VIRTUAL MENTORING AND COACHING IN EDUCATION

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Technology improvements have opened an avenue for online mentoring and coaching for in-service teachers. Providing effective mentoring and coaching online is a viable alternative when traditional methods are unfeasible. A systematic review was conducted to understand virtual mentoring and coaching (VMC) over the last two decades. Findings from 15 studies that met full-text level criteria indicated that VMC is an effective method to support teachers. However, due to variability in the studies' design of VMC implementation, it is not easy to decipher what specific features of VMC make VMC effective. In developing future VMC opportunities, there is a need to understand effective features to maximize teacher learning. Nevertheless, this review has significant implications regarding VMC developments for in-service teachers.

Keywords: mentoring, coaching, online, virtual, professional development, emergent bilinguals, in-service teachers

In the United States, classrooms have become more ethnically and racially diverse in recent decades (U.S. Census Bureau, 2019). Researchers, policymakers, and teachers are battling ways to address emergent bilinguals' (EBs: refers to students who come from non-English speaking backgrounds) needs as many struggle academically. According to the statistics, EBs represent a susceptible population of learners across all major subject areas in education (National Center for Educational Statistics, 2019). This can be attributed to many factors such as EBs being tasked with learning content and language simultaneously (Gupta, 2019; Villegas, 2018). This, coupled with low performance in national standardized assessments, influences policies such as the Every Student Succeeds Act, emphasizing a commitment to equal opportunity for specifically disadvantaged and high needs students in the United States (U.S. Department of Education, 2015). In education, equity refers to providing all students with "the opportunity to receive a fair, equitable, and high-quality education [that closes] educational achievement gaps" (U.S. Department of Education, 2015, Sec. 1001. Statement of Purpose); thus, the Every Student Succeeds Act mandated that each state's educational plan demonstrate the adoption of English language proficiency standards that (a) recognize four domains such as "speaking, listening, reading, and writing"; (b) address EBs' various proficiency levels; and most importantly (c) are aligned with state academic standards (U.S. Department of Education, 2015, p. 25). However, while bilingual or English as a Second Language (ESL) teachers are aware of proficiency levels across the four domains, the familiarity between proficiency levels and content standards is less likely to be evident because it requires knowledge of various sets of content standards (Lee, 2018). Therefore, the Every Student Succeeds Act has mandated the effective advancement of

professional development (PD) needed to improve teachers of EBs instruction (U.S. Department of Education, 2015).

Effective teacher PD supports teachers in advancing complex and unique skills necessary to reach various learners. Darling-Hammond et al. (2017) defined effective PD as "professional learning that results in changes in teacher practices and improvements in student learning outcomes" (p. 5). Technological advances from unique recent challenges have amplified interest in virtual professional development (VPD). The challenges created by COVID-19 for educators across the country were unpredictable and forced adaptation through virtual means. Student learning was not the only element pushed into online platforms; professional training was as well.

Although PD can help teach various pedagogical skills, applying that knowledge in everyday instruction does not always occur (Holmes et al., 2005; Knight, 2009, as cited in Gilbert, 2018). One way to guide teachers of EBs in the implementation of new techniques in their everyday instruction would be through tailored support. However, challenges of onsite assistance have led researchers and PD providers to investigate how technology could foster individualized support (Carmouche et al., 2018; Pianta et al., 2008). Online individualized support has been commonly referred to in the literature as web-based, online, or e- mentoring/coaching. To remain consistent throughout this article, we use the term virtual mentoring and coaching (VMC), a term previously first coined in the literature by Irby (2015). VMC allows mentors/coaches and mentees to interact with minimal constraints due to time, availability, and geography (Bang, 2013; Vernon-Feagans et al., 2015). Most importantly, VMC can be more efficient in feasibility and accessibility without negatively impacting its effectiveness (Gilbert, 2018). Ultimately, we want to support teachers' professional growth regardless of the method used to deliver quality PD.

Pedagogical Practices

As mentioned earlier, equitable education refers to a fair and high-quality education that results in minimizing achievement gaps for disadvantaged and high-needs students (U.S. Department of Education, 2015). Research shows that "higher-quality instruction is positively correlated with EBs outcomes" (Solari et al., 2016, p. 1061). Therefore, a teacher's ability to deliver fair, equitable and high-quality instruction that addresses EBs' academic, linguistic, and cultural needs should encompass their skill to present content through various pedagogical practices. Pedagogical practices such as collaborative learning, visuals, or academic language scaffolding should facilitate EBs' academic language or conceptual understanding. For example, in a study conducted by Huerta et al. (2016), researchers were interested in measuring students' academic language development and conceptual understanding of science. In this study, classroom teachers received PD in many areas, including explicit academic language instruction to support EBs. Over a year, EBs made significant gains in their academic language, which was attributed to the PD teachers received.

Pedagogical practices implemented by a teacher of EBs should focus on making content comprehensible (Gupta, 2019; He et al., 2018; Krashen, 1985) so that EBs' conceptual understanding is facilitated. However, implementing appropriate pedagogical practices for EBs requires teachers' understanding of various concepts such as (a) second language learning process, (b) language and culture as a medium of learning, (c) language and culture as a goal of instruction (de Jong & Harper, 2005, as cited in He et al., 2018) and (d) English language proficiency (Cummins, 2000, as cited in Garza et al., 2018). Therefore, it is essential that teachers' understanding of these concepts is solidified to address their EBs' diverse needs.

Teachers of EBs in Public Education

As the number of EBs rises, so should the number of teachers to support the needs of this increasing population. Nationwide, schools suffer from a shortage of teachers year after year (Sutcher et al., 2016; Sutcher et al., 2019). The Texas Education Agency annually creates a report of areas in the education field needing specialized teachers. In the 2018-2019 school year, the U.S. Department of Education recognized a shortage of teachers in various areas such as bilingual and ESL (Texas Education Agency, 2018). There is a shortage of teachers for the growing population of EBs, but teachers in the United States lack preparation to meet the linguistic, academic, and cultural needs of EBs (Villegas, 2018).

Researchers agree that academic gaps among EBs can be attributed to various factors. According to Huerta and Garza (2019), three interrelated factors that affect EBs' academic gaps include academic language, conceptual understanding, and pedagogical practices. Therefore, to support practitioners of EBs in addressing these gaps, PD that focuses on factors affecting EBs' academic gaps is vital to the academic growth of this population. However, addressing these factors simultaneously may not always be straightforward hence the reason many PD courses, either face-to-face or online, focus on one or a few areas such as specific subjects, academic language, or pedagogical practices. As the population of EBs increases, the need to support teachers' professional growth across different areas is crucial in addressing EBs' academic gaps.

Evolution of PD

In education, PD refers to "in-service training designed to advance teachers' content knowledge and pedagogical skills" (Carmouche et al., 2018, p. 128). There is a mutual understanding among practitioners, researchers, and policymakers for the need of quality PD. In the same manner, as education has evolved so has the differentiation in PD. In recent decades, PD has provided differentiated support to teachers from various subject areas (e.g., music, reading, science), various needs (e.g., classroom management, cultural awareness), and special populations (e.g., EBs, children with autism). Research on PD has proven effective for students and teachers of EBs (Lara-Alecio et al., 2009; Tong et al., 2017). However, there is a consensus among practitioners and researchers that PD is not providing teachers with the support needed to apply the understanding of concepts introduced in PD to their everyday instruction (Holmes et al., 2005; Knight, 2009, as cited in Gilbert, 2018).

The consensus findings allowed for PD follow-up, which can come in various forms such as mentoring or coaching. However, mentoring and coaching are not always feasible due to distance, time, and monetary support (Knight, 2012, cited in Gilbert, 2018). Nevertheless, with the evolution of technology, the transition from face-to-face mentoring and coaching to VMC has been widely accepted by many researchers as we will subsequently present (Simonsen et al., 2009). Additionally, VMC can be partitioned into two formats: synchronous (communication in real-time) and asynchronous (delayed communication), which increases the range of applications. However, research in VMC for in-service teachers continues to be limited especially for teachers of EBs. Nonetheless, due to its impact on several studies (Bang, 2013; Hunt et al., 2013; Ruble et al., 2013; Simonsen et al., 2009), VMC continues to be an area of interest for reasons such as feasibility and sustainability (Carmouche et al., 2018).

Importance of VMC for Teachers of EBs

The demand for education has evolved due to various factors. Additionally, with the continuous increase of EBs with diverse needs, the need to support teachers' professional growth has become vital. However, how can one reach the mass population of teachers that need support? It has become evident that creating PD focused on individualized support is necessary to enrich teachers' understanding of the content presented in PD (Aguilar, 2013; Yoon et al., 2007). Individualized support in mentoring and coaching has been implemented for quite some time (Pianta et al., 2008; Ruble et al., 2013; Vernong-Feagans et al., 2015).

VMC has been a viable option to support practitioners, researchers, and policymakers' logistical and financial challenges with increased technology. According to Dede et al. (2009), VMC is an efficient way to achieve the goals we intend to achieve through traditional PD. The number of empirical studies conducted to evaluate the effectiveness of VMC with teachers of EBs is limited to date. In an extensive review of the literature, only two studies discussed EBs: one was qualitative (Leighton et al., 2018) and the other was a quantitative, randomized controlled trial (Tang et al., 2020). In the Leighton et al. (2018) study, the teacher receiving support was ESL certified, and 65% of her student population were EBs; in this study, VMC supported teachers' professional growth in questioning, confidence in instructional delivery, and an increase in explicit talk. In Tang et al. (2020) study, the researchers worked with bilingual teachers through VPD and VMC and reported improved practices for teachers in the experimental group; according to the researchers, this success was attributed to the teacher's individualized support through VMC. Both of these studies (Leighton et al., 2018; Tang et al., 2020) support the idea of developing VMC to support teachers' professional growth related to EBs.

Purpose

The purpose of this systematic review was to review articles within the last 20 years (2000–2020) containing intervention studies that integrate VMC while comparing articles with teachers of EBs (i.e.., bilingual, ESL) and teachers of non-EBs for teachers of EBs. The following questions guided this study:

1. How do virtual mentoring and coaching interventions affect teachers' professional growth, including teachers of EBs?
2. What notable trends exist in virtual mentoring and coaching that most affected teachers' professional growth? and
3. How do studies contrast in their research design?

We further discuss our findings on how to best support all teachers but especially teachers of EBs as they deliver quality instruction to support their EBs. This review is essential for exploring how VMC has contributed to teachers of non-EBs and EBs' professional growth and, most importantly, supports practitioners, researchers, and policymakers in VMC development.

Method

A systematic review was conducted to ensure the rigor and transparency of the review process and avoid any bias and arbitrariness that could jeopardize the reproducibility and updatability of this study and its findings (Newman & Gough, 2020). This synthesis is needed to make proper

decisions regarding future funding, interventions, or programs that positively affect teacher communities. Therefore, to locate all related literature regarding VMC's topic and its effects on teachers of EBs and non-EBs professional growth, we set the following inclusion and exclusion parameters for a comprehensive synthesis.

Inclusion

To be included in this systematic review, the study should include the following:

1. Articles with studies including synchronous (communication in real-time) and asynchronous (delayed communication) through a VMC intervention in any major area (e.g., mathematics, social development), mentioning VMC with brief descriptions of the VMC and addressing teacher outcomes (i.e., instructional practices, reflective practice).
2. Articles published from 2000 to 2020 thus providing 20 years. This period provides a look at the evolution of VMC with 21st-century technology.
3. Articles conducted in the United States. This provides research, practice, and policy synthesis that can contribute to future studies' alterations or implementations to the specific population of EBs in the United States.
4. Articles with studies including EBs, non-EBs, and in-service teachers.
5. Articles that conducted empirical studies with VMC interventions for K-12 in-service teachers using various research methodologies (e.g., qualitative, mixed methods, and quantitative).

Exclusion

1. Articles conducted internationally as these articles may involve the different populations of EBs with varying characteristics of EBs and non-EBs in the United States' context.
2. Articles with studies including preservice teachers.
3. Articles mentioning VMC without descriptions of the VMC intervention were excluded.
4. Articles with VMC interventions in higher education.

Search and Screening Process

A comprehensive search was initiated with five major databases in the education field: Education Resources Information Center, Education Source, APA PsycInfo, Professional Development Collection, and Academic Search Ultimate. The concepts included in the search were *virtual or online or videoconferencing* and *mentoring or coaching* and *in-service teachers*. The initial search yielded 1,301, but after removing duplicate records ($N = 97$), 1,204 articles were collected. The screening of titles and abstracts yielded 26 articles that met the inclusion and exclusion criteria. We then exported all 26 articles into RefWorks for a comprehensive review of the full-text level screening. Articles not including a description of the VMC intervention and discussion of teacher outcomes were also excluded, which resulted in 8 articles after this systematic search.

The author then reviewed the bibliographies of the eight articles included for any potentially relevant articles that fit the inclusion and exclusion criteria. The potentially relevant articles identified ($N = 13$) through bibliographies were sent for rescreening. The full-text level screening was conducted on the 13 articles, which yielded four articles that met the inclusion and exclusion criteria. A final search was conducted through Google Scholar, yielding 105 articles, 7 of which met the inclusion-exclusion criteria based on titles and abstracts, then sent for full-text

level rescreening. The full-text level screening for the Google Scholar articles resulted in 3 articles that met the inclusion and exclusion criteria. The searches of articles through bibliographies and Google Scholar resulted in 7 articles that met the inclusion and exclusion criteria at the full-text level screening. A total of 15 articles met the inclusion and exclusion criteria thus rendering them appropriate for this systematic review analysis. The screening process is presented in Figure 1 (Page et al., 2020).

Figure 1

PRISMA Flowchart Showing the Article's Inclusion of VMC Criteria
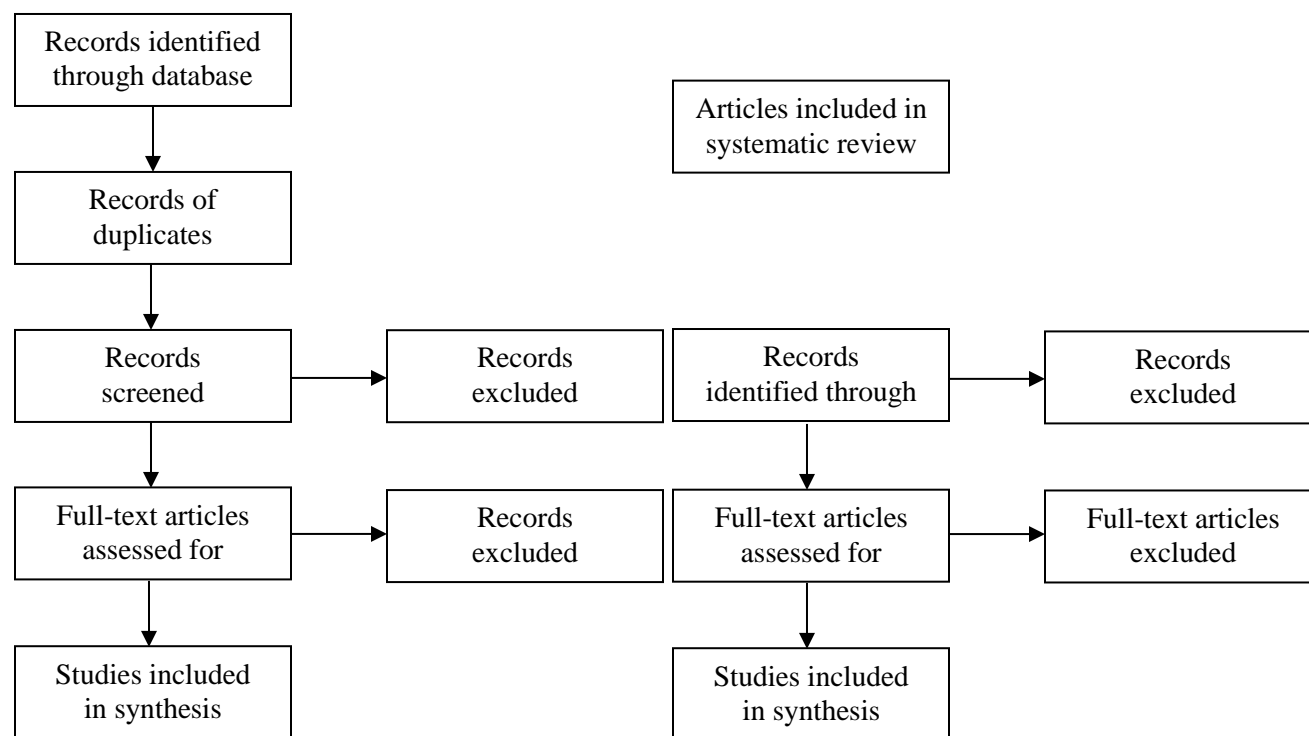
Review

Thirteen of the 15 articles selected analyzed teachers of non-EBs in their samples (92%; see Appendix A), and 2 (13%; see Appendix B) analyzed teachers of EBs in their samples. The studies that analyzed teachers of non-EBs made no mention of EBs; therefore, they were classified as studies with teachers of non-EBs. Similarly, we analyzed one study on teachers of EBs due to the high proportion (65%) of EBs in the teacher's classroom and teacher's qualifications (ESL). However, we should emphasize that the study's purpose was not necessarily to support teachers of EBs; rather, the focus was to support the teachers' professional growth regardless of the student population. Subsequently, we discuss teacher outcomes and how VMC was implemented. We report findings for each of the research questions by combining both groups of articles due to the limited number of studies representing teachers of EBs and efficiently report our findings.

Teachers Outcomes

To answer research Question 1 (How do virtual mentoring and coaching interventions affect teachers' professional growth, including teachers of EBs?), we noted patterns in the reported findings. All but two articles with teachers of non-EBs (Powell et al., 2010; Ruble et al., 2013) reported positive teacher outcomes. One article with teachers of non-EBs reported favorable and unfavorable teacher outcomes (Gilbert, 2018). The majority of the articles differed in the professional outcomes expected by teachers receiving VMC intervention. Nevertheless, all studies supported teachers' professional growth across various areas. All articles are discussed below.

Altogether quantitative analysis was composed of teachers of non-EB samples. Sixty-six percent of quantitative studies reported positive professional growth changes for teachers receiving VMC (Carmouche et al., 2018; Nugent et al., 2016; Pianta et al., 2008; Vernon- Feagans et al., 2015). In comparison, 33% reported no statistically significant differences in teachers' professional growth (Powell et al., 2010; Ruble et al., 2013).

Studies like Nugent et al. (2016) and Pianta et al. (2008) found statistically significant changes in teachers' pedagogical practices due to VMC. Among these two studies, Nugent et al. reported PD intervention effects whereas Pianta et al.'s study was solely based on VMC. In this study, Nugent et al. reported that major contributions to teacher outcomes were attributed to PD. For example, Nugent et al. quantitatively measured and compared teachers' professional growth related to theoretical knowledge, beliefs, self-efficacy, and classroom measures. Teachers in the treatment condition had reported statistically significant higher results across all teacher outcomes.

Other studies found significant changes in teachers' professional growth due to VMC. For example, Vernon-Feagans et al. (2015) quantitatively measured and compared implementing a targeted reading intervention of elementary teachers participating in biweekly 20- to 30- minute VMC sessions. Regardless of condition, the intervention received extended PD through summer institute and PD related to their needs, literacy coaching support, and access to the targeted reading intervention website. Teachers in the treatment received real-time feedback as they worked one-on-one with a struggling student. Analysis of teachers' classroom observations yielded statistically significant changes in the experimental group's targeted reading intervention implementation with large effect sizes of $d = .95$.

Similarly, Carmouche et al. (2018) reported increases in teachers' implementation of evidence-based practices from baseline to intervention and maintenance after PD and VMC intervention. However, in these studies, PD intervention effects were not analyzed. As opposed to many studies, Nugent et al. (2016) are the only researchers in this review that analyzed PD and VMC's effect on teachers' professional growth.

In the subsequent studies, researchers found no statistically significant differences in teachers' professional growth after receiving the VMC intervention (Powell et al., 2010; Ruble et al., 2013). For instance, Powell et al.'s intervention provided teachers with PD and VMC. Results indicated that teachers in both conditions (face-to-face vs. onsite coaching) produced large gains from pre to postintervention. However, no statistically significant changes were evident for teachers in the treatment condition. On the contrary, teachers in the control condition showed statistically significant differences in their implementation of code-focused instruction. Similarly, in Ruble et al.'s study, the researchers focused on supporting teachers of children with autism by mentoring and coaching them to implement evidence-based practices. Researchers found no statistically significant differences between teachers receiving face-to-face coaching and mentoring and VMC concerning teachers' adherence to evidence-based practices in this study. These two studies were the only studies in the review that did not show favorable outcomes for

teachers.

Other researchers qualitatively noted how a VMC intervention affected teachers' professional growth. The subsequent studies showed positive teacher outcomes (Bang, 2013; Bang & Luft, 2014; Jones et al., 2016; Leighton et al., 2018; Malanson et al., 2014; Richardson, 2017). These outcomes were reflected in teachers' instructional practices, self-evaluation, reflection, and decision-making. More specifically, the following researchers centered their interventions around pedagogical practices: Bang (2013), Jones et al. (2016), Leighton et al. (2018), and Malanson et al. (2014). For example, Bang found that teachers maximized their science teaching and implemented new instructional practices. These practices demonstrated professional growth regarding pedagogical content knowledge (i.e., knowledge that goes beyond subject matter); it is the way one represents and formulates the content to make it comprehensible for the students, which may be based on theory or practice (Shulman, 1986). Similarly, Jones et al. found that teachers improved instructional practices and implemented research-based lessons; in this study, an online platform with "immediate and customized mentoring for STEM [science, technology, engineering, and math teachers] through multiple tiers of web-based support, to enhance teachers' practice" (p. 273) was developed. Teachers commented on how questions with important answers had been answered and support received: [received] support on dealing with students who are not motivated to learn" (Jones et al., 2016, p. 281).

Among the studies that centered their intervention around pedagogical practices, Malanson et al. (2014) developed a PD and VMC intervention to support teachers' improvement of instructional practices and inquiry-based learning. In this study, the researchers found that instructional practices improved due to PD and VMC. Specific improvements in instructional practices were not solely focused on one intervention over the other; instead, results were attributed to PD and VMC. In the same way, Leighton et al. (2018) reported improvements in one teacher's instructional practice such as explicit talk, questioning, and facilitation of small and large group discussions resulting from VMC; however, it should be noted that the teacher in this study received PD before VMC, but the findings were only attributed to VMC. In this study, Leighton et al. worked with an ESL teacher with a high proportion of EBs in the classroom. The VMC focused on the teacher and mentee's instructional goals, aligned with language and literacy. Over 14 weeks, the teacher saw improvements in students' discourse due to her instructional practices; "I like the idea of doing the small groups…" (Leighton et al., 2018, p. 44). After weeks of problem-solving and implementing instructional practices suggested by the mentor, the teacher began to see changes in her classroom; "...There is so much good stuff going on from our latest discussion and writing!" (Leighton et al., 2018, p. 47). Other qualitative studies showed positive teacher outcomes related to teachers' increased confidence (self-efficacy), self-evaluation, reflection, and decision-making (Bang & Luft, 2014; Richardson, 2017). Across these qualitative studies, only three provided additional support aside from VMC (Leighton et al., 2018; Malanson et al., 2014; Richardson, 2017).

Lastly, two studies quantitatively and qualitatively reported favorable teacher outcomes (Matsumura et al., 2019; Tang et al., 2020). Tang et al. quantitatively reported bilingual teachers scoring significantly higher and noted medium to large effect sizes compared to teachers in control conditions across various areas—student involvement (Cohen's d = 2.25), teacher time versus student time (Cohen's d = .73), leveled questioning (Cohen's d = .53), ESL strategies (Cohen's d = .65), affective and cognitive feedback (Cohen's d = .57), and physical environment (Cohen's d = .66)—as a result of VPD and VMC. Additionally, researchers qualitatively reported teachers' perceptions regarding the interventions. Teachers shared their improvement regarding their

professional growth; for example, a teacher shared, "It also helped me with my questioning to give more high-order thinking questions to my students" (Tang et al., 2020, p. 120). Another teacher shared, "Feedback is always useful to improve teaching strategies." (Tang et al., 2020, p. 119).

VMC Facets

In order to answer research Question 2 (What notable trends exist in virtual mentoring and coaching that most affected teachers' professional growth?), we noted patterns in characteristics of VMC across all studies and their reported findings. Due to the limited number of studies with teachers of EBs, we will discuss trends in VMC as a whole with teachers of non-EBs and EBs. We further discuss key findings from the articles.

Before addressing trends in VMC interventions related to teachers' professional growth, we begin by discussing how VMC interventions differ across groups of articles. More specifically, we reviewed the VMC protocol teachers received (i.e., observe, assess, and recommend or respond to teacher requests) and the delivery medium (i.e., synchronous or asynchronous). Hence, we were primarily interested in the VMC intervention method described by the researchers.

VMC Interventions

All studies differed in their VMC protocol; however, many followed a variation of the observe, assess, and provide feedback sequence. Other studies followed a similar protocol but involved the teacher in mentoring and coaching by seeking feedback before, during, or after the VMC intervention. Furthermore, other studies discuss mentors and mentees collaborating to devise a plan to address their classroom observations' feedback or suggestions.

Most studies followed a variation of the observe, assess, and provide feedback sequence (Carmouche et al., 2018; Tang et al., 2020; Powell et al., 2010; Vernon-Feagans et al., 2015). In the following studies, mentors were able to go directly into observing classroom observations due to teachers receiving additional support prior to mentoring and coaching (e.g., PD). For example, Tang et al.'s (2020) study centered their intervention on VPD followed by VMC focused on the curriculum teachers in the treatment group employed. The VPD outlined and scripted various areas such as reviewing upcoming lessons, reflecting on practices and student learning, and learning ESL instructional strategies. Following the PD, teachers in the treatment condition received VMC. The VMC followed an observe-feedback protocol. In this study, the mentors virtually observed real-time classroom instruction and provided feedback related to components of the intervention. Similarly, Powell et al.'s study provided teachers with a 2-day PD focused on the intervention content and guided discussion of evidence-based practices related to literacy. Mentors then had the opportunity to observe classroom observations focused on teachers' implementation of the PD intervention content. After that, mentors provided specific feedback regarding improvements related to the intervention content. Similarly, Carmouche et al. included a PD phase prior to intervention, which "used a combination of lecture, role-playing, and videos that demonstrate in-class use of OTR [opportunities to respond], benefits of OTR, and how teachers can increase OTR in their classroom" (p. 137). Teachers then submitted classroom observation videos and received specific feedback related to the intervention.

The following studies delved deeper into the observe, assess, and provide feedback protocol by seeking teachers' feedback before or during the VMC intervention (Bang, 2013; Bang & Luft, 2014; Gilbert, 2018; Leighton et al., 2018; Nugent et al., 2016; Matsumura et al., 2019;

Richardson, 2017). For example, Nugent et al. described mentors and mentees in joint action in each of the five phases of the VMC intervention. In Phase 1 joint planning, mentors and mentees collaborated before and during the implementation. In Phase 2 action/practice, teachers implemented new/existing skills discussed in phase one. In Phase 3, observation consisted of mentors or mentees observing one or the other's instructional practices. Reflection, Phase 4, involved mentors and mentees analyzing practices in light of new or intended outcomes. Lastly, Phase 5 involved mentor and mentee reflecting on observations and providing joint feedback.

Similarly, in Matsumura et al. (2019), the coach and mentee met before implementation to discuss goals and pedagogy aligned with the framework. The coach then observed classroom observations and provided feedback on the framework dimensions related to specific pedagogical practices to reflect with mentees. Additionally, they posed reflective comments and questions for mentees to respond to. Lastly, the mentee and coach then meet to review and discuss the mentees' feedback regarding the classroom observation and then reflect. In these quantitative and qualitative studies, mentees seemed to show better professional outcomes such as implementing instructional practices and reflective thinking when involved in the VMC process.

In other studies, in addition to the observe, assess, and provide feedback sequence, mentees and mentors devised a plan or problem-solved before, during, or after implementation (Bang, 2013; Gilbert, 2018; Leighton et al., 2018; Pianta et al., 2008; Ruble et al., 2013). For instance, in Pianta et al.'s study with preschool teachers, teachers were provided the opportunity to work together to plan for future instruction based on classroom observation feedback. In Bang's study, mentors and mentees collaboratively designed a science lesson within the following virtual platforms: avatar-to-avatar, text-to-text, or online face-to-face. After collaborations, mentees taught the lesson within their classroom and then reflected with their mentor; these reflections led to devising a plan for future implementation. Overall, many studies (80%) implementing a problem-solving phase for future implementation reported some favorable teacher outcomes (Bang, 2013; Gilbert, 2018; Leighton et al., 2018; Pianta et al., 2008).

Method of Delivery

As mentioned previously, VMC can be classified as synchronous or asynchronous. Synchronous communication is in real-time, which is delivered through some form of videoconferencing. On the contrary, asynchronous communication is delayed and can be delivered through emails, discussion forums, or chat boxes. In the following studies, we noted patterns regarding the type of delivery and their reported findings.

A high proportion (47%) of studies followed a synchronous approach to provide VMC interventions (Carmouche et al., 2018; Nugent et al., 2016; Pianta et al., 2008; Richardson, 2017; Ruble et al., 2013; Tang et al., 2020; Vernon-Feagans et al., 2015). In these studies, mentors and mentees could see one another through videoconferencing to mentor and coach. All but one study (Ruble et al., 2013) reported positive findings regarding teachers' professional growth.

Other studies (26%) followed an asynchronous approach. In these studies, VMC interventions between mentors and mentees occurred through online platforms such as chat boxes or emails (Bang & Luft, 2014; Jones et al., 2016; Matsumura et al., 2019; Powell et al., 2010). For instance, in Powell et al.'s study, mentors provided written feedback through a disc; the disc was embedded in software that allowed the mentee to review feedback in a split-screen arrangement. In this arrangement, mentees observed feedback on one side of the screen and video segments corresponding to the feedback. In another study, mentees had access to mentors through chat boxes

and discussion forums (Jones et al., 2016). Similarly, in these studies, all but one study (Powell et al., 2010) reported no differences in teachers' instructions.

Another 13% of studies followed synchronous and asynchronous methods to meet with mentees (Leighton et al., 2018; Malanson et al., 2014). Both of these studies showed positive teacher outcomes regarding implementing instructional practices. For example, in Leighton et al.'s study, the mentor and mentee used different forms of technology to communicate such as email, facetime, and text messages to increase the consistency of interactions.

Two additional studies (13%) implemented a variation of synchronous and asynchronous methods as their purpose was to measure and compare differences across different types of VMC. For example, Bang (2013) measured and compared different VMC (i.e., avatar-to-avatar, text-to-text, and online face-to-face) across different groups of teachers. Researchers qualitatively reported positive findings for teachers in the treatment (avatar-to-avatar, text-to- text, and online face-to-face) versus control (offline mentoring) conditions. Gilbert (2018) employed a study to compare teacher outcomes as the same group of teachers transitioned from synchronous, asynchronous, and face-to-face interventions. In this study, teachers did not show statistically significant differences across formats; however, mean differences for some instructional practices (i.e., questioning and facilitation of discourse) were higher in online mentoring than face-to-face. Both of these studies employed VMC across various methods to study differences across formats.

Studies Research Design Comparisons

We reviewed the context and research designs to answer research Question 3 (How do studies contrast regarding their research design?). We report our findings by combining all studies to present results efficiently.

Articles in urban settings were highly represented in this review (Gilbert, 2018; Leighton et al., 2018; Matsumura et al., 2019; Richardson, 2017). The second highest representation was a mix of urban and rural settings (Jones et al., 2016; Malanson et al., 2014; Powell et al., 2010). Studies with rural settings comprised 14% of the overall studies (Nugent et al., 2016; Vernon-Feagans et al., 2015). Other studies represented at-risk populations (Pianta et al., 2008), low-socioeconomic status (Vernon-Feagans et al., 2015), and diverse populations (Leighton et al., 2018; Malanson et al., 2014; Tang et al., 2020; Vernon-Feagans et al., 2015).

Articles about elementary students (K-5) were also highly represented in this study (60%: Bang, 2013; Gilbert, 2018; Leighton et al., 2018; Matsumura, 2019; Nugent et al., 2016; Richardson, 2017; Ruble et al., 2013; Tang et al., 2020; Vernon-Feagans et al., 2015). Other articles contained studies conducted with preschool students (Pianta et al., 2008; Powell et al., 2010; Ruble et al., 2013). At the same time, other articles included high school (Malanson et al., 2014) and middle school (Bang & Luft, 2014; Carmouche et al., 2018). The remaining studies contained a mix of different education periods (Bang, 2013; Jones et al., 2016; Nugent et al., 2016; Ruble et al., 2013). For example, Nugent et al.'s study contained students from elementary to high school. Similarly, Jones et al. worked with teachers of students in middle to high school. Notably, articles with teachers of elementary students were the most researched.

Research Designs

Research designs employed in these studies differed in many ways. First, studies following synchronous communication used randomized control trial designs more frequently (71%: Nugent

et al., 2016; Pianta et al., 2008; Ruble et al., 2013; Tang et al., 2020; Vernon-Feagans et al., 2015) than studies following asynchronous communication (17%: Powell et al., 2010). Second, articles varied in the sessions they conducted, if at any. Forty percent of articles contained studies that collected data from a span of 2 to 4 sessions (Carmouche et al., 2018; Matsumura et al., 2019; Ruble et al., 2013; Tang et al., 2020), and 40% collected data from a span of 5 to 8 sessions (Malanson et al., 2014; Nugent et al., 2016; Powell et al., 2010; Richardson, 2017) while other studies collected data between 12 to 15 sessions (20%: Bang, 2013; Pianta et al., 2008; Vernon-Feagans et al., 2015). For other studies, time was not specified due to sessions occurring over discussion forums or chat boxes (Bang & Luft, 2014), no precise specification of the number of sessions (Jones et al., 2016; Leighton et al., 2018), or complexity of study due to mentees receiving three types of interventions (Gilbert, 2018). Another aspect that differed was the training of mentors/coaches. A few articles discussed the training of mentors/coaches (Bang & Luft, 2014; Nugent, 2016; Vernong-Feagans, 2015). Other studies capitalized on mentors' experience in training mentors (Leighton et al., 2018; Matsumuru et al., 2019; Richardson, 2017). Third, qualitative studies employed asynchronous communication more frequently (40%: Bang & Luft, 2014; Jones et al., 2016) than quantitative studies (20%: Powell et al., 2010). Lastly, studies employing synchronous and asynchronous communication reported findings qualitatively more frequently (75%; Bang, 2013; Leighton et al., 2018; Malanson et al., 2014) than quantitatively (25%; Gilbert, 2018).

Measures

Measures of teachers' professional growth varied across studies. Therefore, we became interested in how VMC interventions measured teachers' professional growth. As a result, we noted patterns in the measures and instruments implemented in these studies.

Several articles relied on one measurement reflective of teachers' professional growth. For example, some articles considered classroom observations as their sole predictor of teachers' growth (Pianta et al., 2008; Powell et al., 2010; Ruble et al., 2013) whereas other studies only used surveys or questionnaires as their measurable variable (cf. Jones et al., 2016). For example, Pianta et al. quantitatively analyzed teachers' professional growth through classroom observations; in their study, the researchers used a validated instrument, Classroom Assessment Scoring System, to "improve specific dimensions of teachers' observed classroom interactions" (p. 437). Similarly, Jones et al. implemented one survey to measure teachers' professional growth.

While other studies measured teachers' professional growth through two or more measurements, the following articles measured teachers' professional growth through classroom observations and surveys or questionnaires (Carmouche et al., 20108; Nugent et al., 2016; Tang et al., 2020; Vernon-Feagans et al., 2015). Tang et al. (2020) used the Teacher Observation Record to rate bilingual teachers' delivery of ESL instruction. Additionally, the researchers conducted a focus group session to investigate teachers' perceptions of their instructional quality. Studies like Matsumura et al. (2019) analyzed teachers' professional growth through classroom observations, surveys, and interviews.

Discussion

The purpose of this systematic review was to consider 20 years (2000–2020) of articles conducting VMC interventions in the United States across any area while comparing articles with studies working with teachers of non-EBs and EBs. However, the inclusion and exclusion criteria

narrowed the studies included in this review (2008–2020). Additionally, due to the limited number of studies with teachers of EBs, we could not compare articles across groups, so we compared articles in terms of outcomes, interventions, and research designs. The findings allowed us to (a) see changes in research over 20 years, (b) synthesize findings in terms of current understandings regarding VMC, and (c) provide researchers with teachers of non-EBs and EBs directions for future research in VMC.

Development in VMC Interventions Over the Years

In this section, we discuss trends in research for over 12 years. We discuss studies in terms of their historical context regarding the implementation of VMC interventions. We intended to analyze changes over 20 years; however, articles meeting the inclusion/exclusion criteria were only retrieved as early as 2008. Nevertheless, we were keenly interested in developing VMC interventions from theory to implementation across different areas (e.g., literacy, special education, EBs).

  In terms of purpose, the first researchers in their respective areas were concerned with the bigger question of whether VMC supported teachers' professional growth. For example, the first study in this review regarding literacy was concerned with observing changes in teachers' observations due to VPD or VMC (Pianta et al., 2008). The focus on the bigger question of VMC's role in supporting teachers' professional growth guided this research. Similarly, Powell et al. (2010) analyzed and compared the differences between face-to-face and VMC. The focus was to analyze the role VMC had on teachers' professional growth regarding literacy. These studies are among the first articles to examine VMC's effects; therefore, conclusive findings on the effect of VMC were not established. Instead, the researchers contribute to the research by acknowledging VMC interventions' promising outcomes as a promising alternative to onsite mentoring and coaching (Pianta et al., 2008; Powell et al., 2010).

  These articles laid the foundation for later research across different areas. For example, Nugent et al. (2016) contributed to the science area by analyzing and comparing face-to-face coaching and VMC differences. In this study, the researchers provided teachers with PD focused on evidence-based instructional practices in science. Follow-up VMC was hypothesized to promote the transfer of skills to the classroom. Similarly, researchers concluded that technology was effective and efficient in providing teachers with coaching support (Pianta et al., 2008; Powell et al., 2010; Nugent et al., 2016).

  Lastly, research trends regarding theories are unclear in these articles. The first and last studies in this review moved directly into the methods of the study. A few articles followed a theory to provide insights into the development of VMC interventions (Bang, 2013; Bang & Luft, 2014; Nugent et al., 2016; Richardson, 2017; Gilbert, 2018). For example, Bang is the first article in this review that used theory to provide insight into learning development in a situated learning environment.

Researchers' Understandings of VMC

Subsequently, we will discuss findings based on the different methods employed by researchers from qualitative to mixed-methods. These findings are meant to provide an overall idea of findings to date and how they can be furthered. We understand that while the researchers conducting these studies are committed to their work, more studies are needed to make decisive claims regarding

the relationship between VMC and teachers' professional growth. Nevertheless, these findings can provide researchers, practitioners, and policymakers with guidance regarding VMC interventions to promote teachers' professional growth.

Based on the overall findings, employing VMC interventions can foster teachers' professional growth across various areas. These interventions have come to fruition when face- to-face support becomes challenging due to various factors such as lack of resources or distance. In these situations, VMC has provided mentors the flexibility to reach mentees in remote areas or schools with minimal resources (Gilbert, 2018; Matsumura et al., 2019; Nugent et al., 2016).

Most importantly, teachers seem to benefit from VMC and use that feedback to improve instructional practices (Bang, 2013; Bang & Luft, 2014; Jones et al., 2016; Vernon-Feagans et al., 2015). In addition, VMC supported by prior or ongoing PD appears to play a positive role in teachers' professional growth (Carmouche et al., 2018; Leighton et al., 2018; Malanson et al., 2014; Matsumura et al., 2019; Nugent et al., 2016; Pianta et al., 2008; Richardson, 2017). However, only one study (Nugent et al., 2016) discussed the effect of PD and virtual mentoring on teachers' professional growth.

Lastly, from this review, we begin to see VMC's implementation across various areas; however, specific elements of VMC have yet to be studied. The majority of studies in this review have made gains in studying the implementation of VMC, but many have yet to consider specific elements of what makes VMC effective. In this review, one article discussed implementing many evidence-based elements of PD identified through the literature as high-quality PD (e.g., modeling and practice with guided feedback; Nugent et al., 2016). However, these evidence-based elements are based on PD, not VMC. The researchers also concluded that specific elements of the VMC coaching process or time in each of the phases of mentoring or coaching are necessary. According to Nugent et al., unpacking the intervention by operationalizing critical elements and identifying key elements are essential in leading to desired outcomes. Therefore, the primary problem with studies not reporting statistically significant effects for teachers receiving VMC may be that researchers do not discuss implementing evidence-based elements of PD.

Pedagogical Implications

Given what we have discussed, practitioners should consider implementing VMC in their schools to support teachers' professional growth. However, educators should understand that integrating VMC is not the sole variable in improving teachers' growth. Instead, VMC is a tool that can support practitioners when resources such as mentors/coaches or funds are limited. Furthermore, a tool developed through many specific elements (e.g., method of delivery, number of sessions, and training of mentors/coaches) has the potential to support the intervention's effectiveness.

Practitioners should also consider teachers' preferences regarding technology. In Richardson's (2017) study, the teachers had challenges with VMC, so a combination of virtual and face-to-face coaching was provided. Similarly, both synchronous (i.e., videoconferencing) and asynchronous (i.e., email, text messaging) communication was employed to support teachers' professional growth.

Finally, as we noted previously, positive teacher outcomes were observed in studies where teachers received additional support like PD training. Therefore, mentors should consider the anticipated and feasible growth at different phases of the VMC intervention. VMC interventions should be purposefully planned and provide additional support to foster teachers' growth (Nugent et al., 2016). Only expecting VMC interventions to solidify teachers' understanding of aspects

discussed in VMC is not enough. For example, teachers receiving VMC for the first time in an unfamiliar area may demonstrate growth at different intervention phases; therefore, practitioners should consider teachers' understanding of a concept and be prepared to spend more time in the different phases.

Future Research on VMC for Teachers' Professional Growth

The opportunities for future research in the area of VMC are vast. Currently, the literature regarding VMC for teachers continues to be limited in various areas. Nonetheless, researchers in the area of VMC have made enormous contributions to a previously nonexistent area. Researchers conducting studies with large samples and complex interventions (e.g., observing various dimensions) could distance themselves and focus on specific elements that make their study successful. Similarly, researchers conducting studies with small samples and individualized support could replicate their intervention with large or diverse groups to validate their work.

Additionally, researchers embedding PD with VMC should continue analyzing the combined effect of PD and VMC and consider personal effects. Others providing additional support such as PD or resources could address the elements of interventions that support teachers' professional growth. To this end, researchers would understand the impact PD and VMC has on teachers' growth.

Researchers interested in employing quantitative methods should consider utilizing more robust research designs. Additionally, researchers employing qualitative methods should expand their research to more rigorous designs that account for and discuss features such as transparency, credibility, or dependability. Among the qualitative studies reviewed, several articles discussed some of the critical elements necessary for improving the research quality.

Lastly, studies with teachers of EBs were limited thus affecting the recommendations for future research. However, many areas, such as special education, face similar challenges yet researchers could implement VMC interventions following others' work (Carmouche et al., 2018). Leighton et al. (2018) and Tang et al. (2020) have begun contributing to the literature regarding VMC for teachers of EBs.

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Appendix A

VMC Studies: Non-EB Teacher Samples

Study	Grade-level(s)	Context	Sample	Content	Mentors	Intervention Time	Medium	Method	Analysis	VMC Description	Key Findings
Pianta et al. (2008)	Preschool	USA, one state; at-risk population	113 teachers (n = 61 in treatment); (n = 52 control)	Reading, writing, and social competence	Four, consultants experienced in teaching young students and trained in CLASS (observational instrument)	1 year biweekly	Synchronous: "video-chat" Additional support: PD	Quantitative: randomized control trial	HLM on class observations (used CLASS)	Observe and identify teacher behaviors, provide nonevaluative and nonjudgmental feedback, and problem-solve	Experimental group showed growth across seven CLASS dimensions compared to the control group. Statistically significant differences across three dimensions of CLASS (interactions during reading, responding to cues, differentiation in engaging children, and stimulating LD).
Powell et al. (2010)	Preschool	USA, Midwest state; urban, rural, and small cities	88 teachers (n = 45 in treatment); (n = 43 in control)	Reading and writing	Three childhood specialists; master's degree in early childhood; 3- 20 years of lead teachers in preschool	7 coaching sessions over 15 weeks (biweekly sessions)	Asynchronous: feedback through a disc Additional support: PD	Quantitative: randomized control trial	HLM on classroom observations (used observational instrument s)	Observe, assess, and recommend	Teachers in both conditions produced large gains from pre to post-intervention. No statistically significant gains were evident from onsite to remote coaching. Teachers in onsite coaching demonstrated statistically significant gains in code-focused instruction.
Bang (2013)	Elementary/ Primary School (K-5), Middle School (6-8th)	USA, central midwestern state	15 teachers (n = 3 in virtual reality, n = 3 text-text- based, n = 6 in online face-to-face) (n = 3 in control)	Science	4 experienced teachers	5 months; 1-hour weekly mentoring session	Synchronous: videoconferencing Asynchronous: chat box	Qualitative: randomized control trial	Case study on pre and post interviews, journal-reflections, and video-recordings	VMC differed across conditions; however, all followed a design, teach, reflect, and devise plan regarding a science lesson	Experimental group maximized their science teaching and learning by implementing new instructional practices (e.g., picture books, manipulatives) which demonstrated professional growth regarding PCK

Study	Grade-level(s)	Context	Sample	Content	Mentors	Intervention Time	Medium	Method	Analysis	VMC Description	Key Findings
Ruble et al. (2013)	Preschool, Elementary/ Primary School (K-5)	USA, two midsouthern states	49 teachers (*n* = 15 in placebo); (*n* = 14 face- to- face); (*n* = 15 in web)	Special education	Mentors not specified	1 year; 1.5-hr. sessions (2 in fall, 2 in spring)	Synchronous: videoconferencing	Quantitative: randomized control trial	Quantitative: Mann-Whitney U Test on ratings of classroom observations (mention instrument s)	Observe based on targeted objectives and solicit teacher feedback. Then, discuss lesson plans and modify based on discussion and review of the video.	No differences were noted between WEB and FF groups concerning teachers' adherence to implementing teaching practices.
Bang and Luft (2014)	Middle School (6-8th)	USA; southwest	2 teachers treated	Science	2 mentors with content knowledge and grade level teaching experiences (TE) (over 20 years of TE)	1 year (post 3 to 4 times a week) *posting did not always occur	Asynchronous: discussion forum	Qualitative: case study	Computer-mediated discourse analysis of written dialogues, class observations, phone interviews.	Mentors and mentees collaboratively develop a lesson. Observe the teacher's delivery of lesson plans. Lastly, reflect on the lesson taught collaboratively.	Out of two teachers, one teacher showed more growth regarding changes in curriculum, transfer of knowledge to the classroom, self-evaluation, reflection, and working towards improvement. Both teachers implemented teaching practices introduced by mentors.
Malanson et al. (2014)	High School (9-12th)	USA, Massachusetts and Ohio; urban and suburban; diverse population	4 teachers (*n* = 3 in treatment); (*n* = 1 in control)	Science	1 biomedical scientist	32 hours (2 months x 4 hours/week)	Asynchronous: email, chat box, forum, text-messaging Synchronous: google chat and Skype Additional support: PD	Mixed Methods: quasi-experimental; qualitative (Note: qualitative analysis for teacher outcomes.)	Analysis of online questionnaires and questioning about lessons during synchronous communication	Teachers receive support before implementation of lessons. Then support during the implementation of the curriculum. Last, reflection stage.	Instructional practices improved due to MFF PD intervention (inquiry-based learning and integration of practices such as YouTube videos and case studies). Fidelity of implementation increased due to access to mentors.

Study	Grade-level(s)	Context	Sample	Content	Mentors	Intervention Time	Medium	Method	Analysis	VMC Description	Key Findings
Vernon-Feagans et al. (2015)	Elementary /Primary School (K-5)	USA, NC, TX, NM, and NE; rural; low socioeconomic status; diverse population	58 teachers (*n* = 14 in control); (*n* = 44 in treatment)	Response to intervention (RTI)	7 coaches, 6 doctoral students with TE and one with TE and experience as a reading specialist	1 year biweekly (20- to 30-minute sessions)	Synchronous: videoconferencing Additional support: PD	Quantitative: randomized control trial	HLM on classroom observations; questionnaire	Observe and provide feedback.	Webcam coaching was significantly associated with the teacher's quality of implementation of TRI. Additionally, teachers' perception of their effectiveness in class was statistically significantly higher across webcam coaching.
Jones et al. (2016)	Middle School (6-8th), High School (9-12th)	USA, FL, MD, VT, NJ, and Teach for America; urban and rural	61 teachers (responded to survey)	Mathematics and science	Experienced STEM teachers and subject specialists with content knowledge serve as coaches.	Time not specified	Asynchronous: chat box and discussion forum	Qualitative	Analysis of survey	Coaches: respond to teacher requests, answer questions, and provide suggestions with resources. Specialists: offer advice regarding classroom management, pedagogy, and subject content.	Surveys demonstrated that teachers improved instructional practices and integrated research-based lessons that included activities, videos, and power points.
Nugent et al. (2016)	All grade-levels (K-12)	USA, Nebraska, and Iowa; rural	124 teachers (*n* = 63 treatment); (*n* = 61 in control)	Science	Mentors characteristic s not specified	6-8 weeks (1-hour sessions, 1-2 sessions a week)	Synchronous: videoconferencing Additional support: PD	Quantitative: randomized control trial	Linear regression of video lessons (used observational instrument), and three surveys	Joint planning, action/practice, class observation, reflection, and feedback	Teachers in the treatment condition had statistically significantly higher results across all teacher outcomes. PD, when supported by coaching, contributed to increase in teachers' professional growth, major contributions were due to PD.

Study	Grade-level(s)	Context	Sample	Content	Mentors	Intervention Time	Medium	Method	Analysis	VMC Description	Key Findings
Richardson (2017)	Elementary/Primary School (K-5)	USA, southwest Missouri; urban	3 teachers (2 teachers, 1 reading interventionist)	Reading and writing	Two layers: 1 coach, mentored all 4 participants. In phase 2, the coach continued coaching campus coach and interventionist. Teachers were then only coached by campus coach.	8 weeks (1-2 hours per week)	Synchronous: videoconferencing Additional support: PD	Qualitative: Case Study	Content analysis of written analysis, teacher-reflections, pre and post-conference notes, and interviews	Teachers and coaches meet before VMC intervention to discuss teacher goals. Then teacher reflects on classroom observation while coach prepares for VMC. Then both meet to reflect on classroom observation.	Three categories: reflective prompting, consultation, and rehearsals, were most influential in decision-making; thus, improving professional capital across teachers.
Carmouche et al. (2018)	Middle School (6-8th)	USA, Southern; metropolitan city	3 teachers	Special education	one, researcher/author	4 weeks (3 sessions, 20 minutes per session)	Synchronous: videoconferencing Additional support: PD	Quantitative: Visual analysis	Analysis of classroom observation, and survey.	Coaching sessions occurred after classroom observations. Coach then provided specific feedback and prompted self-evaluation based on observations and instrument data.	All three teachers increased in Opportunities to Respond (OTR) from baseline to intervention and maintenance of the evidence-based practices after PD and VC. Additionally, teachers commented on their improved practices.

Study	Grade-level(s)	Context	Sample	Content	Mentors	Intervention Time	Medium	Method	Analysis	VMC Description	Key Findings
Gilbert (2018)	Elementary/ Primary School (K-5)	USA; urban	6 teachers treated	Science (e.g., biology, chemistry, physics)	Mention of one coach	3 months (1 month-F2F, 1 month = asynchronous discussions, & 1 month = synchronous discussion)	Synchronous: teleconferencing Asynchronous: email Additional support: PD	Mixed-methods: qualitative (Note: quantitative analysis for teacher outcomes.)	ANOVA on surveys, coaching logs, and classroom observations (used observational instrument)	Observe, assess, provide written feedback, the teacher responds to feedback, then the teacher and coach discuss and devise an action plan.	Mean differences for questioning and facilitation of discourse strategies were higher in online mentoring as opposed to F2F. Teachers did not show statistically significant differences across formats in their questioning and facilitation of discourse strategies in the classroom.
Matsumura et al. (2019)	Elementary/ Primary School (K-5)	Study 1: Mid-Atlantic region, large urban district; Study 2: Mid-Atlantic and Northeastern region	15 teachers (received intervention) Study 1: 7 teachers Study 2: 8 teachers	Reading	experience in coaching and TE	half a year (two coaching cycles approximately one hour and 30 minutes each)	Asynchronous: phone conference, email, discussion forum Additional support: PD	Mixed methods-qualitative	Thematic analysis of interviews Paired-samples *t* test and HLM of classroom observation instruments Descriptive statistics of survey.	Coach and mentee meet to discuss goals and pedagogy aligned with framework. Coach observes video and provides feed- back related to specific practices. The coach then submits a video to teacher with reflective comments and questions. Teacher and coach then meet to discuss and reflect.	Improvements were reported in instructional practices. Significant changes in teachers' implementation of instructional practices (i.e., questioning, accountable talk, and rigor of student contributions) were observed.

Appendix B

VMC Studies: EB Teacher Samples

Study	Grade-level(s)	Context	Sample	Content	Mentors	Intervention Time	Medium	Method	Analysis	VMC Description	Key Findings
Leighton et al. (2018)	Elementary /Primary School (K-5)	Northeast, USA; urban schools; diverse population	one teacher treated	Reading and writing	one university-based literacy coach	14 weeks	Synchronous: videoconferencing Asynchronous: email, text messaging, video-viewing Additional support: PD	Qualitative	Analysis of email exchanges, virtual meetings, text messages, and coaching video observations	Coaching consisted of three phases that allowed the coach and mentee to analyze problems, brainstorm, try-out solutions, then refine these ideas based on classroom interactions.	Overall, increased confidence in instruction delivery. Instructional practices such as explicit talk, questioning, small group discussions, and facilitation from large group to small group debriefing improved.
Tang et al. (2020)	Elementary /Primary School (K-5)	USA, Texas; diverse population	75 teachers (n = 38 in treatment); (n = 37 in control)	Reading and writing	experience in bilingual, science, and extensive TE	1 year, (3 sessions)	Synchronous: videoconferencing Additional support: PD	Mixed methods: randomized control trial; qualitative	t test on classroom observations (used observational instrument) Thematic analysis of focus group session	Mentor virtually observed real-time classroom instruction and provided feedback related to components of intervention.	Teachers in the treatment condition scored significantly higher in various areas (e.g., leveled questioning, ESL strategies concept, affective and cognitive feedback) than teachers in the control condition. A focus group session demonstrated teachers improved implementation of instructional practices.