

REL Southwest Ask A REL Response

June 2020

Question:

What are effective strategies for virtual job-embedded professional learning for school and district staff?

Response:

Thank you for the question you submitted to our REL Reference Desk. We have prepared the following memo with research references to help answer your question. For each reference, we provide an abstract, excerpt, or summary written by the study's author or publisher. Following an established Regional Educational Laboratory (REL) Southwest research protocol, we conducted a search for research on effective strategies for virtual job-embedded professional learning.

We have not evaluated the quality of references and the resources provided in this response. We offer them only for your reference. Also, we searched the references in the response from the most commonly used resources of research, but they are not comprehensive, and other relevant references and resources may exist. References provided are listed in alphabetical order, not necessarily in order of relevance. We do not include sources that are not freely available to the requestor.

Research References

Anderson, R. K., Boaler, J., & Dieckman, J. A. (2018). Achieving elusive teacher change through challenging myths about learning: A blended approach. *Education Sciences*, 8(98), 1–33. <https://eric.ed.gov/?id=EJ1200069>

From the ERIC abstract: “The idea that success in mathematics is only available to those born as “mathematics people” has been challenged in recent years by neuroscience, showing that mathematics pathways develop in the brain through learning and practice. This paper reports on a blended professional learning model of online and in-person meetings during which 40 teachers in 8 school districts in the US learned about the new brain science, challenging the ‘math person’ myth, as well as effective mathematics teaching methods. We refer to the combination as a Mathematical Mindset Approach. Using mixed methods, we conducted a one-year study to investigate teacher and student learning in a Mathematical Mindset network. We collected data on teacher and student beliefs, teacher instructional practice, and student learning gains on state achievement tests. The results from our quantitative analyses found statistically significant positive

improvements in student beliefs, teacher’s instructional practice, and on students’ math test scores. The mindset approach particularly raised the achievement of girls, English learners, and economically disadvantaged students. Based on our qualitative analysis, we propose that the success of the intervention rests upon two central factors: (1) The different forms of PD served to eradicate the learning myths that had held up teachers and learners; and that (2) Teachers had space for identity work as mathematical learners.”

Azukas, M. E. (2019). Cultivating a blended community of practice to promote personalized learning. *Journal of Online Learning Research*, 5(3), 275–309.
<https://eric.ed.gov/?id=EJ1241727>

From the ERIC abstract: “The purpose of this mixed-methods case study was to examine the effectiveness of a blended learning community of practice model in providing professional development to improve K-12 teacher’s self-efficacy in the implementation of personalized learning. Eighteen teachers participated in a nine-month professional development program focused on personalized learning. Participants took pre and post self-efficacy tests based on nine personalized learning constructs. Qualitative data was collected from feedback surveys, online postings, and individual interviews. Teachers demonstrated greater levels of self-efficacy with regard to the implementation of personalized learning after their participation in the professional development community. They reported increased confidence with regard to personalized learning in the areas of planning, risk-taking, implementation, continuous improvement, and sharing their knowledge with others. Teachers developed additional competencies such as an increased knowledge of their students and skills related to technology, design, problem-solving, and facilitation. Teachers developed new dispositions such as flexibility and open-mindedness. Teachers found that elements of personalized learning could be implemented without technology, but recommended the integration of technology to effectively implement personalized learning across all nine constructs. The online components of the blended design, enhanced the teachers’ sense of community and helped to facilitate collaborative, interdisciplinary work.”

Blitz, C. L. (2013). *Can online learning communities achieve the goals of traditional professional learning communities? What the literature says* (REL 2013-003). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Mid-Atlantic. <https://eric.ed.gov/?id=ED544210>

From the ERIC abstract: “For more than a decade practitioners have promoted professional learning communities (PLCs) as an effective structure for providing teachers with professional development (Chappuis, Chappuis, & Stiggins, 2009; DuFour, Eaker, & DuFour, 2005). These collaborative networks are believed to be effective because they expose teachers to new ideas and practices and improve teaching by promoting critical reflection (Hord, 1997; Wood, 2007). Underpinning this argument is the theory of situated learning in communities of practice (Lave & Wenger, 1991), which contends that teachers who learn within a self-directed and problem-centered community of learners are more likely to find value in their learning and to apply it in their classrooms. When teachers disseminate this knowledge to other teachers and invite feedback, their school

becomes more learning-oriented and results-focused. Ultimately, the expectation is that by cultivating PLCs, schools can improve student achievement by making teaching and classroom practices more effective. One way to facilitate PLCs is to move them online or partially online (Beach, 2012). Online PLCs are loosely defined as teams of educators who use digital and mobile communication technologies, at least part of the time, to communicate and collaborate on learning, joint lesson planning, and problem solving. Partially online (hybrid) PLCs combine online and face-to-face interactions. This review of the scientific literature on online PLCs responds to a request from district and school administrators in the Regional Educational Laboratory Mid-Atlantic Region to learn more about the potential of online PLCs to engage teachers in professional development inside and outside school and their routine school day. It is confined to peer-reviewed journal articles and government-sponsored research studies published during 2000-12 as they relate to two questions: (1) What are the advantages and challenges of online and hybrid models of PLCs compared with traditional (exclusively face-to-face) PLCs?; and (2) What, if any, are some emerging best practices in designing and organizing online and hybrid PLCs? Before examining these two questions, the report describes common characteristics of PLCs and the logic model used in the analysis.”

Carey, R., Kleiman, G., Russell, M., Venable, J. D., & Louie, J. (2008) Online courses for math teachers: Comparing self-paced and facilitated cohort approaches. *Journal of Technology, Learning, and Assessment*, 7(3), 1–36. <https://eric.ed.gov/?id=EJ838629>

From the ERIC abstract: “This study investigated whether two different versions of an online professional development course produced different impacts on the intended outcomes of the course. Variations of an online course for middle school algebra teachers were created for two experimental conditions. One was an actively facilitated course with asynchronous peer interactions among participants. The second was a self-paced condition, in which neither active facilitation nor peer interactions were available. Both conditions showed significant impact on teachers’ mathematical understanding, pedagogical beliefs, and instructional practices. Surprisingly, the positive outcomes were comparable for both conditions. Further research is needed to determine whether this finding is limited to self-selected teachers, the specifics of this online course, or other factors that limit generalizability.”

Collins, L., & Liang, X. (2014). Task relevance in the design of online professional development for teachers of ELLs: A Q methodology study. *Turkish Online Journal of Distance Education*, 15(3), 268–281. <https://eric.ed.gov/?id=EJ1043660>

From the ERIC abstract: “Online professional development (oPD) for teachers should focus on designing web-based learning opportunities that help practicing educators solve the tough problems of practice when working in their schools. Technology, pedagogy, and content knowledge can be integrated in the design of online professional development modules to enhance task relevance for maximum learning and transformation. The purpose of this study was to learn which tasks in an online professional development module were ranked by in-service educators as relevant to their work with English language learners (ELLs). Using Q methodology, the researcher asked participants to rank the relevancy of 36 online tasks from an online professional

development module designed and developed at an American university. Participants used a -5 to 5 forced distribution to rank online activities from ‘Least relevant to my work with ELLs’ to ‘Most relevant to my work with ELLs’ followed by a semi-structured interview to explain their decisions. After data analysis, two factors emerged, indicating that participants’ perceptions on task relevance differed by professional roles and educational settings. The participants also favored didactic online tasks over interactive tasks. The findings from the oPD participants’ responses have the potential to serve as the basis for future online professional development design and for planning other relevant activities to be applied to the e-learning environment.”

Dash, S., de Kramer, R. M., O’Dwyer, L. M., Masters, J., & Russell, M. (2012). Impact of online professional development on teacher quality and student achievement in fifth grade mathematics. *Journal of Research on Technology in Education*, 45(1), 1–26. <https://eric.ed.gov/?id=EJ991837>

From the ERIC abstract: “Despite the ever-increasing number of online professional development (OPD) programs, relatively few studies have been conducted to examine the efficacy of such programs for teachers and students. This manuscript presents findings from an impact study of OPD courses in fractions, algebraic thinking, and measurement on 79 fifth grade teachers’ pedagogical content knowledge and pedagogical practices as well as their students’ mathematics achievement. The OPD courses were offered one course per semester for three semesters, and each course comprised 1 week of orientation and 6 weeks of course content. Overall, teachers participated in more than approximately 70 hours of OPD. The research findings showed that teachers who had been randomly assigned to the experimental group had significantly greater gains in scores for pedagogical content knowledge and pedagogical practices than teachers in the control group. Nevertheless, the positive changes in teacher outcomes did not translate to any meaningful differences in students’ mathematics achievement.”

Durr, T., Kampmann, J., Hales, P., & Browning, L. (2020). Lessons learned from online PLCs of rural STEM teachers. *Rural Educator*, 41(1), 20–26. <https://eric.ed.gov/?id=EJ1251481>

From the ERIC abstract: “This article details a Title II grant funded professional development project for rural STEM teachers. For this project teachers were grouped in online professional learning communities (PLCs). Participants shared teaching videos and received feedback from their group members and university faculty. In a face-to-face workshop, participants were trained on how to effectively record and share videos with their PLC group. After the workshop, all communication was conducted through digital means. During this project we learned that the frequency of video posting, the type of videos posted, and the style of reflection questions, were critical aspects to the engagement of participating teachers. Additionally, teachers showed an increase in teacher efficacy as a result of being part of the online PLCs and they indicated strong enjoyment and value in participation of the program.”

Gosselin, D. C., Thomas, J., Redmond, A., Larson-Miller, C., Yendra, S., Bonnstetter, R. J., et al. (2010). Laboratory Earth: A model of online K-12 teacher coursework. *Journal of Geoscience Education*, 58(4), 203–213. <https://eric.ed.gov/?id=EJ1164615>

From the ERIC abstract: “Laboratory Earth, a series of three NASA-Sponsored, on-line graduate courses for K-8 teachers, was designed to meet a variety of learning styles and appeal to teachers’ motivation to learn the content and improve their teaching. This is especially important to teachers as they seek to demonstrate ‘highly qualified’ status to meet No Child Left Behind standards. These graduate-level courses consist of four modules of two to four lessons each. Pre- and post-course surveys indicated significant increases in teachers’ (n = 51) content knowledge, science teaching efficacy beliefs (STEBIA), sense of community within the course (LEO) and science teaching enjoyment (STES). Qualitative data indicated teachers valued the cohort system, content aligned to teaching needs, and the instructor’s response to requested feedback. Results indicated that online courses can provide valuable professional development opportunities for K-12 science teachers to deepen their knowledge, sharpen their skills, and maintain their knowledge of science developments. Because teachers play an important role in the development of their students’ attitudes towards science, it is extremely important that science and education communities collaborate to create courses that use contemporary pedagogy to address the content-knowledge needs of teachers required by National Science Standards criteria.”

Holmes, A., Signer, B., & MacLeod, A. (2011). Professional development at a distance: A mixed-method study exploring inservice teachers’ views on presence online. *Journal of Digital Learning in Teacher Education*, 27(2), 76–85. <https://eric.ed.gov/?id=EJ907004>

From the ERIC abstract: “This paper uses a mixed-method approach to examine the efficacy of a 5-week distance learning model that offered 2-credit courses for K-12 inservice teachers as a form of professional development. This study examined the experiences of the inservice teachers across online professional development courses and analyzed participant surveys from this population to gain a better sense of satisfaction, learning, and quality of interactions related to the online professional development. The findings speak to the value of establishing a sense of ‘presence’ online, the impact of online teacher professional development on the active classroom, and features that contribute to the enhancement of professional development online.”

Kowalski, S., Busey, A., Goldsmith, L., Bates, M., Beilstein, S., & Perry, M. (2017). *Emerging design principles for online and blended teacher professional development in K-12 STEM*. Waltham, MA: Community for Advancing Discovery Research in Education. (CADRE), Education Development Center, Inc. <https://eric.ed.gov/?id=ED590556>

From the ERIC abstract: “Online modes of teacher professional development (PD) have gained prominence in recent years for their potential to transform and expand access to high-quality resources and experiences that positively impact teachers’ knowledge, beliefs, instructional practices, and ultimately, student learning. However, with the increasing demand for and availability of online offerings, there is still much to be learned about the effectiveness of these programs and the factors that contribute to their success. The National Science Foundation’s (NSF) Discovery Research PreK-12 (DRK-12) program, which ‘seeks to significantly enhance the learning and teaching of science, technology, engineering, mathematics and computer science (STEM) by preK-12 students and teachers, through research and development of STEM education innovations

and approaches,' is poised to contribute in this area (NSF, 2017, p. 1). In fall 2016, Community for Advancing Discovery Research in Education (CADRE) (the resource network for NSF's DRK-12 program) identified 26 active projects in the DRK-12 portfolio that were researching and/or developing online or blended teacher PD programs. Between February and September 2017, awardees representing 11 projects participated in a series of activities designed to elicit and form consensus around emerging design principles for online and blended teacher PD programs in K-12 STEM education. The resulting principles are organized and presented around three themes: (1) Motivating and Sustaining Engagement that Builds Knowledge and Advances Professional Goals; (2) Creating Opportunities for Teachers to Collaborate as Learners; and (3) Supporting Reflection on Content and Practice. Participating awardees also described opportunities and challenges associated with each theme in online and blended settings. They highlighted opportunities for further research that could enhance the design principles presented in this report, inform the development of new principles, and address challenges that are common across projects. As these projects and other research efforts continue to generate empirical evidence around design approaches—including the contexts in which and the audiences for whom they are effective, and their impacts on instruction and student learning—the design principles presented in this report are intended to serve as guidance for the ongoing and future work of (1) researchers and developers of teacher PD programs and (2) administrators and teacher leaders who plan, implement, and facilitate online offerings for PD programming in their schools and districts. The emerging principles in this report were generated based on experience and initial evidence from across DRK-12 projects.”

Marquez, B., Vincent, C., Marquez, J., Pennefeather, J., Smolkowski, K., & Sprague, J. (2016). Opportunities and challenges in training elementary school teachers in classroom management: Initial results from Classroom Management in Action, an online professional development program. *Journal of Technology and Teacher Education*, 24(1), 87–109. <https://eric.ed.gov/?id=EJ1092428>

From the ERIC abstract: “Classroom management remains a challenge for many teachers. The approach and delivery of professional development (PD) in classroom management may determine how well teachers are able to apply evidence-based approaches in their classrooms. We use existing literature to identify the key features that make in-service PD effective and present them as the defining features of a recently developed PD program, ‘Classroom Management in Action,’ which blends online technology, evidence-based practice in positive behavior support, video modeling, self-paced/step-by-step activities, and tools for aiding and measuring fidelity and behavioral outcomes. We report results from studies documenting the program’s social validity, the psychometrics of its online behavioral assessment tool, and its effectiveness based on an initial pilot test using a randomized controlled field trial involving 101 classrooms. We offer recommendations for future research on PD in classroom management and implications for policy and practice.”

Reeves, T. D., & Pedulla, J. J. (2013). Bolstering the impact of online professional development for teachers. *Journal of Educational Research & Policy Studies*, 1(1), 50–65. <https://eric.ed.gov/?id=ED545314>

From the ERIC abstract: “Online professional development (OPD) for teachers is an increasingly popular and viable alternative to face-to-face professional development. While OPD can be effective, little is known about OPD’s design and implementation features that maximize its impact. Using data from a large-scale OPD initiative, this correlational study (N = 1231) investigates antecedents of self-reported changes in teacher knowledge, classroom practice, and student achievement. Three regression analyses replicate the importance of several factors in effective professional development, or online learning more generally, and also identify additional predictors of OPD’s impact(s). The paper also discusses an applied framework for conceptualizing and modeling the effects of OPD’s features on its successive outcomes. Implications for the design, implementation and evaluation of OPD, directions for future research, and study limitations are discussed.”

Shaha, S. H., Glassett, K., & Copas, A. (2015). Sustaining student gains from online on-demand professional development. *Journal of International Education Research*, 11(3), 163–172. <https://eric.ed.gov/?id=EJ1070777>

From the ERIC abstract: “A multi-State, quasi-experimental study was conducted as a longitudinal, two-year follow-up of participation in an online, on-demand professional development (PD) program. The purpose was to ascertain whether student gains were sustained in a second year of PD participation. Data verified gains in Year 1 versus Pre-PD baseline, with continued gains in Year 2 atop those achieved in year 1 of PD participation, reflecting a positive trend and continued advantage over non-PD schools in the same districts. Results showed that student in PD schools gained 7.7% ($p < 0.01$) more in Math in year 2 atop 18.9% ($p < 0.001$) gains from year 1, versus gains of 0.5% (ns) and 4.2% ($p < 0.01$) for non-PD schools in the same districts. Similarly, students in the PD schools gained 10.2% ($p < 0.01$) more in Reading in year 2 atop 18.9% ($p < 0.001$) gains from year 1, versus gains of 0.5% (ns) and 4.2% ($p < 0.01$) for non-PD schools in the same districts. Total gains from baseline for PD schools were 28.1% ($p < 0.001$) in Math for PD schools versus 4.7% ($p < 0.01$) for the same districts collectively, and 30.2% ($p < 0.001$) in Reading for PD schools versus 6.0% ($p < 0.01$) for the same districts collectively. Findings support the high-participation use of Internet-based, on-demand professional learning for improving teacher effectiveness and sustained impacts on student performance.”

Stevenson, M., Stevenson, C., & Cooner, D. (2015) Improving teacher quality for Colorado science teachers in high need schools. *Journal of Education and Practice*, 6(3), 42–50. <https://eric.ed.gov/?id=EJ1083814>

From the ERIC abstract: “This article describes the evaluation of an online professional development program funded by the State of Colorado to address the need for highly qualified science teachers in high need and/or rural school districts. Recruitment and the retention of highly qualified educators in high need and/or rural school districts is a critical factor affecting the education and the possible career trajectory of students enrolled in science, technology, engineering and math (STEM) related courses. The program describes the participants’ experiences with the online format, the educational courses offered, and the overall effect of the program. The results of the evaluation

provided positive results for participants experience and valuable information regarding improvements to such programs.”

Vavasseur, C. B., & MacGregor, S. K. (2008). Extending content-focused professional development through online communities of practice. *Journal of Research on Technology in Education*, 40(4), 517–536. <https://eric.ed.gov/?id=EJ826089>

From the ERIC abstract: “This mixed method case study provides insights about how the professional development of middle school teachers is facilitated through their participation in content-focused online communities of practice. A key finding from this research reveals that the online community provided teachers with enhanced opportunities to share ideas, to discuss issues, and to make new connections with colleagues as well as with their principal. In addition, teachers gained curriculum-based knowledge, developed enhanced self-efficacy with respect to implementing technology, and collaborated on the development of interdisciplinary curriculum units.”

Yoo, J. H. (2016). The effect of professional development on teacher efficacy and teachers’ self-analysis of their efficacy change. *Journal of Teacher Education for Sustainability*, 18(1), 84–94. <https://eric.ed.gov/?id=EJ1112457>

From the ERIC abstract: “The current study examined the effect of an online professional development learning experience on teachers’ self-efficacy through 148 (Male = 22; Female = 126) K-12 teachers and school educators. The Teachers’ Self-Efficacy Scale (TSES) developed by Tschannen-Moran and Woolfolk Hoy (2001) was administered twice with a five-week gap. Additionally, all participants’ descriptive self-analysis of their own score change was examined to analyze teachers’ attributions of their self-efficacy change. Both quantitative and qualitative methodologies were used to analyze the data. The findings indicated that teacher efficacy increased as a result of their online professional development experience. Participants’ self-analysis of their efficacy change provided some possible explanations for mixed reports for the influence of experience on teacher efficacy.”

Additional Organizations to Consult

Friday Institute for Educational Innovation – <https://www.fi.ncsu.edu/teams/pllc/>

From the website: “The Professional Learning and Leading Collaborative promotes pedagogical shifts in digital learning environments and engages educators at all levels, providing research based, job-embedded models and approaches for strategic planning and professional development with the belief that students deserve access to equitable personalized learning experiences. The members of our dedicated team are educational leaders who have extensive experience in strategic planning, leadership support and development, data-driven decision-making, and professional development planning and design—all as they relate to digital learning programs. All the professional development designed is customized and tailored to fit educators’ unique and current needs in schools and districts.”

International Society for Technology in Education – <https://www.iste.org/about/about-iste>

From the website: “Welcome to the International Society for Technology in Education (ISTE), home to a passionate community of global educators who believe in the power of technology to transform teaching and learning, accelerate innovation and solve tough problems in education.

ISTE inspires the creation of solutions and connections that improve opportunities for all learners by delivering: practical guidance, evidence-based professional learning, virtual networks, thought-provoking events and the ISTE Standards. ...

ISTE offers evidence-based professional learning, virtual coaching and year-round academies to support educators in learning and applying effective strategies for the transformational use of technology.”

Learning Forward – <https://www.learningforward.org/>

From the website: “Learning Forward shows you how to plan, implement, and measure high-quality professional learning so you and your team can achieve success with your system, your school, and your students.

We are the only professional association devoted exclusively to those who work in educator professional development. We help our members leverage the power of professional learning to affect positive and lasting change.”

REL Southwest note: Learning Forward offers the following resources relevant to this request:

“Professional Learning Through Virtual Communities” available at <https://learningforward.org/webinar/professional-learning-virtual-communities/>

“Online Professional Development: Design, Deliver, Succeed” available at <https://learningforward.org/journal/april-2011-vol-32-no-2/book-club/>

U.S. Department of Education, Office of Educational Technology (OET) – <https://tech.ed.gov/>

From the website: “The U.S. Department of Education Office of Educational Technology (OET) develops national educational technology policy and establishes the vision for how technology can be used to transform teaching and learning and how to make everywhere, all-the-time learning possible for early learners through K-12, higher education, and adult education.”

REL Southwest note: OET provides the following resources and initiatives relevant to this request:

“Advancing Educational Technology in Teacher Preparation: Policy Brief” available at <https://tech.ed.gov/teacherprep/>

“Future Ready Schools: Empowering Educators through Professional Learning” toolkit available at <https://tech.ed.gov/futureready/professional-learning/>

“The Future Ready District: Professional Learning Through Online Communities of Practice” available at <https://tech.ed.gov/futureready/professional-learning/future-ready-district/>

“Characteristics of Future Ready Leadership” available at <https://tech.ed.gov/files/2015/12/Characteristics-of-Future-Ready-Leadership.pdf>

Methods

Keywords and Search Strings

The following keywords and search strings were used to search the reference databases and other sources:

- “Professional development” AND (virtual OR online) AND effectiveness
- (“online professional development” OR “OPD”) AND teacher AND effectiveness
- “Communities of practice” AND (virtual OR online) AND effectiveness

Databases and Resources

We searched [ERIC](#) for relevant, peer-reviewed research references. ERIC is a free online library of more than 1.8 million citations of education research sponsored by the Institute of Education Sciences (IES). Additionally, we searched the [What Works Clearinghouse](#).

Reference Search and Selection Criteria

When we were searching and reviewing resources, we considered the following criteria:

- *Date of the publication:* References and resources published from 2005 to present, were included in the search and review.
- *Search priorities of reference sources:* Search priority is given to study reports, briefs, and other documents that are published and/or reviewed by IES and other federal or federally funded organizations, academic databases, including ERIC, EBSCO databases, JSTOR database, PsychInfo, PsychArticle, and Google Scholar.
- *Methodology:* The following methodological priorities/considerations were given in the review and selection of the references: (a) study types—randomized control trials, quasi-experiments, correlational studies, descriptive data analyses, literature reviews, mixed methods analyses, and so forth; (b) target population, samples (representativeness of the target population, sample size, volunteered or randomly selected, and so forth), study duration, and so forth; and (c) limitations, generalizability of the findings and conclusions, and so forth.

This memorandum is one in a series of quick-turnaround responses to specific questions posed by stakeholders in the Southwest Region (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas), which is served by the Regional Educational Laboratory (REL) Southwest at AIR. This memorandum was prepared by REL Southwest under a contract with the U.S. Department of Education's Institute of Education Sciences (IES), Contract ED-IES-91990018C0002, administered by AIR. 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.