; math OR achievement AND professional development; math OR achievement AND coaching*

Search databases and websites:

1. ERIC: <http://www.eric.ed.gov/>
2. JSTOR: <http://www.jstor.org/action/showAdvancedSearch>
3. Google Scholar: www.google.com/scholar
4. Institute of Education Sciences (IES) Resources: <http://ies.ed.gov/pubsearch/>
5. What Works Clearinghouse: <http://ies.ed.gov/ncee/wwc/>

Citations Retrieved: (NOTE: Abstracts and executive summaries are copied directly from the reports when possible to ensure accuracy):

Althaus, K. (2015). Job-embedded professional development: Its impact on teacher self-efficacy and student performance. *Teacher Development: An international journal of teachers' professional development*, 19(2), 210-225. doi: 10.1080/13664530.2015.1011346

Abstract/Summary: A quantitative approach was used to investigate the impact of a district-wide, job-embedded mathematics professional development program on elementary teachers' general and personal efficacy. This investigation was based on the principles of mathematics professional development, efficacy theory, and student achievement. It was designed to determine the impact on teachers' personal and general mathematics teaching efficacy as well as the relationship between teachers' personal and general efficacy in teaching mathematics and students' socioeconomic status with students' achievement in mathematics. Teachers' general

and personal efficacies were measured using a paired-*t* analysis on the Math Teaching Efficacy Beliefs Instrument. Student achievement as measured by the state mathematics content test was regressed over the measures of teachers' general efficacy, teachers' personal efficacy, and socioeconomic status. Results indicate teachers' general efficacy and student socioeconomic status predicted student achievement in mathematics, supporting the conclusion that job-embedded, sustained professional development may lead to improved student achievement in mathematics.

Campbell, P. F., & Malkus, N. N. (2011). The impact of elementary mathematics coaches on student achievement. *Elementary School Journal*. 111(3), 430-454. doi: 10.1086/657654

Abstract/Summary: 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.

Gersten, R., Taylor, M.J., Keys, T. D., Rolfus, E., & Newman-Gonchar, R. (2014). Summary of research on the effectiveness of math professional development approaches. (REL 2014-010). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
http://ies.ed.gov/ncee/edlabs/regions/southeast/pdf/REL_2014010.pdf.

Abstract/Summary: The study identified and screened 910 research studies in a comprehensive literature search for effectiveness studies of math professional development approaches. Of these 910 studies, 643 examined professional development approaches related to math in grades K–12 and were conducted in the United States. Of the 643 studies, 32 focused primarily on math professional development provided to teachers and used a research design for examining effectiveness. Five of those were determined to have met WWC evidence standards (version 2.1) either with or without reservations. And of those five, only two found positive effects on students' math proficiency. Thus, there is very limited causal evidence to guide districts and schools in selecting a math professional development approach or to support developers' claims about their approaches.

Kretlow, A. G., Cooke, N. L., & Wood, C. L. (2012). Using in-service and coaching to increase teachers' accurate use of research-based strategies. *Remedial and Special Education*, 33(6), 348-361. doi:10.1177/0741932510395397

Abstract/Summary: 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.

Kretlow, A. G., Wood, C. L., & Cooke, N. L. (2011). Using in-service and coaching to increase kindergarten teachers' accurate delivery of group instructional units. *Journal of Special Education*, 44(4), 234-246. doi: 10.1177/0022466909341333

Abstract/Summary: Early intervention is key to preventing academic failure and referral to special education. General educators are responsible for providing primary instruction for students at risk for failure; however, the training they receive related to specific instructional strategies for these students is often insufficient (e.g., 1-day workshops). Alternative forms of professional development that include a combination of in-service and follow-up support have shown more promise in promoting changes in teaching behaviors. This study examined the effects of in-service support plus coaching on kindergarten teachers' accurate delivery of group instructional units in math. 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 instruction after the in-service training, with a second level of growth achieved after coaching. Teachers also reported high levels of satisfaction using the strategies.

Referrals

Federally Funded Resources:

- Institute of Education Sciences (IES), public search engine available at: <http://ies.ed.gov/pubsearch/>
- What Works Clearinghouse: <http://ies.ed.gov/ncee/wwc/>

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