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Implementation Planning as a Proactive Approach to Treatment Integrity Maintenance of an Academic Intervention

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Treatment Integrity Maintenance of an Academic Intervention

Justin Richard Byron, PhD

University of Connecticut, 2016

Reform in educational policy and federal legislation has placed an emphasis on data collection pertaining to student outcomes in the academic setting. In response, school systems have shifted to multi-tiered frameworks that utilize varying levels of support through the implementation of evidence-based interventions. Data-based decision making determined by student success within these interventions is, at best, inconclusive without the collection of treatment integrity data. However, present evidence-based methods of improving treatment integrity are reactive and also require time and staffing demands that may not be feasible in the school setting. The present research aimed to investigate Computer-Guided Implementation Planning as an effective and more feasible option to consider when supporting implementer levels of treatment integrity. Teachers were asked to implement the academic intervention Cover, Copy, and Compare with nominated students having difficulty with mathematics fluency. Following the completion of Computer-Guided Implementation Planning, teachers consistently demonstrated substantially improved levels of implementation adherence and moderately improved levels of implementation quality. They also found Computer-Guided Implementation Planning to be socially valid. Improved levels of treatment integrity were found to align with improved levels of fluency for the majority of students who participated. Implications and future directions related to the present findings are discussed below.

Implementation Planning as a Proactive Approach to
Treatment Integrity Maintenance of an Academic Intervention

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B.A., University of Connecticut, 2009

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2016

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Justin Richard Byron

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APPROVAL PAGE

Doctor of Philosophy Dissertation

Implementation Planning as a Proactive Approach to
Treatment Integrity Maintenance of an Academic Intervention

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2016

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Chapter I: Introduction

Statement of the Problem

Education is presently in an era in which increasing standards and federal legislation require that educational practices be evidence-based (Shernoff & Kratochwill, 2007). School systems have responded by adopting multi-tiered frameworks such as response to intervention (RTI), which aims to improve student outcomes through evidence-based instruction and progress monitoring. Data-based decision making conducted by school staff focuses on student progress to determine appropriate levels of support required to maximize learning. Evidence-based interventions are utilized to provide assistance for students who are determined to require additional support

However, being knowledgeable of an intervention and its use does not guarantee accurate implementation (Wickstrom, Jones, LaFleur & Witt, 1998). The collection of treatment integrity (TI) data, in combination with student outcome data, is essential to drawing valid conclusions about intervention effects (Shaddish, Cook & Campbell, 2002). Treatment integrity can be defined as the extent to which the intervention components were implemented in a consistent manner by an interventionist trained to deliver the intervention (Sanetti & Kratochwill, 2009). Despite its importance, TI has been largely ignored (Cochrane & Laux, 2008; Gresham, 1989; Noell & Gansle, 2006; Sanetti, Gritter, & Dobey, 2011). This is especially concerning as research suggests that high levels of TI may result in better student outcomes (e.g., Noell, Grasham, & Gansle 2002) whereas lower levels of TI may result in an intervention being less effective (Wilder et al., 2006) and less predictable (e.g., Noell et al., 2002).

Although the necessity of collecting TI data and implementing with high levels is apparent, to date there is only one well-researched strategy for increasing low TI of classroom-based interventions: performance feedback (e.g., Coddling, Livanis, & Vaca, 2008; Fallon, Collier-Meek, Maggin, Sanetti, & Johnson, 2015; Noell, Witt, Slider, Connell, Gatti, Williams et al., 2005). However, performance feedback is reactive in nature (Sanetti, Kratochwill & Long, 2013) and is only able to be utilized after the teacher demonstrates difficulty with implementation. Student outcomes may already have been negatively affected prior to the use of performance feedback. Furthermore, it requires significant time and staffing resources in schools, where time and staff are already strained (Sanetti, Fallon & Collier-Meek, 2013). There exists a significant need for alternative options to increase levels of TI. Ideally, such methods would be proactive in nature, to avoid negative consequences of reactive methods, and require less time and staffing resources to increase feasibility.

Purpose of the Study

Implementation Planning is a method with initial support for increasing and maintaining high levels of TI (Sanetti, Collier-Meek, Long, Byron, & Kratochwill, 2015). Based on the Health Action Process Approach (HAPA, Schwarzer 1992), Implementation Planning involves the creation of both an action plan and coping plan in advance of the onset of the intervention to provide teacher implementation support. Teachers devise both a structured plan of how all intervention components will be accurately implemented as well as strategies to overcome any potential barriers. Unlike performance feedback, Implementation Planning is proactive and does not require poor performance prior to completion. Furthermore, the Computer-Guided Implementation Planning (CGIP) used in

the present research minimizes the time and staffing demands that limit the feasibility of performance feedback.

In initial studies, Implementation Planning has effectively increased the implementation of individualized behavior intervention plans (Sanetti, Collier-Meek, Long, Kim & Kratochwill, 2014) and classroom management strategies. The present study aimed to utilize CGIP alongside the academic intervention Cover, Copy, and Compare (CCC). Although CCC has been used across a variety of subject areas (e.g., Skinner, Belfiore, & Pierce, 1992; Skinner, Turco, Beatty, & Rasavage, 1989; Smith, Dittmer, & Skinner, 2002), the present study utilized it as a way to improve the mathematics fluency ability of students currently having difficulties. Therefore, the purpose of this study was to extend the limited research base on the effectiveness of Implementation Planning in increasing and maintaining teacher levels of TI. It also aimed to expand on previous literature by using CGIP to support implementation of an academic intervention (i.e., CCC).

Chapter II: Review of the Literature

A quarter century ago, Gresham (1989) identified TI for the field of education as “a fundamental aspect of behavior change” (p. 37). Over the years, TI has been known by a variety of names, including treatment fidelity (Moncher & Prinz, 1991), program integrity (Dane & Schneider, 1998), and procedural reliability (Billingsley, White, & Munson 1980). At its most basic level, TI is the extent to which treatment (i.e., intervention) is delivered as intended (Sechrest & Redner, 1979; Sechrest, West, Phillips, Redner, & Yeaton, 1979). However, research over the past few decades has shown TI to be of much greater complexity than the simple adherence to an initial treatment plan.

Defining Treatment Integrity

Despite discussion in the professional literature for decades, researchers still have a long way to go before agreement on a definition of TI in education is reached (Sanetti & Kratochwill, 2009). Multiple terms used to describe TI (e.g., treatment fidelity, intention integrity, procedural reliability) may impede development of knowledge across fields and progress toward defining key elements (Mowbray, Holter, Teague, & Bybee, 2003; Sanetti & Kratochwill, 2009). Early definitions refer to the degree to which the intervention or consultation is implemented as intended (Dusenbury et. al 2003; Gresham, 1989; Yeaton & Seachrest 1981); however, TI is now widely recognized to be a multi-dimensional construct (Sanetti & Kratochwill, 2009). Researchers have suggested that early definitions may be too simplistic to provide an accurate description of TI (Sanetti & Kratochwill, 2009). Numerous dimensions have been proposed (e.g., participant responsiveness, exposure, program differentiation) to provide a more accurate picture of the depth of TI. A number of these proposed models are discussed below.

Waltz, Addis, Koerner and Jacobson (1993) addressed TI with regards to adherence and competence used in psychotherapeutic practices. More specifically, they hypothesized four types of behavior that corresponded with adherence to treatment: (a) unique and essential, (b) essential but not unique, (c) acceptable but not necessary, and (d) proscribed. Although initially applied to psychotherapy, the purpose of these behaviors can be translated to the educational setting using a simple intervention as an example. Consider a timed, general math fluency intervention using worksheets specific to the intervention. Using the adherence behavior recommendations outlined above, a unique and essential behavior would be the use of the worksheets designed specifically for that intervention. An essential but not unique behavior would be the accurate timing of the intervention; although essential to the intervention, it is a component of many academic interventions. An acceptable but not necessary behavior would be the use of a weekly reward system based upon student achievement using the intervention. Rewards would provide incentive for students to perform well, but the intervention could be implemented without a reward system. A proscribed behavior would involve providing the student with hints in order to inflate the accuracy of responses. Additionally, the competence of the therapist translates to the ability of the teacher or other implementer to provide intervention to the student or group both accurately and effectively. School personnel unable to either implement as intended or provide intervention as consistently as recommended hinder the effectiveness of the intervention.

Dane and Schneider (1998) identified five aspects of TI in the clinical psychology prevention literature: (a) exposure, (b) adherence, (c) quality of delivery, (d) participant responsiveness, and (e) program differentiation. Exposure includes the number of

implementation sessions (e.g., days of intervention for a daily fluency intervention), the length of those sessions, and the frequency of those sessions. Adherence was defined similarly to most early definitions of TI in education, as “the extent to which specified program components were delivered as described in program manuals” (p. 23). Quality of delivery was described as aspects not directly related to implementation (e.g., implementer preparedness, attitude toward intervention). Participant responsiveness refers to the participation and enthusiasm of the individual targeted by the intervention (i.e., typically students). Last, program differentiation is a manipulation check to ensure that participants in the experimental condition only receive the planned interventions. Dane and Schneider’s identification of TI dimensions provided a foundation upon which many researchers built.

Power, Blom-Hoffman, Clarke, Riley-Tillman, Kelleher and Manz (2005) expanded on the work of Dane and Schneider (1998). They categorized the five proposed dimensions of TI into content and process variables. Content is defined as how *much* of the intervention was implemented, including adherence, exposure, and program differentiation. Process is defined as how *well* the intervention was implemented, including quality and participant responsiveness.

Jones, Clarke and Power (2008) also built upon the work of Dane and Schneider (1998) with their conceptualization of TI. Dimensions of TI are categorized for either the client participant or the therapist/provider, similar to the teacher and student relationship when implementing interventions in the classroom. Therapist dimensions include adherence and program differentiation, but add therapist competence, similar to the competence hypothesized by Waltz and colleagues (1993). Adherence is also included for

the client participant, as is program differentiation. The dimension of exposure is adapted to participant dosage received, defined by the *percentage* of sessions attended/engaged in, rather than a simply quantity of sessions.

Noell (2008) addresses TI within the behavioral consultation model (Bergan & Kratochwill, 1990), which is typical of intervention implementation in school settings. TI is defined generally by Noell (2008) as “the accuracy of implementation of the independent variable in an experimental study” (p. 324). He divides TI into two concepts: consultation procedural integrity (CPI) and treatment plan integrity (TPI). CPI addresses the actions taking during the consultation process; on how closely they are implemented as designed in both research and practice. It is suggested that CPI be referred to as the independent variable being manipulated when applied to research. TPI addresses the treatment plan created during the consultation process; it is the extent to which the treatment plan is implemented as designed, but as it is not under direct experimental control during research, should be considered the dependent variable. Noell notes that TPI has perhaps inaccurately been considered to be the independent variable in the past, but may be of more use being considered “the most immediate and direct outcome of consultation” (p. 324).

Century, Rudnick, and Freeman (2010) built upon the work of Mowbray and colleagues (2003) to create a framework for measuring fidelity of implementation (FOI) focused on both a structure-process approach as well as the identification of critical components. Century and colleagues (2010) identified two categories of critical components: structural and instructional. Furthermore, structural critical components were divided into procedural (what to do) and educative (what needs to be known),

whereas instructional components were broken down into pedagogical (expected behavior and interactions of teacher during implementation) and student engagement (expected behavior and interactions of students during implementation). Structural components focused on the intervention developers' vision of the framework and design of the intervention. Instructional components focused on participants' (i.e., teachers and student) actions during implementation.

The above models provide a conceptual basis to utilize when attempting to identify what TI is and how it is best measured. They document a need for further research to both clarify and determine quantification of TI dimensions. Over 20 components have been proposed to be relevant to the construct of TI (Sanetti & Kratochwill 2009). Although numerous dimensions have been proposed, adherence and quality are two dimensions that are widely agreed upon (Sanetti & Kratochwill, 2009) and have initial empirical support for improving decision-making (Hirschstein, Edstrom, Frey, Snell, & Mackenzie, 2007; Sanetti & Fallon, 2011). Adherence is defined as the extent to which an intervention step is implemented as originally intended and is aligned with early definitions of TI. Quality is defined as how well each intervention step has been implemented (Durlack & Dupre, 2008). Overall, Sanetti and Kratochwill (2009) define TI as "the extent to which essential intervention components are delivered in a comprehensive and consistent manner by an interventionist trained to deliver the intervention" (p. 448). This definition helps to address the complexity of current understanding of TI. It is this definition with which we will move forward.

Importance of TI in Practice and Applied Research

Consideration of TI data in combination with student outcome data is vital for drawing valid conclusions regarding interventions effects (Shadish, Cook, & Campbell, 2002). Moncher & Prinz (1991) noted that without proper TI documentation, both the internal and external validity of determining treatment effectiveness are threatened. Concerning internal validity, student changes coinciding with intervention participation cannot confidently be attributed to the intervention if documentation of implementation does not exist. Furthermore, a lack of student progress without TI data makes it impossible to distinguish between an ineffective intervention and an effective intervention that was not implemented properly. In terms of external validity, interventions poorly described in the literature hinder their evaluation and replication.

It is widely agreed that the collection of TI data is necessary when conducting prevention or intervention research in the schools (National Association of School Psychologists [NASP], 2005). If TI data were low, a lack of improvement in student outcomes would not be surprising, and could be attributed to inaccurate (or complete lack of) implementation. If the TI data were high, a lack of improvement in student outcomes would require further analysis. Results of research evaluating the level of TI with which school-based interventions are implemented consistently demonstrate that a majority of classroom-based interventions are implemented below acceptable levels within 0-10 days of training (Noell, 2008; Sanetti & Kratochwill, 2009). These data are especially concerning as research results also indicate that low TI generally leads to poorer student outcomes (Biggs, Vernberg, Twemlow, Fonago, & Dill, 2008; Wilder, Atwell, & Wine, 2006).

Levels of Treatment Integrity in Practice and Applied Research

Applied research. Although TI is an essential component of interpreting the success of an intervention, it is often overlooked or forgotten (Gresham 1989; Yeaton & Sechrest 1981). As scholars in education and psychology recognized the importance of TI, they called for it to be evaluated (e.g., Yeaton & Sechrest, 1981). Peterson and colleagues (1982) documented that only 16% of studies published in the *Journal of Applied Behavior Analysis* from 1968-1980 referenced the integrity of the intervention. Additionally, it was found that many studies lacked documentation of either the independent variable under examination or the intervention being put into place. Moncher and Prinz (1991) conducted an evaluation of treatment outcome studies from the major journals in four domains: clinical psychology, behavior therapy, psychiatry, and marital and family therapy. Their findings indicate that the majority of articles reviewed did not take TI into consideration when reporting findings. Gresham, Gansle, Noell, Cohen, and Rosenblum (1993) reviewed research on behavioral interventions in school settings between 1980-1990. Results found only 14% provided TI data, while another 10% mentioned that TI was monitored but provided no data to support this claim.

Despite increased attention to the importance of documenting TI, recent research has found the prevalence of this problem to be ongoing. Sanetti and colleagues (2011), reviewed TI data in four major school psychology journals between 1998 and 2005. They cite a variety of reviews referencing a lack of TI documentation in the following areas: applied behavior analysis, learning disabilities, anger management, autism, alternative communication, prevention programming, and psychotherapy (see Sanetti et al., 2011 for a brief review). Reported percentages of TI documentation range from 3.5% in

psychotherapy (Perepletchikova, Treat, & Kazdin, 2007) to 31% in prevention science (Dane & Schneider, 1998). Such levels are alarming considering Shapiro's (1987) assertion that the documentation of TI is imperative to research both practically and ethically. Sanetti and colleagues (2011) indicate that almost two thirds of reviewed studies in school psychology either quantified TI in some way, or at the very least reported that it was monitored. Although this percentage is encouraging when compared to other fields, and an increasing trend over time was found regarding TI verification, over a third of the studies reviewed lacked a reference to the monitoring of TI.

To provide clarification as to why such a high percentage of research articles lack TI documentation, Sanetti and DiGennaro (2012) surveyed authors of treatment outcome articles in the field of school psychology on the barriers to implementing TI procedures in research. This issue is especially pertinent to research results, as experimental research is designed to document the effects of an independent variable on the dependent variable (Gresham, 1997). Failure to properly implement the independent variable confounds the ability to accurately interpret results. Sanetti and DiGenarro (2012) found four major barriers to implementing TI procedures: (a) lack of theory and guidelines on TI procedures; (b) lack of knowledge regarding TI; (c) time, cost, and labor demands; and (d) lack of editorial requirement when submitting to journals. Considering the present and evolving understanding of TI as a construct, these barriers may be expected, and addressed by further developing the knowledge base and emphasizing the importance of TI in the literature.

Practice. Similar to the reporting of TI data in research, practitioners also confront barriers to collecting and reporting TI. Cochrane and Laux (2008) conducted an

online survey of over 800 individuals who held the credential of National Certified School Psychologist. An overwhelming majority (97.6%) reported that they believed TI was important to consider when determining intervention effectiveness and when examining intervention data to determine special education eligibility. Despite this acknowledgement, only 1.9% of respondents indicated that their school-based problem-solving teams measured TI. Additionally, respondents reported that 67.3% of the time team records did not include even a reference to TI monitoring, and only 4.8% of team records contained any quantifiable measure of TI. These results further emphasize the growing concern regarding TI documentation.

Cochrane and Laux (2008) reported four main reasons that respondents had difficulties with TI. First, time was reported as a common barrier, particularly in reference to lacking the time to collect TI data over progress monitoring, and frustration over implementation sometimes not occurring at all. Next, a lack of understanding of TI's importance among fellow staff members (e.g., teachers, principals) was noted, suggesting that professional development may aid in promoting the importance of TI documentation. Third, many reported that district policies or administrative priorities did not provide adequate support or were obstacles themselves. Finally, a lack of teacher acceptance was reported as a common barrier. While the barriers mentioned above are all of great concern, similar to those barriers documented by research, it seems that dissemination of knowledge of what TI is and its importance to interpreting effective classroom interventions may provide relief for the above concerns.

TI Promotion

To date, there is only one well-researched strategy for increasing low TI of classroom-based interventions: performance feedback (e.g., Coddling, Livanis, & Vaca, 2008; Fallon, Collier-Meek, Maggin, Sanetti, & Johnson, 2015; Noell, Witt, Slider, Connell, Gatti, Williams et al., 2005). Performance feedback involves monitoring a behavior of interest followed by providing feedback to the individual regarding the behavior (Noell et al., 2005). A meta-analysis of the effectiveness of performance feedback on teacher TI in the single-case design literature provides further support (Solomon, Klein & Politylo, 2012). Although an important tool for addressing TI of school-based interventions, performance feedback is a reactive approach (i.e., it is typically provided once an implementer demonstrates low levels of TI) and there are limited data regarding the feasibility of its implementation by school-based practitioners (Sanetti, Fallon, & Collier-Meek, 2011). Performance feedback requires a school psychologist or other qualified staff to schedule regular meetings with teachers, collect and graph implementation data, interpret results, and provide feedback. The time and staffing resources required to accurately implement performance feedback in applied settings puts a strain on systems with little time and staff to spare. Due to these limitations, researchers are developing and evaluating proactive, feasible strategies for promoting high levels of TI, such as Implementation Planning.

Implementation Planning: Emerging Use in Education

Implementation Planning, based on a theory of adult behavior change (Health Action Process Approach [HAPA], Schwarzer, 2008), is a process of defining an intervention, planning the logistics of its implementation, and identifying and planning

for barriers to implementation. Implementation Planning aims to bridge the gap between teacher intention to implement a classroom intervention, and demonstration of the behavior required to carry out implementation with high levels of TI. Additionally, Implementation Planning in applied settings aims to be proactive, avoiding the need for teacher implementation levels to decrease prior to providing implementation support. Proactively preventing such levels allows students to participate in interventions that continue to be executed with high levels of TI, avoiding low levels of implementation that could lead to poorer student outcomes (Biggs et al., 2008; Wilder, Atwell, & Wine, 2006). A summary of the (a) theoretical basis for Implementation Planning, (b) process of completing Implementation Planning, and (c) results of the initial evaluations of Implementation Planning are provided next.

Theoretical basis for implementation planning. The HAPA (Schwarzer, 1992), the theoretical basis of Implementation Planning, originates in the health psychology field and focuses on behavior change, particularly for individuals with chronic illness or disability. It distinguishes between goal setting and goal pursuit (motivational and volitional phases, respectively; Schwarzer, Lippke, & Luszczynska, 2011).

The HAPA focuses on the motivation of the individual to engage in behavior change, and progresses to identifying the supports needed for the change to occur. According to the HAPA, an individual must intend to change their behavior before doing so. The process of developing a behavioral intention is the focus of the motivational phase. Specifically, to develop a behavioral intention, the HAPA posits that an individual must have (a) adequate action self-efficacy (i.e., be confident in being able to perform a behavior), (b) positive outcome expectancies (i.e., beliefs about the outcomes of

alternative behaviors), and (c) perception of a problem (i.e., acknowledgement that a problem exists and must be changed).

A behavioral intention is insufficient to result in behavior change, however. Knowledge of how to perform the desired action, as well as the necessary tools to maintain such behavior are also required, and are “not achieved through a single act of will” (Schwarzer, 2008). Gollwitzer (1999) emphasized the importance of planning to address these requirements. Additionally, individuals often form intentions related to changes in behavior, yet fail to act (Orbell & Sheeran, 1998). Thus, the first stage in the volitional phase is completion of an action plan. An action plan can be defined as “a post-intentional process that links goal-directed responses to situational cues by specifying when, where, and how to act in accordance” (Sniehotta, Scholz, & Schwarzer, 2006). Following action planning, a coping plan is created. A coping plan can be defined as “a barrier-focused self-regulation strategy. It represents a mental link between anticipated risk situations and suitable coping responses” (Sniehotta, Schwarzer, Scholz, & Schüz, 2005). Individuals who create action plans on their own or are instructed to do so are more likely to achieve their intentions (Gollwitzer, 1999; Sniehotta, Scholz, & Schwarzer, 2006). Research results suggest that both action and coping planning should be used when attempting to change behavior and maintain the change across time (Sniehotta, Schwarzer, Scholz, & Schüz, 2005; Wiedemann, Lippke, Reuter, Ziegelmann, & Schwarzer, 2011).

It is not enough for an individual to simply plan to change behavior; they must demonstrate the new behavior. That is, following planning, an individual must: (a) initiate the behavior change, (b) maintain the change, and (c) recover from a potential

disruption in behavior to re-initiate and maintain the same levels of behavior prior to the disruption. According to the HAPA, an individual must have adequate maintenance self-efficacy (i.e., one's confidence in being able to maintain performing the new behavior), and recovery self-efficacy (i.e., one's confidence in being able to re-initiate and maintain high levels of the behavior change should a disruption occur) to sustain a behavior across time.

Implementation planning completion. Implementation Planning is the combination of action and coping planning, applied to intervention implementation in an educational environment. Following the selection of an evidence-based intervention considered appropriate for the targeted student(s) and area(s) of concern, action planning starts by first breaking down the intervention into individual steps required for implementation. The breakdown of steps must include not only those steps required for completion during the intervention itself, but also actions necessary both prior to and following implementation. For example, a student required to complete a daily literacy worksheet as part of an intervention would require materials from the implementer such as a writing utensil and the actual worksheet. Furthermore, should progress monitoring be included within the intervention, actions and materials necessary for its completion should also be included as steps of implementation.

Next, implementers decide if a revision of an individual step is necessary to increase the feasibility of implementation within their unique setting. The revision of a step is intended to simply alter the step while maintaining its intended purpose, rather than working to eliminate the original step (i.e., a teacher revises the original step of administering multiplication worksheets from five times per week to three times per

week). Once it is decided whether or not a step is revised, the implementer determines when, where, how often, and for how long each step will be implemented, and identifies the materials required for the intervention step. This process is carried out for each intervention step, until all steps have been reviewed.

Following the completion of action planning, the implementer engages in coping planning. Coping planning involves proactively brainstorming up to four potential barriers to implementation, as well as strategies to overcome such barriers while maintaining implementation. This proactive approach increases the likelihood of behavior maintenance and recovery.

Initial evaluation of implementation planning. Researchers have explored Implementation Planning as a proactive method to support teacher levels of TI. Initial research on Implementation Planning is ongoing. A case study using Implementation Planning for a fifth-grade behavior support plan demonstrated moderately high and relatively stable levels of both adherence and quality related to TI after completion of Implementation Planning (Sanetti, Kratochwill & Long 2013). Furthermore, results of experimental studies demonstrate low and variable levels of adherence and quality during Behavioral Consultation, and adherence increased to moderate-to-high levels and quality increased to perfect levels after Implementation Planning (Sanetti, Collier-Meek, Long, Byron, & Kratochwill, 2015). Although Implementation Planning has been utilized with behavior intervention plans and classroom management, it has yet to be implemented utilizing an academic intervention. The present study aims to further this line of research by both applying Implementation Planning to an academic intervention in the area of mathematics and experimenting with CGIP.

The Importance of Mathematics

Recent years have seen an increased effort toward the identification of evidence-based interventions that produce positive student outcomes. Unfortunately, a gap continues to exist between research and practice of these validated interventions (Kratochwill & Stoiber, 2002).

The importance of mathematics to the present and future success of the United States has never been more apparent. President George W. Bush addressed the need for high-quality mathematics education in his State of the Union Address on January 31, 2006 (Davis & Cavanagh, 2006). Later that year, the United States Congress commissioned the report *Rising Above the Gathering Storm*, further emphasizing the need for high-quality mathematics education (National Academy of Sciences, 2006). In general, students with reading difficulties have received considerably more attention than those with math difficulties (Fuchs & Fuchs, 2002). This is especially concerning considering a significant number of students (6-7%) in the United States display poor achievement in mathematics (Swanson & Olga, 2006). More recently, scores from The Nation's Report Card indicate that approximately three-fifths of 4th grade students are not proficient in math (National Assessment of Educational Progress, 2011).

Proficiency in mathematics has been linked to successful employment and higher income (Rivera-Baltiz, 1992). Furthermore, research suggests a link between mathematics performance and general academic performance (Stading, Williams, & McLaughlin, 1996). The 2009 National Assessment of Educational Progress reported that 18% of fourth graders and 27% of eighth graders scored below the "basic" level (National Center for Education Statistics, 2011). Students who struggle in mathematics

fall behind their peers academically and continue to perform poorly regardless of motivation (Jitendra & Star, 2011).

The National Mathematics Advisory Panel (NMAP) recognized computational fluency (i.e., the speed and accuracy of responding to math facts; Deno & Mirkin, 1977; Haring & Eaton, 1978) as being necessary to mathematics learning (NMAP, 2008). The NMAP report hypothesizes that American students are behind in fluency when compared with students in other countries due to a lack of both quality and quantity of practicing such skills in the classroom. Practice has been identified as a key component of effective interventions targeting math fluency (e.g., Daly et al., 2007).

Difficulties with fluency have been shown to be linked to difficulties with mathematics in general (Gersten, Jordan, & Flojo 2005), successful independent living (Patton, Cronin, Bassett, & Koppel, 1997) and applications related to time and money (Daly, Martens, Barnett, Witt, & Olson, 2007). Research indicates that individuals with high levels of computational fluency are better able to grasp more advanced mathematical concepts (Skinner, Fletcher, & Hennington, 1996). Similarly, students with low levels of computation fluency may choose not to complete assignments due to the extra energy required for success (Billington, Skinner, & Cruchon, 2004) or experience higher levels of anxiety related to the material (Cates & Rhymer, 2003). Together, these results suggest that interventions aimed to improve students' computational fluency are essential.

Increasing Mathematics Fluency: Cover, Copy, Compare

Cover, Copy, and Compare (CCC; McLaughlin & Skinner, 1996; Skinner, McLaughlin, & Logan, 1997) is a teacher-directed, highly effective intervention. Initially used to help improve student spelling performance (McGuigan, 1975; Hansen, 1978), this

strategy has since been used to improve student outcomes in a variety of subject areas, including geography (e.g., Skinner, Belfiore, & Pierce, 1992), science (e.g., Smith, Dittmer, & Skinner, 2002), and mathematics (e.g., Skinner, Turco, Beatty, & Rasavage, 1989).

Procedure of CCC. Skinner and colleagues (1989) adapted the strategy to help students increase fluency with multiplication facts. The procedure includes: (a) providing the student with a worksheet of selected problems, (b) instructing the student how to study the problem and accurately solve it on the left side of the sheet, (c) setting a timer or documenting the student's start time, (d) covering the problem and answer on the left side of the page, (e) writing the problem and calculating its answer on the right side of the page, (f) uncovering the left side of the sheet to compare answers and determine accuracy, and (g) discontinuing the CCC activity once the allotted time has passed. If the problem is copied accurately and the answer provided is correct, students are instructed to move to the next problem. When either the problem or answer is inaccurate, the student is instructed to re-write the correct response.

Empirical support for CCC. CCC has been demonstrated to improve performance across multiple ages, academic subjects, and settings (e.g., Lee & Tingstrom, 1994; Skinner et al., 1989; Skinner et al., 1997; Stading & Williams, 1996). In particular, researchers have evaluated CCC, along with slight variations, to improve student outcomes in math fluency. Relevant to the current study, Poncy, Skinner, and Jaspers (2006) used CCC to increase the fluency of a 10-year old female struggling with basic addition facts, increasing the percentage of problems correct from approximately 50% during baseline to over 90% when using CCC. It has also been used to increase the

fluency of second graders when completing subtraction problems (Grafman & Cates, 2010; Poncy, McCallum & Schmitt, 2010) and has shown to maintain its effects at two-month follow-up sessions (Poncy, McCallum & Schmitt, 2010).

Selection of CCC. Although there are a variety of interventions aimed at improving student performance in mathematics fluency, CCC offers a number of advantages regarding feasibility and implementation, which aided in selecting it to be used for the present research. CCC allows the student to engage in a substantial amount of learning trials across a small window of time. However, although repetition may aid in student learning, repetition of correct responses is essential when looking to build upon accuracy (Skinner et al., 1997) and therefore facilitate learning. Indeed, if a student consistently and independently repeated the multiplication fact of 2×2 and provided an answer of 22, correction of the student's error is imperative to progress. The immediate self-evaluation provided by students self-correcting errors (and also reinforcing accurate responses) facilitates the learning of correct responses and may also prevent future errors due to recency effects (Skinner et al., 1997). The combination of self-evaluation and immediate reinforcement is unique to CCC and is not offered by other interventions aimed at mathematics fluency improvement.

Furthermore, CCC requires few physical resources to implement and is completed without a significant time commitment from either teachers or students (see Skinner et al., 1997). Additionally, the limited number and discrete manner of CCC steps to implement requires teacher training that is both straightforward and efficient. It also does not require any sort of specialized equipment outside of basic materials typically found in the classroom. Finally, CCC content can be individualized by mathematical concept in order

to facilitate learning based on the skill and progress of individual students.

Purpose of Study

As noted above, the consideration of TI data in combination with student outcome data is vital for drawing valid conclusions regarding intervention effects. Results from research examining school-based interventions show that teachers seldom implement interventions with high levels of TI. When TI is high, teachers have difficulty maintaining these levels past approximately 10 days. Performance feedback remains the only evidence-based strategy currently used to promote TI. However, it is reactive in nature, requiring the implementer to have difficulty with implementation prior to its use. There exists a need for additional strategies that promote TI, particularly ones that are proactive. CGIP helps to fill this gap in the literature by providing a proactive solution to generate and maintain high levels of TI during implementation of interventions. Furthermore, CGIP takes considerable less time to complete than other evidence-based methods aimed at increasing TI (i.e., performance feedback) and its computer-guided format allows implementers to complete the protocol at a convenient time and location that may fall outside the school day. CGIP has yet to be evaluated with academic interventions. Of particular interest is CCC, a strategy that has proven effective for increasing student outcomes across multiple academic domains. As outlined above, CCC was selected as an appropriate academic intervention considering its decades-long literature base that details its success across multiple subjects and populations, along with the benefits and feasibility of adapting implementation to a practical educational setting. The research questions focused on throughout the completion of the present proposal, as well as investigator hypotheses, are as follows:

Research Questions and Hypotheses

Primary research questions. There are three primary research question, listed below, with associated hypotheses.

1. Will completion of CGIP increase the adherence and quality of teachers' implementation of CCC to increase mathematics fluency?

I hypothesize that teacher participation in CGIP will result in increases in both adherence and quality of implementation of CCC that will be maintained over time. This hypothesis is based on findings of Sanetti and colleagues (2015) regarding the effect of Implementation Planning on levels of adherence and quality for behavior support plan implementation.

2. Does a relationship exist between student levels of mathematics achievement and teacher levels of adherence and quality when implementing CCC?

I hypothesize that the implementation of CCC with high and maintained levels of adherence and quality will result in increased mathematics achievement for targeted students. CCC has proven effective across students, settings, and subjects (Skinner, McLaughlin, and Logan, 1997), including mathematics (e.g., Skinner et al., 1989). Implementing with high adherence is essential to maximize program effectiveness (e.g., Gresham, MacMillan, Beebe-Frankenberger, & Bocian, 2000). Thus high levels of adherence and quality will provide maximum effectiveness of CCC, resulting in improved mathematics achievement similar to previous findings.

3. Will teachers find CGIP to be a socially valid intervention for attaining and maintaining high TI levels of adherence and quality?

I hypothesize that teachers will rate CGIP as a socially valid and effective method of attaining and maintaining high levels of adherence and quality when implementing CCC. This hypothesis is based on previous findings of high social validity found by Sanetti and colleagues (2015) when using Implementation Planning with a behavioral intervention.

Chapter III: Methods

Participants

Participants included 5 elementary school teachers in a public school in the Northeast. Teachers included 4 Caucasian females and 1 Caucasian male, had an average of 9.4 years (range 3-18 years) of teaching experience, and all possessed general education certification. Teacher participation was voluntary and limited to those who requested consultation services to address mathematics achievement concerns for individual students. All teachers volunteered on the basis that they required help providing additional support to a student in their class struggling with computational fluency. All participating students were identified through teacher nomination and were screened to identify that the nature of their difficulties in mathematics was appropriate for the targeted academic intervention (i.e., possessed a motivational deficit; see Screening below). Nominated students could not be receiving special education services for any area of academic or behavioral functioning, nor could they be in the process of being referred to determine eligibility for such supports. The selection of students resulted in five student-teacher dyads, which represented the five cases used in the present research. Nominated students included 2 Latino/Hispanic females, 2 Latino/Hispanic males, and 1 Black/African American male. Two of the five students were in the fourth grade while the remaining three were in the fifth grade.

Dyad A. Student A was a nine-year-old Hispanic female enrolled in the fourth grade. Teacher A was a Caucasian male with 16 years of teaching experience. He had general education certification and held a Masters degree. He indicated he had not previously engaged in consultation to develop intervention plans for a student.

Dyad B. Student B was an 11-year-old Hispanic male enrolled in the fifth grade. Teacher B was a Caucasian female with seven years of teaching experience. She had general education certification and held a Masters degree. She indicated she had previously engaged in consultation to develop intervention plans for a student.

Dyad C. Student C was a 10-year-old Black male enrolled in the fifth grade. Teacher C was a Caucasian female with 18 years of teaching experience. She had general education certification and held a doctoral degree. She indicated she had previously engaged in consultation to develop intervention plans for a student.

Dyad D. Student D was a 10-year-old Hispanic male enrolled in the fourth grade. Teacher D was a Caucasian female with three years of teaching experience. She had general education certification and held a Masters degree. She indicated that she had previously engaged in consultation to develop intervention plans for a student.

Dyad E. Student E was a nine-year-old, Hispanic female enrolled in the fifth grade. Teacher E was a Caucasian female with three years of teaching experience. She had general education certification and held a Masters degree. She indicated she had not previously engaged in consultation to develop intervention plans for a student.

Setting

All teacher and student participants attended a K-8 public, elementary school located in an urban district in the Northeast. Approximately 99.6% of the population qualified for free and reduced lunch. More than half (i.e., 57%) of the student population identified as Hispanic, with approximately one third identifying as Black, and the rest spread out across various ethnicities.

Observations and intervention sessions occurred in the participating teacher's general education classroom. Intervention sessions were conducted during the school day at a time agreed upon by both the student investigator and the teacher that minimized disruption of the typical academic schedule for each teacher. Sessions occurred on a daily basis unless a change in the school schedule (e.g., cancellation due to inclement weather) or participation attendance (i.e., student or teacher absence) prevented this from occurring. Consultation meetings took place in each teacher's classroom either immediately preceding school, immediately following the school day, or during a prep period in the school day, depending on the preference of each teacher.

Instrumentation

Five types of instruments were used in this study: (a) instruments for assessing TI, (b) instruments for assessing the academic progress of the targeted student, (c) instruments for implementation of CCC, (d) CGIP, and (e) instruments for assessing social validity.

Assessment of treatment integrity. The primary dependent variable was TI, the extent to which the intervention components were implemented in a consistent manner by an interventionist trained to deliver the intervention (Sanetti & Kratochwill, 2009). It has been well documented that TI is a multidimensional construct; for the purposes of this study, both adherence and quality were measured. Measurement involved a checklist of predetermined steps accompanied by Likert scales rating both adherence and quality (see Appendix A). Each step was a behavior required for accurate implementation of the intervention (e.g., teacher provides student with worksheet). TI levels were calculated as a percentage based on the number of correctly implemented steps divided by the total

number that was applicable for each session. The student investigator was present to observe levels of TI on a daily basis.

A checklist of intervention steps (see Appendix A) served as a guide for the student investigator to observe the adherence and quality of implementation of each intervention step. This checklist listed the steps in chronological order of typical implementation, with each step corresponding to an action carried out by the teacher or student during an intervention session. Implementation was rated for both adherence and quality for each intervention step. Adherence was rated on a scale of one to three, with one representing “not implemented,” two representing “implemented with deviation” and three representing “implemented as planned.” In the event that the implementation of an intervention step was potentially completed either prior to or following the student investigator’s observation window (e.g., student was provided materials prior to the observation beginning), an adherence rating of “NA” (not applicable) was utilized. For steps that were implemented to any degree, quality of implementation was rated on a scale of one to four, with one representing “poor,” two representing “fair,” three representing “good,” and four representing “excellent.” Observations of TI occurred on a daily basis, approximately 2-5 times per week. Typical school weeks (i.e., weeks during which students attended school for all five weekdays) resulted in five observations per week, whereas a variety of factors which were out of the student investigator’s control (student absences, weather cancellation, school vacation, teacher absences, etc.) impacted the number of weekly observations completed. The school’s primary school psychologist served as a second observer and was present for at least 20% of observations for each student within each phase in order to obtain inter-observer agreement.

Assessment of academic progress. Student math fluency data were collected as a measure of student academic performance. More specifically, both the digits correct per minute (DCPM) and percentage of correctly answered digits (i.e., accuracy) on daily math fluency worksheets (MFW, see Appendix B) administered by each teacher were evaluated. Worksheet content focused on a single computational objective that was determined during the Problem Identification Interview (PII; see Instrumentation).

To formatively assess math fluency progress throughout the study, nominated students completed daily MFW. These worksheets were developed to match each individual student's instructional level, as determined by both responses during screening on MFW as well as teacher responses during the PII. Suggested tables of computational objectives provided by Shapiro (2004, Appendix C) were used to aid teachers in providing accurate responses regarding instructional level. MFW were developed using the "math worksheet generator" (Intervention Central n.d.) which provides the option of specifying content based on computational objectives (e.g., add two one-digit sums, sums to eighteen) similar to those recommended by Shapiro (2004). MFW included 24-30 problems on each page and included up to 144 problems total. They were collected and reviewed as permanent products. Products were collected every day by the student investigator within folders color-coded specifically for each teacher.

CCC Worksheets

Teacher steps for implementation of CCC were determined as follows: (a) provide student with necessary materials to complete CCC, (e.g., worksheet, writing utensil, timer for teacher); (b) briefly review instructions and timing with the student; (c) document time CCC begins/start timer; (d) following the allotted time, document time

CCC ends/timer ends; (e) correct worksheet and indicate number of problems correct; (f) graph results with student; (g) collect worksheet and place in folder for collection; (h) provide daily reinforcement, if appropriate based on daily score, and (i) provide weekly reinforcement, if appropriate based on weekly score.

CCC worksheets (see Appendix D) were generated using the *Math Worksheet Generator* obtained from the website interventioncentral.org (Intervention Central n.d.). This source provides the unique option to generate worksheets specifically designed for use while implementing CCC. The CCC worksheets served as the intervention that students engaged in post-baseline (see *Procedures* below) prior to the completion of the daily MFW. When provided, CCC worksheets were completed by targeted students immediately prior to their completion of MFW. Data on both the and DCPM and accuracy of CCC problems answered correctly, as well as scores of MFW, were collected and reviewed as permanent products. The student investigator collected products daily for data review.

Social Validity

Three measures of social validity were collected. Two assessed teachers' perceptions of the academic intervention and CGIP, whereas a third assessed students' perceptions of the academic intervention.

Usage rating profile-intervention revised (URP-IR). The URP-IR (Chafouleas, Briesch, Neugebauer, & Riley-Tillman, 2011) (Appendix F) requires participants to rate their level of agreement on 23 items on a 6-point Likert scale related to four factors: (a) acceptability, (b) understanding, (c) feasibility, and (d) systems support related to the intervention. Each subscale has acceptable internal consistency reliability ($\alpha = .79-.95$).

Participants were provided with the URP-IR approximately one week prior to the TEI and were asked to have the form completed for the student investigator to collect at the time of this final meeting. In the event that the form was not completed at the agreed time, both the teacher and student investigator determined a later date for the completed form to be collected.

PRIME rating profile – Implementation Planning activity. Participants rated the acceptability of the CGIP portion of the intervention by completing the PRIME Rating Profile (Appendix G). This instrument is adapted from the URP-IR, and substitutes words relating to a general intervention to more specific terms relating to CGIP. The measure consists of 23 items rated on a six-point Likert scale, and measures acceptability, understanding, feasibility, and systems climate. Participants were provided with the PRIME Rating Profile approximately one week prior to the TEI and were asked to have the form completed for the student investigator to collect at the time of the TEI. In the event that the form was not completed at the agreed time, both the teacher and student investigator determined a later date for the completed form to be collected.

Children's intervention rating profile (CIRP). Students were asked to rate the acceptability and fairness of their participation by completing the Children's Intervention Rating Profile (CIRP; Witt & Elliott, 1985; Appendix H). This instrument requires target students to rate their level of agreement on seven questions on a 5-point Likert scale. Approximately one week following the TEIs, all students completed the form in the presence of the student investigator to ensure completion and to answer any questions that may arise.

Materials

The majority of materials required for intervention implementation were provided to teachers each morning preceding implementation by the student investigator. Provided materials included daily MFW, CCC worksheets, folders for organizing worksheets, and timers required to implement CCC. Teachers provided students their own writing utensils to complete worksheets, and some teachers preferred the use of timers on their personal cell phones for timing purposes. Teachers also provided pens to correct and graph (when applicable) completed worksheets.

Design

A randomized multiple baseline design across participants was used to evaluate both TI (i.e., adherence and quality of implementation for each intervention step) and student academic performance (i.e., DCPM and accuracy for both MFW and CCC worksheets). Multiple baseline designs are essentially a series of A-B designs that are replicated within the same study (Richard et al., 1999). This type of design avoids a common ethical concern regarding the withdrawal of a successful intervention on the basis of demonstrating intervention effect. Causal inferences can be determined by staggering the introduction of the intervention across students (Kratochwill et al. 2010). Dyads transitioned to the next design phase based upon randomization procedures outlined by Wampold and Worsham (1986) for determining the order of introduction of “units” (i.e., participants) to the staggered intervention start points. A teacher was eligible for CGIP if adherence data displayed a decreasing trend, or a low-to-moderate level (i.e., adherence <80% for two or more consecutive data points). Phase change movement was determined based on adherence data, taking into consideration the What Works

Clearinghouse standards for evaluating single-case designs. Each baseline and treatment phase contained a minimum of five data points (Kratochwill et al. 2010).

Procedures

Phase I: Recruitment. Recruitment was divided into two steps: gaining district and school-level approval to recruit teachers for participation, and the recruitment of individual participants.

District and school approval. The selected district and school settings were identified due to the convenience of the student investigator completing his program internship requirement in these settings. A meeting was held with the chief academic officer of the selected school district to gain initial research approval. The district chief academic officer discussed details of the present research with the student investigator, reviewed documents and materials to be used, and provided approval to move forward with contacting the building principal of the targeted school. The building principal was then contacted and presented information related to the present research in a similar fashion as described above. Principal approval was obtained and permission to contact teachers and recruit for participation was granted.

Teacher recruitment. The student investigator met with potential teacher participants during grade level preparation periods to explain the purpose of the study, the risks and benefits of participation for both teacher and student participants, and the estimated time commitment. A total of 12 teachers across four grade levels (i.e., three teachers each from grades 2-5) were recruited for study participation. Recruitment involved a brief (i.e., 15-20 minute) meeting with each grade level team to review the study procedures, detail the risks/benefits of participation, and provide teachers with the

consent form (Appendix I), which included additional information pertaining to the present study. The student investigator then provided answers to any questions or concerns pertaining to study participation and what potential participation entailed.

Five of the twelve teachers recruited agreed to participate. Provided reasons to not participate included increased workload related to participation, lack of interest in research participation, and upcoming maternity leave that would interrupt study participation. Interested teachers each nominated a student who displayed difficulty with mathematics computation fluency, whose performance was deemed to benefit from intervention (according to teacher report), and whose difficulties were reportedly linked to motivation levels rather than an inability to succeed in mathematics. All five teacher-nominated students provided both parental consent and student assent, therefore requiring no additional nominations from participating teachers.

Phase II: Initial consultation. Following teacher agreement to participate, initial consultation included: (a) consent and assent, (b) the Problem Identification Interview (PII), and (c) student screening.

Consent and assent. At the onset of the study, teachers were asked to complete both a consent form (Appendix I) and a general demographics form (Appendix J) and the parents/guardians of teacher-nominated students were also asked to fill out consent (Appendix K) and demographics (Appendix L) forms. Following the completion of these forms, the student investigator determined a time to meet with the nominated student to obtain assent (Appendix M) as well as a time to meet with the teacher for the PII. All five nominated students provided assent to participate.

Problem Identification Interview. The student investigator met with each teacher and engaged in a PII (Kratochwill & Bergan 1990). Student strengths and weaknesses in mathematics were reviewed and discussed, particularly general performance on the current math curriculum. The teacher and student investigator determined the following over the course of the interview: (a) the approximate objective the target student had mastered, (b) the mathematics objective at which the student was being instructed, (c) the mathematics objective at which the student was frustrated, (d), the mathematics objective the average student in the class had mastered, and (e) the mathematics objective at which the average student in the class was being instructed (Shapiro, 2004). Each teacher agreed to a time during the school day to implement the intervention that was both feasible for implementation and did not disrupt the natural flow of the classroom schedule. Both parties briefly discussed the basic procedures for administering daily MFW to nominated students. It was agreed that the student investigator would collect folders at the end of each day for review, and return them with materials for the following day prior to the start of school the subsequent day.

Potential rewards for each individual student that would provide adequate incentive to attain individual goals were also determined. Student goals were established as one digit correct more overall than the student's previous high score on MFW. Individual teachers and the student investigator openly discussed reward options that were both feasible to implement and considered reinforcing to the individual student. Although the student investigator initially provided options that he deemed to be universally rewarding and feasible to provide (e.g., computer time), teachers also brainstormed to identify appropriate choices. Following a brief discussion, appropriate

option(s) were agreed upon for each student. Additionally, brief weekly meeting times to check-in on teacher concerns as well as implementation, were scheduled.

Screening. Nominated students were screened to confirm low levels of math computation fluency prior to participation. The screening process involved a total of 4, two-minute MFW to (a) determine the level of mathematics problems solved without reaching a frustrational level and (b) understand the nature of the student deficit (i.e., skill vs. performance). The level and type of computation on the MFW were initially determined during the PII. The student investigator presented each teacher with the Computational Skills Mastery Curriculum (CSMC; Appendix C) pertaining to both the student's present and preceding grade levels. Teachers were asked to identify skills where the student had reached mastery and where the student was having significant difficulties (Shapiro, 2004).

The range of items between the participant's ratings of the student's mastery and frustrational levels were examined, and three fluency skills found between the two levels were selected to initially screen students (see below). MFW described above were used for screening purposes. Teachers administered 3, two-minute single probe worksheets on a date determined during the PII. Completed worksheets were collected by the student investigator, and scored for the number of digits answered correctly.

The student investigator used skills that scored within the students' instructional levels (Shapiro 2004) to determine the nature of the deficit (i.e., skill vs. motivational). Shapiro (2004) outlines that DCPM can help determine if a mathematics skill is presently in the frustrational (0-19 DCPM), instructional (20-39 DCPM), or mastery (40+) level. In

the event that multiple skills scored within the student's instructional level, the lower score was used.

Following MFW administration and the determination of appropriate student fluency levels, the student investigator met individually with each student to administer a fourth and final MFW. This process was adapted from the procedures outlined for the Can't Do Won't Do Assessment (CDWD) demonstrated by Ardoin and colleagues (2005). The student investigator provided the student with both an explanation of how the teacher-provided MFW were scored, and also informed the student of digits correct they achieved on the probe of the skill the student scored at an instructional level. The student was then presented with a variety of small reward choices (e.g., colored pencils, notepads, etc.) based upon previous discussion with teachers during the PII. Students were instructed that if their next score on the MFW exceeded their most recent one, they would earn the right to select one of the rewards. Students were then provided two minutes to complete a final CBM. Following the allotted time, the student investigator scored the worksheet, and provided the student with a reward of their choosing if they performed higher than their previous score. All targeted students scored at least 20% higher (Noell, Freeland, & Witt, 2001) than their initial score, and were identified as having a performance deficit (won't do) rather than a skill deficit (can't do). These students proceeded to the next phase of the study.

In the event that a student did not score at least 20% higher, they would have been considered to have a skill deficit, and would not qualify for participation in the present research. In the event that a student was determined to have a skill deficit, participating teachers of the students would have been directed to researched-based interventions that

have been found to aid in skill deficits in fluency at their appropriate grade level, and participants would have been compensated based on their participation up to this point of the study. However, this process was not necessary for any students participating in the present research.

Student A. Teacher A identified “subtract 2, four-digit numbers without regrouping” as the mathematical concept that Student A presently completed at a mastery level and “add three or more two-digit numbers with regrouping” as the mathematical concept that he believed the student presently performed at a frustrational level. It was determined that Student A would be provided teacher-directed MFW covering the concepts of “subtract a two-digit number from a two-digit number with regrouping,” “multiplication facts 3-9,” and “add a five- or six-digit number with regrouping in any column.” Student A scored 48 DCPM on the worksheet targeting “subtract a two-digit number from a two-digit number with regrouping” (mastery), 23 DCPM on the worksheet targeting “multiplication facts 3-9” (instructional), and 19 digits correct on the worksheet targeting “add a five- or six-digit number with regrouping in any column” (frustrational). Based on the previously stated criteria, it was determined that the student evaluator would target “multiplication facts 3-9” for the fourth and final mathematics fluency worksheet to determine the type of potential deficit. Student A scored 30 DCPM on the MFW provided by the student investigator, indicating a motivational deficit due to the 30.43% (i.e., greater than 20%) increase in DCPM.

Student B. Teacher B identified “add a three-digit number to a three-digit number with regrouping from the 10’s column only ” as the mathematical concept that Student B presently completed at a mastery level and “add a five- or six-digit number to a five- or

six-digit number with regrouping in any column” as the mathematical concept that she believed the student presently performed at a frustrational level. It was determined that Student B would be provided teacher-directed MFW covering the concepts of “add a three-digit number to a three-digit number with regrouping from the 100’s column only,” “subtract 2 four-digit numbers with no regrouping,” and “multiplication facts 3-9.” Student B scored 42 DCPM on the MFW targeting “add a three-digit number to a three-digit number with regrouping from the 100’s column only” (mastery), 42 DCPM on the MFW targeting “subtract 2 four-digit numbers with no regrouping” (mastery), and 22 DCPM on the MFW targeting “multiplication facts 3-9” (instructional). Based on the previously stated criteria, it was determined that the student evaluator would target “multiplication facts 3-9” for the fourth and final MFW to determine the type of potential deficit. Student B scored 27 DCPM on the MFW provided by the student investigator, indicating a motivational deficit due to the 22.72% (i.e., greater than 20%) increase in DCPM.

Student C. Teacher C identified “subtract 2, four-digit numbers without regrouping” as the mathematical concept that Student A presently completed at a mastery level and “add three or more two-digit numbers with regrouping” as the mathematical concept that she believed the student presently performed at a frustrational level. It was determined that Student C would be provided teacher-directed MFW covering the concepts of “subtract a two-digit number from a two-digit number with regrouping,” “multiplication facts 3-9,” and “add a five- or six-digit number with regrouping in any column.” Student C scored 41 DCPM on the worksheet targeting “subtract a two-digit number from a two-digit number with regrouping” (mastery), 21 DCPM on the

worksheet targeting “multiplication facts 3-9” (instructional), and 5 digits correct on the worksheet targeting “add a five- or six-digit number with regrouping in any column” (frustrational). Based on the previously stated criteria, it was determined that the student evaluator would target “multiplication facts 3-9” for the fourth and final mathematics fluency worksheet to determine the type of potential deficit. Student C scored 28 DCPM on the MFW provided by the student investigator, indicating a motivational deficit due to the 33.33% (i.e., greater than 20%) increase in DCPM.

Student D. Teacher D identified “subtract 2, four-digit numbers without regrouping ” as the mathematical concept that Student D presently completed at a mastery level and “add a five- or six-digit number to a five- or six-digit number with regrouping in any column” as the mathematical concept that she believed the student presently performed at a frustrational level. It was determined that Student D would be provided teacher-directed MFW covering the concepts of “subtract a one-digit number from a two-digit number with regrouping,” “subtract a three-digit number from a three-digit number with regrouping from the 10’s column only,” and “multiplication facts 3-9.” Student D scored 9 DCPM on the MFW targeting “subtract a one-digit number from a two-digit number with regrouping” (frustrational), 7 DCPM on the MFW targeting “subtract a three-digit number from a three-digit number with regrouping from the 10’s column only” (frustrational), and 20 DCPM on the MFW targeting “multiplication facts 3-9” (instructional). Based on the previously stated criteria, it was determined that the student evaluator would target “multiplication facts 3-9” for the fourth and final MFW to determine the type of potential deficit. Student D scored 28 DCPM on the MFW provided

by the student investigator, indicating a motivational deficit due to the 40% (i.e., greater than 20%) increase in DCPM.

Student E. Teacher E identified “add a three-digit number to a three-digit number with regrouping from the 10’s column only ” as the mathematical concept that Student E presently completed at a mastery level and “add a five- or six-digit number to a five- or six-digit number with regrouping in any column” as the mathematical concept that she believed the student presently performed at a frustrational level. It was determined that Student E would be provided teacher-directed MFW covering the concepts of “add a three-digit number to a three-digit number with regrouping from the 100’s column only,” “subtract 2 four-digit numbers with no regrouping,” and “multiplication facts 3-9.” Student E scored 15 DCPM on the MFW targeting “add a three-digit number to a three-digit number with regrouping from the 100’s column only” (frustrational), 48 DCPM on the MFW targeting “subtract 2 four-digit numbers with no regrouping” (mastery), and 20 DCPM on the MFW targeting “multiplication facts 3-9” (instructional). Based on the previously stated criteria, it was determined that the student evaluator would target “multiplication facts 3-9” for the fourth and final MFW to determine the type of potential deficit. Student E scored 26 DCPM on the MFW provided by the student investigator, indicating a motivational deficit due to the 30% (i.e., greater than 20%) increase in DCPM.

Phase III: Baseline. Teachers were asked to administer the targeted student a MFW daily for a minimum of one week. The student investigator collected MFW daily during baseline. Following the collection of a minimum of five baseline data points, and

the determination that a stable data trend existed across all students, all participating dyads progressed to the next study phase.

Phase IV: Pre-Implementation Planning. Following the completion of the baseline phase, the student investigator scheduled and completed an individual Problem Analysis Interview (PAI; Kratochwill & Bergan 1990) with each participating teacher at a time and location deemed feasible by both the investigator and the teacher. During each PAI, the student investigator and teacher discussed and reviewed both baseline fluency data and the implementation of CCC to address the academic difficulties of the target student. Teachers were also provided intervention training (Appendix N) by the student investigator for CCC. The student investigator reviewed the brief PowerPoint presentation with each teacher and briefly provided direct training regarding daily CCC worksheet administration, correction, and graphing. Any questions or concerns that teachers had regarding this process were answered at this time. Additionally, the student investigator agreed with each teacher on a feasible time of the day during which observations of student MFW and CCC implementation would occur.

Following the completions of all PAIs, teachers initiated daily implementation of CCC for each targeted student in addition to the previously administered MFW. Teachers met with the student during their predetermined times and provided their student with a CCC worksheet (Appendix D). Computation problems with the correct answer were located on the left side of the page, while identical problems without answers were located on the right side of the worksheet.

Teachers instructed students on how to complete the CCC worksheets. Next, teachers either noted the time at which the students began the CCC worksheet or began a

three-minute timer, followed by a signal for the student to begin. Students studied the first completed problem, and then covered the item while directing their focus to the right side of the page, where an identical problem without the correct answer was located. Students proceeded to work through solving the problem. After responding, students confirmed whether or not their responses matched the correct answer provided on the left side of the worksheet. If answers matched, the student proceeded to the next problem. If the student's answer was incorrect, the problem was repeated until an accurate response was provided, similar to the methods used by Skinner and colleagues (1989). Students completed as many problems as possible using the CCC procedure within three minutes, as used by Coddington and colleagues (2009). Once the allotted time passed, participating teachers notified students and collected the completed worksheet. Following the completion of CCC, teachers provided targeted students with a daily fluency worksheet, similar to those completed in the baseline phase. These worksheets were completed using the same procedures as the baseline phase, and were also collected by the teacher after a three-minute work period. Following the completion of both worksheets, participating teachers efficiently determined the number of digits correct for MFW using an answer key provided by the student investigator. Teachers then helped students graph their daily progress, and provided a small reward if the student met their targeted goal. All completed worksheets were placed in a teacher-specific folder and collected by the student investigator at the end of each school day.

Phase V: Computer-Guided Implementation Planning. A teacher was considered eligible for CGIP if adherence data were either decreasing in trend, or showing a low-to-moderate level (i.e., adherence <80% for two or more consecutive data

points). Phase change movement occurred based on movement of adherence data, and occurred only after a minimum of five data points in the preceding phase i.e., pre-implementation planning) had been documented. Once teacher order was determined by the randomized order of the multiple baseline design (i.e., once each participant obtained at least one data point during baseline) and moderate to low levels of TI were established, teachers were introduced to CGIP in a staggered fashion aligned with the study design (see below).

CGIP (Appendix E) included a fill-in PDF form that teachers completed independently. Prior to engaging in the CGIP, teachers met with the student investigator to briefly review how to complete the online protocol. Teachers were provided the CGIP protocol and training video on a flash drive to be reviewed and completed later that day. Teachers were instructed to watch a brief (i.e., 20-minute) training video, fill out the protocol in its entirety, and print out a copy of the protocol as confirmation of their completion. During the training video, teachers were guided through the completion of each page of the form using a hypothetical case. Background information including instructional content as well as methods to contact the student investigator should difficulties arise with the form were also provided.

The CGIP protocol was comprised of three sections: (a) an assessment of the readiness of the individual to complete CGIP, (b) brief background information, and (c) action and coping planning. In section one, teachers were asked three questions to determine their readiness, including (a) whether or not the target problem(s) had been identified and defined, (b) if an evidence-based intervention (EBI) that addresses the target problem had been identified, and (c) if a copy of the intervention

plan/manual/guide was present (if applicable). All teachers in the present study met readiness criteria. In the event that an individual had not met readiness criteria, they would be directed to contact the student investigator for further instructions as to how to proceed with CGIP. Once teachers were identified as having met readiness criteria, they completed additional questions related to background information, and other details including (a) the name of the intervention, (b) the target population and domain of the target problem, and (c) the intervention's place within a Response to Intervention model (if applicable).

Teachers were then provided instructions on how to complete an action plan. Examples of how to break down an intervention into steps that are useful to the teacher were provided, along with instructions on how to make proper revisions to individual steps if deemed necessary. For each step, teachers provided the following information: (a) if a revision of the step was made, (b) a description of the intervention step, (c) when the step will take place, (d) where it will take place, (e) how often it will take place, (f) for how long the step will be implemented, and (g) if any additional resources or materials are required to implement the individual step. Teachers then proceeded to complete an individual action plan for their intervention.

Teachers were then presented with an example of how to complete a coping plan. They were instructed to identify up to four barriers to implementation that may occur as well as brainstorm solutions to these barriers. Examples of both possible barriers as well as ways to overcome these obstacles were provided. At the completion of the coping plan, teachers were instructed to print two forms of the CGIP: one for their records and a second to provide to the student investigator. The student investigator collected CGIP

forms following teacher completion, and teachers resumed administration of both MFW and CCC worksheets with their targeted student.

Participation in CGIP was initiated based on the randomized order of dyads along with the staggered introduction of the independent variable inherent in the multiple baseline design across participants. Following the completion of the pre-implementation planning phase, Teacher A was the first participant to complete the CGIP, which occurred during the evening immediately following the completion of the pre-implementation planning phase. His completion of the protocol lasted 60 minutes. Teacher A then proceeded to continue administering both MFW and CCC worksheets on a daily basis, as did all teachers who had yet to complete the CGIP. A minimum of five data points were collected for all participants prior to the introduction of the CGIP by the next teacher in order.

Once a minimum of five data points were collected following Teacher A's completion of CGIP, Teacher B completed the protocol. Teacher B's completion of CGIP lasted 30 minutes. A minimum of five data points were once again collected on all teachers, and Teacher C was then provided the necessary materials to complete CGIP. This pattern of protocol completion and data collection was repeated for the remainder of teachers until all teachers had completed the protocols and data had been collected for a minimum of five data points following completion. Teacher C completed the protocol in 22 minutes, while Teacher D completed it in 9 minutes, and Teacher E completed it in 11 minutes.

Following exactly five data points obtained for Teacher C in the post-implementation phase, she withdrew from the study due to personal reasons. While TI

data collection was no longer possible, the student investigator continued to administer both MFW and CCC Worksheets to Student C for the remainder of the study.

Phase VI: Treatment evaluation interview (TEI). At the completion of the study (i.e., after five data points were collected for Teacher E in the post-implementation phase), the student investigator scheduled a TEI with each teacher to discuss the progress and results of the study for their targeted student. Approximately one week prior to the TEI, teachers were asked to complete a URP-IR and PRIME Rating Profile to gain a better understanding of social validity related to the present study. Teachers were provided with a visual representation of both math fluency achievement as well as levels of implementation. Data were discussed with teachers while considering the level, trend, and variability across study phases. Following the completion of all TEIs, the student investigator scheduled a time to meet with each targeted student to complete the CIRP.

Data Analysis

Data Design Standards. The data analysis plan was developed to follow the What Works Clearinghouse guidelines established by Kratochwill and colleagues (2010). These guidelines are divided into both Design and Evidence Standards. Design standards aim to inform reviewers on whether or not a single-case design falls into one of three categories: (a) Meets Standards, (b) Meets Standards with Reservations, and (c) Does not Meet Standards. Evidence Standards are utilized by applying visual analysis for research indicated to either Meet Standards or Meet Standards with Reservation. Each outcome variable is then categorized as demonstrating Strong Evidence, Moderate Evidence, or No Evidence. The present research was designed with the intent of being categorized as Meets Standards under design Standards.

Visual analysis. Data were interpreted utilizing visual analysis involving four steps and six variables (Parsonson & Baer, 1978; Kratochwill et al., 2010). First, data were analyzed to determine a predictable baseline pattern. Second, data were reviewed to determine if there existed a sufficient level of consistency within each phase. Third, data were compared across both adjacent and similar phases to determine the occurrence of an “effect.” Kratochwill and colleagues (2010) define an effect as being demonstrated if “manipulation of the independent variable is associated with predicted change in the pattern of the dependent variable (p. 18).” The fourth and final step involved the analysis of data across all phases of the present research to determine if a minimum of three demonstrations of effect occurred.

The six variables utilized throughout the visual analysis steps above include the following: (a) level, (b) trend, (c) variability, (d) overlap, (e) immediacy of effect, and (f) consistency of data patterns across similar phases (Kratochwill et al., 2010). These variables were assessed both in isolation and collectively to determine whether or not the present research aligns with the What Works Clearinghouse guidelines.

Quantitative synthesis. Several quantitative methods were used to analyze data collected during the present research. There presently exist a variety of non-overlap analysis techniques for single-case research (see Parker, Vannest & Davis, 2013 for a review). The present research included three non-parametric methods of analysis to determine effect size. Percent of Non-overlapping Data (PND; Scruggs et al., 1987), Percent of Data Exceeding the Median (PEM; Ma, 2006), and standard mean difference (SMD; Busk & Serlin, 1992). The PND method was selected due to its previous support through visual analysis despite its noted limitations (Wolery, Busick, Reichow, & Barton

2010). The PEM method was selected because it removes one of the limitations of PND, namely its susceptibility to extreme outliers (Wolery, Busick, Reichow, & Barton 2010). Finally, SMD was selected because, similar to PND, Manolov and Solanas (2008) indicate that SMD can “better differentiate between the distinct data patterns and appear(s) to have lower probability of false alarms in absence of treatment effects (p. 872).”

Qualitative descriptors for PND interpretation were aligned with suggestions provided by Scruggs and Mastropieri (1998) suggesting that a $PND > .90$ is considered very effective, $.70-.90$ is effective, $.50-.70$ is questionable, and $< .50$ is deemed ineffective. Similar descriptors for PEM were utilized according to Ma (2006) and the interpretation of PEM pertaining to various data sets. At this time, there are not standard descriptors for interpreting SMD.

Descriptive statistics. The present research utilized both means and standards deviations of multiple study variables. Such methods aided in assessing data both within and across phases for (a) levels of teacher TI both overall and across individual steps, (b) student DCPM and accuracy on MFW, (c) student DCPM and accuracy on CCC Worksheets, and (d) analysis of social validity responses.

Chapter IV: Results

The results of the present research are listed below and organized by research question.

Research Questions

The present research aimed to answer three research questions associated with teacher level of implementation, student performance in mathematics fluency, and the social validity of CGIP according to teachers. These questions along with the related results and analysis can be found below.

Research question 1: Will completion of CGIP increase the adherence and quality of teachers' implementation of CCC to increase mathematics fluency?

The initial hypothesis indicated that teacher participation in CGIP would result in increases in both adherence and quality of implementation of CCC. Visual analysis was conducted related to daily implementation of CCC. Figure 1 depicts teacher levels of adherence and quality of implementation during daily observations. Additionally, descriptive statistics were calculated to further quantify level and variability within and between phases, and non-overlap analyses and effect size calculations were conducted to determine intervention effects. Table 1 presents descriptive statistics related to levels of implementation for both adherence and quality. Table 2 presents data related to effect size analyses of teacher adherence and quality.

Teacher A. Teacher A was the first participant to engage in CGIP following the pre-implementation phase. Pre-implementation planning levels of adherence were observed as moderate and highly variable (see Table 1; $M = 53.24$, $SD = 13.46$) while quality was documented as having a high level and less variability ($M = 93.67$, $SD =$

7.93). Qualitative descriptors for TI levels were aligned with guidelines presented by Pereplechikova and Kazden (2005). Following CGIP, adherence increased dramatically and demonstrated decreased variability ($M = 93.67$, $SD = 7.93$) while quality was perfect for all observations across the phase ($M = 100.0$, $SD = 0.0$).

Effect size calculations for adherence showed noticeable effects across all methods of measurement. PEM calculations indicated CGIP to be very effective (see Table 2; $PEM = 1.0$), while PND calculations also indicated CGIP was very effective ($PND = 1.0$) and SMD showed a large effect ($SMD = 4.193$). Effect size calculations for implementation quality showed mixed results, potentially impacted by ceiling effects associated with the measurement of implementation quality used in this study. Calculations for both PEM ($PEM = 0.0$) and PND ($PND = 0.0$) indicated no intervention effect, while SMD showed a small effect ($SMD = 0.276$).

Teacher B. Teacher B participated in CGIP six school days following Teacher A's completion. Baseline levels of adherence were observed as moderate along with moderate to high variability (see Table 1; $M = 49.31$, $SD = 11.46$) while quality was documented as having a high level with similar variability to adherence ($M = 90.62$ $SD = 10.66$). After engaging in CGIP, Teacher B's adherence increased substantially and became less variable ($M = 75.53$, $SD = 9.23$) while quality also saw an increase in level and decrease in variability ($M = 97.93$, $SD = 5.24$), but was most likely impacted by ceiling effects.

Effect size calculations for Teacher B's adherence were mixed. While PEM and SMD calculations determined CGIP to be very effective and to have a large effect, respectively, (see Table 2, $PEM = 1.0$, $SMD = 2.288$), PND calculations indicated that

CGIP was ineffective ($PND = 0.286$). Effect size calculations for quality also showed mixed results, most likely impacted by a ceiling effect. PEM and SMD calculations indicated effective and moderate intervention effects, respectively ($PEM = 0.857$, $SMD = 0.686$), while PND showed no effect ($PND = 0.0$).

Teacher C. Teacher C was the third participant to engage in CGIP. Due to personal reasons, Teacher C dropped out of the study five school days after completing CGIP to attend to a personal matter. Baseline levels of adherence were observed as moderate in both level and variability (see Table 1, $M = 51.23$, $SD = 8.52$) while quality was documented as having a high level with moderate variability ($M = 94.99$, $SD = 9.57$). After engaging in CGIP, Teacher C's level of adherence increased dramatically and became more stable ($M = 85.28$, $SD = 5.78$) while quality displayed a slight decrease in both level and variability ($M = 91.21$, $SD = 8.49$).

Effect size calculations for Teacher C's adherence were consistently high across methods, with PND, PEM, and SMD all indicating a very effective and large intervention effect (see Table 2, $PND = 1.0$, $PEM = 0.8$, $SMD = 3.996$). However, effect size calculations for quality showed either no effect ($PND = 0.0$, $PEM = 0.0$) or a negative effect ($SMD = -0.395$), which was impacted by ceiling effects.

Teacher D. Teacher D completed CGIP five school days following Teacher C's completion. Baseline levels of adherence were observed as moderate along with high variability (see Table 1; $M = 64.75$, $SD = 14.29$) while quality was documented as having a high level with low variability to ($M = 97.85$ $SD = 5.42$). After engaging in CGIP, Teacher D's adherence increased and became less variable ($M = 74.19$, $SD = 6.53$) while

quality demonstrated an increase in level and decreased variability ($M = 98.81$, $SD = 4.12$).

Effect size calculations for Teacher D's adherence demonstrated mixed results. Following the introduction of CGIP, effect size calculations ranged from no effect (see Table 2; $PND = 0.0$) to a medium effect ($SMD = .661$) to effective ($PEM = .833$). Effect size calculations for quality showed consistent results. PND and PEM calculations indicate no intervention effect ($PEM = 0.0$, $PND = 0.0$) while SMD indicated minimal intervention effect ($SMD = 0.177$), all of which were impacted by ceiling effects.

Teacher E. Teacher E was the final participant to complete CGIP. Baseline levels of adherence were observed as moderate along with moderate to high variability (see Table 1; $M = 57.10$, $SD = 8.30$) while quality was documented as having a high level with low variability ($M = 98.77$, $SD = 4.45$). After engaging in CGIP, Teacher E's adherence increased substantially and became less variable ($M = 91.90$, $SD = 6.30$) while quality also saw a slight increase in level and no variability was observed ($M = 100.0$, $SD = 0.0$).

Effect size calculations for Teacher E's implementation were consistent for both adherence and quality. Following completion of CGIP, all methods indicated very effective, large intervention effects for adherence (see Table 2, $PEM = 1.0$, $PND = 1.0$, $SMD = 4.193$). For quality, effect size calculations indicated little to no intervention effect ($PEM = 0.0$, $PND = 0.0$, $SMD = .276$), again due to ceiling effects.

Research question 2: Does a relationship exist between student levels of mathematics achievement and teacher levels of adherence and quality when implementing CCC? The initial hypothesis indicated that the implementation of CCC

with high and maintained levels of adherence and quality would result in increased mathematics achievement for targeted students. To best answer this question, visual analysis was conducted related to DCPM for MFW and CCC worksheets as well as student accuracy on the MFW. Additionally, descriptive statistics were calculated to further quantify level and variability within and between phases, and non-overlap analyses and effect size calculations were conducted to determine intervention effects.

Figure 2 depicts student DCPM on MFW, and Figure 3 displays student accuracy when completing these worksheets. Figure 4 depicts student DCPM on CCC worksheets. Table 3 presents descriptive statistics detailing student DCPM on MFW while Table 4 depicts effect sizes for DCPM on MFW across phases. Table 5 presents descriptive statistics detailing student accuracy on MFW while Table 6 depicts effect sizes for accuracy across phases. Finally, Table 7 presents descriptive statistics detailing student DCPM on CCC worksheets while Table 8 depicts effect sizes for DCPM on CCC worksheets across phases.

Student A. Baseline levels of DCPM on MFW for Student A display a high level along with substantial variability (see Table 3, $M = 25.57$, $SD = 5.85$). During the pre-implementation planning phase, DCPM showed an increase in level and substantial decrease in variability ($M = 28.50$, $SD = 3.36$). The post-implementation planning phase resulted in considerable increases in both level and variability of DCPM ($M = 47.60$, $SD = 10.99$), along with a definitive upward trend. Effect sizes across phases for DCPM on MFW (see Table 4) provide mixed results. Effect sizes measuring from baseline to the pre-implementation planning phase range from ineffective ($PND = .167$) to medium ($SMD = .501$) to effective ($PEM = .833$). However, from pre-implementation planning to

post-implementation planning, all three measures indicate large intervention effects (PND = .926, PEM = 1.0, SMD = 5.679).

Student A accuracy (i.e., percentage of DCPM) on MFW indicates high levels of accuracy with moderate variability (see Table 5, $M = 80.15$, $SD = 11.55$). During the pre-implementation planning phase, accuracy demonstrated an increase in level and considerable decrease in variability ($M = 84.28$, $SD = 4.53$). Student A data for the post-implementation planning phase saw accuracy increase substantially while variability decreased minimally ($M = 95.58$, $SD = 4.28$). Effect sizes across phases for accuracy on MFW (see Table 6) are again mixed. From baseline to pre-implementation planning, effect sizes range from small and ineffective (PND = 0.0, SMD = .358) to effective (PEM = .833). However, from pre-implementation planning to post-implementation planning, all three measures indicate large intervention effects (PND = .852, PEM = 1.0, SMD = 2.494).

Data documenting DCPM on CCC Worksheets during pre-implementation planning indicate low levels of digits correct along with high variability (see Table 7, $M = 16.78$, $SD = 1.41$). Post-implementation planning data for DCPM on CCC worksheets correct increased significantly in both level and variability ($M = 26.63$, $SD = 7.13$) along with an increasing trend. Effect sizes across phases for CCC DCPM (see Table 8) show large effects across all methods (PND = 1.0, PEM = 1.0, SMD = 6.988).

Student B. Baseline levels of DCPM on MFW for Student B show high level as well as high variability (see Table 3, $M = 22.30$, $SD = 5.90$). During the pre-implementation planning phase, DCPM showed an increase in level and variability ($M = 28.20$, $SD = 4.60$). The post-implementation planning phase showed an increase in both

level and variability ($M = 30.62$, $SD = 6.53$). Effect sizes across phases for DCPM on MFW (see Table 4) indicate mixed results. From baseline to pre-implementation planning, two methods indicated a large effect ($SMD = 1.0$) and that CCC is very effective ($PEM = .8$) while the third deems CCC as ineffective ($PND = .3$). Similarly, the pre-implementation planning phase to the post-implementation planning phase, PEM is in the questionable range ($PEM = .571$), while SMD shows a medium effect ($SMD = .526$) and PND deems CCC as ineffective ($PND = .286$).

Student B accuracy on MFW during baseline indicates moderate levels and moderate variability (see Table 5 $M = 71.46$, $SD = 4.67$). During the pre-implementation planning phase, accuracy indicates increases in both level and variability ($M = 77.07$, $SD = 7.80$). The post-implementation planning phase shows accuracy increasing in level and slightly decreasing in variability ($M = 82.04$, $SD = 6.25$). Effect sizes across phases for DCPM on MFW (see Table 6) are again mixed. From baseline to pre-implementation planning, effect sizes range from large ($SMD = 1.201$) and very effective ($PEM = .8$), to moderate ($PND = .5$). Following the transition from pre-implementation planning to the post-implementation planning phase, intervention effects range from ineffective ($PND = .095$), to medium ($SMD = .637$), to effective ($PEM = .714$).

Data documenting CCC DCPM during pre-implementation planning indicate moderate level and moderate variability (see Table 7, $M = 23.70$, $SD = 5.83$). During the post-implementation planning phase, DCPM on CCC worksheets increased substantially while variability increased slightly ($M = 88.62$, $SD = 19.05$). Effect sizes across phases for DCPM on CCC worksheets (see Table 8) show questionable ($PND = .571$, $PEM = .619$) to large ($SMD = 1.001$) intervention effects.

Student C. Baseline levels of DCPM for MFW for Student C show low level and high variability (see Table 3, $M = 13.96$, $SD = 4.90$) Pre-implementation planning data on DCPM for MFW show an increase in level and slight increase in variability ($M = 20.67$, $SD = 5.38$). The post-implementation planning phase shows both a large increase in level and small decrease in variability ($M = 33.92$, $SD = 6.89$) for DCPM on MFW. Effect sizes across phases for DCPM on MFW (see Table 4) show mixed results. From baseline to pre-implementation planning, PND shows CCC as ineffective ($PND = .471$) while PEM and SMD demonstrate very effective ($PEM = .941$) and large effects ($SMD = 1.369$), respectively. From pre-implementation planning to post-implementation planning, CCC ranges from very effective ($PEM = 1.0$) to effective ($PND = .706$), to large effects ($SMD = 2.462$).

Baseline accuracy on MFW indicates moderate level and variability (see Table 5, $M = 71.27$, $SD = 11.69$). Accuracy during the pre-implementation planning phase shows an increased level and decreased variability ($M = 83.44$, $SD = 8.35$). Post-implementation planning accuracy on MFW accuracy indicates a substantial increase in level and decrease in variability ($M = 96.86$, $SD = 3.61$). Effect sizes across phases for accuracy on MFW (see Table 6) remain fairly consistent. From baseline to pre-implementation planning, effect sizes range from questionable ($PND = .5$) to very effective ($PEM = .944$) and large ($SMD = 1.041$). From pre-implementation planning to post implementation planning, all three methods of analysis indicate large intervention effects ($PND = .8$, $PEM = 1.0$, $SMD = 1.607$).

Data documenting DCPM on CCC worksheets during pre-implementation planning indicate high level and variability (see Table 7, $M = 33.25$, $SD = 9.44$). Post-

implementation planning DCPM on CCC worksheets indicate a slight increase in level and variability ($M = 33.67$, $SD = 1.26$). Effect sizes from pre-implementation planning to post-implementation planning for DCPM on CCC worksheets digits correct (see Table 8) are mixed, ranging from small ($SMD = .044$) and ineffective ($PND = 0.0$) to large ($PEM = .882$).

Student D. Baseline levels of DCPM on MFW for Student D show low level and low variability (see Table 3, $M = 10.83$, $SD = 1.13$). Digits correct per minute on MFW during the pre-implementation planning phase show a slight increase in level and moderate increase in variability ($M = 11.51$, $SD = 3.10$). Post-implementation planning DCPM on MFW indicated a small increase in level and slight decrease in variability ($M = 13.08$, $SD = 2.87$). Effect sizes across phases for DCPM on MFW (see Table 4) show consistently mixed results. From baseline to pre-implementation planning, PND deems CCC ineffective ($PND = .333$) while other values show questionable ($PEM = .619$) and medium effects ($SMD = .598$). Similarly, from pre-implementation planning to post-implementation planning, analysis ranges from questionable ($PEM = .667$), to medium effects ($SMD = .508$) to ineffective ($PND = 0.0$).

Baseline accuracy on MFW indicates moderate level and variability (see Table 5, $M = 76.53$, $SD = 8.11$). Accuracy during the pre-implementation planning phase shows a stable level and small increase in variability ($M = 76.14$, $SD = 10.42$). Post-implementation planning accuracy on MFW indicates a slight increase in level and decrease in variability ($M = 77.55$, $SD = 7.62$). Effect sizes across phases for accuracy on DCPM (see Table 6) are again mixed. From baseline to pre-implementation planning, PEM demonstrates a questionable effect ($PEM = .591$) while PND and SMD indicate

minimal intervention effect ($PND = .136$, $SMD = -.048$). Similarly, from pre-implementation planning to post-implementation planning, PEM indicates a questionable effect ($PEM = .636$) while PND and SMD show little to no effect ($PND = 0.0$, $SMD = .131$).

Data documenting DCPM on CCC Worksheets indicate low level and high variability (see Table 7, $M = 21.29$, $SD = 26.48$). Post-implementation planning DCPM on CCC worksheets indicate a substantial increase in level along with a moderate decrease in variability ($M = 30.33$, $SD = 6.51$). Effect sizes from pre-implementation planning to post-implementation planning (see Table 8) are mixed, ranging from ineffective ($PND = 0.25$) to very effective ($PEM = 1.0$) and large ($SMD = 1.025$).

Student E. Baseline levels of DCPM on MFW for Student E show low level and high variability (see Table 3, $M = 14.29$, $SD = 5.85$). Pre-implementation planning DCPM on MFW show an increase in level and small decrease in variability ($M = 17.64$, $SD = 4.82$). Student E's DCPM on MFW demonstrates a small increase in both level and variability ($M = 19.83$, $SD = 6.28$). Effect sizes across phases for DCPM ON MFW (see Table 4) show mixed results. From baseline to pre-implementation planning, PND deems CCC ineffective ($PND = 0.0$) while SMD demonstrates a medium effect ($SMD = .557$) and PEM deems CCC effective ($PEM = .815$). Analysis of DCPM for MFW from pre-implementation planning to the post-implementation planning phase ranges from ineffective ($PND = .167$) to questionable ($PEM = 0.5$) to small ($SMD = .475$).

Baseline accuracy for Student E on MFW indicates high level and moderate variability (see Table 5, $M = 88.13$, $SD = 8.57$). Accuracy during the pre-implementation planning phase indicates a small increase in level and small decrease in variability ($M =$

93.93, $SD = 4.74$). Accuracy during the post-implementation planning phase demonstrates an increase in level and decrease in variability ($M = 96.87$, $SD = 2.97$). Effect sizes across phases for accuracy of DCPM on MFW (see Table 6) are again mixed. From baseline to pre-implementation planning, analysis ranges from questionable ($PND = .519$) to medium ($SMD = .677$) to effective ($PEM = .852$). From pre-implementation planning to post-implementation planning, PND shows no intervention effect ($PND = 0.0$) while SMD indicates a medium effect ($SMD = .620$) and PEM deems CGIP as effective ($PEM = .833$).

Data documenting DCPM during the pre-implementation phase on CCC worksheets indicate high level and variability (see Table 7, $M = 35.05$, $SD = 6.42$). Post-implementation planning DCPM on CCC worksheets show an increase in level along with a decrease in variability ($M = 40$, $SD = 0.70$). Analysis of DCPM for CCC worksheets from pre-implementation planning to the post-implementation planning phase are mixed (see Table 8); ranging from no effect ($PND = 0.0$) to a medium effect ($SMD = .711$) to being very effective ($PEM = 1.0$).

Inter-observer agreement (IOA). To assess reliability of TI observations, the primary school psychologist from the school in which the student investigator conducted the current study was present for a minimum of 20% of observations within each phase for each participant. She was provided identical materials as those used by the student investigator to document both adherence and quality of TI during observations.

Across all observations for Dyads A, C, D, and E, levels of IOA for both adherence and quality remained perfect (i.e., the student evaluator and school psychologist agreed on 100% of ratings across each observation). For Dyad B, average

IOA for adherence across all observations was 98.61%, while average IOA for quality during the same observations was 97.22%. At no point during an observation was IOA below 88.89% for either adherence or quality.

Procedural reliability. To assess procedural reliability during consultation meetings, the student investigator recorded meetings with permission of participating teachers. Following each meeting, the student investigator listened to the recorded meetings and documented the percentage of completed consultation meeting objectives. Across all three consultation meetings (i.e., PII, PAI, and TEI) for each participant, 100% of meeting objectives were completed. To ensure reliability, a second rater listened to 40% (i.e., six of fifteen total meetings) of the recordings and individually documented the percentage of objectives met. The second rater found that 100% of meeting objectives were met across all recordings.

Researcher question 3: Will teachers find CGIP to be a socially valid intervention for attaining and maintaining high treatment integrity levels of adherence and quality?

The initial hypothesis indicated that teachers would rate CGIP as a socially valid and effective method of attaining and maintaining high levels of adherence and quality when implementing CCC. This hypothesis was based on previous findings of high social validity found by Sanetti and colleagues (2015) when using Implementation Planning with a behavioral intervention. Additionally, social validity data was collected regarding CCC as an effective intervention to increase student levels of math fluency. To best answer these questions, descriptive statistics are provided for (a) the Usage Rating Profile- Intervention Revised (URP-IR; Chafouleas, Briesch, Neugebauer, & Riley-

Tillman, 2011), (b) PRIME Rating Profile – Implementation Planning Activity, and (c) Children’s Intervention Rating Profile (CIRP; Witt & Elliott, 1985). Teacher responses were collected for the URP-IR and PRIME Rating Profile, while student responses were collected for the CIRP.

Teachers completed the URP-IR to indicate their perception of how acceptable and effective CCC was during the present research. Across the four factors included in the URP-IR, responses indicated that teachers “agreed” that CCC was acceptable ($M = 5.10$, $SD = .55$), understandable ($M = 5.27$, $SD = .23$), feasible ($M = 5.13$, $SD = .24$), and supported by their school climate ($M = 4.96$, $SD = .59$).

Teachers also completed the PRIME Rating Profile – Implementation Planning Activity to indicate their perception of how acceptable CGIP was during the present research. Across the four factors included in the URP-IR, responses indicated that teachers “agreed” that CGIP was acceptable ($M = 4.82$, $SD = .42$), understandable ($M = 4.87$, $SD = .42$), feasible ($M = 5.00$, $SD = .13$), and supported by their school climate ($M = 5.08$, $SD = .23$).

Students completed the CIRP to indicate their perception of how acceptable they found the study procedures with which they were involved. Overall, student responses indicate that they “sort of agreed” that the intervention was fair ($M = 1.0$, $SD = 0.0$) and would be good for other children ($M = 1.2$, $SD = 0.45$). Of particular interest was the item, “there are better ways to handle this problem.” Student responses for this item ($M = 2.4$, $SD = 1.79$) indicate that students “sort of agreed” that the worksheets were not the best way to handle their difficulties with math fluency.

Chapter V: Discussion

The present research aimed to provide further support of CGIP as a proactive strategy to attain and maintain high levels of TI in the educational setting. Although previous research with Implementation Planning has addressed functional behavior assessments and behavior interventions plans, this study aimed to expand its use to the implementation of an established academic intervention, CCC.

Treatment Integrity

The present study targeted teacher levels of TI during the implementation of an academic intervention through the measurement of adherence and quality. Results of the present study provide support for CGIP as an appropriate method for supporting teachers to implement with high levels of integrity. Overall, levels of adherence following completion of CGIP indicated substantial increases for four of the five teachers, with the fifth (i.e., Teacher D) displaying moderately increased levels following visual analysis. When considering trend, all targeted teachers demonstrated consistent quality regardless of phase. However, teacher adherence typically demonstrated a gradual decreasing trend (Teachers B, C, and E) or plateau (Teacher D) following higher levels of adherence immediately following completion of CGIP. Teacher A's consistently high level of adherence is impacted by ceiling effects when documenting trend.

Despite these significant increases in adherence, only Teacher A approached perfect (i.e., 100% adherence) levels of implementation with any consistency. These results are similar to those in previous research on Implementation Planning (Sanetti, Collier-Meek, Long, Byron, & Kratochwill, 2015). As pointed out by Sanetti and colleagues (2015), previous research has aimed to document perfect or near-perfect levels

of adherence (e.g., DiGennaro et al., 2007; Noell et al., 1997). Although 80% has been suggested as a targeted level, there is presently no empirical support confirming the necessity of that level of implementation (Perepletchikova and Kazdin, 2005).

CCC is considered highly feasible, academic intervention to implement in the classroom (Skinner et al., 1997) and teachers were provided structured training involving direct modeling of implementation by the student investigator prior to beginning the intervention. Despite these supports, teachers consistently failed to implement intervention steps during both the pre-implementation planning and post-implementation planning phases. Teacher difficulty implementing a relatively simple intervention supports the need for teacher training on all types of classroom interventions, not simply those deemed to be more complex. These results suggest that brief teacher training of classroom academic interventions may be inadequate for teachers to learn how to implement academic interventions in the classroom with high levels of TI. Furthermore, it supports the notion that teachers require some level of training prior to being asked to effectively implement classroom interventions, regardless of complexity, whose aim is improving student outcomes.

Outside of teacher or student absences, implementation of CCC occurred for all possible observation periods across all phases and dyads involved in the present research. In other words, there was never an instance in which the student evaluator visited a classroom to observe CCC implementation and the expected implementation did not occur. Across all teachers, the intervention steps most likely not to be implemented included the provision of daily and weekly reinforcement (when necessary) based on the

student's daily DCPM. These steps also may have seemed less "typical" for teachers compared to the other steps involved with the CCC implementation.

Contrary to improvements in levels of adherence, levels of implementation quality following engagement in CGIP did not increase as significantly. Teacher C actually saw her level of quality decrease slightly following CGIP. This result is partially explained by the high levels of quality of steps implemented prior to exposure to the main independent variable. Additionally, ceiling effects related to the selected method of measurement may have affected data related to quality. While teachers did not reach perfect levels of adherence prior to the completion of CGIP, those steps that were implemented were typically done so with quality ratings of either "good" or "excellent."

Teachers, similar to students, may progress along the instructional hierarchy as they learn a new skill/intervention. They demonstrate the intervention behaviors they are fluent with, and do so with high quality. As they are introduced to new and less familiar skills/interventions, levels and consistency of TI may take time to gradually improve as individuals become more fluent. Consistent with previous research (Sanetti et al., 2015), the teachers in the present study demonstrated high levels of TI quality across phases, including when their levels of adherence rose. Rather than ceiling effects, as long as teachers engage in implementing a step of an intervention, they may simply do so with high levels of quality regardless of what the individual step involves.

Math Fluency

As previously mentioned, CCC was selected as an appropriate academic intervention to implement with CGIP in part due to the vast amount of research detailing improved student outcomes (i.e., Joseph, Konrad, Cates, Vacjner, Eveleigh, & Fishley,

2015). Its success as an intervention has spanned multiple decades and subjects (e.g., Skinner, Belfiore, & Pierce, 1992; Smith, Dittmer, & Skinner, 2002; Skinner, Turco, Beatty, & Rasavage, 1989). Students in the present study consistently exhibited moderate to high levels of improvement in DCPM on MFW, as demonstrated by visual analysis. Students A, B, C, and E demonstrated increasing trends for DCPM across phases, while Student D's remained fairly stagnant. Increases in mathematics fluency replicate similar findings of CCC's effectiveness on mathematics fluency with elementary-aged students (Grafman & Cates, 2010; Poncy, McCallum & Schmitt, 2010; Skinner et al., 1989). Student levels of accuracy were not as consistent, and although most displayed at least moderate improvement in level, Student D showed little to no progress based upon visual analysis. Similarly, Student D was the only individual that did not demonstrate an increasing trend in accuracy across phases. Student D's accuracy actually demonstrated a decreasing trend during the Post-Implementation Planning phase. Although the majority of teachers saw substantial increases in adherence during the post-implementation planning phase, not all students saw similar increases in DCPM on MFW. However, all students saw considerable increases in both level and trend for DCPM on CCC worksheets during the post-implementation planning phase.

Overall, teachers rated both CGIP and CCC as socially valid interventions. Teacher ratings landed closest to the "agreed" range for all factors across each measure. Completion of CGIP seems to serve as a feasible support of teacher implementation that reduces the amount of time and consultation required between the consultant and teacher. Teachers were able to complete the online protocol at a time and setting convenient for them, and saw increases in levels of TI while requiring no more than a brief explanation

from the student investigator on how to access the form. Of particular interest are student responses which indicate that they “sort of agree” that there exists better methods to deal with their difficulties with math fluency. Additionally, negative student perceptions of the completion of CCC and MFW do not align with the amount of improvement made via intervention exposure. Student A, who undoubtedly made the most progress academically of the five students, answered, “I agree very much,” regarding the existence of better ways to solve the problem.

Limitations

The present research includes a number of limitations that require consideration. All nominated students were screened and identified as having a motivational deficit. This deficit type may have impacted student participation in some manner, particularly pertaining to student improvement in math fluency. Similarly, the present research took place over multiple months over the course of the academic year. A percentage of student improvement may be attributed to maturation effects as well as the fact that students did not refrain from receiving instruction in mathematics during the course of the study.

Participating teachers were employed at the school in which the student investigator was completing his internship year. Prior to the start of the present research, professional relationships had been formed based upon support provided to other students within teachers’ classrooms. It is unclear whether or not those relationships impacted motivation to implement the targeted interventions.

Direct observation was the method of data collection selected during the present study. As a result, the presence of the student investigator may have served as a behavioral cue to engage in implementation whereas such a cue would not typically be

present in an applied setting. Although variability of implementation was certainly present across all teachers, direct observation may have impacted the initiation of CCC, which otherwise may have been implemented inconsistently on a day-to-day basis. This presence may also have impacted implementation knowing that an individual was observing and rating adherence and quality. Additionally, the student investigator provided folders each morning containing the worksheets necessary to implement the intervention. Obtaining and organizing materials may be seen as a potential barrier to implementation that some teachers have difficulty overcoming. Providing materials may have, to some extent, made implementation easier than it typically would be by serving as a prompt to initiate the intervention. Furthermore, although the item content for both MFW and CCC worksheets was randomized within the selected mathematical skill (i.e., single-digit multiplication) using the math worksheet generator, no specific methods were utilized to control for difficulty across worksheets. Therefore, some caution may be taken when interpreting student outcomes.

Unlike the completion of social validity forms for teachers, the student investigator was present for student completion of the CIRP. That presence and the knowledge that the student investigator would be reviewing responses may have effected how truthful students were when completing the forms. With regards to the measurement of quality, intervention effects may have been blunted due to ceiling effects inherent in the method of data collection. Additionally, CGIP requires the use of a technological device (e.g., computer) to access and complete the electronic protocol. The present nature of the form does not allow it to be saved online, requiring a properly connected printer to

obtain proof of activity completion. Such requirements may limit the choice of CGIP in districts that lack such technological devices.

The limitations of the selected quantitative methods for the present study should be recognized when interpreting data for both mathematics fluency and TI. More specifically, Parker and colleagues (2014) noted that PND is calculated from a single data point in the baseline phase, which is often extreme and unlikely to be unreliable. They observe that PND has also been found to be susceptible to floor and ceiling effects which impact interpretation of effect. Furthermore, they note that PEM is also subject to severe ceiling effects, has low power, and has difficulty interpreting effect when the median is a poor representation of the overall data distribution.

Future research and screening procedures pertaining to the identification and comparison of frustrational, instructional, and mastery levels in mathematics should aim to clarify a continuum of mathematical concepts that are straightforward for teachers to grasp. The continuum utilized from Shapiro (2004), while informative, may not be fair to expect teachers to be able to identify for students whom they have only been teaching for a couple of months. That continuum specifically delineates differences in skills pertaining to place value and regrouping position that many individuals, regardless of background, may have difficulty differentiating between. In such circumstances, teachers may have anchored towards the “multiplication facts 3-9” as an easier concept to recollect compared to differentiating how students perform with five-digit subtraction compared to three-digit subtraction with regrouping.

Similarly, despite the independence of meeting with teachers individually for PIIs, all students ended up testing within the “instructional range” during screening procedures,

regardless of grade. While one potential explanation is mentioned above, it should be noted that the building principal had placed a significant emphasis on students (within the appropriate grade levels) becoming fluent with their multiplication fact knowledge. This most likely led to an emphasis on multiplication instruction, and may have further informed teachers of the exact level of nominated students pertaining to this mathematical concept. When provided a detailed list of mathematics concepts for screening purposes, familiarity and understanding of student performance may have impacted selection of this concept rather than student skill level.

Each teacher participating in the present research volunteered to do so, which may indicate that they were more motivated than typical individuals to improve their practice. As such, one could argue that levels of TI may be slightly higher than would be expected from a teacher picked at random to engage in the procedures of the present study. Furthermore, both teacher and student outcome measurement lacked a follow-up phase to determine whether or not increased levels of TI and DCPM sustained once the observations of the student evaluator ceased. Finally, the students nominated to participate in the present research were both identified by teachers as having motivational concerns and screened into the present study via confirmation of those concerns. Such students would typically require more incentive than the average student to complete work products, let alone engage in an activity to the best of their abilities on a consistent basis. Considering that the reinforcing steps of the process were those least likely to be implemented by teachers, and that no such reinforcement existed during the screening process, motivational difficulties may have impacted student outcome data.

Implications

Results from the present research provide a number of implications for both research and practice. The collection of TI data along with maintaining high levels of implementation remain essential when making informed decisions based on evidence-based interventions in the applied setting. Results indicate that CGIP provides an effective option for maintaining high levels of TI that is seemingly more feasible than prior methods. Future research should continue to look into CGIP and its feasibility as a way to attain and maintain high levels of TI in the applied setting, as well as its usefulness as a proactive support for TI. The evolving understanding of TI continues to point towards a multi-dimensional construct. Adherence and quality were selected for the present research because they are widely agreed upon and have empirical evidence supporting that they both improve decision-making (Sanetti & Fallon, 2011; Hirschstein, Edstrom, Frey, Snell, & Mackenzie, 2007). Present results provide further support for these constructs under the measurement of TI.

To the student investigator's knowledge, CCC is presently the only academic intervention studied while utilizing CGIP as a support for implementation. Future research should identify additional evidence-based interventions to determine not only the appropriate levels of implementation required to obtain student outcomes, but also the type of intervention steps that CGIP aids teachers in implementing accurately. Student social validity responses on individual items noted some discontent with the intervention used to improve their math fluency. Additionally, students were screened into the study as having motivational deficits as opposed to skill deficits. Intervention researchers may consider obtaining additional information regarding student perceptions toward evidence-

based interventions, as student buy-in raises potential confounding variables related to effort and performance.

Despite significant increases in adherence, only Teacher A approached perfect (i.e., 100% adherence) levels of implementation with any consistency. These levels of improved TI that do not reach perfect levels are similar to findings found in previous research on implementation planning (Sanetti, Collier-Meek, Long, Byron, & Kratochwill, 2015). As pointed out by Sanetti and colleagues (2015), previous research has aimed to document perfect levels of adherence (e.g., DiGennaro et al., 2007; Noell et al., 1997). Although 80% has been suggested as a targeted level, there is presently no empirical support confirming the necessity of that level of implementation (Perepletchikova and Kazdin, 2005). Future research should aim to further investigate TI levels and either confirm the 80% benchmark or redefine the percentage of adherence deemed necessary to be considered acceptable. Additionally, perfect levels of TI were not obtained by the majority of teachers despite CCC being a relatively straightforward intervention to implement. Future research should aim to consider CGIP or other methods of implementation support to use as a part of typical consultation.

One of the presumed benefits of CGIP is teacher's ability to complete the protocol, if they choose, outside of typical school hours. Indeed, both Teacher's A and B elected to complete CGIP in the confines of their own home and spent a noticeably longer amount of time completing the protocol. Future research may aim to investigate methods of teacher implementation support that enable individuals to engage in effective activities outside of the school day and school setting. Further investigation may also be warranted into the differences between implementation supports both within and across settings

(e.g., school vs. home) and medium (e.g., computer-guided vs. paper and pencil vs. verbal).

The evolving concept of TI has led to a variety of dimensions that various authors find imperative to its measurement and understanding. Although TI research has typically focused on adherence, and the present research measured both adherence and quality similar to Sanetti and colleagues (2015), further research should identify the dimensions of TI most impacted following the completion of CGIP. Finally, the present research utilizes a single method of documenting TI data (i.e., direct observation). In an attempt to further investigate the feasibility of CGIP, additional research may aim to utilize other methods of TI data collection, such as teacher self-monitoring, to remove some of the limitations associated with an observer being present during implementation.

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TABLES

Table 1:

Teachers' Implementation Means and Standard Deviations by Percent Across Phases

	Pre-Implementation Planning				Post- Implementation Planning			
	Mean		Standard Deviation		Mean		Standard Deviation	
Teacher	Adherence	Quality	Adherence	Quality	Adherence	Quality	Adherence	Quality
A	53.24	95.24	13.46	7.38	93.67	100.0	7.93	0.0
B	49.31	90.62	11.46	10.66	75.53	97.93	9.23	5.24
C	51.23	94.99	8.52	5.78	85.28	91.21	9.57	8.49
D	64.75	97.85	14.29	5.42	74.19	98.81	6.53	4.12
E	57.1	98.77	8.3	4.45	91.9	100.0	6.3	0.0

**Note: Teacher C exited the study due to personal reasons following five data points in the Post-Online IP phase)*

Table 2:

Effect Sizes of Teachers' Implementation Adherence and Quality from Pre-Implementation Planning to Post-Implementation Planning

Teacher	Adherence			Quality		
	PEM	PND	SMD	PEM	PND	SMD
A	1.0	0.926	3.004	0.0	0.0	0.645
B	1.0	0.286	2.288	0.857	0.0	0.686
C	1.0	.8	3.996	0.0	0.0	-0.395
D	.833	0.0	0.661	0.0	0.0	0.177
E	1.0	1.0	4.193	0.0	0.0	0.276

Table 3:

Students' Math Fluency Worksheets Digits Correct Per Minute Across Phases

Student	Baseline		Pre-Implementation Planning		Post- Implementation Planning	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
A	25.57	5.85	28.50	3.36	47.60	10.99
B	22.30	5.90	28.20	4.60	30.62	6.53
C	13.96	4.90	20.67	5.38	33.92	6.89
D	10.83	1.13	11.51	3.10	13.08	2.87
E	14.29	5.85	17.54	4.82	19.83	6.28

Table 4:

Effect Sizes of Student Digits Correct Per Minute Across Phases

Student	Baseline to Pre-Implementation Planning			Pre-Implementation Planning to Post-Implementation Planning		
	PND	PEM	SMD	PND	PEM	SMD
A	.167	.833	.501	.926	1.0	5.679
B	.3	.8	1.0	.286	.571	.526
C	.471	.941	1.369	.706	1.0	2.462
D	.333	.619	0.598	0.0	.667	.508
E	0.0	.815	.557	.167	0.5	.475

Table 5:

Students' Math Fluency Worksheets Accuracy Across Phases

Student	Baseline		Pre-Implementation Planning		Post- Implementation Planning	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
A	80.15	11.55	84.28	4.53	95.58	4.28
B	71.46	4.67	77.07	7.80	82.04	6.25
C	71.27	11.69	83.44	8.35	96.86	3.61
D	76.53	8.11	76.14	10.42	77.55	7.62
E	88.13	8.57	93.93	4.74	96.87	2.97

Table 6:

Effect Sizes of Student Percent Digits Correct Across Phases

Student	Baseline to Pre-Implementation Planning			Pre-Implementation Planning to Post-Implementation Planning		
	PND	PEM	SMD	PND	PEM	SMD
A	0.0	.833	.358	.852	1.0	2.494
B	.5	.8	1.201	.095	.714	.637
C	.5	.944	1.041	.8	1.0	1.607
D	.136	.591	-.048	0.0	.636	.131
E	.519	.852	.677	0.0	.833	.620

Table 7:

Students' CCC Worksheets Digits Correct Per Minute Across Phases

Student	Pre-Implementation Planning		Post- Implementation Planning	
	Mean	Std. Dev.	Mean	Std. Dev.
A	16.78	1.41	26.63	7.13
B	23.70	5.83	29.79	6.30
C	33.25	9.44	33.67	1.26
D	21.29	8.83	30.33	6.51
E	35.05	6.42	40.00	0.70

Table 8:

Effect Sizes of Student CCC Worksheets Digits Correct Across Phases

Pre-Implementation Planning to Post-Implementation Planning			
Student	PND	PEM	SMD
A	1.0	1.0	6.988
B	.571	.619	1.001
C	0.0	.882	.044
D	0.25	1.0	1.025
E	0.0	1.0	.771

FIGURES

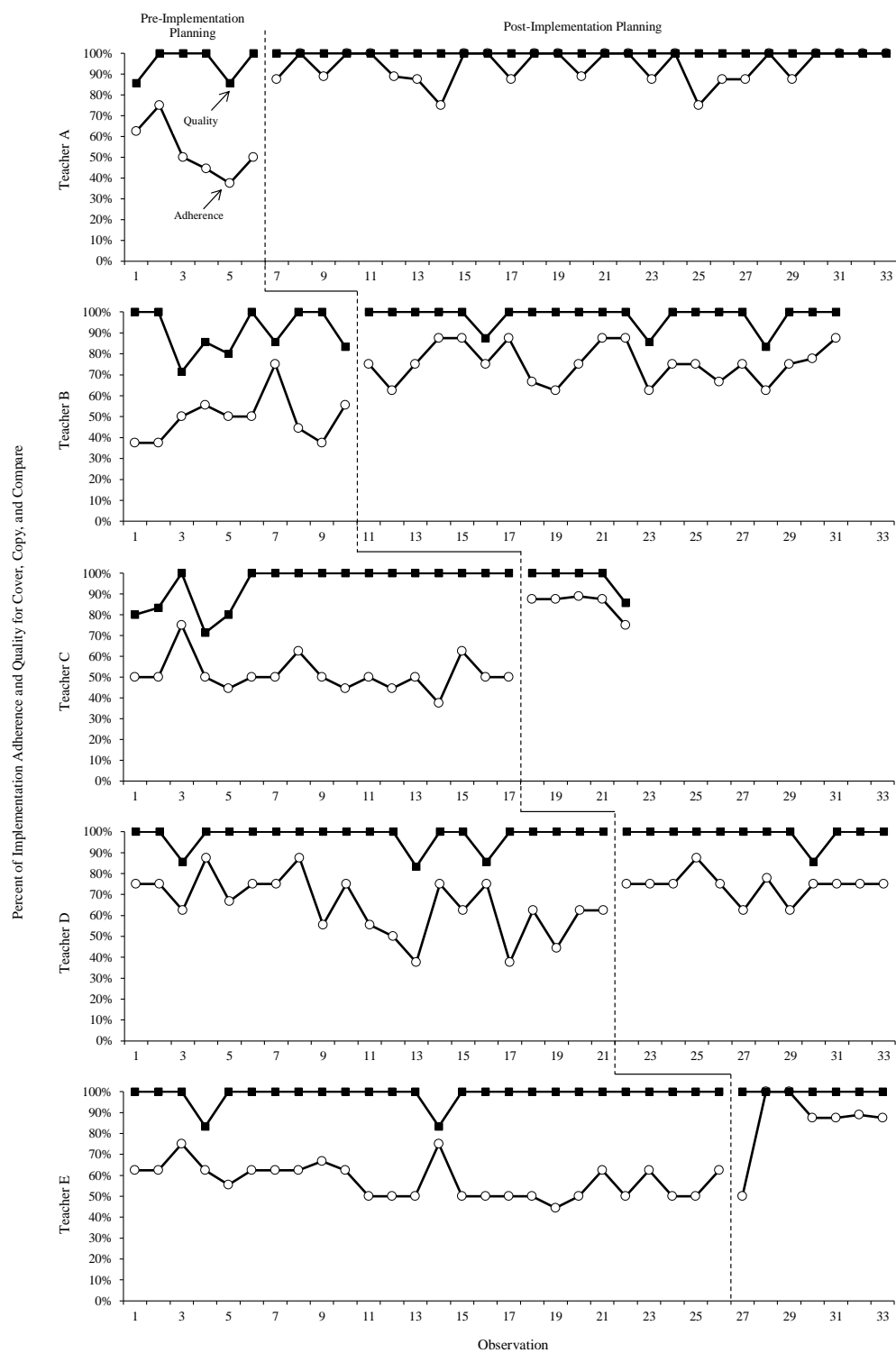


Figure 1. Teacher levels of implementation adherence and quality across phases

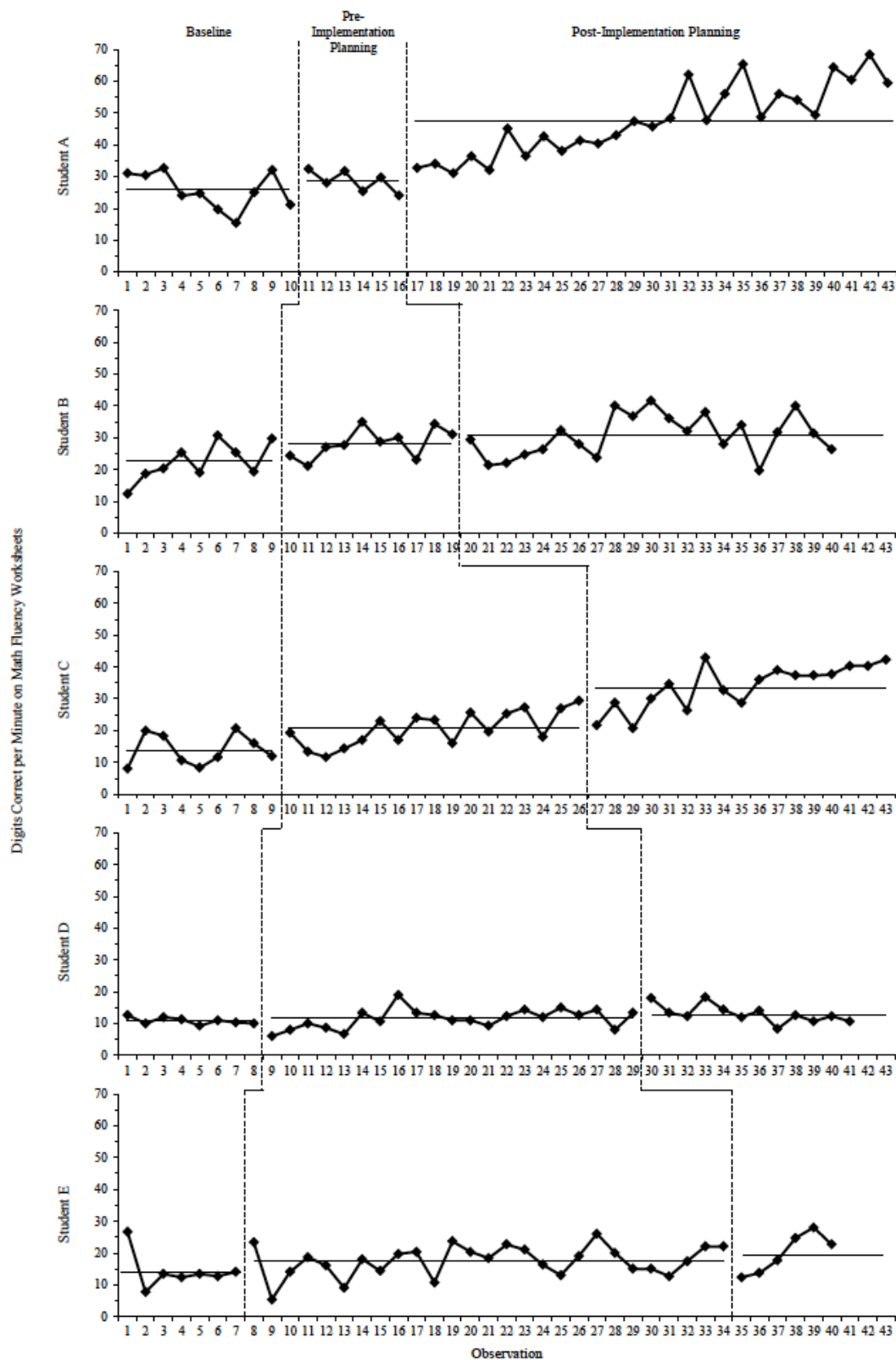


Figure 2. Student digits correct per minute on daily math fluency worksheets across phases

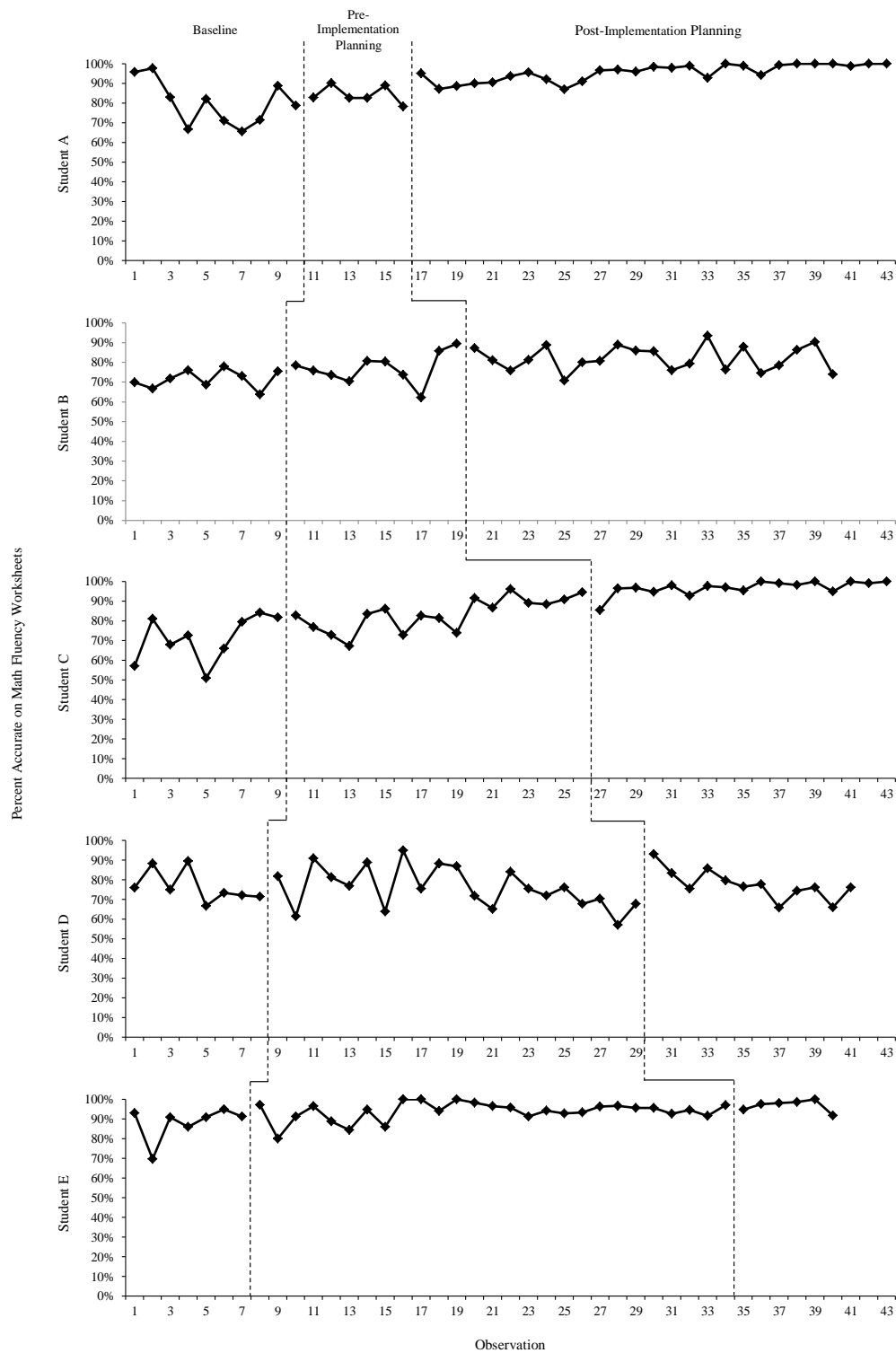


Figure 3. Student levels of accuracy on math fluency worksheets across phases

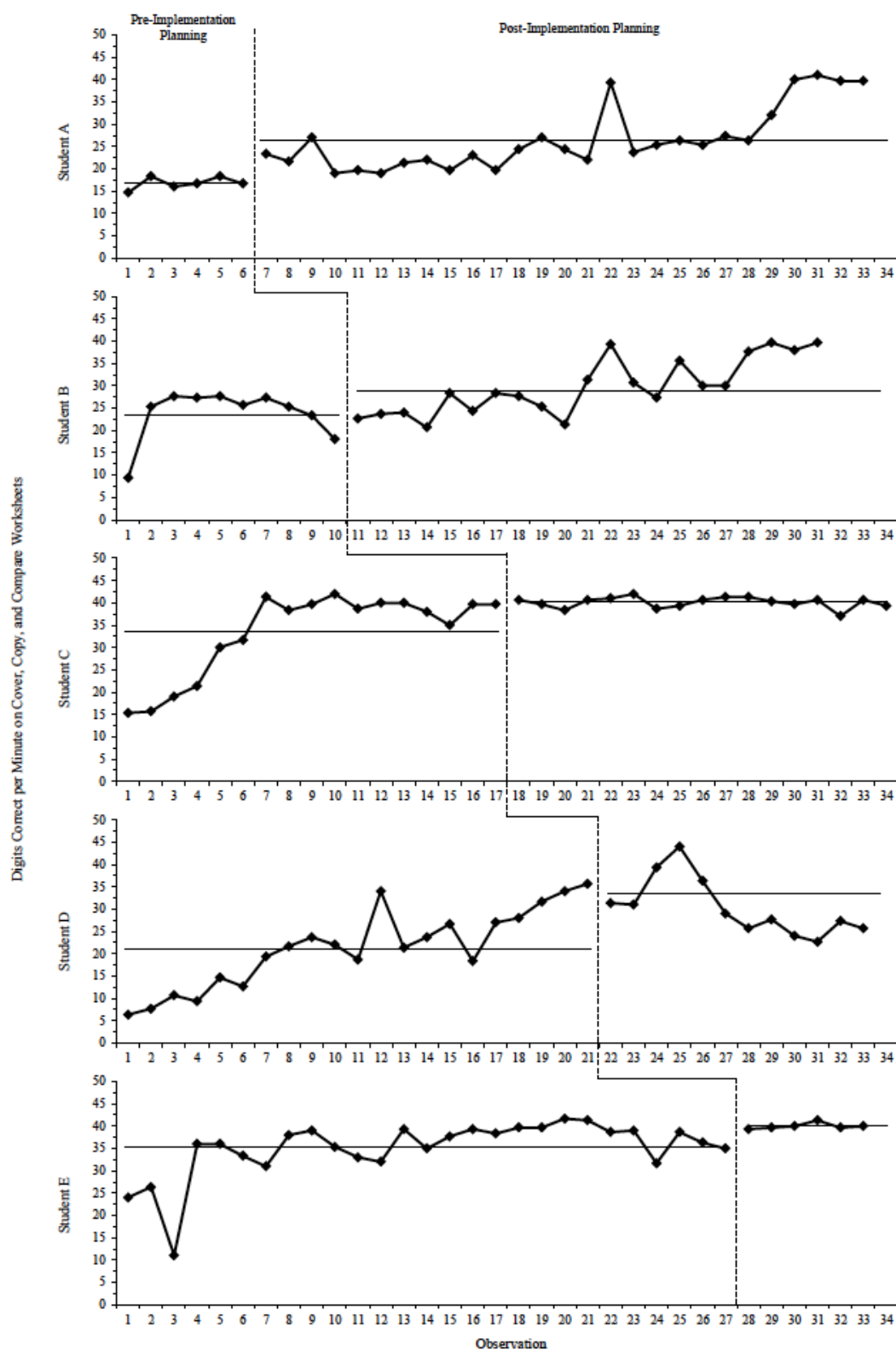


Figure 4. Student levels of digits correct per minute on CCC worksheets across phases

APPENDICES

Appendix A: CCC Treatment Integrity Observation Sheet

CONSULTANT: _____ **CONSULTEE:** _____ **DATE:** _____

SUBJECT & ACTIVITY: _____ **SESSION:** _____ **START TIME:** _____ **END TIME:** _____

Intervention Step	Adherence*				Quality*				Applicable per Plan	
	Implemented as Planned	Implemented w/ Deviation	Not Implemented	Not observed	Excellent	Good	Fair	Poor		
1. Provide student with necessary materials to complete CCC, (e.g., worksheet, writing utensil, timer for teacher)	3	2	1	NA	4	3	2	1	Y	N
2. Briefly review instructions and timing with student	3	2	1	NA	4	3	2	1	Y	N
3. Document time CCC begins/start timer	3	2	1	NA	4	3	2	1	Y	N
4. Document time CCC ends/stop timer	3	2	1	NA	4	3	2	1	Y	N
5. Collect and correct worksheet, and place in appropriate folder	3	2	1	NA	4	3	2	1	Y	N
6. Indicate number of problems correct	3	2	1	NA	4	3	2	1	Y	N
7. Aid student in graphing daily results	3	2	1	NA	4	3	2	1	Y	N
8. Provide daily reinforcement, if appropriate based on daily score	3	2	1	NA	4	3	2	1	Y	N
9. Provide weekly reinforcement, if appropriate based on weekly score	3	2	1	NA	4	3	2	1	Y	N

***NOTES** (please take notes during or immediately following observation regarding ratings)

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Ratings Key

Adherence

Implemented as planned=exactly as indicated on CCC

Implemented with deviation=implemented, but different from plan

Not Implemented=there was an opportunity for implementation, but step wasn't implemented

Not observed=no opportunity for implementation during observation

Quality

Excellent: CCC step was implemented skillfully as indicated by:

- Step smooth/natural-looking (e.g., teacher responds automatically/ has materials immediately accessible), and
- Appropriately timed (e.g., review of directions right before worksheet completion),

Good: CCC step implemented adequately, but in a less skillful manner; step somewhat flawed in at least 1 of the indicators under “excellent”

Fair: CCC step implemented poorly in a manner that is inadequate or seriously flawed in at least 1 OR somewhat flawed in at least 2 of the indicators under “excellent”.

Poor: CCC step implemented poorly, with none of the indicators under “excellent.”

Applicable per Plan

(Completed AFTER observation)

Y : circle Y for each intervention step that, per the written CCC, the teacher could have been expected to implement during the observation.

N: circle N for each intervention step that, per the written CCC, the teacher would not have been expected to implement during the observation. (e.g., The intervention step is: “Provide weekly reinforcement, if appropriate, based on weekly score” and the observation takes place on the first day of the week.

You would circle N for this step, as you would not expect the teacher to provide reward.)

Appendix B: Sample Intervention Central Fluency Worksheet

Curriculum-Based Assessment Mathematics
Single-Skill Computation Probe: Student Copy

Student:

Date: _____

$\begin{array}{r} 7 \\ \times 4 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 3 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 4 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$	
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$\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array}$		$\begin{array}{r} 3 \\ \times 5 \\ \hline \end{array}$		$\begin{array}{r} 3 \\ \times 4 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$	
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$\begin{array}{r} 1 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 9 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 9 \\ \times 2 \\ \hline \end{array}$	
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$\begin{array}{r} 9 \\ \times 1 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 1 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 9 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 3 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 2 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 7 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 2 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 1 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 3 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 9 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 9 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 5 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 7 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 1 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 7 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 4 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 9 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 1 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 4 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 3 \\ \times 9 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 9 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 4 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 1 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 9 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 4 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 5 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 9 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 7 \\ \hline \end{array}$		$\begin{array}{r} 3 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 3 \\ \times 3 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 6 \\ \times 1 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 2 \\ \times 6 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 1 \\ \hline \end{array}$		$\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$		$\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 4 \\ \times 4 \\ \hline \end{array}$		$\begin{array}{r} 9 \\ \times 1 \\ \hline \end{array}$	
--	--	--	--	--	--	--	--	--	--	--	--

$\begin{array}{r} 7 \\ \times 1 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 4 \\ \hline \end{array}$		$\begin{array}{r} 9 \\ \times 8 \\ \hline \end{array}$		$\begin{array}{r} 3 \\ \times 5 \\ \hline \end{array}$		$\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$		$\begin{array}{r} 1 \\ \times 6 \\ \hline \end{array}$	
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Appendix C: Computational Skills Mastery Curriculum

GRADE 1

1. Add two one-digit numbers: sums to 10
2. Subtract two one-digit numbers: combinations to 10

GRADE 2

3. Add two one-digit numbers: sums 11-19
4. Add a one-digit number to a two-digit number – no regrouping
5. Add a two-digit number to a two-digit number – no regrouping
6. Add a three-digit number to a three-digit number – no regrouping
7. Subtract a one-digit number from a one- or two-digit number – combinations to 18
8. Subtract a one-digit number from a two-digit number – no regrouping
9. Subtract a two-digit number from a two-digit number – no regrouping
10. Subtract a three-digit number from a three-digit number – no regrouping
11. Multiplication facts – 0's, 1's and 2's

GRADE 3

12. Add three or more one-digit numbers
13. Add three or more two-digit numbers – no regrouping
14. Add three or more three- and four-digit numbers - no regrouping
15. Add a one-digit two a two-digit number with regrouping
16. Add a two-digit two a two-digit number with regrouping
17. Add a two-digit number to a three-digit number with regrouping from the 10's column only
18. Add a two-digit number to a three-digit number with regrouping from the 100's column only
19. Add a two-digit number to a three-digit number with regrouping from the 10's and 100's columns
20. Add a three-digit number to a three-digit number with regrouping from the 10's column only
21. Add a three-digit number to a three-digit number with regrouping from the 100's column only
22. Add a three-digit number to a three-digit number with regrouping from 10's and 100's columns
23. Add a four-digit number to a four-digit to a four-digit number with regrouping in one to three columns
24. Subtract two four-digit numbers – no regrouping
25. Subtract a one-digit number from a two-digit number with regrouping
26. Subtract a two-digit number from a two-digit number with regrouping
27. Subtract a two-digit number from a three-digit number with regrouping from the 10's column
28. Subtract a two-digit number from a three-digit number with regrouping from the 100's column
29. Subtract a two-digit number from a three-digit number with regrouping from the 10's and 100's column
30. Subtract a three-digit number from a three-digit number with regrouping from the

<p>10's column</p> <p>31. Subtract a three-digit number from a three-digit number with regrouping from the 100's column</p> <p>32. Subtract a three-digit number from a three-digit number with regrouping from the 10's and 100's column</p> <p>33. Multiplication facts – 3-9</p>
<p>GRADE 4</p> <p>34. Add a five- or six-digit number to a five- or six-digit number with regrouping in any columns</p> <p>35. Add three or more two-digit numbers with regrouping</p> <p>36. Add three or more three-digit numbers with regrouping</p> <p>37. Subtract a five- or six-digit number from a five- or six-digit number with regrouping in any columns</p> <p>38. Multiply a two-digit number by a one-digit number with no regrouping</p> <p>39. Multiply a three-digit number by a one-digit number with no regrouping</p> <p>40. Multiply a two-digit number by a one-digit number with regrouping</p> <p>41. Multiply a three-digit number by a one-digit number with regrouping</p> <p>42. Division facts – 0-9</p> <p>43. Divide a two-digit number by a one-digit number with no remainder</p> <p>44. Divide a two-digit number by a one-digit number with remainder</p> <p>45. Divide a three-digit number by a one-digit number with remainder</p> <p>46. Divide a four-digit number by a one-digit number with remainder</p>
<p>GRADE 5</p> <p>47. Multiply a two-digit number by a two-digit number with regrouping</p> <p>48. Multiply a three-digit number by a two-digit number with regrouping</p> <p>49. Multiply a three-digit number by a three-digit number with regrouping</p>

Appendix C. Computational Skills Mastery Curriculum adapted from “*Academic skills problems: Direct assessment and intervention (3rd ed.)*.” by E. Shapiro, 2004. Copyright 2004 by Guilford Press.

Appendix D: Cover Copy Compare Worksheet
Cover-Copy-Compare Mathematics
Single-Skill Computation Student Worksheet

MULTIPLICATION: Multiplication facts: 0 to 9

Student:

Date: _____

Item 1:
2 CD/2 CD Total

$$\begin{array}{r} 6 \\ \times 6 \\ \hline 36 \end{array}$$

$$\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$$

Item 2:
2 CD/4 CD Total

$$\begin{array}{r} 6 \\ \times 9 \\ \hline 54 \end{array}$$

$$\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$$

Item 3:
2 CD/6 CD Total

$$\begin{array}{r} 8 \\ \times 2 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$$

Item 4:
1 CD/7 CD Total

$$\begin{array}{r} 7 \\ \times 1 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 7 \\ \times 1 \\ \hline \end{array}$$

Item 5:

1 CD/8 CD Total

$$\begin{array}{r} 1 \\ \times 2 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 1 \\ \times 2 \\ \hline \end{array}$$

Item 6:

2 CD/10 CD Total

$$\begin{array}{r} 6 \\ \times 7 \\ \hline 42 \end{array}$$

$$\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array}$$

Item 7:

1 CD/11 CD Total

$$\begin{array}{r} 4 \\ \times 2 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$$

Item 8:

2 CD/13 CD Total

$$\begin{array}{r} 6 \\ \times 3 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 6 \\ \times 3 \\ \hline \end{array}$$

Item 9:

1 CD/14 CD Total

$$\begin{array}{r} 4 \\ \times 1 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$$

Item 10:
2 CD/16 CD Total

$$\begin{array}{r} 8 \\ \times 8 \\ \hline 64 \end{array}$$

$$\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$$

Item 11:
2 CD/18 CD Total

$$\begin{array}{r} 5 \\ \times 5 \\ \hline 25 \end{array}$$

$$\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$$

Item 12:
2 CD/20 CD Total

$$\begin{array}{r} 6 \\ \times 9 \\ \hline 54 \end{array}$$

$$\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$$

Item 13:
2 CD/22 CD Total

$$\begin{array}{r} 2 \\ \times 7 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$$

Item 14:
2 CD/24 CD Total

$$\begin{array}{r} 6 \\ \times 4 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 6 \\ \times 4 \\ \hline \end{array}$$

Item 15:
1 CD/25 CD Total

$$\begin{array}{r} 1 \\ \times 2 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 1 \\ \times 2 \\ \hline \end{array}$$

Item 16:
1 CD/26 CD Total

$$\begin{array}{r} 6 \\ \times 1 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 6 \\ \times 1 \\ \hline \end{array}$$

Item 17:
1 CD/27 CD Total

$$\begin{array}{r} 1 \\ \times 2 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 1 \\ \times 2 \\ \hline \end{array}$$

Item 18:
1 CD/28 CD Total

$$\begin{array}{r} 7 \\ \times 1 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 7 \\ \times 1 \\ \hline \end{array}$$

Item 19:
2 CD/30 CD Total

$$\begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}$$

$$\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$$

Item 20:
2 CD/32 CD Total

$$\begin{array}{r} 8 \\ \times 5 \\ \hline 40 \end{array}$$

$$\begin{array}{r} 8 \\ \times 5 \\ \hline \end{array}$$

Item 21:
1 CD/33 CD Total

$$\begin{array}{r} 1 \\ \times 8 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 1 \\ \times 8 \\ \hline \end{array}$$

Item 22:
2 CD/35 CD Total

$$\begin{array}{r} 7 \\ \times 3 \\ \hline 21 \end{array}$$

$$\begin{array}{r} 7 \\ \times 3 \\ \hline \end{array}$$

Item 23:
1 CD/36 CD Total

$$\begin{array}{r} 1 \\ \times 5 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 1 \\ \times 5 \\ \hline \end{array}$$

Item 24:
2 CD/38 CD Total

$$\begin{array}{r} 6 \\ \times 9 \\ \hline 54 \end{array}$$

$$\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$$

Item 25:
2 CD/40 CD Total

$$\begin{array}{r} 8 \\ \times 3 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$$

Item 26:
2 CD/42 CD Total

$$\begin{array}{r} 2 \\ \times 6 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 2 \\ \times 6 \\ \hline \end{array}$$

Item 27:
1 CD/43 CD Total

$$\begin{array}{r} 1 \\ \times 4 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 1 \\ \times 4 \\ \hline \end{array}$$

Item 28:
2 CD/45 CD Total

$$\begin{array}{r} 5 \\ \times 9 \\ \hline 45 \end{array}$$

$$\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$$

Item 29:
1 CD/46 CD Total

$$\begin{array}{r} 3 \\ \times 2 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 3 \\ \times 2 \\ \hline \end{array}$$

Item 30:
2 CD/48 CD Total

$$\begin{array}{r} 5 \\ \times 7 \\ \hline 35 \end{array}$$

$$\begin{array}{r} 5 \\ \times 7 \\ \hline \end{array}$$

Item 31:
2 CD/50 CD Total

$$\begin{array}{r} 2 \\ \times 6 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 2 \\ \times 6 \\ \hline \end{array}$$

Item 32:
2 CD/52 CD Total

$$\begin{array}{r} 2 \\ \times 8 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 2 \\ \times 8 \\ \hline \end{array}$$

Item 33:
2 CD/54 CD Total

$$\begin{array}{r} 2 \\ \times 8 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 2 \\ \times 8 \\ \hline \end{array}$$

Item 34:
2 CD/56 CD Total

$$\begin{array}{r} 6 \\ \times 9 \\ \hline 54 \end{array}$$

$$\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$$

Item 35:
2 CD/58 CD Total

$$\begin{array}{r} 8 \\ \times 8 \\ \hline 64 \end{array}$$

$$\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$$

Item 36:
1 CD/59 CD Total

$$\begin{array}{r} 2 \\ \times 1 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 2 \\ \times 1 \\ \hline \end{array}$$

Item 1:
2 CD/2 CD Total

$$\begin{array}{r} 4 \\ \times 8 \\ \hline 32 \end{array}$$

$$\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$$

Item 2:
2 CD/4 CD Total

$$\begin{array}{r} 7 \\ \times 2 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 7 \\ \times 2 \\ \hline \end{array}$$

Item 3:
2 CD/6 CD Total

$$\begin{array}{r} 9 \\ \times 4 \\ \hline 36 \end{array}$$

$$\begin{array}{r} 9 \\ \times 4 \\ \hline \end{array}$$

Item 4:
2 CD/8 CD Total

$$\begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}$$

$$\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$$

Item 5:
2 CD/10 CD Total

$$\begin{array}{r} 5 \\ \times 5 \\ \hline 25 \end{array}$$

$$\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$$

Item 6:
2 CD/12 CD Total

$$\begin{array}{r} 7 \\ \times 8 \\ \hline 56 \end{array}$$

$$\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$$

Item 7:
2 CD/14 CD Total

$$\begin{array}{r} 7 \\ \times 6 \\ \hline 42 \end{array}$$

$$\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$$

Item 8:
1 CD/15 CD Total

$$\begin{array}{r} 1 \\ \times 6 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 1 \\ \times 6 \\ \hline \end{array}$$

Item 9:
2 CD/17 CD Total

$$\begin{array}{r} 9 \\ \times 5 \\ \hline 45 \end{array}$$

$$\begin{array}{r} 9 \\ \times 5 \\ \hline \end{array}$$

Item 10:
1 CD/18 CD Total

$$\begin{array}{r} 1 \\ \times 4 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 1 \\ \times 4 \\ \hline \end{array}$$

Item 11:
1 CD/19 CD Total

$$\begin{array}{r} 4 \\ \times 2 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$$

Item 12:
1 CD/20 CD Total

$$\begin{array}{r} 8 \\ \times 1 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 8 \\ \times 1 \\ \hline \end{array}$$

Item 13:
2 CD/22 CD Total

$$\begin{array}{r} 7 \\ \times 5 \\ \hline 35 \end{array}$$

$$\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$$

Item 14:
2 CD/24 CD Total

$$\begin{array}{r} 5 \\ \times 4 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$$

Item 15:
2 CD/26 CD Total

$$\begin{array}{r} 6 \\ \times 4 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 6 \\ \times 4 \\ \hline \end{array}$$

Item 16:
2 CD/28 CD Total

$$\begin{array}{r} 5 \\ \times 8 \\ \hline 40 \end{array}$$

$$\begin{array}{r} 5 \\ \times 8 \\ \hline \end{array}$$

Item 17:
2 CD/30 CD Total

$$\begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$$

$$\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$$

Item 18:
2 CD/32 CD Total

$$\begin{array}{r} 8 \\ \times 5 \\ \hline 40 \end{array}$$

$$\begin{array}{r} 8 \\ \times 5 \\ \hline \end{array}$$

Item 19:
1 CD/33 CD Total

$$\begin{array}{r} 1 \\ \times 2 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 1 \\ \times 2 \\ \hline \end{array}$$

Item 20:
1 CD/34 CD Total

$$\begin{array}{r} 1 \\ \times 7 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 1 \\ \times 7 \\ \hline \end{array}$$

Item 21:
1 CD/35 CD Total

$$\begin{array}{r} 2 \\ \times 2 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 2 \\ \times 2 \\ \hline \end{array}$$

Item 22:
1 CD/36 CD Total

$$\begin{array}{r} 3 \\ \times 1 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 3 \\ \times 1 \\ \hline \end{array}$$

Item 23:
2 CD/38 CD Total

$$\begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}$$

$$\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$$

Item 24:
2 CD/40 CD Total

$$\begin{array}{r} 4 \\ \times 8 \\ \hline 32 \end{array}$$

$$\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$$

Item 25:
2 CD/42 CD Total

$$\begin{array}{r} 3 \\ \times 8 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$$

Item 26:
2 CD/44 CD Total

$$\begin{array}{r} 6 \\ \times 6 \\ \hline 36 \end{array}$$

$$\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$$

Item 27:
2 CD/46 CD Total

$$\begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$$

$$\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$$

Item 28:
1 CD/47 CD Total

$$\begin{array}{r} 6 \\ \times 1 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 6 \\ \times 1 \\ \hline \end{array}$$

Item 29:
2 CD/49 CD Total

$$\begin{array}{r} 8 \\ \times 3 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$$

Item 30:
2 CD/51 CD Total

$$\begin{array}{r} 2 \\ \times 6 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 2 \\ \times 6 \\ \hline \end{array}$$

Item 31:
2 CD/53 CD Total

$$\begin{array}{r} 5 \\ \times 2 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$$

Item 32:
2 CD/55 CD Total

$$\begin{array}{r} 5 \\ \times 7 \\ \hline 35 \end{array}$$

$$\begin{array}{r} 5 \\ \times 7 \\ \hline \end{array}$$

Item 33:
2 CD/57 CD Total

$$\begin{array}{r} 4 \\ \times 5 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 4 \\ \times 5 \\ \hline \end{array}$$

Item 34:
2 CD/59 CD Total

$$\begin{array}{r} 7 \\ \times 4 \\ \hline 28 \end{array}$$

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$$\begin{array}{r} 7 \\ \times 4 \\ \hline \end{array}$$

Item 35:
1 CD/60 CD Total

$$\begin{array}{r} 8 \\ \times 1 \\ \hline 8 \end{array}$$

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$$\begin{array}{r} 8 \\ \times 1 \\ \hline \end{array}$$

Item 36:
1 CD/61 CD Total

$$\begin{array}{r} 3 \\ \times 3 \\ \hline 9 \end{array}$$

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|
|
|

$$\begin{array}{r} 3 \\ \times 3 \\ \hline \end{array}$$

Appendix E: Online Implementation Planning

Implementation Planning

This protocol, along with the video training, will guide you through the completion of an Implementation Plan, a tool designed to facilitate definition and adaptation of an intervention to fit the context (e.g., classroom, routines) in which you will be implementing it. Completion of the Implementation Plan is a 3-step process:

1. Background Information

You will provide some background information about the selected intervention and intervention recipient(s).

2. Action Plan

Every context in which an intervention is implemented is different; sometimes making small revisions to an intervention step can make it much easier to implement in a particular context. To make an intervention better "fit" your routines and context, you will define each intervention step, making revisions, as needed, for each step. You will also answer planning questions about how you will implement the intervention (e.g., when, where) and identify the resources required for implementation.

3. Coping Plan

Even with the best planning, there may be barriers that interfere with plans to implement an intervention. The purpose of creating a coping plan is to identify major barriers to intervention implementation to develop strategies to address these barriers and promote effective, maintained implementation. You will identify up to four major implementation barriers and problem-solve strategies, for each barrier, to enable continued intervention implementation should you encounter a barrier.

Completion of these 3 steps will support your implementation of the intervention over time, benefiting you and your students.



I. Background Information

To help us understand how long it takes educators to complete Implementation Planning independently, please record the current time here:
Please note, you will be asked to record the time when you finish Implementation Planning as well.

To confirm you are ready to complete the Implementation Plan, please respond to the following questions:

1. Has the target problem(s) been identified and defined?

2. Has an evidence-based intervention designed to address the target problem(s) been selected?

3. Do you have a copy of the intervention plan/manual/guide present?

To help you reflect on your unique context and intervention, please complete the following background information:

Date Completed:

Intervention Name:

Note: In the event that the intervention does not have a name, please indicate what you refer to the intervention as.

Target Population (select one):

Primary domain of target problem (select one):

Is this intervention in the student's IEP? (select one)

Is this intervention part of a response-to-intervention model? (select one):

Level of intervention (select one):

2. Action Plan

The Action Plan is completed in three steps, outlined below:

For each intervention step:

1. Review each intervention step in the initial intervention plan.

An intervention step is a specific behavior or task you engage in to carry out the intervention. Consider whether the intervention step would better "fit" with your routines or the implementation context if revised.

2. Revise each intervention step, as needed and appropriate, to best fit your student(s)' needs and the intervention context.

Type in each intervention step, revised or according to the initial intervention plan, as you intend to implement it. If you revised the step, please indicate that the step was revised in the first column.

3. Record your answers to the planning questions for each intervention step.

Answer each planning question to clarify how each intervention step will be implemented.

Examples of completing each of these steps for both a behavioral and academic intervention are listed below:

BEHAVIOR

Intervention step in an initial intervention plan: *Pair student with peer to complete morning jobs*

Revised?	Intervention Step	When	Where	How Often	For how long	Resources /Materials Needed	
Yes	Allow student to choose peer to help complete AM jobs.	AM transition	Student location	Once daily	Throughout AM jobs	AM jobs list	Add row

ACADEMIC

Intervention step in an initial intervention plan: *Student completes 1 multiplication practice activity daily.*

Revised?	Intervention Step	When	Where	How Often	For how long	Resources /Materials Needed	
Yes	Student completes 1-2 multiplication practice activities 3x/week.	End of math lesson	Student's desk	3x/week	up to 5 minutes	multiplication activities	Add row

Revised?	Intervention Step	When	Where	How Often	For how long	Resources / Materials Needed	
<div><div></div><div></div></div>							Add row

3. Coping Plan

The Coping Plan is completed in two steps, outlined below:

1. **Decide what major barriers to implementing the intervention you may encounter.**
List the top four barriers in the left-hand column below.

2. **Develop a plan to modify your implementation to enable you to continue implementing when each barrier is encountered.**
Type your plan for how you can modify the intervention to ensure the intervention is continued, despite the barrier, in the right-hand column.

An example of completing both of these steps is listed in the top row of the table below:

Major Barrier	Plan to Enable Continued Implementation
Behavior Support Plan example: During some activities, I need to work one-to-one with other students so I am not able to be in close proximity to the target student.	Assign a responsible student to check in with the target student, to provide reminders of appropriate behavior, and to answer questions about work to reduce frustration.

Congratulations!

You have successfully completed Implementation Planning.

To help us understand how long it takes educators to complete Implementation Planning independently, please record the current time here:

Please be sure to:

Print two copies of the form. One copy to provide to your consultant and a second copy to refer to as you implement the intervention. Please note, due to the potential for technological difficulties, printed hard copies will be needed. Click on the "Print" button below to print. Or, under "File" select "Print."

Should you have any questions or feedback regarding this activity, please do not hesitate to e-mail them to Anna Long, project manager for Project PRIME at anna.long@uconn.edu

Print Form



Appendix F: Usage Rating Profile- Intervention Revised (URP-IR)

Usage Rating Profile-Intervention Revised (URP-IR)						
	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. This intervention is an effective choice for addressing a variety of problems.	1	2	3	4	5	6
2. I would need additional resources to carry out this intervention.	1	2	3	4	5	6
3. I would be able to allocate my time to implement this intervention.	1	2	3	4	5	6
4. I understand how to use this intervention.	1	2	3	4	5	6
5. A positive home-school relationship is needed to implement this intervention.	1	2	3	4	5	6
6. I am knowledgeable about the intervention procedures.	1	2	3	4	5	6
7. The intervention is a fair way to handle the child's behavior problem.	1	2	3	4	5	6
8. The total time required to implement the intervention procedures would be manageable.	1	2	3	4	5	6
9. I would not be interested in implementing this intervention.	1	2	3	4	5	6
10. My administrator would be supportive of my use of this intervention.	1	2	3	4	5	6
11. I would have positive attitudes about implementing this intervention.	1	2	3	4	5	6
12. This intervention is a good way to handle the child's behavior problem.	1	2	3	4	5	6
13. Preparation of materials needed for this intervention would be minimal.	1	2	3	4	5	6
14. Use of this intervention would be consistent with the mission of my school.	1	2	3	4	5	6
15. Parental collaboration is required in order to use this intervention.	1	2	3	4	5	6

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
16. Implementation of this intervention is well matched to what is expected in my job.	1	2	3	4	5	6
17. Material resources needed for this intervention are reasonable.	1	2	3	4	5	6
18. I would implement this intervention with a good deal of enthusiasm.	1	2	3	4	5	6
19. This intervention is too complex to carry out accurately.	1	2	3	4	5	6
20. These intervention procedures are consistent with the way things are done in my system.	1	2	3	4	5	6
21. This intervention would not be disruptive to other students.	1	2	3	4	5	6
22. I would be committed to carrying out this intervention.	1	2	3	4	5	6
23. The intervention procedures easily fit in with my current practices.	1	2	3	4	5	6
24. I would need consultative support to implement this intervention.	1	2	3	4	5	6
25. I understand the procedures of this intervention.	1	2	3	4	5	6
26. My work environment is conducive to implementation of an intervention like this one.	1	2	3	4	5	6
27. The amount of time required for record keeping would be reasonable.	1	2	3	4	5	6
28. Regular home-school communication is needed to implement intervention procedures.	1	2	3	4	5	6
29. I would require additional professional development in order to implement this intervention.	1	2	3	4	5	6

URP- I SCORING GUIDE

Factor I: ACCEPTABILITY

Items - 1, 7, 9*, 11, 12, 18, 21, 22, 23

Factor II: UNDERSTANDING

Items – 4, 6, 25

Factor III: HOME SCHOOL COLLABORATION

Items – 5, 15, 28

Factor IV: FEASIBILITY

Items – 3, 8, 13, 17, 19*, 27

Factor V: SYSTEM CLIMATE

Items – 10, 14, 16, 20, 26

Factor VI: SYSTEM SUPPORT

Items – 2, 24, 29

* REVERSE CODE THESE ITEMS WHEN SCORING

Note: Use care when interpreting individual factors and in combination. For example, a LOW score for system support reflects greater ability to independently implement the intervention. Thus, if aggregating across all factors to find an overall mean indicative of more favorable responses, consider reverse coding all items in this factor.

Citation for the measure:

Chafouleas, S.M., Briesch, A.M., Neugebauer, S. R., & Riley-Tillman, T. C. (2011). *Usage Rating Profile – Intervention (Revised)*. Storrs, CT: University of Connecticut.

Suggested citation for the associated publication is as follows:

Briesch, A.M., Chafouleas, S. M., Neugebauer, S. R., & Riley-Tillman, T.C., (2011). Exploring the multi-dimensional influences on intervention usage: Revision of the Usage Rating Profile-Intervention (URP-IR).

Appendix G: PRIME Rating Profile

PRIME Rating Profile-Implementation Planning Activity						
	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. The Implementation Planning activity is an effective choice for addressing a variety of implementation problems.	1	2	3	4	5	6
2. I would need additional resources to carry out the Implementation Planning activity.	1	2	3	4	5	6
3. I would be able to allocate my time to complete the Implementation Planning activity.	1	2	3	4	5	6
4. I understand how to use the Implementation Planning activity.	1	2	3	4	5	6
5. I am knowledgeable about the Implementation Planning activity procedures.	1	2	3	4	5	6
6. The Implementation Planning activity is a fair way to handle implementation problems.	1	2	3	4	5	6
7. The total time required to complete the Implementation Planning activity would be manageable.	1	2	3	4	5	6
8. I would not be interested in completing the Implementation Planning activity.	1	2	3	4	5	6
9. My administrator would be supportive of my use of the Implementation Planning activity.	1	2	3	4	5	6
10. I would have positive attitudes about using the Implementation Planning activity.	1	2	3	4	5	6
11. The Implementation Planning activity is a good way to handle implementation problems.	1	2	3	4	5	6
12. Preparation of materials needed for the Implementation Planning activity would be minimal.	1	2	3	4	5	6
13. Use of the Implementation Planning activity would be consistent with the mission of my school.	1	2	3	4	5	6

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
14. Completion of the Implementation Planning activity is well matched to what is expected in my job.	1	2	3	4	5	6
15. Material resources needed for the Implementation Planning activity are reasonable.	1	2	3	4	5	6
16. I would complete the Implementation Planning activity with a good deal of enthusiasm.	1	2	3	4	5	6
17. The Implementation Planning activity is too complex to carry out accurately.	1	2	3	4	5	6
18. The Implementation Planning activity procedures are consistent with the way things are done in my system.	1	2	3	4	5	6
19. The Implementation Planning activity would not be disruptive to other intervention-related activities.	1	2	3	4	5	6
20. I would be committed to carrying out the Implementation Planning activity.	1	2	3	4	5	6
21. The intervention procedures easily fit in with my current practices.	1	2	3	4	5	6
22. I would need consultative support to complete the Implementation Planning activity.	1	2	3	4	5	6
23. I understand the procedures of the Implementation Planning activity.	1	2	3	4	5	6
24. My work environment is conducive to completing something like the Implementation Planning activity.	1	2	3	4	5	6
25. The amount of time required for paperwork completion during the Implementation Planning activity would be reasonable.	1	2	3	4	5	6
26. I would require additional professional development in order to complete the Implementation Planning activity.	1	2	3	4	5	6

PRIME Rating Profile- I SCORING GUIDE (Revised)
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Factor I: ACCEPTABILITY

Items - 1, 6, 8*, 10, 11, 16, 19, 20, 21

Factor II: UNDERSTANDING

Items – 4, 5, 23

Factor III: FEASIBILITY

Items – 3, 7, 12, 15, 17*, 25

Factor IV: SYSTEM CLIMATE

Items – 9, 13, 14, 18, 24

Factor V: SYSTEM SUPPORT

Items – 2, 22, 26

* REVERSE CODE THESE ITEMS WHEN SCORING

Note: Use care when interpreting individual factors and in combination. For example, a LOW score for system support reflects greater ability to independently implement the intervention. Thus, if aggregating across all factors to find an overall mean indicative of more favorable responses, consider reverse coding all items in this factor.

Citation for the measure:

Chafouleas, S.M., Briesch, A.M., Neugebauer, S. R., & Riley-Tillman, T. C. (2011). *Usage Rating Profile – Intervention (Revised)*. Storrs, CT: University of Connecticut.

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Briesch, A.M., Chafouleas, S. M., Neugebauer, S. R., & Riley-Tillman, T.C., (2011). Exploring the multi-dimensional influences on intervention usage: Revision of the Usage Rating Profile-Intervention (URP-IR).

Appendix H: Children's Intervention Rating Profile (CIRP)

Children's Intervention Rating Profile

(Witt & Elliott, 1985)

Student name: _____

Date: _____

Consultant name: _____

We are interested in learning your ideas about the program that you are now finishing. Below are some sentences. You may or may not agree with the sentences. For each one, please circle the number that describes how much you agree or disagree with the statement. Using the following guide:

5 = I disagree very much

4 = I sort of disagree

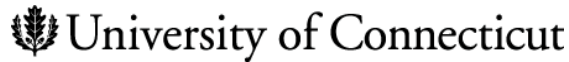
3 = I don't agree or disagree

2 = I sort of agree

1 = I agree very much

	I agree very much 1	I sort of agree 2	I don't agree or disagree 3	I sort of disagree 4	I disagree very much 5
1. The things used to deal with the problem were fair.	1	2	3	4	5
2. The teacher/parent were too hard (mean).	1	2	3	4	5
3. The things used to deal with the problem might cause problems with my friends.	1	2	3	4	5
4. There are better ways to handle this problem.	1	2	3	4	5
5. The things used would be good for other children.	1	2	3	4	5
6. I like the things used to handle this problem.	1	2	3	4	5
7. The things used for this problem would help other children do better in school.	1	2	3	4	5

Appendix I: Teacher Consent Form



Teacher Consent Form for Participation in a Research Study

Student Investigator: Justin R. Byron, MA

Supervising Investigator: Lisa M. H. Sanetti, PhD

Study Title: Implementation Planning as a Proactive Approach to Treatment Integrity Maintenance in an Academic Intervention

Introduction

You are invited to participate in a dissertation research study of Implementation Planning, a structured support to aid K-12 teachers' implementation of student interventions. This study is being conducted by Justin Byron, MA and supervised by Lisa Sanetti, PhD, both from the University of Connecticut's Neag School of Education.

Why is this study being done?

The purpose of this research study is to provide an initial test Implementation Planning in an electronic format for an academic intervention. Information gathered will help to further revise and refine the electronic protocol. A secondary purpose is to facilitate teachers' implementation of the academic intervention Cover, Copy, and Compare (CCC). To meet purpose, we need teachers who believe they would benefit from additional assistance with academic interventions, particularly those focused on mathematics.

What are the study procedures? What will I be asked to do?

If you agree to take part in this study, you will be asked to do the following:

If you consent to participate, we will collect some information about you and your student. First, we will ask you to complete a background information form. Second, we will meet with you and interview you to identify your student's specific level of difficulty in mathematics. Third, we will ask you to provide fluency worksheets for your students to complete for three minutes each day. Fourth, we will meet with you to review the student's progress and discuss the possible implementation of a mathematics intervention to aid with your student's needs.

Training for mathematics intervention will be provided. Then you will be asked to implement the mathematics intervention for a minimum of three weeks. While you implement the intervention, the student investigator will observe your student approximately three times per week during mathematics, and will meet with you briefly at least once per week to answer questions and collect intervention materials.

After implementing the intervention for approximately three weeks, you will be asked to independently complete a detailed planning regarding the implementation of the intervention within your unique context. You will also be asked to identify possible barriers to implementing the mathematics intervention. A training module will be provided to help guide you through the completion of this process. Observations by the student investigator will continue for an additional few weeks, at which point you will be asked to meet and discuss both the progress of your student, as well

as your thoughts on aspects of the intervention process. You will also be asked to complete two forms regarding your implementation of the intervention.

Throughout the study, all meetings will be scheduled at times and places of convenience for you. All meetings will be audiotaped so we can be sure all needed information was collected.

What other options are there?

You may continue addressing student academic needs in mathematics the way you have been or utilize school-based resources to obtain additional support in addressing student academic needs.

What are the risks or inconveniences of the study?

Although the risks associated with participation in the study are minimal, you may experience low levels of anxiety during your involvement in the study. However, you, and/or researchers may immediately terminate any activity at any time, without penalty. Inconveniences may include time to meet with us and complete the intervention implementation-related tasks.

What are the benefits of the study?

Benefits to participating in this study include potentially (a) increasing your student's academic achievement in mathematics as a result of the chosen intervention and (b) increasing your initial and sustained implementation of an academic intervention classroom management system. Furthermore, this study will inform revision of Implementation Planning supports and extend the literature on implementation of academic interventions.

Will I receive payment for participation? Are there costs to participate?

There are no costs to participation. As an acknowledgement of your time and effort, you will be provided with a gift card valued at \$10 for each week of your participation (with an option to choose from several stores) at the completion of the study.

How will my personal information be protected?

The following procedures will be used to protect the confidentiality of your data. Research records will be labeled with an assigned ID number. The ID number will be a two-digit number that reflects how many people have enrolled in the study. A master key that links names and codes will be maintained in a separate and secure location. Paper-based data will be stored inside a locked file cabinet inside a locked office suite in the Department of Educational Psychology at the University of Connecticut. All electronic files (e.g., database, spreadsheet, etc.) containing identifiable information will be password protected. Electronic versions of reports for each teacher participant will be saved with codes (i.e., "Teacher" in place of teacher name) for all identifying information. Any computer hosting such files will also have password protection to prevent access by unauthorized users. Only the members of the research staff will have access to the passwords.

At the conclusion of this study, the researchers may publish their findings. Information will be presented in summary format and you will not be identified in any publications or presentations. We will refer to the school as a public or school program setting located in the Northeast. All raw and electronic data will be maintained at least 7 years after the end of the project; data will be maintained longer if necessary to complete publication of results.

You should also know that the UConn Institutional Review Board (IRB) and the Office of Research Compliance may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

Can I stop being in the study and what are my rights?

You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate. During meetings, you do not have to answer any question that you do not want to answer.

Who do I contact if I have questions about the study?

Take as long as you would like before you make a decision. We will be happy to answer any questions you have about this study. If you have further questions about this study or if you have a research-related problem, you may contact the student investigator, Justin Byron (203-414-8483) or the supervising investigator, Lisa Sanetti (860-486-2747). If you have any questions concerning your rights as a research participant, you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8802.

Documentation of Consent:

I have read this form and have decided that I will participate in the project described above. Its general purposes, the particulars of involvement and possible risks and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

Participant Signature:

Print Name:

Date:

Signature of Person
Obtaining Consent

Print Name:

Date:

Appendix J: Teacher Demographics

Thank you for participating in our project. Please note that all names on this and other forms will be removed and replaced with an ID number. Names will not be shared with anyone outside this project.

TEACHER INFORMATION

Name: _____ **Today's Date:** _____
 First Middle Last Month Day Year

School: _____ **E-mail:** _____

Birthdate: _____ **Please indicate your gender:** Male Female
 Month Day Year

What is your race/ethnicity?

- | | |
|---|---|
| <input type="radio"/> White | <input type="radio"/> Latino/Hispanic |
| <input type="radio"/> Black / African American | <input type="radio"/> Native American/American Indian |
| <input type="radio"/> Asian | <input type="radio"/> Other _____ |
| <input type="radio"/> Native Hawaiian/ Pacific Islander | <input type="radio"/> Multiracial _____ |

Please indicate the grade you currently teach? (check all that apply)

- | | | | |
|---------------------------------------|---------------------------------------|--|--|
| <input type="radio"/> Kindergarten | <input type="radio"/> 4 th | <input type="radio"/> 8 th | <input type="radio"/> 12 th |
| <input type="radio"/> 1 st | <input type="radio"/> 5 th | <input type="radio"/> 9 th | <input type="radio"/> |
| <input type="radio"/> 2 nd | <input type="radio"/> 6 th | <input type="radio"/> 10 th | <input type="radio"/> |
| <input type="radio"/> 3 rd | <input type="radio"/> 7 th | <input type="radio"/> 11 th | <input type="radio"/> |

How many years of teaching experience do you have? _____

On average, how many students are present in your classroom at one time? _____

Please indicate whether you have special and/or general education certification:

- | | |
|---|--|
| <input type="radio"/> General education certification | <input type="radio"/> General & special education certifications |
| <input type="radio"/> Special education certification | <input type="radio"/> Not currently certified |

What is your highest level of education completed? (check one)

- | | |
|---------------------------------------|---|
| <input type="radio"/> High School/GED | <input type="radio"/> Master's/Specialist |
| <input type="radio"/> Associate's | <input type="radio"/> Master's plus _____ credits |
| <input type="radio"/> B.A./B.S. | <input type="radio"/> Doctorate (e.g., PhD, JD) |

Have you engaged in consultation to develop intervention plans for a student before?

No Yes

STUDENT INFORMATION

Nominated student name: _____ **How long have you known this student?** _____

Has this student had any academic problems in school? **No** **Yes**

If yes, what are/were the academic problems? _____

When did they start? _____

Have these problems ended? **No** **Yes**

Has this student had any behavioral problems in school? **No** **Yes**

If yes, what are/were the behavioral problems? _____

When did they start? _____

Have these problems ended? **No** **Yes**

Is there a response-to-intervention initiative in your school? **No** **Yes**

Does the child currently receive any supplemental supports (Tier 2 or 3)? **No** **Yes**

If yes, please describe domain, delivery setting, and frequency:

Domain and Subtype	Delivery Setting		Person Implementing, Type, and Frequency
	In Class	Out of Class	
<i>Example:</i> Academic – Reading	X		Reading Teacher, Small group fluency work, daily for 20 min.
Academic:			
Behavior:			
Other:			

If supports are not in place, is a referral planned or in process? **No** **Yes**

If yes, please indicate domain (academic, behavior, etc.): _____

Does the student currently receive special education services? **No** **Yes**

If yes, which designation applies?

- | | | | |
|--|--|---|--|
| <input type="radio"/> Learning Disability | <input type="radio"/> Emotional and/or Behavioral Disability | <input type="radio"/> Orthopedic or Physical Impairment | <input type="radio"/> Other Health Impaired |
| <input type="radio"/> Specific Learning Disability | <input type="radio"/> Speech/Language Disability | <input type="radio"/> Visual Impairment | <input type="radio"/> Traumatic Brain Injury |
| <input type="radio"/> Developmental Disability | <input type="radio"/> Intellectual Disability | <input type="radio"/> Hearing Impairment | <input type="radio"/> Multiple Disabilities |
| <input type="radio"/> Autism | <input type="radio"/> Deaf-Blind | | |

If no, is an evaluation for special education services planned or in process? **No** **Yes**



University of Connecticut

Parental Permission Form for Participation in a Research Study

Student Investigator: Justin R. Byron, MA

Supervising Investigator: Lisa M. H. Sanetti, PhD

Study Title: Implementation Planning as a Proactive Approach to Treatment Integrity Maintenance in an Academic Intervention

Introduction

You are invited to participate in a dissertation research study of Implementation Planning, a system of supports to aid K-12 teachers' implementation of student interventions. This study is being conducted by Justin Byron, MA and supervised by Lisa Sanetti, PhD, both from the University of Connecticut's Neag School of Education.

Why is this study being done?

We are doing this study to test Implementing Planning to help us further improve its use. We need teachers to apply student interventions in the classroom and to use Implementation Planning during this process.

What are the study procedures? What will my child be asked to do?

If you give permission for your child to be in the study, we will collect some information. First, we will talk with your child's teacher to learn about your child's specific difficulties in mathematics(s). Second, your child will meet with the student investigator to complete a brief (three minutes) mathematics worksheets used for screening purposes. In the event that your child screens out of the study, the classroom teacher will be provided with information regarding additional mathematics supports for your child. Third, your child will be asked to complete brief (three-minutes) daily mathematics worksheets for approximately one week. Fourth, we will meet with your child's teacher to review this information and decide if a mathematics intervention is needed.

If a mathematics intervention is not needed, your child will no longer be in the study.

If a mathematics intervention, we will work with your child's teacher to develop a plan for implementation. The intervention will provide your child with structured opportunities to improve on their mathematical computation skills. We will show your child's teacher how to implement the intervention. Your child's teacher will use the intervention and provide information about your child's progress for at least 3 weeks. During this time, we will observe your child during mathematics and collect information about their progress. At least once a week, we will meet with your child's teacher to answer questions and collect materials.

After three weeks, we will ask your child's teacher to engage in the following:

- planning about how s/he will use the mathematics intervention; and/or
- naming things that might make it hard to use the mathematics intervention and ways to make implementing the intervention easier.

If use of the mathematics intervention does not seem to be helping your child, it will be changed. If the intervention doesn't seem to be working after two weeks, we may decide to change it again or stop. If the behavior plan is stopped, your child and his or her teacher will have access to intervention supports typically provided by the school.

After implementing for an additional few weeks, we will talk with your child's teacher about changes in your child's achievement in mathematics and his/her thoughts about the implementation process. Finally, your child's teacher will answer questions about your child's progress and whether s/he liked the process.

During the study, we will be very careful to take up as little classroom time as possible.

What other options are there?

Your child may continue to receive help with mathematics from his/her teacher who may use typical school resources to help your child.

What are the risks or inconveniences of the study?

Although the risks associated with being in the study are minimal, your child may experience low levels of anxiety or some awkward social interactions (e.g., questions from peers about the intervention) linked with their involvement in the study. However, it is common for teachers to design supports that are different across students, so that each student gets the support s/he needs. So it is expected that your child's teacher will be able to address such anxiety or social interactions. Further, you, your child, your child's teacher, and/or researchers may immediately stop any activity at any time, without penalty. Inconveniences may include time to meet with us and complete the assessments.

What are the benefits of the study?

Benefits to your child being in this study may include (a) increasing your child's academic achievement in mathematics as a result of the intervention, and (b) increasing your child's teachers' ability to use interventions. Also, this study will help improve Implementation Planning and improve what we know about how teachers use classroom-based interventions.

Will my child receive payment for participation? Are there costs to participate?

There are not costs to you and your child for being in this study. Your child will not be paid to participate in this study.

How will my child's information be protected?

The following procedures will be used to protect the confidentiality of your child's data. Research records will be labeled with an assigned ID number. The ID number will be a two-digit number that reflects how many people have enrolled in the study. A master key that links names and codes will be maintained in a separate and secure location. Paper-based materials will be stored inside a locked file cabinet inside a locked office suite in the Department of Educational Psychology at the University of Connecticut. All electronic files (e.g., database, spreadsheet, etc.) containing identifiable information will be password protected. Electronic versions of reports will be saved with codes (e.g., "Teacher" in place of teacher name) for all identifying information. Any computer hosting such files will also have password protection to prevent access by unauthorized users. Only the members of the research staff will have access to the passwords. At the conclusion of this study, the researchers may publish their findings. Information will be presented in

summary format and your child will not be identified in any publications or presentations. We will refer to the school as a public school located in the Northeast. All raw and electronic data will be maintained at least 7 years after the end of the project; data will be maintained longer if necessary to complete publication of results.

Confidentiality will not be maintained if:

- There is any suspicion of child abuse; the appropriate authorities will be contacted by the student investigator and any research staff member with relevant information.
- An indication that your child might harm to him/herself or others is endorsed through the assessment process; the appropriate school support personnel/administrator will be informed.

You should also know that the UConn Institutional Review Board (IRB) and the Office of Research Compliance may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

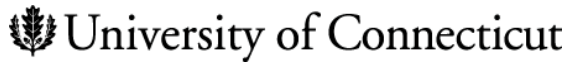
Can my child stop being in the study and what are my and my child's rights?

Your child does not have to be in this study if you do not want him/her to participate. If you give permission for your child to be in the study, but later change your mind, you may withdraw your child at any time. There are no penalties or consequences of any kind if you decide that you do not want your child to participate.

Whom do I contact if I have questions about the study?

Take as long as you would like before you make a decision. We will be happy to answer any questions you have about this study. If you have further questions about this study or if you have a research-related problem, you may contact the student investigator, Justin Byron (203-414-8483) or the supervising investigator, Lisa Sanetti (860-486-2747). If you have any questions concerning your rights as a research participant, you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8802.

Parental Permission Form for Participation in a Research Study



Student Investigator: Justin R. Byron, MA

Supervising Investigator: Lisa M. H. Sanetti, PhD

Study Title: Implementation Planning as a Proactive Approach to Treatment Integrity Maintenance in an Academic Intervention

Documentation of Permission:

I have read this form and decided that I will give permission for my child to participate in the study described above. Its general purposes, the particulars of my child's involvement and possible risks and inconveniences have been explained to my satisfaction. I understand that I can withdraw my child at any time. My signature also indicates that I have received a copy of this parental permission form.

Child Signature:

Print Name:

Date:

Parent/Guardian Signature:

Print Name:

Date:

Relationship to Child (e.g. mother, father, guardian): _____

Signature of Person
Obtaining Consent

Print Name:

Date:

Appendix L: Parental/Guardian Demographics Form

Thank you for allowing your child to participate in our project. Please note that all names on this and other forms will be removed and replaced with an ID number. Names will not be shared with anyone outside this project.

CHILD INFORMATION

Child's Name: _____ **Today's Date:** _____

First Middle Last Month Day Year

School: _____ **Teacher's Name:** _____

Please indicate the grade in which your child is currently enrolled? (check one)

- | | | | |
|---------------------------------------|---------------------------------------|--|--|
| <input type="radio"/> Kindergarten | <input type="radio"/> 4 th | <input type="radio"/> 8 th | <input type="radio"/> 12 th |
| <input type="radio"/> 1 st | <input type="radio"/> 5 th | <input type="radio"/> 9 th | <input type="radio"/> |
| <input type="radio"/> 2 nd | <input type="radio"/> 6 th | <input type="radio"/> 10 th | <input type="radio"/> |
| <input type="radio"/> 3 rd | <input type="radio"/> 7 th | <input type="radio"/> 11 th | <input type="radio"/> |

What is your child's date of birth?

Month Day Year

Please indicate your child's gender:

Male Female

What is your child's race/ethnicity?

- ☐ White
☐ Black / African American
☐ Asian
☐ Native Hawaiian/ Pacific Islander
☐ Latino/Hispanic
☐ Native American/American Indian
☐ Other _____
☐ Multiracial _____

Has your child had any academic problems in school?	No	Yes
--	----	-----

If yes, what are/were the academic problems? _____

When did they start? _____

Have these problems ended? No Yes

Has your child had any behavioral problems in school?	No	Yes
--	-----------	------------

If yes, what are/were the behavioral problems?

When did they start? _____

Have these problems ended? No Yes

Is your child currently receiving special education services?	No	Yes
---	----	-----

If yes, which designation applies?

- | | | | |
|--|--|---|--|
| <input type="radio"/> Learning Disability | <input type="radio"/> Emotional and/or Behavioral Disability | <input type="radio"/> Orthopedic or Physical Impairment | <input type="radio"/> Other Health Impaired |
| <input type="radio"/> Specific Learning Disability | <input type="radio"/> Speech/Language Disability | <input type="radio"/> Visual Impairment | <input type="radio"/> Traumatic Brain Injury |
| <input type="radio"/> Developmental Disability | <input type="radio"/> Intellectual Disability | <input type="radio"/> Hearing Impairment | <input type="radio"/> Multiple Disabilities |
| <input type="radio"/> Autism | <input type="radio"/> Deaf-Blind | | |

If no, is an evaluation for special education services planned or in process? No Yes

If no, is your child currently receiving other intervention or support services? No Yes

If yes, what kind of services? _____

What is the primary language spoken at home? _____

RESPONDENT INFORMATION

How are you related to this child? ☐ Mother ☐ Father ☐ Guardian ☐ Other _____

What is the child's Mother's highest level of education completed?

- | | |
|---------------------------------------|---|
| <input type="radio"/> High School/GED | <input type="radio"/> Master's/Specialist |
| <input type="radio"/> Associate's | <input type="radio"/> Master's plus _____ credits |
| <input type="radio"/> B.A./B.S. | <input type="radio"/> Doctorate (e.g., PhD, JD) |

What is the child's Father's highest level of education completed?

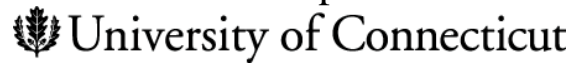
- | | |
|---------------------------------------|---|
| <input type="radio"/> High School/GED | <input type="radio"/> Master's/Specialist |
| <input type="radio"/> Associate's | <input type="radio"/> Master's plus _____ credits |
| <input type="radio"/> B.A./B.S. | <input type="radio"/> Doctorate (e.g., PhD, JD) |

What is the child's Mother's current occupation? _____

What is the child's Father's current occupation? _____

Appendix M: Student Assent Form

Student Assent Form for Participation in a Research Project



Co-Directors: Justin Byron, MA and Lisa Sanetti, PhD

Project Title: Implementation Planning as a Way to Help Treatment Integrity in Academic Interventions

Your parents or guardians may have talked to you about being part of a study that Mr. Byron and one of his teachers, Dr. Sanetti her co-workers are doing to learn more about students who sometimes have trouble with math in school and how teachers can help them get better.

If you decide to be in the study these things will happen:

1. Your teacher will do work with you to help doing some things in math a little easier. You may earn rewards for doing well every day and doing a little more every week.
2. Throughout the year, someone may come in to observe your classroom. They may take notes on what is going on.
3. Mr. Byron or one of his supervisors may also talk with one or more of your teachers.

You can decide whether or not you want to participate in this study. And, you can quit the study at any time. Whatever you decide to do, your teachers or parents/guardians should not be upset with you.

People that come in to observe will be quiet and keep to themselves, but if you feel uncomfortable, just let your teacher or parent know and you will not have to participate anymore.

You can ask questions about this study at any time.

By signing below, it means that you understand the study and you are willing to participate. It also means that you can decide not participate later on too.

Participant _____

Participant's Signature _____ Date _____

Researcher's Signature _____ Date _____

Reason why Participant did not sign: _____

Teacher Training: Cover, Copy, and Compare

What is Cover, Copy and Compare (CCC)?

- Evidence-based academic intervention
- Effective across a variety of subjects
 - Mathematics, geography, spelling
- In math, used to aid a variety of calculation skills, including computational fluency

Why CCC?

- Large research base
- Provides many brief, productive opportunities for responding
- Student does not practice incorrect strategies and/or computation skills
 - Correct answers provided

Example CCC Worksheet

Cover-Copy-Compare Mathematics
Single-Skill Computation Student Worksheet

ADDITION: Two 3-digit numbers: No regrouping

Student: _____ **Date:** _____

<p><small>Item 1: 3 33.3 33.3</small></p> $\begin{array}{r} 366 \\ +511 \\ \hline 877 \end{array}$	 	$\begin{array}{r} 366 \\ +511 \\ \hline \end{array}$
<hr/>		
<p><small>Item 2: 3 33.3 33.3</small></p> $\begin{array}{r} 181 \\ +625 \\ \hline 806 \end{array}$	 	$\begin{array}{r} 181 \\ +625 \\ \hline \end{array}$
<hr/>		
<p><small>Item 3: 3 33.3 33.3</small></p> $\begin{array}{r} 600 \\ +208 \\ \hline 808 \end{array}$	 	$\begin{array}{r} 600 \\ +208 \\ \hline \end{array}$
<hr/>		
<p><small>Item 4: 3 33.3 33.3</small></p> $\begin{array}{r} 340 \\ +437 \\ \hline 777 \end{array}$	 	$\begin{array}{r} 340 \\ +437 \\ \hline \end{array}$

How does it work?

- Student covers right side of worksheet
- Student examines correct answer to problem on left side

Cover-Copy-Compare: Mathematics
Single-Skill Computation: Student Worksheet

ADDITION: Two 3-digit numbers: No regrouping

Student: _____ **Date:** _____

<p>Item 1: 3 0 3 + 30 = Sum</p> $\begin{array}{r} 366 \\ +511 \\ \hline 877 \end{array}$	<p>Item 1: 3 0 3 + 30 = Sum</p> $\begin{array}{r} 366 \\ +511 \\ \hline 877 \end{array}$
<p>Item 2: 3 0 3 + 30 = Sum</p> $\begin{array}{r} 381 \\ +625 \\ \hline 586 \end{array}$	<p>Item 2: 3 0 3 + 30 = Sum</p> $\begin{array}{r} 381 \\ +625 \\ \hline 586 \end{array}$
<p>Item 3: 3 0 3 + 30 = Sum</p> $\begin{array}{r} 400 \\ +228 \\ \hline 608 \end{array}$	<p>Item 3: 3 0 3 + 30 = Sum</p> $\begin{array}{r} 400 \\ +228 \\ \hline 608 \end{array}$
<p>Item 4: 3 0 3 + 30 = Sum</p> $\begin{array}{r} 340 \\ +637 \\ \hline 977 \end{array}$	<p>Item 4: 3 0 3 + 30 = Sum</p> $\begin{array}{r} 340 \\ +637 \\ \hline 977 \end{array}$

How does it work?

- Student covers left side of worksheet
- Student answers the same problem, on their own, on right side of the worksheet
- Once answered, student uncovers left side of worksheet
 - If answer is correct, proceed to next problem
 - If answer is incorrect, repeat process until correct answer is attained

Copy-Copy-Copy e Mathematics Single-Skill Computation Student Workbook			
ADDITION: Two 3-digit numbers: No regrouping			
Student: _____	Date: _____		
(Draw 3.) 344 +511 --- 855	 	344 +511 --- 855	
(Draw 3.) 181 +605 --- 786	 	181 +605 --- 786	
(Draw 3.) 400 +208 --- 608	 	400 +208 --- 608	
(Draw 3.) 340 +637 --- 977	 	340 +637 --- 977	

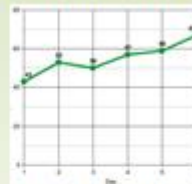
What does the teacher do?

- Provides students with CCC worksheets
 - Worksheets provided to the teacher by student investigator
- Review completion instructions with student
- Set timer for three minutes, tell student when to begin
- After three minutes, stop student from working
- Briefly correct worksheet, indicating number of problems answered correctly



What does the teacher do?

- Graph results with student
- Retrieve completed worksheet, place in designated folder for collection
- Provide student with daily/weekly reinforcement if earned



Worksheet Collection

- Collection of completed worksheets is important for the student investigator
- Collection will take place at least once per week, at times agreed upon by teacher and student investigator

Do you have any questions?

