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ACCEPTANCE

This dissertation, EFFECTS OF PROFESSIONAL DEVELOPMENT AND VIRTUAL TEACHER COACHING WITH VIDEOCONFERENCING ON THE INCREASE OF TEACHER GIVEN OPPORTUNITIES TO RESPOND AND THE ON-TASK BEHAVIOR OF STUDENTS WITH EMOTIONAL BEHAVIOR DISORDERS, by MILLICENT CARMOUCHE, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree, Doctor of Philosophy, in the College of Education and Human Development, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chairperson, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty.

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EFFECTS OF PROFESSIONAL DEVELOPMENT AND VIRTUAL TEACHER COACHING WITH VIDEOCONFERENCING ON THE INCREASE OF TEACHER GIVEN OPPORTUNITIES TO RESPOND AND THE ON-TASK BEHAVIOR OF STUDENTS WITH EMOTIONAL BEHAVIOR DISORDERS

by

Millicent Carmouche

Under the Direction of Nicole Patton Terry, Ph.D.

ABSTRACT

Coaching has been identified as a critical support for persistent use of newly adopted practices and skills (Joyce & Showers, 1982). A systematic review of the literature was conducted to examine the literature base on supervisory coaching, an approach in which an outside expert or supervisor gives specific, positive, and corrective coaching when needed and is offered to the teacher after the completion of the observed lesson in an effort to move the recipient toward a desired level of performance (Joyce & Showers, 1981; 1982; Maeda, 2001; Simonsen, Myers, & DeLuca, 2010). Sixteen quasi-experimental and single-subject studies were identified and reviewed using quality indicators specific to quasi-experimental (Gersten et al., 2005) and single subject (Horner et al., 2005) research. Only six of the sixteen studies met all quality indicators. Mixed results were found across the studies, with six reporting improved teacher results and four

reporting improved student behaviors. The subsequent study explored an alternative means to offering supervisory coaching to teachers: professional development and virtual teacher coaching with videoconferencing. A single-case multiple baseline design was used to investigate the effect the intervention had on the frequency with which teachers offer Opportunities to Respond (OTR) and on the on-task behavior of middle school students with emotional/ behavior disorders (E/BD). OTR is a teacher behavior that petitions a student response (Haydon et al., 2010). After baseline data was collected, virtual coaching sessions were implemented to increase OTR after every other observed session. Results indicated there was a functional relation between virtual teacher coaching with videoconferencing and teacher rates of OTR. However, no functional relation was observed between teachers given OTR and student on-task behavior. Implications for virtual teacher coaching, OTR, and future research are discussed.

INDEX WORDS: Virtual teacher coaching, Videoconferencing, Professional development, Emotional/behavior disorders, and Opportunities to respond

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by

Millicent Carmouche

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Education of Students with Exceptionalities

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in

the College of Education and Human Development

Georgia State University

Atlanta, GA
2015

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DEDICATION

This dissertation is dedicated to Elmo Leon Carmouche, Jr, an imperfect man who made a perfect impression on my life. I know you are in heaven crying tears of joy and telling every-one that I am the first Carmouche to earn a PhD. I love and miss you Daddy and I pray that you are proud of me now and always!

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SUPERVISORY TEACHER COACHING IN K-12 CLASSROOMS

In recent years, the push for increased rigor and accountability in kindergarten through twelfth grade (k-12) classrooms has been at the forefront of national, state, and local legislators' educational agendas (National Statistics for Education Statistics, 2007). As legislators and instructional reformers lead the charge to change what children learn and how they learn it, classroom teachers are responsible for the implementation of these changes. In addition to daily classroom responsibilities that include instruction, assessment, classroom management, and differentiation for a variety of learners, teachers are also expected to continue their own learning (Darling-Hammond, 2014). While teachers are expected to be lifelong learners (Merriam, Caffarella, Baumgertner, 2012), their development as professionals must be effective and meaningful. In-service teachers rely overwhelmingly on professional development to learn new evidence-based techniques to implement in the classroom (Desimone, Porter, Garet, Yoon & Birman, 2002). With continual professional development, as well as daily classroom responsibilities, teachers may need additional supports to reinforce professional learning (Gregory, Allen, Mikami, Hafen & Pianta, 2014).

What is Professional Development?

Hargreaves (2014) defines *professional development* (PD) as the "experiences that take place within a collaborative culture of shared leadership, that increase educators' knowledge about content and pedagogy and enable them to use that knowledge to improve classroom and school practices that improve student learning" (p. 44). This definition describes the importance

of the professional growth of the teacher as an individual, but also takes into account the need for teachers to learn as a community and the impact PD has on the entire school community.

Researchers have suggested that traditional PD generally consists of three activities: (1) within district workshops, (2) courses for college credit, and (3) out-of-district workshops (Desimone et al., 2002). These activities are conventionally comprised of one-time workshops, in which teachers are inactive consumers of knowledge, with little to no follow-up (Loucks-Horsley, 1998, Putnam & Borko, 2000).

Garet and colleagues (2001) surveyed 1027 teachers in 358 school districts. Teachers were asked to compare recent PD opportunities they had attended as grantees of the Eisenhower Professional Development Program over four semesters. Teachers reported that short term "sit and get" PD delivered by outside experts with little connection to the reality of the classroom did not have the same positive effects as long term hands-on PD. They reported that short term PD rarely translated into actual and prolonged implementation in the classroom.

What Makes Professional Development Effective?

School administrators and PD providers must plan and implement effective PD that engages and encourages teachers and improves the instruction students receive (Billingsley, 2005). What constitutes effective PD has been discussed comprehensively in the literature (Birman, Desimone, Porter & Garet, 2000; Borko, 2004; Leko & Brownell, 2009). Some general principles of effective PD have been suggested over the years. First, in a report to US Department of Education, Yoon and colleagues (2007) recommended that effective PD be coherent and aligned

with teachers' objectives and needs in the classroom (Klingner, 2004; Penuel, Fishman, Yamaguchi, & Gallegher, 2007; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). Effective PD efforts help teachers align the content standards that they are responsible for teaching with the practical delivery and implications of classroom implementation.

Second, effective PD should be content focused. Desimone and colleagues (2002) conducted a longitudinal survey study, over 3 years, of 207 teachers in 30 schools. Teachers reported that PD focused on specific instructional practices increased their use of that instructional practice. Participant responses to the surveys also indicated that, in creating content focused PD, it is important to carefully blend theory, content area knowledge, understanding of students as learners, and general pedagogical skills. These elements help ensure that teachers not only understand the content, but also are able to properly implement content area knowledge that connects to student needs. In a mixed method case study, Vavasseur and MacGregor (2008) investigated how the professional development of middle school teachers was facilitated through their participation in content-focused online communities of practice. Results indicated that, in this content-focused context, teachers gained curriculum-based knowledge, developed enhanced self-efficacy with respect to implementing technology, and collaborated on the development of interdisciplinary curriculum units.

Third, effective PD includes monitoring of student gains. Faulkner and Cain (2013) conducted a 5-day professional development module to improve teachers' math knowledge and understanding of number sense. Using a quasi-experimental design, they investigated if the students

enrolled in the trained teachers' classrooms improved in mathematics content performance. Significant changes in student performance were not found, which was attributed to teachers not continuously monitoring student achievement and student responses. Because this may be difficult while also learning new instructional material or interventions, an element of effective PD may be to provide teachers with tools to monitor gains in student achievement (Yoon, Duncan, Lee, & Shapley, 2008).

Fourth, it is suggested that effective PD is active. Researchers suggest that teachers be actively engaged in learning new instructional practices, preferably in actual classroom settings (Dagan & Bean, 2014; Desimone et al., 2002; McCutchen et al., 2002). Browder and colleagues (2012) developed an interactive PD on alternate achievement standards for 193 teachers of students with severe disabilities. Results of this quasi-experimental study indicated that teachers improved in aligning standards and generalizing the training to other content areas. It is suggested that teachers receiving PD obtain tangible images and demonstrations on how to apply new instructional strategies in the classroom (Bryant, Linan-Thonpson, Ugel, Hamff, & Hogan, 2001).

Finally, effective PD can be collaborative in nature (Brock & Carter, 2013; Garet et al., 2001; Penuel et al., 2007). Teachers may benefit from continuous feedback, opportunities to observe, and coaching inside the classroom when implementing new materials (Billingsley, 2005; Brownell, Ross, Colon, & McCallum 2005; Neufeld & Roper, 2003). Researchers have suggested that during and after PD, teachers and school personnel should work together to share ideas,

discuss problems that may arise, discuss student response to new material, and share instructional resources needed for proper implementation (Wayne, Yoon, Zhu, Cronen, & Garet, 2008).

Reform PD

These elements of effective PD move the field away from more traditional types of PD toward what has been referred to as *reform PD* (Darling-Hammond & McLaughlin, 1995). Penuel and colleagues (2007) conducted a survey of 454 teachers involved in an inquiry science program to examine the effects of different characteristics of PD. This study points to the significance of teachers' perceptions about how coherent their professional development experiences were for teacher learning and program implementation. Teachers reported that the following aspects of reform PD increased their contact with the content being acquired: (1) teacher study groups, (2) teacher networks or communities, (3) mentoring or coaching, (4) internships, and (5) resource centers. It has been suggested that reform PD is more effective than traditional PD because it requires that teachers take time to explore new theories and strategies, introduced briefly, to improve classroom practice. According to Hargreaves (2014), of the reform-oriented PD elements, teacher coaching is the most widely used and has been mentioned in professional literature as an effective means to encourage necessary follow-up and on-going discussion about professional learning.

Coaching. Defined as the study and teaching of theory, the observation of demonstrations, and opportunities for feedback given by a peer, mentor, supervisor, or PD provider (Showers, 1982), coaching is a critical support for persistent use of newly adopted practices (Joyce &

Showers, 1982). According to Fixsen and colleagues (2005), coaching is a core component of effective program implementation because newly acquired behavior is (a) rudimentary when compared to routine of a more experienced practitioner, (b) delicate and needs to be reinforced for consumers in a natural setting, and (c) imperfect and will need to be formed to be most functional in a natural setting. The form coaching takes differs in the literature, but it is likely to include some combination of the following components: planning, teaching, modeling, practicing new skills, direct supervision of implementation of target practices in the classroom, and feedback (Fixsen et al., 2005; Stormont & Reinke, 2012). A growing body of research substantiates the positive effects coaching can have on both teacher behavior and student outcomes. For example, Bradshaw and colleagues (2008) conducted a quasi-experimental study on using PD and coaching to implement school-wide positive behavior intervention supports (SWPBIS). Twenty-one schools received training, and 16 schools did not. The schools receiving PD and coaching showed significant gains in SWPBIS implementation as compared to the control group.

Supervisory Teacher Coaching. An outside expert or supervisor who gives specific, positive, and corrective coaching when needed provides supervisory teacher coaching. This type of coaching can be offered to the teacher after the completion of the observed lesson or in an effort to move the recipient toward a desired level of performance (Joyce & Showers, 1981; 1982; Maeda, 2001; Simonsen, Myers, & DeLuca, 2010). Supervisory teacher coaching offers a supportive means for teachers to implement new learning and improve fidelity over time (Joyce & Showers, 1982; Miller, Harris, &Watanabe, 1991; Shidler, 2009; Showers 1985). Supervisory

coaching offers an extension of PD from an expert or supervisor that offers an in-depth study of the theory behind the skill being coached, observations of demonstrations, and continuous practice with timely feedback.

Supervisory teacher coaching as a reform PD activity has a growing evidence base; however, the relationship between supervisory coaching and positive teacher behaviors remains unclear. That is, in some studies, supervisory coaching results in significant change in teacher behavior, while in other studies no significant effects are observed. Moreover, the quality of these studies is inconsistent, with some designed according to standards for conducting impactful, high-quality research and others only meeting some of those standards. Therefore, the purpose of this systematic review of the literature is to answer the following questions:

1. What studies can be identified as implementing supervisory coaching?
2. Among these studies, what are the characteristics and components of supervisory teacher coaching that lead to successful teacher and student outcomes?
3. What is the quality of the existing literature on supervisory teacher coaching?

Method

Search and Selection Process

A search was conducted using the following EBSCO databases: Academic Search Complete, Education Full Text, Professional Development Collection, PsycARTICLES, PsycEXTRA, Psychology and Behavioral Sciences Collection, PsycINFO, and Sociological Collection. An additional search was conducted using ProQuest and Google Scholar. The search terms used

included the following: *special education and teacher coaching and k-12 education and teacher coaching* or *supervisory coaching* or *in vivo coaching* and *professional development* or *staff development* or *teacher training* or *in-service* and *teacher* or *practitioner* or *educator* or *instructor.*

To be included in this systematic review of literature, studies had to meet six inclusionary criteria: (a) conducted with special or general education teachers; (b) conducted with teachers of k-12 students; (c) utilized a supervisory coaching model as the independent variable in the study; (d) published in a peer reviewed journal; (e) use of experimental or quasi-experimental research design to show a causal relationship between supervisory teacher coaching and teacher behavior; (f) conducted in the United States. As a result of these requirements, articles containing the following were excluded: (a) teachers certified in bilingual education subjects only; (b) settings in preschool classrooms; (c) utilization of peer coaching models; (d) use of qualitative methods; and (e) studies conducted in classrooms outside the United States. An ancestral search was conducted on all articles that met criteria. The search originally rendered 277 articles, 16 of which met criteria for inclusion (see Table 1).

Quality Indicators

Intervention research sets out to establish that the desired change in participants' behavior was caused by the intervention and not because of any other reasonable explanation. To assess the quality of experimental and quasi-experimental, Gersten and colleagues (2005) set forth a set of quality standards. Gersten et al. provided 10 quality indicators within four domains for evaluating experimental and quasi-experimental research (see Table 2). The six experimental and quasi-experimental design studies were coded using Gersten et al.'s (2005) standards and the following guiding questions:

1. *Participants and Settings* addresses three questions: (a) are participant difficulties or disabilities described sufficiently?; (b) are relevant characteristics comparable across conditions?; and (c) are characteristics of interventionist/teachers described sufficiently, and are they comparable across conditions?
2. *Implementation of Intervention and Description of Comparison Conditions* addresses three questions: (a) are interventions clearly and specifically described?; (b) is fidelity of implementation described and assessed?; and (c) are comparison conditions described?
3. *Outcome Measures* addresses two questions: (a) are multiple measures closely aligned with intervention?; and (b) are outcomes for capturing the intervention's effect measured at appropriate times?

4. *Data Analysis* addresses two questions: (a) are techniques linked to research questions?; and (b) did the research report include inferential statistics and effect size calculations?

To systematically assess the quality of single-subject research, Horner and colleagues (2005) provided 18 quality indicators within seven domains for evaluating single-subject studies (see Table 3). The ten single case design studies were coded using Horner et al.'s (2005) standards and the following guiding questions:

1. *Participants and Setting* addresses three questions: (a) are the participants described sufficiently to be replicated by the reader?; (b) is the selection of participants described sufficiently to be replicated by the reader?; and (c) is the setting of the study described sufficiently to be replicated by the reader?
2. *Dependent Variable* addresses five questions: (a) was it described well enough to be replicated?; (b) was it observable?; (c) how it was measured?; (d) how often it was measured?; and (e) was inter-observer reliability reported, and did it meet minimum levels of acceptability (e.g. IOA= 80%)?
3. *Independent Variable* addresses three questions: (a) was it described sufficiently enough to be replicated?; (b) was it systematically manipulated?; and (c) was procedural fidelity described and measured?

4. *Baseline* addresses two questions: (a) was the condition of baseline described sufficiently as to be replicated by the reader?; and (b) was evidence provided regarding baseline patterns and trends?
5. *Experimental Control/Internal Validity* addresses three questions: (a) were there three demonstrations of experimental effect?; (b) did the design control for threats to internal validity?; and (c) did the results indicate a pattern that demonstrated experimental control, as judged by visual analysis?

Procedures

Studies chosen to be included in this review of the literature were evaluated to identify student and teacher participants, settings, dependent variables, independent variables, design, and results. To analyze the chosen studies, each domain was rated *Yes* if all quality indicators were present. If one quality indicator was not present in a domain, that domain was rated *No.* In addition, the quality indicator that dealt with procedural fidelity only received a *Yes* rating if fidelity had been collected on the actual coaching procedures. Finally, studies were analyzed for components of coaching procedures commonly identified in the literature: (a) modeling, (b) prior training, (c) pre-observation meeting, (d) e-mail feedback, (e) handwritten feedback, (f) face-to-face feedback, and (g) teacher goal setting.

Reliability was coded for the evaluation of the quality of the articles after the literature review was completed. An independent coder was trained on the established inclusion criteria and search methods, including a mock search to agree on search terms and criteria. Researcher and

independent coder reached 100% agreement during training. Then, the independent coder read all chosen articles and reviewed them for basic evaluation criteria, quality indicators and components of coaching procedures. All total, 588 items were coded. Each research question was coded: research evaluation (n = 112), coaching components (n = 112), and quasi-experimental (n = 84) and single case (n = 280) quality indicators.

The formula for calculating reliability involved dividing the number of agreements by the sum of agreements and disagreements and multiplying by 100. Reliability agreement was 100% for the total number of articles. Reliability on the research evaluation reached 90.1%. Reliability on the information coded for the quasi-experimental studies was 98.8%. Reliability on single case studies was 97.5%, and the reliability on coaching components evaluated was 97.3%.

Results

Supervisory Coaching Study Evaluation

A total of 485 teacher participants were included in the studies that met the criteria for this review of literature. Of those teachers, 11 (3%) were teachers in gifted/honors classrooms, 76 (15%) were classified as in-service special education teachers, 292 (60%) were general education teachers, and 106 (22%) were dually certified as general education and English language learner (ELL) teachers. One teacher was a preschool teacher who did not meet inclusion criteria; therefore, that teacher's data were not included in the analyses. The teachers included in these studies taught students in a variety of settings. While 75% of the studies were conducted in an elementary classroom, studies also were conducted in alternative schools (17.65%), middle

schools (23.5%), and high schools (17.65%). The majority of the studies (56.25%) included in this review were conducted in a general education classroom; 37.5% of studies were conducted in a self-contained special education classroom; and 6.25% of studies were conducted in an inclusion classroom.

Over 56% of the studies discussed in this review of literature used teacher praise as a teacher participant dependent variable. That is, a coaching intervention was used to increase the use of teacher praise. Of the remaining studies, 31.25% (n = 5) measured the teachers' fidelity of implementation of the function-based intervention; fidelity was maintained after the coaching intervention was removed for two weeks. Kretlow et al. (2011; 2012) observed an increase in accuracy of delivery of academic tasks, i.e., math problem solving, use of response cards, by teachers with the introduction of teacher coaching. An immediate increase in desired academic tasks was observed in both studies with the onset of supervisory coaching. The improved fidelity of implementation of an established behavior plan was measured in Codding and colleagues (2005). Teachers received a coaching intervention, and with the onset of intervention, fidelity of implementation improved and was maintained even after the end of the intervention phase.

In this review, supervisory teacher coaching was used as a stand-alone intervention in 23.5% of the studies. The remaining studies offer supervisory coaching along with PD. Of the studies reviewed, general education teachers displayed relatively positive results with some change in teacher behaviors after the introduction of supervisory coaching. Although studies focusing on special education classrooms also displayed positive results, special education teachers

represented only small number of participants (Gregory et al., 2013; Kretlow et al., 2011; Kretlow et al., 2012; Matsumara et al., 2012, Podhajski et al., 2009; Rienke et al., 2014, Sailors & Price, 2015; Thompson et al., 2012).

Components of Coaching

Fidelity of implementation on the coaching procedure was examined, as well as the description of components of supervisory coaching, in each study (see Table 4). Fidelity of implementation was collected on coaching procedures in only 50% of examined studies. Face–to-face feedback was offered in 94% of studies. Components offered along with face-to-face coaching included email feedback (12%) and face-to-face coaching offered via web (12%). Of the studies reviewed, only two studies explored the option of using widely available web-based technologies. Ruble et al. (2013) compared web-based coaching to face-to-face coaching with similar gains in positive teacher behaviors, compared to the placebo group that received no coaching. Gregory et al. (2013) showed a modest increase in student engagement with the use of the "My Teaching Partner" web-based program in secondary classrooms. Training was offered to participants in 81% of studies, while modeling and pre-observation meetings were offered in 50% of studies. Handwritten feedback was offered in 44% of studies, while teacher goal setting was utilized in only 31% of studies. Location of coaching was discussed in 31%, and time spent coaching, or dosage, was mentioned in 37.5% of reviewed studies.

Evaluation of Research Quality

Of the six experimental or group design studies, two (Ruble et al., 2009; Sailors & Price, 2015) met all four quality indicator domains for group design studies. The remaining group design studies failed to describe or report the collection of treatment fidelity, therefore not meeting one domain of quality indicators.

Of the ten single case design studies, only four (Bethune & Wood, 2013; Duchaine et al., 2011; Kretlow et al., 2012; Kretlow et al., 2011) met all quality indicator domains and 3 of the 4 studies measured the fidelity of implementation of a specific academic task. The remaining single case studies failed to meet indicators in the dependent variable, independent variable, baseline, internal validity, and social validity domains. Although the studies did meet most of the domains, each domain and sub-domain had to have been met (*Yes*) for the study to meet all quality indicators.

Of the single case studies, Marten et al. (1997) utilized a multiple baseline design with only two cases as opposed to the three cases suggested by What Works Clearinghouse (Kratochwill et al. (2010), therefore not meeting requirements for internal validity quality indicators. Sutherland and colleagues (2000) used a withdrawal (ABAB) single case design to measure an intervention that is seemingly not reversible. Sutherland collected baseline data, introduced coaching, and withdrew the coaching intervention. Kazdin (2011) would suggest that the participant could not withdraw information that has been learned. The remaining single case studies failed to meet indicators in the dependent variable, independent variable, baseline, internal valid-

ity, and social validity domains. Single case studies also did not meet indicators in the dependent variable, independent variable, baseline, internal validity, and social validity domains (Codding et al., 2005; Martens et al., 1997; Miller et al., 1991; Simonsen et al., 2010; Sutherland et al., 2000; Thompson et al., 2012).

Discussion

The purpose of this systematic review of the literature was to examine the literature that tested the effects of supervisory teacher coaching with K-12 classroom teachers. Results of this literature review suggest that supervisory teacher coaching may be a promising strategy to change classroom teacher behaviors. The results have been mixed. In general, supervisory teacher coaching increased desired behaviors in classroom teachers; however, the behavior was not always maintained nor was maintenance always measured. Duchaine and colleagues displayed mixed results among teachers with the maintenance of behavior specific praise statements. A majority of studies included in this review did not collect maintenance data at all (Gregory et al.,2014; Kretlow et al., 2012; 2011; Martens et al., 1997; Matsumara et al., 2010; Podhajski et al., 2009; Reinke et al., 2014; Ruble et al., 2013; Sailors et al., 2015; Simonsen et al., 2010; Sutherland et al., 2000; Thompson et al., 2012) therefore it is not possible to know for sure if the teachers effectively maintained the strategy introduced by the coach. Student data were also mixed. In studies where student data were collected, they did not always show completely positive results. Where student data were collected students often made small gains or gains that were not maintained without the intervention. The included studies seem to assert that

supervisory teacher coaching has a more positive effect on teacher outcomes than student outcomes.

Over half of the studies reviewed concentrated on coaching to increase teacher praise. In each study, teacher praise increased with the support of the coaching intervention. In addition to teacher praise, one study found an increase in the use of higher level questioning and a decrease in general, nonspecific praise. Although supervisory coaching did not have the same positive outcomes on teacher-specific behaviors as it did on students' academic performance, it is important to note that the teacher-specific behaviors are of interest in these studies. Studies that focused on academic outcomes showed gains in student performance and teacher implementation of the specific academic task.

Another important finding from the review was that several specific components of supervisory coaching are often not described in the literature. These components are necessary to evaluate the effectiveness of a coaching package and to replicate implementation of the intervention. It is also an important factor in informing future research in coaching and creating a solid evidence base for the field. Details such as location and dosage of coaching could have a substantial impact on the outcome.

Finally, when standards for high quality research were applied to the reviewed studies, the results indicated that quality was highest in both single case and quasi-experimental design studies where teachers received coaching to improve the fidelity of implementation of specific academic tasks (e.g., reading comprehension, calendar math), as compared to when it was intro-

duced to change teacher-specific behaviors (e.g., praise statements, opportunities to respond). Not only did studies concentrating on specific academic tasks meet more quality indicators (Gersten et al., 2005; Horner et al., 2005), they also demonstrated more immediate and sustained positive outcomes (Bethune & Wood, 2013; Kretlow et al., 2011; Kretlow et al., 2012).

The discrepancy in the adherence to quality indicators could be connected to the fact that it may be easier to measure data on a specific academic task as opposed to teacher-specific behaviors where guidelines may not be as clear as in specific academic tasks. Of the majority of studies that offered face to face coaching, only Bethune and Wood, 2013; Duchaine et al., 2011; Kretlow et al., 2012; Kretlow et al., 2011; Sailors & Price, 2015; Ruble et al, 2009 met all quality indicators.

Implications for Future Research

This systematic review of the literature revealed gaps in the teacher coaching literature that should be addressed in future research. First, all studies included in this review were conducted using university researchers or coaches trained by university researchers to implement the intervention. Future research could explore the effectiveness of school personnel providing the coaching (e.g., academic coaches, school psychologists, administrators). Further investigation would be necessary to determine whether the supervisory teacher coaching interventions would generalize with k-12 classroom teachers using school personnel as the coach of record.

Second, follow-up or maintenance data may be collected to add information to the literature base on the sustainability of the evidence based practice that the teacher was coached to use.

Collecting follow-up data is important in these investigations, as it provides information on the extent that continuous use of teacher coaching is needed. Third, it is suggested that future researchers ensure that quality indicators are adhered to in an effort to increase the output of quality research that is replicable and reliable. For researchers interested in delving into the effects of specific teacher behaviors, such as specific praise or opportunities to respond, it is recommended that researchers maintain strict standards and that those standards be properly and thoroughly explained to ensure valuable research based on proposed quality indicators.

Fourth, in planning and carrying out coaching studies, it is recommended that components of the coaching package being used (e.g. coaching dosage, location of coaching) are carefully described. The components need to be described not only to increase the likelihood of accurate replication but also to ensure that researchers can identify which components have the greatest effect on the intervention outcome. Fidelity of implementation also should be collected to ensure that the coaching procedure is implemented as described.

Fifth, it is suggested that future researchers work to expand research into special education and secondary classrooms. The number of special education teachers and students included in published coaching studies is very low compared to the larger number of general education teachers and students. Moreover, of the special education classrooms included in this review, the majority of study participants were teachers in self-contained classrooms with students who have severe disabilities. Teachers of students with high-incidence disabilities and in collaboratively taught classrooms only represented a small number of included studies. Another disparity in

population was the very low number of secondary classrooms included. Teachers in secondary classrooms could benefit from supervisory coaching on newly acquired academic tasks learned in PD and on implementing behavioral interventions for students who display challenging behaviors. Going forward, researchers may concentrate on those populations and classroom settings, which may support both generalizability and impact of this approach to coaching.

Finally, researchers should continue to explore the viability of technology-based coaching for teachers in k-12 classrooms. As technology continues to be more immersed in aspects of daily life, researchers should explore the option of offering PD and follow-up coaching via technology. Using technology to train teachers may not only be a cost effective option; it also may offer flexibility for the coach and teacher.

Conclusion

This review revealed that desirable teacher behaviors can improve with the use of supervisory teacher coaching in several settings. This review indicated that supervisory teacher coaching might be a practical strategy for improving and increasing teachers' use of evidence-based strategies. While the studies included in this review displayed some positive change in teacher behavior, it is not possible to say conclusively that the supervisory teacher coaching intervention will have a long term positive impact on teacher behaviors without additional research.

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Table 1

Overview of Supervisory Teacher Coaching Studies

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
Bethune & Wood, (2013)	3 special education teachers, 4yrs exp M, 3yrs exp, 15yrs exp, 2 female, 1 male, SpEd Cert, Did not report age	4 Students w/ moderate to severe disabilities w/challenging BX, 1-DS – 8 yo, 1- SevAutism – 5yo, 1 – autism-10yo	Elementary school self-contained	Percent accuracy of teacher implementation of function based intervention -Measure of the students problem behavior - Measure of the students replacement behavior	Researcher implemented side by side coaching	Delayed MB across participants design for teachers, MB across participants design for students	Teacher implementation function based interventions improved. Student problem behavior decreased with FBI and coaching. Replacement bx results varied.

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
Codding et al. (2005)	5 special education teachers, Experience ranged from, 6-30 months, Bachelor's degrees, SpEd Cert, Did not report age	3 students with non-traumatic brain injury, -2 with TBI, Ages 10-19	Private school for students with brain injuries ages 10-19	Integrity of steps of behavior plan implemented as written.	Face to face Performance feedback	Concurrent MB across teacher-student dyads	Increase with all 5 teacher-student dyads on proper implementation of antecedent and consequence components. The results varied; all of the teachers did not respond to the entire intervention.
Duchaine et al. (2011)	1 sp ed, -MA degree 2 gen ed – 1 BA 1 MA	Random sample of students with and	High School Inclusion math	Teacher Praise, On-task BX	Written performance feedback	Multiple Baseline across teachers	Increase in Praise. Inconclusive w/ on-task

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
		w/out disabilities			with training		BX; Maintenance showed return to baseline BX.
Gregory et al. (2013)	87 teachers in 12 schools	n/a	61% middle school general ed 39% high school	student engagement	My Teaching Partner - Secondary	Randomized control trial	Although, modest increase in student bx engagement. Results were mixed; the Emotional Support domain of the CLASS-S the intervention did not result in a major shift

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
Kretlow et al. (2012)	3 1st grade teachers	28-30 students per class 84-90 students total	Elementary school 1st grade classroom	Accuracy in implementation of trained calendar math and an untrained math practice	Professional Development and coaching	Multiple baseline across teachers	Mean instructional accuracy increased post in-service and again post coaching. No student data collected
Kretlow et al. (2011)	3 kindergarten teachers	n/a	Elementary school kindergarten classroom	Accuracy in group instructional units	Professional Development and coaching	multiple baseline	Mean instructional accuracy increased post in-service and again post coaching. No causal relation in-service training was sim-

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
							ultaneous.
Martens et al. (1997)	1 special education teacher, Female, SpEd Cert, Did not report age or degree	2 boys w/ ED, 6 yrs old	Self-contained elementary classroom	Combined appropriate BX (school-work, attending to instruction, responding aloud)	Goal setting plus written feedback	Multiple baseline across students design	Appropriate BX increased immediately and remained stable with intervention. Study does not meet evidence based practice standards
Matsumara et al. (2010)	177 4th and 5th grade teachers (79 left) - 2nd year 171(73 added) 4th and 5th grade teachers	1269 student standardized student test scores	32 Elementary schools	state standardized test for English language learners	Content focused coaching	HLM analyses	CFC program predicted significantly higher school level gains on the state standardized

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
							test for English language learners. Only half the intended teachers participated in the study.
Miller et al. (1991)	6 special education teachers , 2 M, 4 B, SpEd Cert, Did not report age or sex	N/A	Elementary, Middle & High summer school for low achievers	Effective and ineffective teacher BX	Florida Performance Measurement System (coaching form)	Multiple baseline across teachers	Effective teacher BX increased while ineffective practices remained low. Results were mixed, after coaching, neither teacher in

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
							team 3 demonstrated improve-ments in teaching be-haviors. No Student data collected.
Podhajski et al. (2009)	Experi-mental group 4 1st and 2nd grade teach-ers Control group 3 1st and 2nd grade teach-ers	Experi-mental - 33 1st grd 20 2nd grade students - 3 504 3 IEPs Control - 14 1st grd, 22 2nd grd - 1 504, 1 IEP	Public school 1st and 2nd grade class-rooms	scientifical-ly based reading in-struction	TIME for teachers profession-al devel-opment plus coach-ing	Ran-domized control trial	Teacher growth on teacher knowledge and student growth in student measures. Mixed re-sults; TOW-RE Sight Word Effi-

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
							ciency showed no growth pre-test to post-test.
Reinke et al. (2014)	68 teachers 34 teachers received coaching	1,148 total students	Grades k-3 grades	Teacher rep-rimands, teacher use of general and specific praise	Coaching using uni-versal classroom manage-ment pro-gram	quasi-experi-mental	Decrease in teacher rep-rimands. Although low, increase in teacher general and specific praise
Ruble et al. (2013)	49 special education teachers, 1 male , 48 female,	49 students with Autism (1 per teacher) ag-	Elementary, one to one work on IEP goals	IEP goals as measured with PET-GAS tool	COMPASS coaching tool	Ran-domized control trial	COMPASS tool im-proves IEP goal out-

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
	SpEd Cert, 22 – B 45%, 23 – M 47%, 4 – DNI 8%, Did not report age	es 3-9 years old					comes for students with Autism than the placebo group. Unable to detect differences in web group versus face-to-face group.
Sailors & Price (2015)	120 teacher - 50 control - 70 treatment - grades 2(16%), 3(12%), 4(13%), 5(15%), 6(17%),	1496 student participants	3 school districts in Texas 2-8th grade classrooms	comprehension instruction	workshops plus SIPIC (Support for the Improvement of Practices through Intensive Coaching)	quasi-experimental - pre/post test	Coached teachers improved comprehension instruction. Also, SIPIC model of coaching improved the

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
	7(15%), 8(12%)				coaching model		practices of reading teachers and increased the student achievement.
Simonsen et al. (2010)	3 special education teachers , 2 female, 1 male, SpEd Cert, M 16yr exp, 13 yr exp, M 13 yrs exp, Did not report age	N/A	Self-contained classrooms alt setting	Prompts, OTRs and SP	PORT training and feed-back	Multiple baseline across DV	Training alone did not increase praise or OTR. Feed-back increased praise & OTR.

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
Sutherland et al. (2000)	1 special education teacher – male Did not report age or degree	9 students with E/BD, 2 girls, 7 boys, ages 10-11, 6 Black, 3 White	5th grade self-contained classroom	Non-behavior specific praise - Behavior specific praise -On-task behavior	Observation and verbal feedback	ABAB withdrawal design	NBSP and BSP increased with observer feedback. On-task BX improved with the increase of NBSP & BSP. No student data collected; replication during academic instruction is needed to determine on-task behavior of students.

Citation	**Teacher Participant**	**Student Participant**	**Setting**	**DV**	**IV**	**Design**	**Results**
Thompson et al. (2012)	3 Female teachers between ages 40-50	3 students ages 8,10&11 displayed non-compliant/disruptive bx	3 public elementary schools	Teacher BSP - Student On-Task	Training, Video Self-Monitoring, Coaching	Mulitple Probe Multiple Baseline	Increase BSP by teachers' on-task bx increased. After tier the faculty training, results show that the participants' BSP did not increase as intended. Also, one participant did not attend scheduled coaching sessions, due to absence.

Table 2

Quality Indicators of Group Experimental and Quasi-Experimental Research Design

	Gregory et al. (2013)	Matsumara et al.(2010)	Reinke et al. (2014)	Ruble et al. (2013)	Podhajski et al. (2009)	Sailors & Price (2015)
Participants	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Sufficient info provided to determine disability/difficulties	N/A	Yes	Yes	Yes	Yes	Yes
Relevant characteristics comparable across conditions	Yes	Yes	Yes	Yes	Yes	Yes
Sufficient info characterizing interventionist/teachers. Comparable across conditions.	Yes	Yes	Yes	Yes	Yes	Yes
Implementation of Intervention and Description of Comparison Conditions	**No**	**No**	**No**	**Yes**	**No**	**Yes**
Intervention clearly described and specific	Yes	Yes	Yes	Yes	Yes	Yes
Fidelity of implementation described	No	No	No	Yes	No	Yes

	Gregory et al. (2013)	Matsumara et al.(2010)	Reinke et al. (2014)	Ruble et al. (2013)	Podhajski et al. (2009)	Sailors & Price (2015)
and assessed (coaching)						
Comparison condition described	Yes	Yes	Yes	Yes	Yes	Yes
Outcome Measures	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Multiple measures closely aligned with intervention	Yes	Yes	Yes	Yes	Yes	Yes
Outcomes for capturing the intervention's effect measured at appropriate times	Yes	Yes	Yes	Yes	Yes	Yes
Data Analysis	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Analysis techniques linked to research questions	Yes	Yes	Yes	Yes	Yes	Yes
Did the research report include inferential statistics and effect size calculations	Yes	Yes	Yes	Yes	Yes	Yes

Gersten, R., Fuchs, L. S., Compton, D., Coyne, M., Greenwood, C., & Innocenti, M. S. (2005). Quality indicators for group experimental and quasi-experimental research in special education. *Exceptional Children, 71*, 149-164.

Table 3

Quality Indicators of Single Subject Design

	Bethune & Wood (2013)	Cod-ding, et al. (2005)	Duchaine et al. (2011)	Kretlow et al. (2012)	Kretlow et al. (2011)	Marten-set al. (1997)	Miller et al. (1991)	Simon-senet al. (2010)	Suther-landet al. (2000)	Thomp-sonet al. (2012)
Participants	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Replicable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sufficient de-scription of participants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sufficient de-scription of setting	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dependent Variable	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**No**	**No**	**Yes**	**Yes**	**Yes**
DV replicable	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Quantifiable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Measurement valid and rep-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Bethune & Wood (2013)	Cod-ding, et al. (2005)	Duchaine et al. (2011)	Kretlow et al. (2012)	Kretlow et al. (2011)	Marten-set al. (1997)	Miller et al. (1991)	Simon-senet al. (2010)	Suther-landet al. (2000)	Thomp-sonet al. (2012)
licable										
Measurement repeated	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IOA reported	Yes	No	Yes	Yes	Yes	No	No	No	Yes	Yes
Independent Variable	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**	**Yes**	**Yes**
IV replicable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Systematically manipulated	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Procedural fi-delity meas-ured and de-scribed	Yes	No	Yes	Yes	Yes	No	No	No	Yes	Yes
Baseline	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**	**Yes**	**Yes**	**No**
Conditions replicable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Bethune & Wood (2013)	Cod-ding, et al. (2005)	Duchaine et al. (2011)	Kretlow et al. (2012)	Kretlow et al. (2011)	Marten-set al. (1997)	Miller et al. (1991)	Simon-senet al. (2010)	Suther-landet al. (2000)	Thomp-sonet al. (2012)
Baseline pat-tern prior to intervention	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No
Experimental con-trol/internal validity	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**	**Yes**	**No**	**Yes**
3 demonstra-tions of effect	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Design con-trolled threats to internal va-lidity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Visual analysis	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes
External Va-lidity	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**
Replicated	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

	Bethune & Wood (2013)	Cod-ding, et al. (2005)	Duchaine et al. (2011)	Kretlow et al. (2012)	Kretlow et al. (2011)	Marten-set al. (1997)	Miller et al. (1991)	Simon-senet al. (2010)	Suther-landet al. (2000)	Thomp-sonet al. (2012)
across partici-pants										
Social validity	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**	**Yes**
DV socially important	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Change in DV due to inter-vention	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes
IV cost effec-tive	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IV implement-ed over time	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evi-dence-based practice in special education. *Exceptional Children, 71*, 165-179.

Table 4

Coaching Components

	Modeling	**Prior training**	**Pre-observation**	**E-mail Feed-back**	**Hand written Feedback**	**Face to Face Feedback**	**Teacher Goal Setting**	**Location of coaching**
Bethune & Wood (2013)	Yes	Yes	Yes	No	No	Yes	No	Classroom
Codding et al. (2005)	Yes	Yes	No	No	Yes	Yes	No	Outside Class-room
Duchaine et al. (2011)	Yes	Yes	Yes	No	Yes	Yes	Yes	Not Mentioned
Gregory et al. (2013)	No	Yes	No	No	Yes	No	No	Web/Telephone
Kretlow et al. (2012)	Yes	Yes	Yes	No	No	Yes	No	Not Mentioned
Kretlow et al. (2011)	Yes	Yes	Yes	No	No	Yes	No	Not Mentioned
Martens et al. (1997)	No	No	Yes	No	Yes	Yes	Yes	Not Mentioned
Matsumara et al.(2010)	Yes	Yes	No	No	No	Yes	No	Not Mentioned
Miller et al. (1991)	No	No	No	No	Yes	Yes	Yes	Not Mentioned
Podhajski et al. (2009)	Yes	Yes	No	No	No	Yes	No	Not Mentioned
Reinke et al.(2014)	No	Yes	No	No	No	Yes	No	Not Mentioned
Ruble et al. (2013)	No	No	No	No	Yes	Yes	No	Web
Sailors & Price (2015)	Yes	Yes	Yes	Yes	No	Yes	No	In Classroom
Simonsen et al. (2010)	No	Yes	Yes	Yes	Yes	Yes	Yes	Not Mentioned
Sutherland et al (2000)	No	Yes	Yes	No	No	Yes	No	Not Mentioned
Thompson et al. (2012)	No	Yes	No	No	No	Yes	No	Not Mentioned

EFFECTS OF PROFESSIONAL DEVELOPMENT AND VIRTUAL TEACHER COACHING WITH VIDEOCONFERENCING ON THE INCREASE OF TEACHER GIVEN OPPORTUNITIES TO RESPOND AND THE ON-TASK BEHAVIOR OF STUDENTS WITH EMOTIONAL BEHAVIOR DISORDERS

Technology can be found in all aspects of our daily life. Smart phones, tablets, and computers are essential tools for personal and professional experiences. Not surprisingly, technology used in the classroom has become a staple for many teachers, with the National Center for Educational Statistics (NCES, 2007) reporting that virtually every classroom in the United States is equipped with Internet access. Although technology is used frequently, it is not accessed frequently for teacher professional development (PD), especially when coaching professional educators (Rock et al., 2013).

PD is in-service training designed to advance the content knowledge and pedagogical skills of teachers. PD is widely viewed as an important means of improving teaching and learning and can be a remedy to teacher turnover when it is effective and well planned (Billingsley, 2005). Researchers have suggested that a combination of PD and follow-up coaching support can be more effective than stand alone PD for novice and experienced teachers to increase the tools they use in the classroom (Aquilar, 2013; Yoon et al., 2007).

The literature is on coaching is still quite small and many variables warrant further investigation. Although empirical evidence is lacking, coaching has shown some promise in changing teacher behavior towards more effective practice. Nevertheless, school and district coaching positions are often eliminated when schools face budget complications. This has moved efforts towards investigating technology as a cost-efficient and effective means of offering coaching to in-service teachers.

Coaching as Teacher PD

Coaching is defined as the study and teaching of theory, the observation of demonstrations, and opportunities for feedback given by a peer, mentor, supervisor, or PD provider (Showers, 1982). Coaching is a core component of effective mentoring/induction program implementation for several reasons (Billingsley, 2005). Boe and colleagues (1997) reported in a survey study with 4798 teachers that mentoring with coaching and administrative support emboldens them to remain in a school and not migrate to other schools or leave the profession completely. They also found that teachers report that the profession is more fulfilling when they feel confident in the delivery of content. Coaching can increase confidence and performance for classroom teachers (Showers, 1982).

The literature suggests that effective coaching has three critical components(e.g., Showers, 1982). First, coaches should elicit buy-in from the teacher for effective implementation of an evidence-based practice by thoroughly discussing and offering an understanding of the theory guiding the practice. Second, the coach should model effective behaviors to the teacher, prefera-

bly in the teachers' own classroom. Finally, the coach should provide low risk feedback that is non-judgmental and encourages a positive, non-evaluative relationship.

Although these components have been suggested in the literature there is little empirical evidence to support their effectiveness. However, there is emerging evidence that teacher behaviors may change if some of these elements are implemented. For example, researchers have reported significant changes in teachers' use of evidence based practices for the delivery of academic content (Codding, Feinberg, Dunn, & Pace, 2005; Kretlow et al., 2012). Less positive results have been reported for changes in teachers' use evidence based practices suppprt appropriate child behaviors (Gregory, Allen, Mikami, Hafen, & Pianta, 2014; Martens, Hiralall, Bradley, 1997; Miller, Harris, Watanabe, 1991). Moreover, although teachers may have demonstrated increase use of the targeted behavior, it was not always maintained once the coaching support was removed (Kretlow, Cooke, & Wood, 2012; Sailors & Price, 2015; Simonsen, Myers, & DeLuca; 2010). Finally, although significant changes may be reported in teacher behaviors, their use of these practices does not always translate into changes in child academic or behavior outcomes. All in all, the empirical evidence about teacher coaching as an effective component of PD is mixed.

Nevertheless, these positive results, coupled with the practical challenges of offering effective on-site support to teachers, have led researchers and PD providers to investigate how coaching could be delivered effectively with technology. Technological advances have created new opportunities for reimagining teacher training. Of particular interest is the ability to offer

more frequent and consistent communication and feedback to teachers in a variety of classroom settings and stages of teaching experience at scale with minimal cost.

Virtual Coaching

As an approach to PD, virtual coaching, is a means of offering expert feedback to a teacher to improve his/her classroom practice via online technologies (Israel, Carnahan, Snyder, & Williamson, 2013; Smith & Israel, 2010). Virtual coaching may be a critical strategy for new and struggling teachers to receive regularly scheduled communication, sustenance to properly implement evidence-based strategies, reassuring feedback, and moral support from experienced teachers/coaches (Dal Bello et al., 2007; Israel Knowlton, Griswold, & Rowland, 2009; Wasburn, Wasburn-Moses, & Davis, 2012).

According to Aquilar (2013), successful virtual coaching requires a coach to display several traits to ensure that teachers are receiving strategies effectively. Aquilar asserts that virtual coaches demonstrate a professional disposition that includes positive praise and constructive feedback that builds the teachers' pedagogical understanding. It is recommended that coaches possess content expertise and incorporate modeling of proper implementation of the skills being coached (Rock et al., 2012; Stormont & Reinke, 2012). Virtual coaches would have the ability to offer feedback loops in an immediate or agreed- upon delayed form to teachers being coached, if these coaches are well versed in technology (Rock et al., 2012; Scheeler, Ruhl, & McAfee, 2004). Researchers have utilized several means to facilitate technology based coaching, such as email, Bug-In-Ear technology, live webcam coaching, avatar coaches, and videoconferencing.

Email. Email correspondence between coach and teacher has been used as a practical way to answer questions about new teaching strategies and their proper implementation for over two decades (Grugenhagen, McCracken, & True, 1999; Rock et al., 2012). Gareis and Nussbaum-Beach (2008) found that the digital text-based format allows novice teachers to interact more with mentors, seek peers for support, and vent about issues in their classrooms. Although email offers an option for coaching feedback that is both cost effective and time saving, it deprives the teacher of the face-to-face feedback offered by more traditional coaching methods (Simonsen, Myers, & DeLuca, 2010). E-mail correspondence may also lack in providing timely correspondence and may cause confusion in continuous back–and-forth writing with little chance for personal contact (Sailor & Price, 2015).

Bug-In-Ear. Bug-In-Ear (BIE) technology used in educational settings dates back to the 1970s (Bowles & Nelson, 1976). Traditionally consisting of a portable two-way radio with an earpiece and microphone, BIE technology has advanced in recent years to include classroom computers, (if they can be equipped with webcams with sound capability) and Bluetooth headsets for both the teacher and coach. BIE technology offers the benefit of immediate feedback that instructs, corrects, encourages, and questions a teacher on instructional decisions as they are happening (Scheeler et al., 2004). Rock and colleagues (2014) used BIE technologies in a six semester long research study with 14 general and special education teachers in p-12 classrooms. Ottley and Hanline (2014) found that BIE coaching showed improvement in student classroom engagement and an increase in desired academic and behavior strategies used by teachers. Simi-

lar positive outcomes have been observed in early childhood education classrooms and with special education pre-service teachers (Goodman, Brady, Duffy, Scott, & Pollard, 2008).

Although the immediate feedback offered by BIE technology has been praised in recent research (Ottley & Hanline, 2014; Rock et al., 2014; Rock et al., 2012; Wade, Bohac, & Platt, 2013), some teachers and coaches complain the two sets of verbal stimuli can be overwhelming while trying to deliver instruction. A novice teacher may struggle more with the added stimuli of coaching via BIE (Smith & Isreal, 2010). In addition, BIE technology may be cost prohibitive in many K-12 settings. The cost of implementing BIE technology in one classroom can range from $200 for simple webcam and Bluetooth technologies to $12,000 for highly customizable systems (Rock et al., 2012). Such costs can be impossible for school districts to take on during an economic downturn (Heafner & Petty, 2010).

Live Webcam. Live webcam coaching allows the coach to observe a classroom teacher in real time from a different location, even hundreds of miles away. Unlike videotaped lessons, the coach has access to teachers in various locations during their actual classroom instructional time. In using a live webcam, coaches alleviate the extra time it takes to video record, view the video, analyze, and offer feedback to the teacher. Moreover, feedback can be offered soon after the delivered lesson, as opposed to watching a video later in the day (Mashburn, Downer, Hamre, Justice, & Pianta, 2010; Pianta, Mashburn, Downer, Hamre, & Justice, 2008). Vernon-Feagans and colleagues (2013) conducted a group design study to measure rural teachers' response to virtual coaching to improve reading instruction to struggling readers. Struggling read-

ers of teachers in the intervention group showed significant gains over struggling readers in the control group. Despite these benefits, live webcam coaching costs and equipment requirements in K-12 classrooms presents a problem in implementing this technology (Heafner, Petty, & Hartshorne, 2011).

Avatar. Avatar coaching is a little-used software-based technology that offers non-human assistance to teachers on specific skills that they can use to provide instructional information to teachers. PD developers/providers create software that can respond to questions that a coach or teacher may have about implementing new skills in the classroom. Avatar coaching has the obvious benefit of providing information immediately to coaches and teachers with access to the software. The downside to this very new technology is that access to the software and the rather large financial obligation may be impossible for many school districts (Warner, 2012). Moreover, to date, no empirical studies have been conducted on avatar coaching.

Videoconferencing. Virtual coaching with videoconferencing can take place via free internet programs like Skype, OoVoo, Google Hangouts, or Face Time with coaches who are housed in other schools, district offices, or the office of PD providers (Israel et al., 2009). It increases the number of teachers that a coach can have contact with on a regular schedule. Videoconferencing proposes a cost effective way to offer one on one follow-up to PD without the need to have a coaching expert in each school building, therefore increasing access and decreasing travel and monetary barriers (Rock et al., 2013). Virtual coaching using videoconferencing considers the time and convenience of not only the coach but of the teacher. A teacher may be more

agreeable to feedback from a coach if the session can take place at a time and place more comfortable and convenient for her/him (Isreal et al., 2009). Virtual coaching using videoconferencing technologies can present difficulties in that not all teachers or coaches are proficient in the use of these online technologies. Another anomaly that could hinder the use of this technology is the availability of proper cellular data or Wi-Fi internet access to teachers in remote or rural areas. To date, no study has been done that isolates the effect of virtual coaching with videoconferencing; however, emerging evidence from studies using BIE technologies to observe classrooms and Skype technologies to later offer feedback suggest that this approach may be effective to pre-service and novice in-service teachers.

Rock and colleagues (2012) used BIE and Skype technologies to offer coaching to pre-service teachers using a mixed methods research approach to evaluate the effectiveness of virtual coaching with BIE and Skype technologies on teachers' delivery of positive behavior interventions and supports in elementary school classrooms. Coaches were housed off campus. Teachers increased their use of evidence based behavior strategies with the onset of the coaching strategies.

Ploessl and Rock (2014) used BIE and Skype technologies to coach teachers to improve co-teaching planning practices. A single case, reversal design was used to measure a change in planning from six co-teacher dyads. BIE technologies were used to give feedback during instructional time to improve use of specific praise, while Skype technologies were used to coach teachers during lesson planning sessions. Virtual coaching increased teachers' varied uses of co-

teaching models. Specifically, teachers were measured using more stations and alternative co-teaching models as opposed to their originally observed One Teach One Assist.

Virtual Coaching with Videoconferencing for Special Education Teachers

While all teachers may benefit from technology- enhanced coaching and professional development (PD), this study will focus specifically on special education teachers. Teachers of students with disabilities require continuous PD to support students with challenging academic, social, and behavioral needs effectively (Cullinan & Sabornie, 2004). Yet, they often do not receive the amount or intensity of PD that is required to sustain effective classroom behaviors (Billingsley, 2005). As a result, special education teachers have reported classroom behavior as one of the reasons that they leave the field at a rate of about 7-15% each year (Boe, Bobbitt, Cook, Whitener, & Weber, 1997; McLesky, Tyler, & Flippen, 2004). Special education teachers assigned to a self-contained classroom for students with emotional/behavior disorders (E/BD) tend to leave the field at even greater rates (Billingsley, 2004; George, George, Gersten, & Grosenick, 1995). These teachers report that a lack of support from school administration, low salaries, ineffective induction, and PD programs play a role in making a decision to leave the special education teaching profession (Billingsley, 1993; Boe et al., 1997; Cross & Billingsley, 1994; Gersten, Keating, Yovanoff, & Harniss, 2001; Whitaker, 2003). Therefore, innovative and cost effective means of providing effective PD and coaching to both pre-service and in-service special education teachers is a critical need in the field (Darling-Hammond, 2014).

To date, no empirical studies have been conducted to evaluate the effectiveness of virtual coaching with videoconferencing with special education teachers. In fact, relatively few studies have been done on coaching with special education teachers. Of the studies done with special education teachers, many have focused on teachers' use of evidence- based practices with students with challenging behaviors and E/BD. Students with E/BD display both internalizing and externalizing behaviors such as, noncompliance, verbal and physical aggression, off-task behavior, and disruption. These persistent behaviors hinder a student's ability to benefit from vital learning opportunities (Gresham, Lane, MacMillan, & Bocian, 1999; Landrum, Tankersley, & Kauffman, 2003; Reid, Gonzalez, Nordness, Trout, & Epstein, 2004). On-task behavior is defined as the student looking at the teacher while s/he is talking, talking to the teacher about the assignment, talking to other students about the assignment during approved group work, or looking at and working on the assignment.

Survey studies have shown that teachers find PD on evidence-based practices essential to better support students with E/BD (Billingsley, 1993; Boe et al., 1997). Virtual coaching may offer these teachers an opportunity to have regular contact with a coach to manage the behaviors of students with E/BD that may inhibit their ability to maintain positive academic outcomes and desirable behaviors (Rock et al., 2013; Simonsen et al., 2008). Studies that have used face-to-face coaching to provide PD support to special education teachers to implement evidence-based strategies report positive outcomes (Capizzi, Wehby & Sandmel, 2010; Duchaine, Jolivette, &

Copeland, 2011; Simonsen, Meyers & DeLuca, 2010; Sutherland & Wehby, 2001; Sutherland, Wehby, & Copeland, 2000).

Coaching OTR. One teacher behavior that appears to be particularly amenable to coaching is opportunity to respond (OTR). An OTR is an evidence-based practice that has been used successfully in classrooms with students with disabilities. OTR has been cited as an effective practice used to decrease disruptive and other undesirable behaviors, increase on-task behavior, academic engagement, and number of correct responses (Carnine, 1976; Haydon et al., 2010; Sutherland, Adler & Gunter, 2003; Sutherland & Wehby, 2001; West & Sloan, 1986). Although not using virtual coaching, three studies have investigated the effect of teacher coaching on teacher given OTR.

Capizzi and colleagues (2010) used a single case multiple-baseline across teachers design to evaluate the effectiveness of coaching teachers to increase the use of behavior-specific praise statement (BSPS) and OTR. Three teachers assigned to graduate-level practicum placement in special education classrooms participated in this study. After the teachers video recorded their lessons, an educational consultant and doctoral student viewed lessons and offered coaching. Participants met with the educational consultant once per week for approximately one hour to review videoed lesson. The results of this study were inconclusive, with two teachers responding positively to coaching and one teacher showing no increase in OTR with teacher coaching; the researchers reported that classroom management may have played a role on the lack of increase of one teacher. No student data were collected.

Simonsen, Meyers, and DeLuca (2010) used a single case-multiple baseline across teachers design to examine the effect of PD plus teacher coaching on increased use of prompts, BSPS, and OTR. This study took place in an alternative school serving students with high incidence disabilities with three experienced teachers. Teachers received explicit PD on prompts, BSPS, and OTR prior to coaching. Data were collected after teacher PD without coaching. Teachers began receiving coaching on the three desired behaviors in staggered fashion every day. The researchers found that training alone did not increase OTR; when teacher coaching was introduced, all teachers demonstrated an increase in OTR. Student data were not collected.

Sutherland and Wehby (2001) examined OTR with 20 teachers (10 control and 10 experimental) in self-contained classrooms in grades k-8. A total of 216 students (ages 5-15 years old) participated (108 control and 108 experimental). Teacher participants listened to an audio-recording of their teaching and evaluated their delivery of BSPS and OTR. Research assistants collected correct academic responses of students in the classroom. The results showed positive short-term outcomes for teachers and students, but teacher and student participants returned to baseline levels when maintenance data were collected.

Although the aforementioned studies examined teacher coaching of OTR, none isolated OTR as a dependent variable, because it was paired with another dependent variable such as prompts or BSPS. Therefore, it cannot be determined that positive outcomes were a direct result of the coaching intervention on OTR as a dependent variable. In addition, only one study evaluated student outcomes as a result of teachers' use of OTR. Finally, previous studies only includ-

ed face to face coaching without the use of virtual teacher coaching. Therefore, it is unknown whether similar positive outcomes can be achieved with a technology based coaching platform like virtual coaching with videoconferencing.

Purpose

The purpose of this study was to investigate the effectiveness of a professional development and virtual teacher coaching with videoconferencing intervention to improve special education teachers' use of a low-cost, high-impact evidence based practice, OTR, and the on-task behavior of students with E/BD. The following questions were posed:

1. What effect does a professional development and virtual teacher coaching intervention have on the frequency with which teachers offer OTR to middle school age students with E/BD?
2. What effect do OTR have on on-task behaviors of middle-school age students with E/BD?
3. To what extent do teachers report that virtual coaching is a socially valid form of professional development?
4. To what extent do teachers report that increased OTR is a socially acceptable intervention to increase on-task behavior of middle-school age students with E/BD?

Method

Participants and Setting

The study took place in three self-contained classrooms in two middle schools, located inside a major metropolitan city in the southeastern United States. Intervention sessions were conducted during a 15minute span within an interactive English/Language Arts (ELA) class period. The teacher participants included one female, Ms. Harold, and two males, Dr. Roberts and Mr. Winters. All three teachers were certified by the state to teach special education (see Table 1). Ms. Harold and Dr. Roberts taught at the same school, while Mr. Winters was at a second school. Two additional teachers were recruited and consented for this study; however, they were not able to complete the study due to time constraints, school commitments, and family obligations.

Each teacher nominated from his or her classroom two students with E/BD eligibility as possible participants for the study. Student participants included six students (five boys and one girl), two from each of the three classrooms. To be included in the study, students had to be receiving services for E/BD based on district requirements and nominated by their ELA teacher for displaying chronic off-task behavior, which would include inattention, disruptive behavior during a lesson, i.e, walking around, talking to other students, and an inability to complete assigned classwork.

Ms. Harold (pseudonyms are used throughout) taught a seventh grade ELA class and nominated two seventh grade male students, Anthony and Jordan, for student participants. Based

on anecdotal notes taken during 12 observations in Ms. Harold's classroom, the researcher observed a minimum of two discipline-focused events per observation. During each observation, Ms. Harold corrected Jordan and Anthony repeatedly for talking out of turn, leaving their seats, playing around with classmates, and leaving the room without permission. Undesirable behaviors continued despite disciplinary actions and verbal reprimands. A school wide positive behavior intervention support (SWPBIS) was in place at this school, but Ms. Harold did not display the use of these interventions on a consistent basis.

Mr. Winters taught an 8th grade ELA class and nominated two eighth grade student participants, one male, Elijah, and one female, Emily. Mr. Winters implemented a variety of SWPBIS strategies, such as using good behavior tickets for SWPBIS rewards. Based on anecdotal notes taken during 14 classroom observations in Mr. Winters' classroom, the researcher observed Mr. Winters reprimanded Emily on five occasions for talking out of turn. Mr. Winters' students displayed off-task behaviors, but fewer undesirable behaviors than observed in Ms. Harold's classroom.

Dr. Roberts was the special education department chair and taught an eighth grade ELA class. Dr. Roberts nominated two eighth grade male student participants, Michael and Simon. Based on anecdotal notes taken during 17 classroom observations in Dr. Roberts' classroom, the researcher observed an average of one discipline-focused event per observation. Dr. Roberts focused his reprimands on the entire class as opposed to targeting individual students.

Measures

Study outcomes were measured for both the virtual coaching intervention to increase OTR in participant teachers and the on-task behavior of participant students.

Teacher Data. A frequency count was used to record OTR per 15minute interactive period; then each OTR was recorded on a data sheet (see Appendix A). Based on the average number of OTR offered during baseline, a criterion for mastery was set. The average number of OTR offered during baseline plus three additional OTR determined each teacher's OTR goal during intervention. If any of the teachers had offered zero OTR during baseline, the OTR goal was set to three OTR per session.

The researcher observed teachers in person in the classroom or by video. In-class observations took place in 88% of teacher observations. During classroom observations the researcher only collected data on teacher given OTR; no student data were collected during classroom visits, although anecdotal notes were taken pertaining to teacher/student interactions. Twelve percent of teacher OTR classroom observations were conducted by viewing a video uploaded to a personal password protected Dropbox account. Before the interactive ELA session, each teacher set up his or her camera on a tripod. After each lesson, the teacher would upload the video to the password protected Dropbox site. The researcher observed each dependent variable independently in class or via video upload. Student data were observed separately. When collecting student data, the researcher watched each video twice, one time for each targeted student.

Student Data. On-task behavior was measured every 10 seconds using whole interval recording (Carnett et al., 2014; Gourwitz, 2014; King, Radley, Jenson, Clark, & O'Neill, 2014) during a 15-minute interactive class period. The mobile application, *Intervals, an ABA interval recording application* (Mays, 2013), was used to signal a 10second interval as data collectors used pencils to record the occurrence and nonoccurrence of on-task behavior of students on data sheets (see Appendix B). The percentage of on-task intervals was calculated by dividing the number of observed on-task intervals by the number of total possible intervals and multiplying by 100% per each student. Although student data were not used to determine phase change, the effect of the intervention on on-task behavior was of interest.

The researcher and graduate assistant collected all student on-task behaviors by viewing uploaded videos. The teacher participant always turned the camera toward the student participants and stood close enough to the camera that his or her voice could be heard. The researcher and graduate assistant also collected anecdotal notes during these observations to record classroom activities and interactions.

Fidelity of PD and Coaching. To measure the fidelity of PD, each session was recorded using a video recorder. A graduate assistant watched 33% of PD sessions, one entire session for one teacher, and scored fidelity using the PD treatment fidelity checklist. The PD checklist (see Appendix C) ensured that: (a) PD was offered in a one to one environment;(b) an overview was given of OTR; (c) the benefits of OTR were described; (d) examples of OTR were given; (e) teachers could view videos of OTR used in a classroom; (f) chances were given for the teacher to

practice OTR; (g) identify critical components of coaching; (h) there were discussions of the specifics of virtual teacher coaching with videoconferencing; and (i) opportunities for questions were allotted. To measure the fidelity of the coaching intervention, the researcher followed a coaching feedback script used after the observation of every other lesson. During the coaching session the researcher: (a) asked the teacher how s/he felt about the last two sessions; (b) asked the teacher about his/her perceived strengths; (c) asked the teacher about his/her perceived weaknesses; (d) discussed student on-task behavior; (e) discussed specific OTR given by the teacher; (f) discussed number of OTR given (g) compared the number OTR given to goal; (h) discussed ways to increase OTR; (i) reminded the teacher of goal for next 2 sessions; and (j) asked the teacher if s/he had any questions or concerns (see Appendix D). In all, teachers received 90 minutes of PD and 20 minutes of virtual coaching for 3 sessions for a total of 150 minutes of professional development and coaching during a 4-week intervention.

Materials. In addition to the intervals mobile application and digital video cameras, teachers used the standard ELA curricular materials during classroom instruction; there was no change in class curriculum or content made by the researcher. Teacher participants and the researcher used cellular telephones or a computer with a Skype or Facetime video conferencing application for coaching sessions. Each interactive session was digitally video recorded. Teachers uploaded classroom videos to a privately assigned, password protected, and encrypted cloud storage account .The camera had a USB arm that plugged directly into the computer for direct upload to the password protected Dropbox account.

Social Validity. Teacher participants were given a social validity survey after the completion of data collection for the OTR intervention (see Appendix E). Social validity was measured using a modified version of the *Intervention Rating Profile-15* (IRP-15); Witt & Elliot, 1987). The IRP-15 is a 15-item social validity instrument used to measure acceptability and perceived effectiveness of an intervention. Each item was rated on a 6-point Likert-type scale ranging from 1 (strongly disagree) to 6 (strongly agree). The IRP-15 was adapted to obtain social validity ratings on the use of OTR to increase on-task behavior. The wording of the survey items was modified to reflect the intervention.

Social validity for the coaching intervention (see Appendix F) was measured using a researcher-created, 7-item instrument. Each item was rated on a 6-point Likert-type scale ranging from 1 (strongly disagree) to 6 (strongly agree). Teachers had the opportunity to write supplementary statements in the opened-ended section of the survey.

Design

A multiple baseline single-case design was used to investigate the effect of PD and virtual teacher coaching through videoconferencing on the number of OTR teachers gave to students. Teacher OTR was used for phase change decisions. Percentage of intervals of on-task behaviors displayed by students during interactive work time was also measured. Multiple baseline was appropriate for this study because coaching, as an intervention, is not reversible. The information gained during the coaching process could not be withdrawn; therefore, a withdrawal design was not appropriate (Alberto & Troutman, 2012; Kazdin, 2011). If there was a change in performance during intervention over baseline and it was replicated across the tiers of the multiple

baselines, then the change could be credited to the intervention rather than to other changes in the environment such as history or maturation. The study included three phases: baseline, intervention, and maintenance across three teachers (Gast, 2010).

Independent Variable and Dependent Variables

The independent variable was PD with virtual teacher coaching with videoconferencing, which was operationally defined as offering teachers a PD workshop followed by one-on-one training prior to feedback using Internet programs such as Skype or Facetime. Data were collected on two dependent variables: OTR and on-task behavior. An OTR was operationally defined for this study as a teacher asking a question of an individual or group that necessitate a specific academic response or was open ended with the purpose of having a student or students describe the thought process. To be counted, the question had to request an explicit response that was linked to the ELA lesson being observed (Haydon et al., 2010; Sutherland et al., 2003). On-task behavior was operationally defined as the student looking at the teacher while s/he was talking, talking to the teacher about the assignment, talking to other students about the assignment during approved group work, or looking at and working on the assignment.

Data Collector Training

The primary researcher and one graduate student conducted all data collection. Prior to beginning the study, the graduate student was trained on the data collection procedures. The researcher and graduate student used role playing procedures and watched videos of classrooms to practice collecting data on OTR and on-task behavior, properly using the data sheet, and the op-

erational definition of OTR and on-task behavior was reviewed along with possible examples and non-examples. Training was conducted for a total of two hours and 25 minutes over a three-day period. Progress was measured until 100% agreement was reached. Agreement was reached after watching and scoring two videos watching teachers deliver OTR and three separate videos to score student on-task behavior. The graduate student also was trained on proper use of the *Intervals, an ABA interval recording application* (Mays, 2013).

Procedure

To get an accurate record of OTR in baseline, teachers were not fully informed of the purpose of the study until after baseline data were collected. During the informed consent process, teacher participants were told that the purpose of the study was to examine the effect of positive behavior support on on-task behaviors. Teachers were given the option to discontinue involvement in the study once they were told the purpose of the study. All teachers remained in the study. Teachers participated in PD one at a time in a staggered manner. After PD, teachers continued to teach ELA as normal. After student assent and parent consent was gained, baseline observations were conducted. Observations were conducted on all three teachers daily. Once Ms. Harold reached six baseline data points with a downward trend, she was moved into intervention. Mr. Winters and Dr. Roberts continued in baseline.

Baseline. During baseline, the researcher observed a 15minute interactive ELA class period. The interactive period consisted of review of previous instruction, guided practice, and review of student warm-up or homework answers. Warm-up and homework review was done as

group work at the teachers' discretion. Frequency recording was used to measure teacher use of OTR. The decision rule to move a teacher from baseline to intervention was based on stability of data or a downward trend in teacher given OTR. Stability was defined as 50% or less variability around the mean and/or a downward trend which was characterized by a downward slant of data within the phase (Kazdin, 2011).

Professional Development. Teacher participants attended a 90minute PD workshop on offering OTR and teacher coaching (see Appendix C). Each teacher received one-on-one training by the researcher in person directly before entering the intervention phase. Teacher participants were given an overview of OTR. During the session, the researcher discussed the benefits of offering OTR in the classroom with extensive examples of ways to increase OTR. The researcher used a combination of lecture, role-playing, and videos that demonstrate in-class use of OTR, benefits of OTR, and how teachers can increase OTR in their classroom.

In addition, PD included a definition of teacher coaching. Teacher coaching was defined, for the purposes of this study, as an outside expert or supervisor offering a critique of observed behavior that is specific, positive, and corrective when needed after the completion of the observed lesson (Joyce & Showers, 1981, 1982; Maeda, 2001; Simonsen et al., 2010). Teachers received an overview of teacher coaching, including goal setting criteria and teacher coaching procedures. The combination of this 90 minute PD session and subsequent coaching sessions incorporated the critical components of coaching identified by Kretlow and colleagues (2010). The critical components of coaching include (a) highly engaged, instructive training session(s); (b)

follow-up observations; and (c) specific feedback to include sharing of observational data and self-evaluation. During PD, teachers had the option of choosing which video conferencing application they would be most comfortable using. The teachers then had the opportunity to ask questions following the 90-minute training session.

Coaching. During this 15minute interactive ELA period, teachers engaged in a review of previous instruction, guided practice, review of student answers, and games covering previously taught materials. After every other session, the researcher had a coaching session with the teacher. This coaching session took place via Skype or Facetime video conferencing by telephone, tablet, or computer after school hours at a time agreed upon by both researcher and teacher participant.

Maintenance. To determine if OTR techniques maintained over time, maintenance data were collected in each teacher's class one week after data collection ended for the student in that teacher's class. Teacher coaching was not conducted during the week prior to maintenance data collection. One maintenance data point was collected at individual times based at the end of data for collection for each teacher.

Interobserver Agreement

Interobserver agreement (IOA) was collected by a graduate assistant distributed evenly across phases and participants for teacher OTR (40%) and student on-task (37.5%) behavior data collection (Kennedy, 2005). The graduate assistant collected all IOA data by viewing video recorded classroom instruction. IOA for frequency of OTR was collected using total agreement and

yielded a mean of 94% (range of 83% - 100%) agreement (Kennedy, 2005). For Ms. Harold, IOA for OTR was assessed for 42% (n = 5) of classroom and video recorded observations with 95.2% agreement (range 88%-100%). For Mr. Winters, IOA for OTR was assessed for 43% (n = 6) of classroom and video recorded observations with 93.3% agreement (range 83%-100%). For Dr. Roberts, IOA for OTR was assessed for 35.2% (n = 6) of classroom and video recorded observations with 94% agreement (range 87%-100%). All OTR IOA data were collected via video recording by the graduate assistant. The graduate assistant watched the videos chosen for IOA and scored the frequency of OTR. When possible, the researcher and graduate assistant watched the videos together and scored the frequency of teacher given OTR.

IOA for on-task behavior (see Appendix B) was calculated using point-by-point agreement (Kennedy, 2005). Point-by-point agreement was calculated by the number of agreements divided by the number of agreements plus disagreements multiplied by 100%. IOA for student on-task behavior generated a mean of 91.46% (range of 74% - 100%) agreement. For Anthony, IOA for on-task behavior was assessed for 41.7% (n = 5) of video recorded observations with 82.2% agreement (range 74%-98%). For Jordan, IOA for on-task behavior was assessed for 41.7% (n = 5) of video recorded observations with 97.4% agreement (range 96%-99%). For Emily, IOA for on-task behavior was assessed for 35.7% (n = 5) of video recorded observations with 94% agreement (range 80%-100%). For Elijah, IOA for on-task behavior was assessed for 35.7% (n = 5) of video recorded observations with 82.2% agreement (range 74%-98%). For Michael, IOA for on-task behavior was assessed for 35.3% (n = 6) of video recorded observations with

95.2% agreement (range 90%-99%). For Simon, IOA for on-task behavior was assessed for 35.3% (n = 6) of video recorded observations with 97.8% agreement (range 97%-100%). IOA for on-task behavior was completed by synchronously taking observational data using the mobile application to cue the 10second intervals and the data collection sheet. The observation period was synchronized by both observers counting down from three to begin each observation period on the Intervals application.

Treatment Fidelity

Teachers received PD individually to maintain the independence of the tiered legs of the multiple baseline design. It was important for each teacher's PD to be consistent, so treatment fidelity was assessed on 33% of PD sessions. Each session was recorded using a video recorder. A graduate assistant watched 33% of PD sessions, one entire session for one teacher, and scored fidelity using the PD treatment fidelity checklist. Dividing the number of PD steps correctly completed by the total number of PD steps expected for the PD session and multiplying by 100% calculated PD fidelity. Treatment fidelity for PD was 100%.

To ensure that coaching sessions were implemented as designated, a graduate assistant collected fidelity of the researcher's implementation of coaching sessions. Each coaching session was recorded using QuickTime audio. A graduate assistant listened to 33% of coaching sessions and scored fidelity using the coaching treatment fidelity checklist; the graduate assistant scored one coaching session per teacher for fidelity of implementation (see Appendix D). Coaching fidelity was calculated by dividing the number of coaching steps correctly completed by the total

number of coaching steps expected for the coaching feedback session and multiplying by 100%. Treatment fidelity collection was at a 100%.

Data Analysis

Visual analysis was used to assess the effects that PD with virtual coaching with video conferencing had on teacher given OTR and student on-task behavior. Within- and between-phase data patterns were examined, and the following criteria were used to determine if there was a functional relation between the independent and dependent variables: (a) level: mean score for the data within each phase; (b) immediacy of effect: the change in level during the time of onset or termination of a phase; (c) overlap: the number of data points from one phase that overlaps with data from the previous phase; and (d) variability: the degree to which individual data points deviate from the overall trend (Alberto & Troutman, 2012; Kazdin, 2011).

Anecdotal notes were kept on data collection sheets; the researcher kept anecdotal notes on student behavior, teacher reprimands, and disciplinary interactions. These notes were analyzed to report classroom climate, student behaviors, and negative and positive teacher/student interactions.

Results

Teacher OTR Outcomes

During baseline, Ms. Harold displayed a decreasing trend; a decreasing trend is a downward pattern in the data within a phase (see Figure 1). Her scores ranged from 0-13 (M = 6) OTR per 15 minute session during baseline. Ms. Harold's goal following PD was 9 OTR per 15 mi-

nute session. Once PD and coaching was introduced, Ms. Harold's data path showed an immediate change in level (M = 6 to M = 19) and trend. The intervention data ranged from 10-30 (M = 19) OTR per 15 minute session, with 17% overlapping data. One maintenance data point was collected. Ms. Harold's OTR at maintenance was 21 OTR per 15 minute session, which was higher than her mean OTR during intervention.

During baseline, Mr. Winters displayed stable data and a decreasing trend. His scores ranged from 5-20 (M = 11) OTR per 15 minute session. Based on his mean OTR during baseline, Mr. Winters' goal was set at 14 OTR per 15 minute session. Once coaching was introduced, Mr. Winters' data path showed a change in level (M = 11 to M = 22) and trend, with 40% overlapping data. The data ranged from 14-29 (M = 22) OTR per 15 minute session. During maintenance, Mr. Winters' gave 21 OTR for the session, a score very close to his intervention mean.

During baseline, Dr. Roberts displayed a decreasing trend. His scores ranged from 0 -13 (M = 4) OTR per 15 minute session. During intervention Dr. Roberts' goal OTR per 15 minute session was set at 7. Once coaching was introduced Dr. Roberts' data path showed an immediate change in level (M = 4 to M = 25), trend. The data ranged from 21-30 (M = 25) OTR per 15 minute session. There were no overlapping data. During maintenance, Dr. Roberts' displayed 13 OTR per 15 minute session.

Student Outcomes

Ms. Harold's students displayed variable on-task interval percentages in baseline and intervention. Antony had a baseline range of 46% - 84% of on-task intervals (M = 66.7%) and dur-

ing intervention his on task behavior ranged from 44% - 100% (M = 73.6%). During baseline, Jordan displayed an on-task percentage of interval range of 0% - 54% (M = 33%) and during intervention he had a range of 27% - 89% (M = 51.3%). Maintenance data were not collected on student participants.

Mr. Winters' students displayed variable and unstable on-task interval percentages during baseline. Emily had a baseline range of 0% - 57% of on-task intervals (M = 31.6%); she displayed stability and an increase in trend during intervention with a range of 44% - 100% of on-task intervals (M = 73.6%). Elijah displayed a baseline range of 0% - 74% of on-task intervals (M = 46.7%); again he displayed stability and an increase in trend during intervention with a range of 44% - 94% of on-task intervals (M = 77.4%).

Dr. Roberts' students displayed variable and unstable on-task interval percentages during baseline. Michael had a baseline range of 7% - 62% of on-task intervals (M = 26%); he displayed stability and an increase in trend during intervention with a range of 69% - 85% of on-task intervals (M = 80.2%). Simon displayed a baseline range of 16% - 86% of on-task intervals (M = 34.8%); he also displayed stability and an increase in trend during intervention with a range of 83% - 96% of on-task intervals (M = 91.6%).

Social Validity on OTR

On the OTR questionnaire, each of the teachers either agreed or strongly agreed with the following statements: "Most teachers would find OTR appropriate for behavior problems," "Most teachers would find OTR suitable to increase on-task behavior," "OTR is consistent with

things I have used in my classroom," "OTR was a fair way to handle the child's problem behavior," "OTR is reasonable for the off-task behavior described," and "I liked the procedures used in this intervention." All participant teachers strongly agreed with the following statement: "I would be willing to use OTR in the classroom setting."

The participants strongly disagreed with the statement "I would NOT suggest the use of OTR to other teachers." Two teachers strongly disagreed and one disagreed that "OTR would NOT be appropriate for a variety of children."

Questions on the survey about the teachers' observations of their students' response to the intervention varied. For all six students, the teachers either agreed or strongly agreed with the following statement: "Increased OTR would be an acceptable intervention for the child's problem behavior." Participants strongly disagreed that "Overall, OTR would NOT be beneficial for the child" for five of the six students. Participants also either strongly disagreed or disagreed, for five of the six students that "OTR would result in negative side effects for the child." In addition, teachers concluded they either agreed or strongly agreed that "OTR was a good way to handle this child's behavior problem" and "OTR would prove effective in changing the child's problem behavior" for five of the six students.

Social Validity on Virtual Coaching with Videoconferencing

Participants completed a virtual coaching survey. Two participant teachers strongly agreed and one teacher agreed with the following statements: "Coaching to increase OTR in the classroom is an acceptable form of teacher training," "Virtual teacher coaching using video con-

ferencing is an acceptable form of professional development," "I would recommend virtual coaching to other teachers," and "Virtual coaching would be effective to improve a variety of teaching practices." Two of the three teachers strongly disagreed and one disagreed with the following statements: "The time spent on virtual coaching was NOT acceptable" and "I would NOT be willing to participate in virtual coaching to develop another instructional skill." One teacher wrote the following comment in the open-ended section, "The coaching experience added value to my classroom; the introduction of OTR, increased on-task behavior for all of my students. Using OTR in my class has also increased my familiarity with other PBIS strategies. I would be interested in a coaching experience using one of the other strategies because of the success I achieved with OTR." Another teacher added, "Although I enjoyed the experience, I think that my instructional technique and my students would benefit from a longer coaching intervention. I wish this study could be year long." The final teacher included in the study commented that "The functionality of the digital camera was an issue, at times teachers had to share a camera." He added, "Overall, I really enjoyed being a part of the study and learned a great deal about my practice and how to improve it."

Discussion

The purpose of this study was to investigate the effects of PD along with virtual coaching on special education teachers' increase in an evidence-based practice, OTR. This study also sought to investigate the effect increased OTR would have on students with E/BD who display

chronic off-task behavior. In general, the findings indicated that PD and virtual coaching resulted in a change in teacher OTR but not student on-task behavior.

Teacher Results

A functional relation was observed between the implementation of PD and virtual coaching and an increase in teacher given OTR. All three teachers' data show an immediate change in level after PD and coaching. One teacher showed high levels of OTR during baseline during certain classroom activities, such as game playing and reviewing homework on the board, and low levels during seatwork. With the onset of PD and virtual coaching, his data path became less variable. Although the teachers' baseline data were not always consistent, all teachers met their OTR goal on each intervention session. The findings of this study are consistent with previous research, indicating that PD and teacher coaching can have an immediate effect on the implementation of evidence-based strategies (Bethune & Wood, 2013; Kretlow, Cooke, & Wood, 2012; Simonson et al., 2010; Sutherland et al., 2000). Like other successful studies, this study used PD and teacher coaching as a package; therefore, these positive results were not surprising. However, it was unclear whether such positive results could be maintained if coaching was delivered through a videoconferencing content. Not only were teachers able to learn and use the targeted practice, but teacher feedback also indicated that virtual coaching was an acceptable.

Importantly, teachers also noted that they appreciated the flexibility offered by videoconferencing. All teachers participated in PD and virtual coaching before or after school hours, as mandated by one school principal. Two teachers were housed at the school with this principal.

For continuity of intervention, the researcher only worked with all three teachers on this schedule. Teachers were willing to participate on this schedule and voiced that it was very convenient, even coaching on the weekends from home or on a weekend trip in one instance. That said, it cannot be assumed that all teachers would be willing to participate in PD and coaching during off hours. Technology allowed for this flexibility and for teachers to receive useful information on their own schedule and without interfering with school day commitments.

One maintenance data point was collected one week after the cessation of the coaching intervention. All teachers met their intervention goal during maintenance. Maintenance data and responses to the social validity surveys suggest that teachers felt like this was a worthwhile intervention and would continue to use it without coaching. Similar studies that collected maintenance data 5-7 days after the conclusion of intervention have shown that teachers maintain evidence-based strategies at goal levels after coaching ended (Bethune & Wood, 2013; Codding, Feinberg, Dunn, & Pace, 2005; Duchaine et al., 2011). Other researchers have shown positive maintenance results as far as three months after the intervention (Miller, Harris, Watanabe, 1991; Thompson, Marchant, Anderson, Prater, & Gibb, 2012).

Student Results

Student data did not exhibit the favorable results that teacher data did. While student data showed a demonstration of effect and one replication, the conclusion must be made that there was no functional relation. According to Kratochowill et al. (2010), a demonstration and two replications are necessary to claim a function relation. Similar results have been reported in prior

research studies. For example, Duchaine and colleagues (2011) found that the collection of on-task behavior of random students during observations did not produce a functional relation between the coaching of behavior specific praise statements and on-task behavior of students. Gregory et al. (2014) only saw a modest shift in student engagement after implementing the My Teaching Partner – Secondary program intervention.

If student data in Ms. Harold's class had been stable, a functional relation could have been observed. The students in Ms. Harold's class demonstrated significant behavior difficulties during baseline and intervention. Her classroom management style may have played a role in her students' variable on-task behavior. Ms. Harold presented loud and sometimes negative interactions with her students, and they did not respond well to this discipline style (Newberry & Davis, 2008). Although baseline data were variable, the students in Mr. Winters and Dr. Robinson's classes showed an increase in trend with the onset on teacher given OTR. These results suggest that OTR is an intervention that could have more successful results with students who display less challenging behaviors or with teachers who display more positive interactions with students.

Social Validity

Teachers reported that OTR was an appropriate intervention to respond to their students' off-task behavior. Moreover, they reported that they would continue to use OTR in their classrooms and that it would be beneficial to students both academically and behaviorally. Overall, teachers strongly agreed that OTR is effective in changing students' challenging behaviors. Positive social validity for OTR in coaching studies has been reported in previous studies. For exam-

ple, Simonsen, Meyers, and DeLuca (2010) reported that overall, teachers rated that the intervention increased appropriate behaviors in their classrooms, was relatively easy to implement, and should be recommended to other schools for teacher training. Teachers also reported that virtual coaching would be an acceptable form of PD and did not take more time than they were willing to spend to improve their practice. They agreed that virtual coaching would be an effective way to improve a variety of classroom practices and that they would recommend it to other teachers.

One teacher reported that he had some complications with the video recording technology. At times the teacher reported that his camera would not record or would cut off during the 15 minute session and the session would end up in two or three sections. The teacher also reported that uploading to the encrypted site often took a long time and was inconvenient. It is recommended that researchers consider investing in high quality video equipment. Although teachers received training on the operation of the equipment, refresher training on equipment use would be beneficial to teacher participant and researcher. Moreover, such technology-based interventions may be restricted in contexts that do not have reliable networking capabilities. Although access to the internet is constantly growing, there are still many areas that continue to lack consistent, high quality accessibility (NCES, 2007).

Limitations and Implications for Future Research

Several limitations in this study are important to discuss. First, the three teacher participants in this study were housed in two different schools. Ideally, all teachers involved would be housed at separate schools. The two teachers housed in the same building were asked not to dis-

cuss the intervention until intervention was complete. The staggered implementation helped to control for contamination, maturation, and history, but using teachers in different buildings would reduce the possibility of training carryover.

Second, teachers voiced in the social validity survey that the intervention was not long enough. Although the intervention met standards for single case research (Kratochwill et al., 2010), teachers felt that more time receiving virtual coaching could have produced more time to introduce different methods to increase OTR, such as choral responding, use of individual white boards, yes/no popsicle sticks, and other ways to engage students to respond.

Third, a classroom assessment tool could be used before baseline begins to assess the teacher's classroom interactions, such as the *Classroom Assessment Scoring System – Secondary* (CLASS-Secondary) (Allen, Pianta, Gregory, Mikami, & Lun, 2011). The CLASS – Secondary is an observational teacher assessment tool that captures teacher behaviors that describe the classroom climate, such as positive and negative teacher/student interactions. Armed with information from a measure like the CLASS-Secondary, the researcher could make both design and implementation decisions about how the intervention may be affected by the teacher's existing classroom management style.

Fourth, future researchers should consider collecting data on academic information such as the number of correct responses in addition to on-task behavior. Adding this number of correct responses to a study of this nature would require the researcher to collect permanent products from students to score correct answers. Data collected on correct responses may give teachers an

idea of how prepared students are for upcoming classroom assessments. Teachers may also use this information to group students according to ability for re-teaching and enrichment.

Finally, studying students with disabilities other than E/BD and even students without disabilities may give important information on how OTR works with other populations. Duchaine and colleagues' (2011) intervention was conducted in a co-taught classroom with students with and without disabilities and did not show a functional relation, but they used a random sampling of students. If researchers concentrate on a particular disability or challenging behavior, the field could learn more about what kinds of students are helped the most by OTR.

Conclusion

The increased OTR for all three teachers using PD along with virtual teacher coaching indicates that the intervention may be useful in offering instruction to students with E/BD who display chronic off-task behavior, although this study failed to show a functional relation in student on-task behavior. OTR is an evidence-based practice, and further investigation may lead researchers to know what population receives benefits the most from its use and would be valuable to special education. Social validity measures support the study's findings that teachers also report that virtual coaching and OTR are worthwhile interventions to be used to improve teacher practice and student behaviors. The use of technology frees teacher participants to improve practice at their own pace and at times convenient for them.

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Table 5

Participant Demographic Information

Participant	Highest Degree or Grade	Certification	Years of Teaching Experience	Gender
Ms. Harold	Bachelors	Special Education	2	Female
Anthony	7th			Male
Jordan	7th			Male
Mr. Winters	Masters	Special Education	2	Male
Elijah	8th			Male
Emily	8th			Female
Dr. Roberts	Doctorate	Special Education	10	Male
Simon	8th			Male
Michael	8th			Male

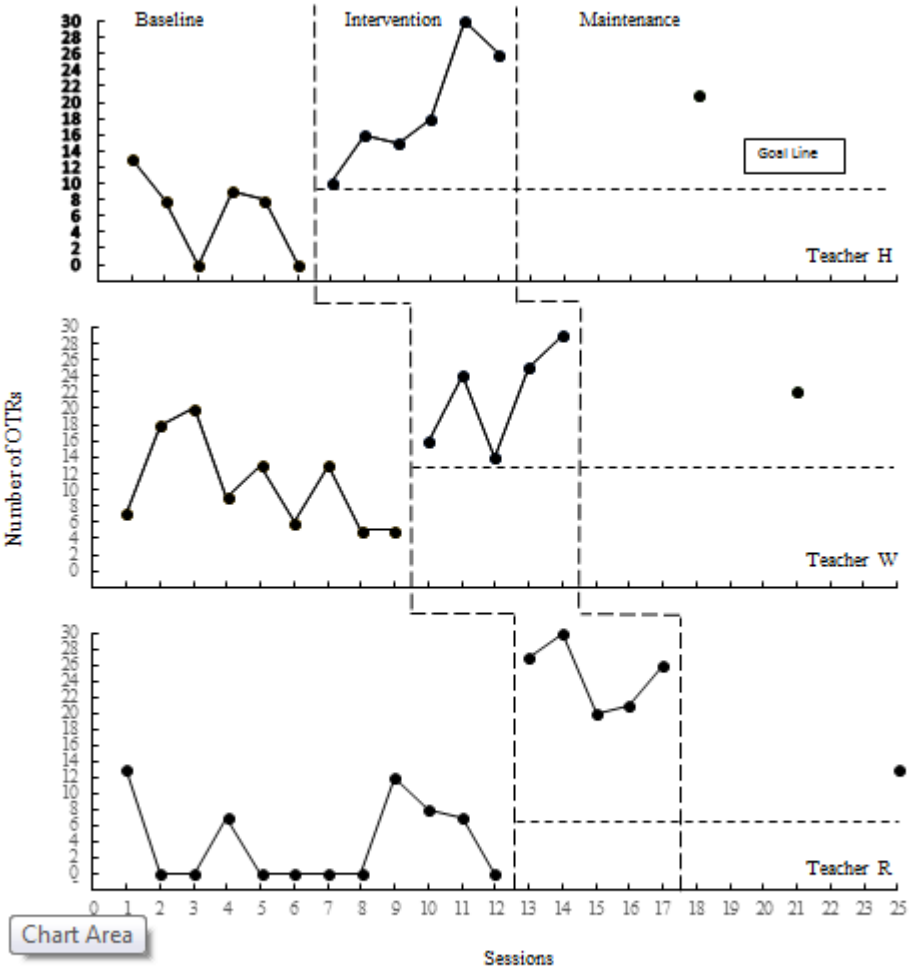

Figure 1. Student participants' graphs

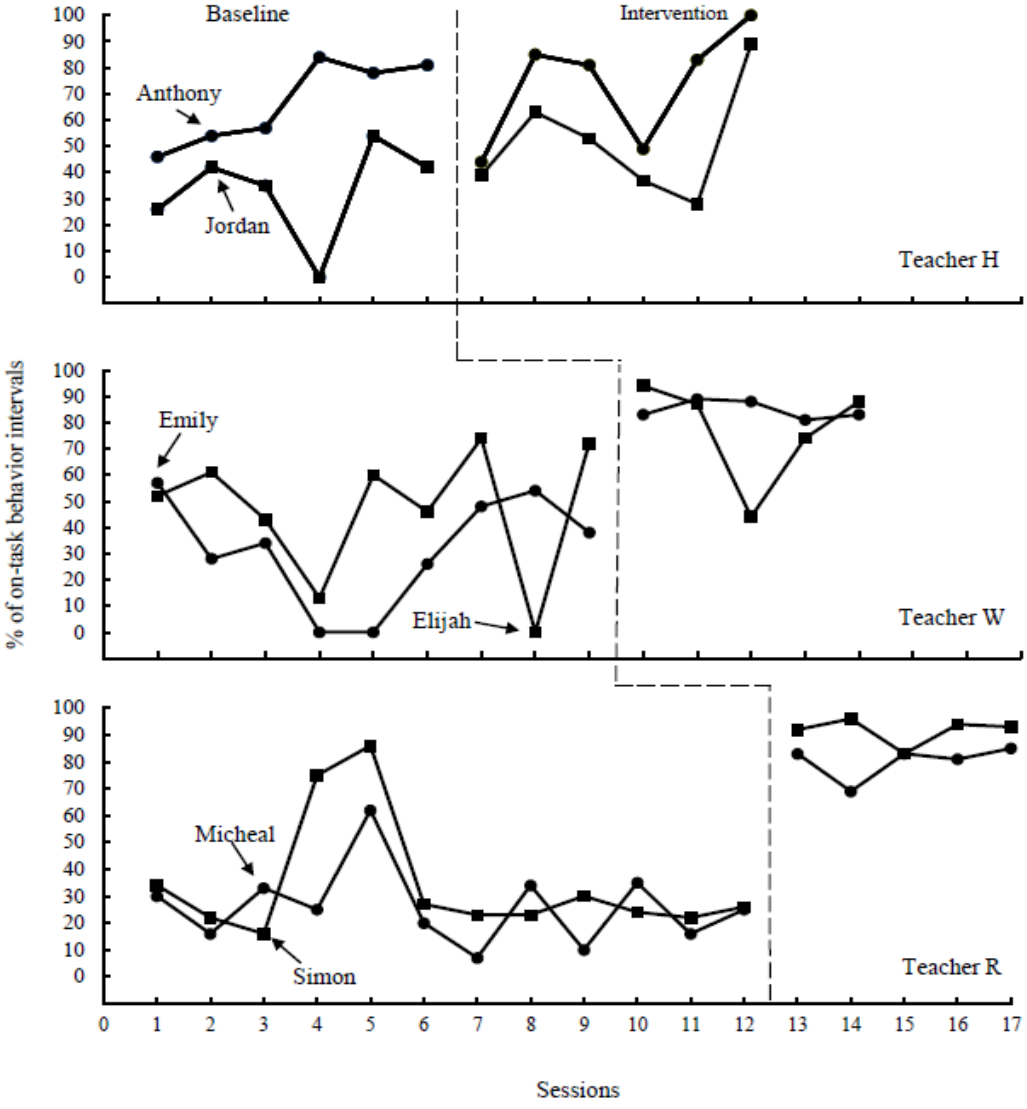

Figure 2. Student participants' graphs

APPENDICES

Appendix A

Frequency of Opportunities to Respond Recording Sheet

Teacher: _____**Date**:_____ **Start Time**: _____ **End Time**: _____
Person recording data: _____ Primary_____ IOA_____
Target Behavior: Opportunities to Respond
Behavior Definition: An opportunity to respond is operationally defined as a teacher asking a question of an individual or group that necessitates a specific response, or is open ended with the purpose of having a student describe his/her thought process. To be counted, the question must seek an explicit response that is linked to the E/LA lesson being observed.
Directions: For 15 minutes use a slash mark (/) each time the teacher offers an OTR.

How to Record: Observer will use slash marks to record each OTR observed.

	Notes

Total number of OTR observed_____ Goal OTR_____

Total Agreement IOA Formula:

Lower Total _____ / Higher total _____ * 100% = _____

Appendix B
On-Task Interval Recording Sheet

Student: _____**Date**:_____ **Start Time**: _____ **End Time**: _____
Person recording data: _____ **Target Behavior**: On-Task Behavior
Behavior Definition: Looking at the teacher while she is talking; talking to the teacher about the assignment; talking to other students about the assignment during approved group work, or looking at and working on the assignment
How to Record: For a one minute recording period, mark each box with (x) for on-task intervals and (0) if the student did not remain on-task for the entire interval.

	10 s	20 s	30 s	40 s	50 s	60 s	Notes
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

Total Intervals of on-task behavior observed____/ Total possible intervals ____ X 100% = _____
Total IOA Formula: Agreement divided by agreement plus disagreement times 100%
A /A + D X 100% =
____/____+____= ___ X 100% = ___%

Appendix C

Professional Development Treatment Fidelity Checklist

Teacher: _____

Date: _____Beginning Time: _____ End Time: _____

Data Collector Name_____

	yes	no
Professional Development		
Professional development delivered in a one-on-one environment		
Overview of Opportunities to Respond (OTR) – Delivered as Lecture		
Researcher describes evidence-based benefits of OTR– Delivered as Lecture		
Researcher gives examples of ways to increase OTR– Delivered as Lecture		
Teacher views at least 2 videos of OTR used in a classroom		
Researcher and teacher role play OTR		
Definition of Teacher Coaching given to teacher by researcher		
Critical components of coaching were identified		
a) highly engaged, instructive training session(s)		
b) follow-up observations		
c) specific feedback to include sharing of observational data and self-evaluation		
Researcher discussed the specifics of virtual teacher coaching with vide-oconferencing		
a) Use of videoconferencing technologies		
Teachers had opportunities for questions following the 90 minute training session		
Total yes /13		

Appendix D

Virtual Coaching with Videoconferencing Treatment Fidelity Checklist

Teacher: _____

Date: _____Beginning Time: _____ End Time: _____

Data Collector Name_____

	yes	no
Coaching The coach:		
How have you felt about the last 2 sessions?		
Tell me about your strengths during these sessions.		
Tell me about your weaknesses during these sessions.		
The student(s) on-task behavior for the last 2 sessions…		
The OTR that you delivered were as follows…		
You delivered _____ number of OTR		
Your goal OTR was _____		
You could increase OTR by…		
Remember, your goal OTR for the next 2 sessions is ____.		
Do you have any questions or concerns?		
Total yes /10		

Appendix E

Social Validity – Opportunities to Respond Intervention

The purpose of this questionnaire is to obtain information that will aid in the selection of classroom interventions. Teachers of students with behavior problems may use these interventions. Please circle the number which best describes your agreement or disagreement with each statement.

Teacher: _____ Date: _____

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
Most teachers would find OTR appropriate for behavior problems.	1	2	3	4	5	6
I would NOT suggest the use of OTR to other teachers.	1	2	3	4	5	6
Most teachers would find OTR suitable to increase on-task behavior.	1	2	3	4	5	6
I would be willing to use OTR in the classroom setting.	1	2	3	4	5	6
OTR would NOT be appropriate for a variety of children.	1	2	3	4	5	6
OTR is consistent with things I have used in classroom settings.	1	2	3	4	5	6
OTR was a fair way to handle the child's problem behavior.	1	2	3	4	5	6
OTR is reasonable for the off-task behavior described.	1	2	3	4	5	6
I liked the procedures used in this intervention.	1	2	3	4	5	6

Student 1	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
Increased OTR would be an acceptable intervention for the child's problem behavior.	1	2	3	4	5	6
The child's behavior is severe enough to warrant OTR.	1	2	3	4	5	6
OTR would result in negative side effects for the child.	1	2	3	4	5	6
OTR was a good way to handle this child's behavior problem.	1	2	3	4	5	6
OTR would prove effective in changing the child's problem behavior.	1	2	3	4	5	6
Overall, OTR would NOT be beneficial for the child.	1	2	3	4	5	6

Appendix F

Social Validity - Virtual Coaching

The purpose of this questionnaire is to obtain information that will aid in the selection of professional development techniques. Please circle the number which best describes your agreement or disagreement with each statement.

Date: _____

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. Coaching to increase OTR in the classroom is an acceptable form of teacher training.	1	2	3	4	5	6
2. The time spent on virtual coaching was NOT acceptable.	1	2	3	4	5	6
3. Virtual teacher coaching using video conferencing is an acceptable form of professional development.	1	2	3	4	5	6
4. I would recommend virtual coaching to other teachers.	1	2	3	4	5	6
5. I would NOT be willing to participate in virtual coaching to develop another instructional skill.	1	2	3	4	5	6
6. Virtual coaching would be effective to improve a variety of teaching practices.	1	2	3	4	5	6
7. Virtual coaching would NOT cause negative effects in my teaching practices.	1	2	3	4	5	6

What else would you like to share about your coaching/professional development experience?