ABSTRACT

Title of Dissertation: THE EFFECT OF INSTRUCTIONAL CONSULTATION TEAMS ON TEACHERS' REPORTED INSTRUCTIONAL PRACTICES

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A primary goal of Instructional Consultation Teams (IC Teams; Rosenfield & Gravois, 1996) is that students' problems will be prevented or resolved through the provision of services to the adults who serve them. The assumption is that teachers will improve instructional planning, delivery, management, and assessment (e.g., matching instruction to student levels) as a result of working with a colleague through a collaborative problem-solving relationship, or working in a school building in which norms of collaboration and problem-solving with a focus on instruction have been developed. The efficacy of IC Teams for improving instruction has not yet been rigorously evaluated. The current study assesses teachers' self-reported frequency of use of good instructional practices in assessment and delivery of instruction to evaluate the effect of instructional consultation services on instruction in a sample of 977 teachers. Because teachers are nested within schools, multilevel analysis was conducted to control for nonequivalence and to correctly model the error structure of the data. Elementary school teachers in 11 schools that have implemented IC Teams for two or three years were compared with teachers in 17 non-equivalent schools that have never implemented IC Teams and teachers from 17 schools with one year of implementation. Results of

multilevel analyses indicate that there are no significant differences in instructional practices between schools with or without IC Teams, but that teacher characteristics, such as years of experience and grade level of instruction, do explain some of the variance in teacher practices. Implications and limitations of the study are addressed.

THE EFFECT OF INSTRUCTIONAL CONSULTATION TEAMS ON TEACHERS' REPORTED INSTRUCTIONAL PRACTICES

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Dissertation submitted to the Faculty of the Graduate School of
the University of Maryland, College Park in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy
2007

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Table of Contents

List of Tables

Chapter 1: Introduction

Concern for increasing teacher quality and ensuring a "highly effective teacher in every classroom" is a hallmark of the No Child Left Behind Act. Special education reforms have also placed greater emphasis on the teacher role in a response to intervention movement, which focuses on "high-quality instruction and intervention" (Batsche et al., 2005). The political emphasis may be new, but many researchers have documented the important role of classroom teachers for years. The teacher effectiveness movement, beginning in the late sixties and continuing through the eighties, marked an increase in observation tools to better understand the science of teaching (Brophy & Good, 1986). Correlational and experimental studies have found that specific teacher behaviors, beyond basic teacher personality traits and demographic characteristics, make a difference in terms of student achievement, even for the lowest achieving students (Brophy & Good, 1986; Kyriakides, Campbell, & Christofidou, 2002; Rosenshine, 1983; Rosenshine & Stevens, 1986).

Recent research confirms the general belief that teachers are critical to the success of their students. In a large-scale longitudinal value-added study across the state of Tennessee, Wright, Horn, and Sanders (1997) found that factors such as class size and class heterogeneity had minimal influence on academic gain, but that teacher effects significantly accounted for differences in student achievement. Research by Rivkin, Hanushek, and Kain (2001) found that differences in teachers explain at least seven percent of the variance in test-score gains. Teachers are so critical to student success that students who are assigned ineffective teachers for several years in a row have consistently lower achievement scores and yearly gains than those who are assigned

effective teachers for consecutive years (Sanders & Rivers, 1996). Likewise, low-achievers in an "effective" teacher's classroom can outperform their low achieving peers in a "typical" teacher's classroom and, more strikingly, perform similarly to, or above, the average achievers in a "typical" teacher's classroom (National Research Center on English Learning & Achievement, 1998). Policy-makers and researchers generally agree on the importance of the classroom teacher, and while information is available regarding the components of effective instruction, there still remains the wide variation in actual practices that Brophy and Good (1986) documented over two decades ago. Moreover, debate continues on what makes a highly qualified teacher and how to adequately train and develop teachers to that end (Lasley, Siedentop, & Yinger, 2006).

Instructional Practices That Make a Difference

There is much debate around the definition of teacher quality (Darling-Hammond, & Young, 2002). Teacher quality has been defined by specific traits such as verbal ability, general academic ability, and subject matter knowledge (U.S. Department of Education Secretary Report, 2002), or broadly as "instruction or intervention, matched to student need, that has been demonstrated through scientific research and practice to produce high learning rates for most students" (Batsche et al., 2005, p. 5). Influences on teacher effectiveness can be categorized in the following ways: (a) presage-product or personality traits (e.g., appearance, leadership, enthusiasm, etc.); (b) process-product or specific behaviors or processes (e.g., opportunity to learn, instructional match, etc.); (c) subject knowledge; (d) knowledge of pedagogy; (e) teacher beliefs; and (f) teachers' perceptions of their own efficacy (Kyriakides et al. 2002). Although all of these factors are complex and likely intertwined in meaningful ways, this study will focus primarily

upon the effect of one school-based intervention, namely Instructional Consultation Teams (IC Teams) upon what the literature refers to as process-product or specific teacher behaviors. The term instructional practices will be used interchangeably with teacher behaviors.

Much of the research to date has focused upon the amount of instruction as being most critical to student success. Teachers' quantity and pacing of instruction are among the strongest correlates with student achievement and have been most consistently replicated, including factors such as opportunity to learn, time allocation to academic activities, student engaged time, and academic learning time (Brophy & Good, 1986). Although quantity is certainly necessary, effective, or quality, instruction, according to Rosenshine (1983), requires a planned structure, consisting of small steps covered at a brisk pace with many examples, ample feedback, and correction. These specific skills can be further categorized into the four domains essential to instruction: planning, management, delivery, and monitoring or evaluation of student performance (Ysseldyke & Christenson, 1993). Within each of those domains, Ysseldyke and Christenson found key instructional principles and practices that are consistently reported throughout the literature as critical to effective outcomes. Good teachers are skilled at planning, managing, instructing, and assessing at an appropriate level of challenge and success when working with students to link new information to what is known, in small meaningful chunks, and allowing feedback and repetition until mastery is achieved.

Review of the process-product or instructional practices literature produces a laundry list of specific behaviors that are considered to be hallmarks of effective instruction (Brophy & Good, 1986; Kyriakides, Campbell, & Christofidou, 2002;

Medley, 1979; Rosenshine, 1983, 1995; Rosenshine & Stevens, 1986; Ysseldyke & Christenson, 1993), but several are consistently cited and are the focus of this study. They include the following: (a) maintaining instructional levels, (b) activating and linking to prior knowledge, (c) staying within the limits of working memory, (d) repetition and practice, (e) corrective and confirming feedback, (f) classroom management, and (g) behavioral assessment and intervention.

Maintaining instructional levels. A theme that emerges across the teacher effectiveness literature is the need for learning to occur at a high success rate, while maintaining an appropriate level of challenge. This concept has been referred to as "instructional match" (Gravois & Gickling, 2002; Rosenfield & Gravois, 1996; Ysseldyke & Christenson, 1993), "appropriate level of challenge" (Brophy & Good, 1986), "instructional level" (Betts, 1946), or "zone of proximal development", (Vygotsky, 1978). Instructional level has been made explicit and quantifiable through the work of Betts (1946) and others who have determined optimal ratios of known to unknown material for reading instruction and comprehension (e.g., 93-97% accuracy when reading connected text), as well as in drill and practice tasks (e.g., 75-80% known material when practicing word recognition, math facts, spelling, etc.) (Gickling & Armstrong, 1978; Gickling & Thompson, 1985; MacQuarrie, Tucker, Burns, & Hartman, 2002; Neef, Iwata, & Paige, 1977; Roberts, Turco, & Shapiro, 1991; Roberts & Shapiro, 1996; Shapiro, 1992). While ratios differ depending on the type of task, it is generally agreed that success rates should exceed 80% for initial learning tasks and 90-100% for continued practice for automatic responses (Rosenshine, 1983).

Assessing and activating prior knowledge. In order to create an instructional match, a teacher must be skilled at assessing a student's prior knowledge for the given curricular objective and task as well as helping build upon schemata to make meaningful connections with what is known (Rosenshine, 1995). Cognitive researchers have determined that new information needs to be related in a meaningful way to what the learner already knows (Glaser, 1984; Resnick, 1985), and if that does not happen, the learner tends to lose focus (Wolfe & Brandt, 1998). Research has linked teachers' use of repeated formative assessments with student achievement outcomes, with effect sizes larger than those found for most educational interventions (Black & William, 1998). A study by Peterson, Carpenter, and Fennema (1989) found that teachers with more knowledge of their students' math problem-solving abilities spent more time questioning and listening to their students. This time spent engaged in discussion and assessment of students' individual problem solving was significantly related to math achievement.

Staying within the limits of working memory. A teacher not only needs to know what a student knows, but also the appropriate amount of new information to introduce so as not to overwhelm the student's working memory capacity. Each student's working memory capacity may differ slightly, but teachers can use general age guidelines as a starting point. Pascuel-Leon (1970) suggested a five-year old be presented with two new pieces, or sets, of information at a time, a seven-year old with three, a nine-year old with four, an eleven-year old with five, a thirteen-year old with six, and a 15-year old or older with seven (plus or minus two). In his summary of the teacher effects research, Rosenshine (1995) reported that effective teachers deal with the limits of working memory by teaching new material in small steps.

Repetition with corrective and confirming feedback. A teacher must also be skilled at creating opportunities for students to practice newly acquired skills and knowledge at high rates of success. The amount of repetition needed for a student to learn a new piece of information can vary among students of the same age-range and is related to ability levels, with students needing as little or as much as 30 to 55 repetitions for mastery to occur (Gates, 1930). Increasing the amount of drill and practice, or the number of opportunities to respond, improves learning and retention of new information (Chase & Symonds, 1992; Daly, Hintze, & Halmer, 2000; Greenwood, Delquadri, & Hall, 1984; Logan & Klapp, 1991).

While repetition and increased opportunities to respond are critical to student mastery of new information, it is *correct* practice that produces gains in student achievement. Students need high levels of corrective and confirming feedback while practicing new skills (Marzano, Pickering, Pollack, 2001). Rosenshine and Stevens (1986) provided the following guidelines for feedback and correctives: (a) when a student is correct, feedback should indicate correctness in a quick and firm manner to maintain momentum; (b) when a student is correct, but hesitant, feedback should indicate correctness but also re-state the steps to arrive at the correct answer; and (c) when a student is incorrect the teacher may provide further prompts or simply re-teach the material. Research indicates that students learn better when feedback is given as immediately as possible and when errors are corrected before they become systematic (Brophy & Good, 1986; Rosenshine, & Stevens, 1986). If early errors are not corrected, they can become more difficult to correct later and can interfere with subsequent learning (Rosenshine et al., 1986)

Classroom management and behavioral intervention. When the aforementioned variables are implemented, it is likely that students' on-task behaviors will also be maximized. But, classroom management and behavioral strategies are also critical to overall student success. Effective teachers have been found to utilize classroom structures, such as grouping students together to practice skills and process information, and to establish clear rules and procedures to increase student engagement and opportunity to learn (Marzano, Marzano, & Pickering, 2003). When a student is experiencing behavioral difficulty, the literature suggests that teachers should conduct academic assessments in the subject areas where the behavioral concerns occur to consider the possibility of an aversive nature of the academic activities (Gickling & Armstrong, 1978). Research has illustrated the link between the use of instructional assessment data to provide differentiated instruction and increases in students' on-task behaviors (Gickling & Armstrong, 1978; Roberts, Marshall, Nelson, & Albers, 2001; Treptow, Burns, & McComas, 2007). Functional behavioral assessment approaches, which consider academic antecedents as well as other possibilities, have been found to effectively solve student behavior problems in a number of different settings and situations when conducted by support staff or researchers. Although teacher use of such approaches has received little attention in the literature, there is initial evidence to suggest that, when teachers are trained in such approaches, they are able to reduce negative behaviors effectively by analyzing antecedents and consequences of the behaviors, developing hypotheses about the function of the behavior, developing classroom based interventions that address the function, and collecting and graphing systematic data over time to assess progress (Symons, McDonald, & Wehby, 1998).

Instructional match. The above research-based principles taken together form the theoretical concept of instructional match and are widely acknowledged in educational literature, but little is known about teachers' confidence, knowledge, skill, or use related to instructional match principles. Although good practice is to maintain student learning at high levels of successful experiences, there remains the problem of the match (Hunt, 1961), the difficulty of matching the level of challenge of the task with skill and interest of the student for multiple students. Bennett, Desforges, Cockburn, and Wilkinson (1984) have related this complex task to, "avoiding twin pitfalls of demanding too much and expecting too little" (p.41). In a study of learning environments of 16 teachers of 6 and 7-year olds, they found that less than half of the tasks were matched to student need. Low achievers' instructional levels were overestimated on 44% of the tasks. More research is needed to understand teachers' skill and use of practices to help plan for, manage, and assess the varying instructional levels of the students in their classrooms.

Methods to Enhance Instructional Practices

Several models of professional development have been espoused but few have actually been evaluated to determine if teacher change has occurred. After an extensive review of the literature, Brophy and Good (1986) cautioned that low to modest correlations, although consistent, indicate that related variables for one teacher with one student, might not relate significantly under differing circumstances. As a result, they advocate that professional development,

> must be presented in ways that recognize that classrooms are *complex social settings* in which teachers must process a great deal of information rapidly. Information should not be overly prescriptive or overgeneralized, but instead

> framed in a decision-making format that enables teachers to examine concepts critically and adapt them to the particular context within which they teach (Brophy & Good, 1986, p 370).

The current professional development literature confirms this recommendation and finds that traditional short or one-shot workshops are insufficient and largely ineffective (Boyle, 2005; Fullan, 2007; Little, 1982, 1990; Ridgeway, & Bond, 1998; Shields, Marsh, & Adelman, 1998; Weiss, Montgomery, Ridgeway & Bond, 1998). The most effective professional development experiences (a) have a substantial number of contact hours and are sustained over a period of time; (b) allow teachers the opportunity to collaborate, practice and reflect; (c) are carefully linked to what happens in the classroom; and (d) focus on a specific need or concern expressed by teachers (Arbaugh, 2003; Borman & Rachuba, 2000; Corcoran, 1995; Darling-Hammond, 1995; Fullan, 2001; Hargreaves & Fullan, 1992; Hiebert, 1999; Lieberman, 1996; Little, 1982, 1990; Loucks-Horsley, Hewson, Love, & Stiles, 1998; Richardson, 1994; Stigler & Hiebert, 1997, 1999; Stiles, Loucks-Horsley, & Hewson, 1996). Professional development opportunities with the potential to meet those criteria include mentoring, coaching, inquiry groups, school consultation and problem-solving teams.

Richardson and Placier (2001), in their extensive review of the teacher change literature, categorized professional development in two different ways: (a) individual or small group change processes, or (b) collective or organizational change processes. For example, mentoring or consultation models may fall within an individual change process, while some problem-solving team models may represent an organizational change process. They state that the direction of the relationship between individual and

organizational change is unclear. While the two views are seemingly independent of one another in the literature, they posit that the most effective method of teacher change is one that assumes both an individual and organizational view (Richardson & Placier, 2001), one in which a culture of inquiry is established, and where autonomy is valued and interdependence is emphasized (Lieberman, 1996). In the following sections, select individual and organizational change methods will be reviewed in order to provide a context for the current study, which aims to investigate teacher change through a combination of individual and organizational change processes.

Individual Teacher Change Process: The Effect of Consultation on Instructional Practices

Many of the hallmarks of school-based consultation include the criteria of effective professional development and can be considered an individual process of teacher change. Within school-based consultation, there are several similar yet distinct models of consultation including, consultee-centered or mental health consultation (Caplan, 1970), behavioral (Bergan, 1977), conjoint-behavioral (Sheridan, Kratochwill, & Bergan, 1996), school-based problem-solving (Kratochwill, Elliott, & Callan-Stoiber, 2002), and instructional consultation (Rosenfield, 1987). One of the major claims of most school-based consultation models is that they are preventive and help students by helping teachers improve their own attitudes and practices (Gutkin & Curtis, 1999; Sheridan, Welch, & Orme, 1996). These claims, however, have not been well-researched especially across all the various forms of consultation (Riley-Tillman & Eckert, 2001; Sheridan, et al., 1996). Most consultation research to date has focused solely on student outcomes, assuming that teacher practices have been affected.

In their review of meta-analyses of consultation research conducted in the 1970s and 1980s, Sheridan and her colleagues (1996) determined that consultation research has typically yielded positive results for students, although they also reported consistent research limitations across much of this research. Reported limitations included reliance on descriptive data-analysis procedures, lack of experimental design, and use of subjective data rather than direct observation or objective data. In their review of more recent consultation research from 1985 to 1995, Sheridan et al. found 76% of the studies yielded positive results. They also noted an increase in methodological rigor since previous meta-analyses, with nearly half of the studies utilizing an experimental design. Although the majority of studies produced positive results, less than a third of the studies utilized direct observations of student behavior or achievement; as most of the studies included teacher reports or ratings. The majority of the studies published and included in the analysis were studies of behavioral consultation specifically, so the efficacy of other consultation models for student outcomes is still not clear. A large scale analysis of consultation outcomes reported after 1995 has not been conducted, so the current trends in consultation are unclear.

While increasing positive student outcomes is the ultimate goal and appears to at least be a promising outcome of consultation, studying that alone does not provide us information regarding the effect upon teachers, which is the critical component for building capacity and creating systematic long-term change. Only a handful of studies have focused on consultee or teacher change (Sheridan et al., 1996). Variables of interest include teachers' problem-solving skills (Curtis & Watson, 1980), attributions of students' problems (Ponti & Curtis, 1985; Stine, Curtis, & Zins, 1989; Wehmann, Zins,

& Curtis, 1989) perceived abilities to handle similar problems in the future (Weissenburger, Fine, & Poggio, 1982), and improvement in skills (Gutkin, 1986; Jason & Ferone, 1978; Maitland, Fine, & Tracy, 1985; Meyers, Freidman, & Gaughan, 1991; Riley-Tillman & Eckert, 2001). Some research supports the notion that there are cognitive changes within teachers after having worked with a consultant on a classroom concern. But, this research is limited in scope and thus is limited in its ability to generalize to specific methods of consultation. This research is summarized below.

Curtis and Watson (1980) conducted a randomized experimental study to investigate the effect of consultation on 24 teachers' problem-clarification skills. By transcribing and coding pre- and post-interviews, they found that teachers assigned to "high-skilled" consultants, versus "low-skilled" consultants or no consultation at all, significantly improved their ability to clarify classroom concerns after just three weeks of consultation one time per week. It is important to note that the eight consultants in this study were special educators and did not have any previous background training in consultation. They were assessed on their entry level consultation skills to determine who would be in the "high-skilled" or "low skilled" groups, and those with high skills were given additional consultation training to enhance the differences between the two groups. Although the results were promising, considering effects were significant with just a brief period of consultation and consultant training was limited, the ability to generalize the findings of this study is limited in terms of the small sample size and lack of clarity around what type of consultation was being evaluated.

Stine, Curtis and Zins (1989) created a similar experimental study to investigate the effect of consultation on the attributional statements of 39 volunteer teachers from

suburban Catholic elementary schools. Volunteer teachers were randomly assigned to consultation or no-consultation. Pre and post-consultation interviews were conducted, transcribed, and coded to determine locus of causality and globality in their description of the causes or expectations for successful problem resolution. No significant differences were reported between the two groups after 10-weeks of consultation. These results were similar to those of Ponti and Curtis (1985), but differed from Wehmann and others (1989) who did find teachers' attributions for the causation of students' problems to shift significantly during consultation from internal to interactional in nature. Although these studies employed experimental procedures to investigate teachers' attributions, the mixed findings across all three studies and the lack of clarity in the definition of the consultation approach used, make it difficult to interpret the findings.

In a survey of 107 teachers, Weissenburger, Fine, and Poggio (1982) found that teachers' reported feelings of being better able to deal with problems in the future correlated significantly with their reported consultation with someone they rated as having high empathy and congruence. This study did not explore what specific type or length of consultation teachers received. Consultation was simply defined as "any interaction with another professional that was the result of the teacher needing assistance with a problem student or classroom situation." The correlational design of this study makes it difficult to assign any causal claims.

The studies described thus far, although limited in number and design, suggest some potential cognitive changes that occur within teachers during consultation. There is also some limited indication that teachers' skills and practices are enhanced or improved through consultation. Gutkin (1986) and Maitland and colleagues (1985) surveyed

teachers and found that they felt their "professional skills," vaguely defined, improved as a result of consultation. Three studies have investigated actual behavior change through small-*n* observational research (Jason & Ferone, 1978; Meyers et al., 1991; Riley-Tillman & Eckert, 2001). These studies are promising in that they documented teacher behavior change as a result of working with a consultant; however, they are largely focused upon discrete behavior modification techniques (e.g., the use of praise) and not more broad key components of effective instruction.

As noted above, the focus on the classroom teacher within consultation has been largely ignored in the literature or lacks methodological rigor. This assertion is not limited to one type of consultation, but seems to cut across all methods. In particular, this information is not available for instructional consultation outcomes because most research on instructional consultation to date has been conducted in the context of a larger team process. The process of instructional consultation can be delivered individually within a school or schools, but has not yet been studied in this manner because most instructional consultation is delivered as part of a team approach to service delivery that will be described below. Outcomes of implementation of the IC Teams model, which includes individualized delivery of instructional consultation services, will be described in more depth.

Organizational Teacher Change Process: The Effect of Problem-Solving Teams on Instructional Practices

A shared assumption among educational researchers is that teacher change is not entirely individually determined, but is also largely determined by school context and socialization (Lee & Smith; 1996; Louis, Marks, & Kruse, 1996; Richardson & Placier,

2001). In their review of the line of research that presumes that changes in school structure and culture produces meaningful changes in teaching, Richardson and Placier (2001) found such common prerequisite conditions as the following: shared goals, administrative vision, learning opportunities for teachers, joint action, reflection, communication, creation of professional communities, and a shared, complex view of teaching. Recent multilevel research has supported this theoretical notion that both the collective attitudes of teachers (Lee & Smith, 1996) and sense of professional community (Louis et al., 1996) produce significant effects for teachers and students. In order to create those conditions, development and use of new structures such as teacher development activities, teams, or planning groups are often recommended (Lieberman, 1995), but are not necessarily well understood or researched (Lee & Smith, 1996).

As this notion of the importance of collaborative and professional school cultures started to develop, an emphasis was placed on creating such structures as problem-solving teams. Teams were increasingly developed based on the theory that group or organizational processes were superior to individual processes (Burns, Vanderwood, & Ruby, 2005, Iverson, 2002; Rosenfield & Gravois, 1999). Despite the strong theoretical base behind collaborative team models, there is still a relatively small body of research indicating success of the wide application of problem-solving teams in schools, and this research has been criticized for serious methodological issues such as low sample sizes and lack of experimental design (Burns, Vanderwood, & Ruby, 2005, Iverson, 2002; Nelson, Smith, Taylor, Dodd, & Revis, 1991; Rosenfield & Gravois, 1999).

Nelson, Smith, Taylor, Dodd, and Revis (1991) reviewed 16 articles regarding the outcomes of pre-referral intervention teams and found positive support for their use in

reducing inappropriate special education referrals, increasing student achievement, and effecting teachers' attitudes and problem-solving abilities. While those findings appear promising, Burns and Symington (2002) caution that the review was not conducted using empirical meta-analysis techniques. Nelson and his colleagues also cautioned their readers to the fact that all of the studies under review except two were post-test only or quasi-experimental designs and did not examine treatment fidelity or potential threats to validity within the studies, thus, limiting the ability to make strong causal claims about the effect of such teams. In a more recent meta-analysis of 72 pre-referral intervention team effectiveness studies, Burns and Symington found only nine that met criteria for empirical review. For inclusion, the studies required an outcome measure, at least one between-group comparison or within-group comparison (pre-post), sufficient data to compute effect sizes, and be written in English. Review of those nine studies suggests that team models do influence student outcomes (M_{ES} = 1.15). They found that results varied greatly between randomized (M_{ES} =1.43) and non-randomized (M_{ES} =.64) trials as well as university-based (M_{ES} =1. 32) and field-based (M_{ES} =.54) studies. Although this meta-analysis can only be considered exploratory due to the small number of articles included, the results suggest that better student outcomes can be expected with more experimental and implementation rigor. Neither meta-analysis addressed the differences in the team models in terms of structure or process so it is unclear if certain team characteristics are more likely to produce the effects that were reported.

As indicated in these two meta-analyses, current research on the effect of teams in schools focuses largely upon student outcomes. The literature review conducted by Nelson and others produced only three studies that examined team effects on teachers'

abilities and attitudes. Only one of those three studies focused on changes in teachers' attitudes or abilities (Pugach & Johnson, 1988) as opposed to teacher's acceptability or satisfaction with team processes (Carter & Sugai, 1989; Harrington & Gibson, 1986). While Burns and Symington's review produced 12 studies that investigated systemic effects of pre-referral intervention teams (e.g., changes in special education referral, placement and eligibility patterns; numbers of student retentions; increases of school psychologist or counselor consultation activities), they found no studies that analyzed teacher effects of team models. Therefore, we know very little about the effects of problem-solving teams upon students and much less about the effects upon the teachers.

Instructional Consultation Teams

The models described above may be flawed in that they attempt to generalize past the unit that they were developed to effect. For example, individual processes of change, like consultation, may fail to create school-wide effects if focused upon individual student and teacher change. In a large school it may be difficult to see widespread change if one consultant is working alone to assist individual teachers in the building. This type of "lone ranger" model may have long-term consequences as the consultant becomes overburdened, lacks the necessary skills, or transitions to another school or a different role. Likewise, an organizational approach, like a team model, might not produce the individual outcomes intended if ineffective group processes are used or that don't attend to the needs of the individuals that utilize the team for support. Effective models of teacher change must assume both an individual and organizational view (Richardson & Placier, 2001).

One particular team model, Instructional Consultation Teams (IC Teams; Rosenfield & Gravois, 1996), has been designed to attend to the individual and organizational aspects of school functioning and is one example of a team-based service delivery approach to provide collaborative and consultee-centered consultation (Caplan, 1970) services in the schools. The focus of IC Teams is the training of school-based professionals (e.g., regular educators, special educators, specialists, administrators, school psychologists and counselors) to engage in individual Instructional Consultation with teachers in order to assist them with their classroom concerns. A primary objective of the team model is to "enhance teachers' skills in and application of best practices of instructional assessment and delivery" (Gravois, Rosenfield, & Gickling, 2002, p. A-1). IC Teams is designed around the fundamental assumptions that (a) the instructional match and classroom setting is the focus of problem solving and (b) teachers, as professionals, are entitled to consult and collaborate. The IC Team is led by a facilitator and meets weekly to provide problem-solving support to cases or to conduct training of the team in the use of collaborative communication skills, problem-solving, or instructional or behavioral assessment (Gravois & Rosenfield, 1996). When a teacher requests assistance of the team, a "case manager," or consultant, is assigned to work one-on-one with that teacher to go through a series of systematic problem-solving steps together (see Rosenfield, 1987, 2002 for detailed description of IC procedures). Working as a pair, the teacher is allowed a more comfortable place to reflect upon his or her own practices in a systematic way.

Instructional consultation, like other consultation models, follows a structured problem-solving sequence, in which the teacher and consultant work together to identify

the concerns, conduct instructional and, if necessary, behavioral assessments to determine what the student knows and can do in order to identify an instructional or behavioral starting point. Once the dyad prioritizes the concerns, data are collected to determine the student's current performance in the prioritized area and to set short-term goals. The teacher and consultant collaboratively design an intervention or instructional plan for the student to be implemented in the classroom consistently over the next three to six-weeks while monitoring progress towards goals. When possible, the skilled instructional consultant assists the teacher in forming a plan for more students if the concern is shared by other students or if the teacher feels the strategy would benefit the entire class. The case is closed when the student meets the goal and the teacher is comfortable embedding or fading the strategy. If the student is not making adequate progress towards the goal, the teacher and consultant work to revisit an earlier stage of problem-solving to make necessary revisions.

This study will investigate the effect that application of IC Teams within a school has upon instructional practices of the entire regular education teaching staff. Even teachers who may not have consulted with an IC Team member are hypothesized to improve their own instructional practices and skills because (a) the culture of the school is becoming more collaborative or problem-solving focused, (b) embedded and ongoing training is occurring in the building, or (c) they have consulted with other team members in years past and are now generalizing skills learned to other similar students. This is one of the claims of proponents of IC Teams; however, it has not been studied using empirical methods.

Descriptive and quasi-experimental studies of IC Teams have demonstrated preliminary links to student achievement, goal-attainment, and reduction in special education referrals (Levinsohn, 2000; Gravois, Kaiser, Groff, Huang, Signor, 2006; Gravois & Rosenfield, 2002, 2006; Ray, 2005; Silva, 2007) and will be summarized below. Rosenfield and Gravois (2006) claim positive student outcomes and reduction in inappropriate referrals to special education have been replicated with consistent results in over 200 schools across seven states since the 1990s. For example, 77% or more of students met or exceeded the goals set for them by teachers across three of four geographically distinct project areas, suggesting consistency of program effects on student goal attainment (Gravois et al., 2006). The confirmatory program evaluation criterion of consistency (Reynolds, 1998) was used by Rosenfield and Gravois (2002) to document these outcomes. Although findings were consistently positive, a closer review of the three studies presented by Rosenfield and Gravois (2002) indicates methodological flaws and such internal threats to validity as history, maturation, and selection bias, thus limiting the causal inferences that can be made. The other key criteria of confirmatory program evaluation, (e.g., temporality of program exposure, strength of association between implementation and outcomes, gradient effect for the amount of exposure to the process and outcomes, specificity of program theory and outcomes, and coherence) were not present in the studies reviewed in Gravois and Rosenfield (2002).

Levinsohn (2000) conducted the first quasi-experimental study to compare IC Teams to Student Support Teams (school-based, traditional, non-structured group problem-solving approach) in a suburban school district in the mid-Atlantic region. Despite the lack of significant differences in achievement of students of IC Teams versus

their comparison peers at the time of post-test, positive gains in academic achievement were indicated because the two groups differed significantly at the outset of team services, with the students served by IC Teams underperforming significantly on the pre-test as compared to students referred to the SST. Therefore, students with teachers who received support from the IC Team made more gains in achievement over the course of the year than those whose teacher received support from the SST. It is not clear if these findings represent regression to the mean or a meaningful gain, because students scoring so low on pre-tests are not expected to score as low on the post-test (Shadish, Cook, & Campbell, 2002), so these findings should be considered in terms of this potential threat to internal validity. In addition to the suggested achievement gains, Levinsohn found that students referred to IC Teams were significantly less likely to be screened for and/or placed in special education. Furthermore, teachers receiving support through IC Teams were less likely to refer minority students to special education when compared to teachers receiving support through Student Support Teams. Specifically, no African American students receiving IC Teams services were referred to or placed in special education, whereas 80% of the African American students receiving SST services were referred to special education, with half of those students being placed in special education.

In a separate quasi-experimental study, Gravois and Rosenfield (2006) also provided evidence for decreased disproportionate evaluation and placement of minority students in special education as a result of IC Team implementation using risk indices, odds ratios, and composition indices to investigate disproportionate evaluation and placement of minority students in special education. They found that the 13 schools which implemented IC Teams showed significant decreases on all three

disproportionality indices over a two year period when compared to the nine control schools. This study is subject to similar internal validity threats such as history, maturation, and selection since data were collected one year prior to implementation and schools were able to voluntarily select into participation in the IC Teams model.

More recent quasi-experimental research has also reported positive results for student achievement. An unpublished doctoral dissertation by Ray (2005) investigated the effects of IC Teams implementation on third and fourth grade student reading achievement, as measured by the local high stakes reading assessment in two schools in North Carolina as compared to two control schools that were matched on the basis of class size, race, and socioeconomic status of the students. A *t*-test was conducted to investigate the difference of mean gain in reading developmental scale scores. Ray (2005) reported a derived $t = -2.437$ and $p = .015$, suggesting that a statistically significant difference did exist in the mean gain in reading scores of students in ICT schools over students not in ICT schools. Although these findings are encouraging, results of this study are limited due to the small scope of this project.

Another unpublished doctoral dissertation by Silva (2007), utilized hierarchical linear modeling and the same dataset as the current study, but investigated the student outcomes of IC Teams. In her quasi-experimental study, Silva indicated that third through fourth grade classrooms in IC Teams schools had significantly higher class average reading achievement test scores (ES = .36) compared to classrooms in control schools. Significant effects were not found at the individual student level; however, Silva suggests that the presence of significant effects at the classroom level may indicate that the classroom is a better unit of analysis for investigating the effectiveness of the IC Team

model during the first two to three years of implementation, when its greatest impact may be on teacher, as opposed to student, improvement.

An overarching limitation of the research summarized above on IC Teams is the descriptive or quasi-experimental nature of the studies conducted to date. With this design, it is difficult to isolate treatments in the school setting. The IC Teams model was present in the treatment groups, but not present in the control groups; however, the assignment to treatment or control was not random and certain unmeasured criteria for the selection of schools may have been related in meaningful ways to the outcomes studied. Therefore, other factors besides implementation of IC Teams may have contributed to the differences in reading achievement or special education placement rates, preventing any strong causal claims at this time.

In addition to the studies reported above that have focused on the student outcomes of IC Teams, a handful of studies have explored teacher outcomes in a school or schools. An open-ended interview study with five school-based professionals (i.e., general education and special education teachers, school psychologist, and principal) in one urban school suggested: (a) development of professional skills, specifically data-based decision making and improved instruction; (b) changes in professional beliefs about student problems; (c) changes in staff mood and motivation; and (d) effects on individual student success and the whole class through teacher generalization of skills learned, as well as the school culture of collaboration and support (Costas, Rosenfield, & Gravois, 2001). Despite the small scope of this interview study, it provided initial evidence that teachers and IC Teams members gain assessment and intervention skills through consultation and, in turn, use those skills and strategies with other students.

In a related descriptive study, post-test only with no control group, Costas, Rosenfield, and Gravois (2003) explored teachers' acceptance of IC Teams and their perceptions of its effect upon their skill application. Findings based on surveys from 271 teachers from six Mid-Atlantic IC Teams school districts suggest that the majority of teachers are highly satisfied with IC and as a result feel more confident to handle similar problems in the future. It was unclear whether the exceptionally high satisfaction was indicative of the teachers' true experience, a measure of social desirability, or something else. Issues related to inconsistent survey administration and sampling procedures may have contributed to a biased sample. In addition to satisfaction, the majority of teachers reported learning one or more skill or strategy from participating in IC, as well as using those skills and strategies with more than just the target student. A limitation of this finding is that it is unclear whether the reported changes were indicative of actual changes or learning since observations or interviews were not conducted to validate these findings. Teachers may have under or over reported the specific skills or strategies they developed as a result of working with an IC Team member. Although the amount of and consistency across qualitative information that was provided by teachers about their experience was convincing, causality can not be inferred from these descriptive findings.

Qualitative research conducted by Knotek, Rosenfield, Gravois, and Babinski (2003), through use of audiotapes, interviews, observations, and document review, found that teachers went through many conceptual changes as a result of IC Teams. Specifically, they were found to shift their focus from global issues to more specific, positive, and achievable goals. They reframed the problem and focused on what the student could do. Additionally, teachers were found to become more comfortable with

data-collection and using data to guide instructional decision-making. Although recent research such as this is promising, it is exploratory and descriptive, because the studies have not been true experiments or well-designed quasi-experiments and thus are unable to control for factors that might be related to other pre-existing differences in the groups.

In sum, instructional consultation is typically delivered individually, but as part of a larger school-wide service delivery model, specifically the IC Teams. Although it is hypothesized that a teacher who requests assistance of a Case Manager on the IC Team will improve instructional practices, it is also hypothesized that *all* teachers in the school will enhance and improve instruction. The goal of the school-wide model is to develop what Fullan (2001) calls a "critical mass," a sufficient number and representation of the school staff skilled in and committed to the change," (p. 89), talking about and reflecting upon their instruction, creating norms of collaboration and problem-solving that will affect the performance of all staff members (Gravois, Knotek, & Babinski, 2002). To date, the limited research on IC Teams has focused on students or teachers who have interacted with the IC Team directly. Research on how implementation of the team effects the practices of all teachers in a school has not been conducted. The current research is the first of its kind to explore the effectiveness of the model on a number of teacher outcomes in a quasi-experimental context, utilizing hierarchical linear modeling (HLM), which has been described as the most appropriate method for investigating school effects within educational contexts (Lee, 2000).

Research Objectives and Conceptual Framework

The purpose of the present study is to determine the effect of Instructional Consultation Teams (IC Teams) on general educators' instructional practices. The

primary question is how does a school's adoption of the IC Teams model effect teachers' instructional practices? The study is designed to answer the following specific questions:

1) Do teachers within Instructional Consultation Teams schools report more frequent use of overall effective instructional practices?
    a. General instructional practices?
    b. Individualized instructional practices?
    c. Behavior assessment and intervention practices?

In this study, IC Teams is viewed as a school intervention since it is applied at the school level. Although the effect of IC Teams on instructional practices has not yet been tested under experimental or quasi-experimental conditions, based on the theoretical underpinnings of consultation, it is hypothesized that instructional practices will be significantly better in treatment schools than comparison schools. The difference is hypothesized to be modest at this time, however, because treatment schools have only been exposed to and implemented the model for one to three years, and the literature on school change indicates that results are typically not present until three to ten years depending on the complexity and use of the innovation (Fullan 2007).

The primary focus of the study is not on the personal attributes of teachers or the characteristics of schools that lead to enhanced instructional practices; but, those variables are important to consider along with treatment effects in developing a conceptual model of teachers' instructional practices. Since schools are the level of analysis of this study, and schools, not teachers, were assigned non-randomly to the intervention, HLM was employed to better understand the effects of teachers' use of

instructional practices. See Appendix A for a diagram of the conceptual map or heuristic for this work.

Teacher, Classroom, and School Level Variables that May Influence Instructional Practices. Variables such as years of teaching experience and education level may relate in meaningful ways to the use of effective instructional practices in conjunction with or over and above that of the innovation. Researchers have tried to understand the effect that years of teaching experience has on teaching effectiveness, typically evidenced by student achievement. This research yields inconsistent results, meaning there is little evidence that supports a linear relationship between teacher experience and student achievement. Teachers with the most years of experience do not necessarily produce the greatest student gains. It appears that a couple of years of experience make a difference and that effectiveness continues to improve for close to four or five years, but after that more experience does not necessarily improve student outcomes (Louis, Marks, & Kruse, 1996, Rivkin et al., 2005; Walsh & Tracy, 2004). This will have to be explored as it relates to teachers' reported use of certain instructional practices.

Although it may be expected that more educated teachers will produce greater student achievement gains, research is inconclusive about the effect that teachers with advanced degrees have upon student achievement. The variable of teachers holding master's degrees has been found to have a modest effect on student achievement (Walsh & Tracy, 2004). Because the findings are inconclusive, little is known about the effect further education will have upon teachers' instructional practices in the context of this particular study; this variable will be explored for potential significance.

The composition of students who make up a teacher's classroom may be related to teachers' use of instructional practices as well. Although effective teachers have been found to produce significant student achievement despite students' varying backgrounds, variables such as class size and heterogeneity have been found to make a slight contribution to student achievement (Wright et al., 1997). Classroom demographics will be investigated to determine if any features of classroom demographics influence use of instructional practices.

School-effects research has demonstrated the effect school level variables such as demographics (e.g., size, minority composition, SES status, and average achievement) have upon school effectiveness outcomes such as student achievement or teacher attitudes (Lee & Burkham, 2003; Lee & Loeb, 2000). Therefore, it is expected that there may be significant relationships between these variables and instructional practices.

Chapter 2: Method

This study was conducted as a part of a larger longitudinal randomized, controlled study of the effects of Instructional Consultation Teams (IC Teams), funded by the Institute of Educational Sciences. The purpose of the larger study is to investigate the effect of Instructional Consultation Teams on a variety of school, teacher, and student outcomes. This particular study focuses solely on the impact of IC Teams on teachers' instructional practices.

Participants

During the 2005-2006 school year, 34 elementary schools from one ethnically and linguistically diverse suburban public school district in a mid-Atlantic state agreed to participate in a longitudinal experimental study of the effects of Instructional Consultation Teams (IC Teams), and were randomly assigned to treatment (n=17) and control groups ($n=17$). During the 2005-2006 school year, the treatment schools were involved in readiness training activities and initial program implementation. In addition to the 34 experimental schools, 11 schools in the district had previously adopted the IC Teams model. Within those 11 schools, some schools were in their second (n = 6) or third (n = 5) year of IC Teams implementation. For the purpose of this study, the *Phase 2* group consists of the 11 non-randomly assigned schools and the *Phase 1* group is the 17 randomly assigned treatment schools. These groups will be compared to the control group with a quasi-experimental design. A description of the phases of implementation is provided below in the intervention design section in order to describe the nature of the differences between the two treatment groups.

Due to the non-random selection of 11 of the 45 schools, these schools were thought to vary from the control schools in meaningful ways that may affect the outcome variables of interest. In order to assess the significance of potential differences, school means were compared on primary variables by conducting an analysis of variance and a comparison of the means between the 11 Phase 2 schools and the 34 other schools (Phase 1 and control together). Results indicated that the 11 non-randomly assigned Phase 2 schools did not differ significantly in terms of the overall size of the schools or the percentage of special education students in each school, $F(1, 43) = 3.56$, $p = .06$, ES = -.66). However, they did differ significantly in terms of other student composition variables. Specifically, the percentage of students receiving free and reduced meals was significantly greater in the Phase 2 schools, $F(1, 43) = 43.33$, $p<.001$, ES = 2.28. The percentage of students from historically disadvantaged racial and ethnic groups was also significantly greater, $F(1, 43)= 32.53$, $p<.001$, ES = 1.97. The average school achievement was significantly lower, $F(1, 43)= 19.18$, $p<.001$, ES = -1.52. The schools also differed significantly in terms of the amount of experience of the regular education teachers on staff, $F(1, 43) = 6.06$, $p<.001$, ES = -.88, and the number of students per class, $F(1, 43) =9.13$, $p<.001$, ES = -1.05. The teachers in the randomly selected schools had significantly more years of experience than the Phase 2 schools; however, the Phase 2 schools had lower class sizes, which may be a result of a purposeful reduction in class size due to student need. Table 1 presents the group means and Table 2 presents the results from the analysis of variance. These results are not surprising because the schools that were selected to receive training in IC Teams prior to the experimental research

study were selected due to level of need. As a result, comparisons between the Phase 2 and control schools will need to take these differences into account.

Table 1

Comparison of Means between IC Teams Phase 2 Schools and the Phase 1 or Control Schools

	Mean			Standard Deviation		
Variable	Control	Phase 1	Phase 2	Control	Phase 1	Phase 2
School Size	705.4	620.7	597.9	203.1	174.3	153.0
% Free and Reduced Meals	21.9	26.8	61.6	16.5	20.2	5.9
% Disadvantaged	39.4	40.6	74.3	20.7	19.3	4.2
% Special Education	11.7	11.7	13.4	2.5	2.3	3.3
Average Achievement	485.8	482.7	459.1	17.8	19.8	5.7
Teacher Years of Experience[a]	3.3	3.3	2.9	.5	.5	.3
Class Size	24.4	24.1	22.6	1.5	1.5	1.7

Note. Explanation of variables provided in Appendix E.

[a]Teacher years of experience was rated categorically on a scale of 1 to 5.

Across all 45 schools, a total of 1922 teachers were surveyed. The term teacher was defined as "anyone who teaches more than one student" in order to be inclusive of general educators, special educators, and teacher specialists. Of those 1922 teachers, 1666 consented to participate in the study and completed the survey. This is a response rate of 87%. For the purpose of this study, general educators will be the primary focus in order to better understand the effect of IC Teams on general educators. A total of 1111 general educators, kindergarten through fifth grade teachers, were surveyed. Of those 1111 teachers surveyed, 1001 consented and participated in the study, resulting in a response rate of 90%. Of those 1001 regular educators who responded to the survey, 977 teachers had sufficient classroom data (e.g., class achievement data, number of students in the class) to be included in the analysis, rendering 88% of the regular education teacher data available to be used for multi-level analysis.

Intervention Design

IC Teams is a complex school innovation package in which the overarching goal is to enhance, improve, and increase student *and* staff performance by helping schools to create a service delivery system in which an interdisciplinary team of professionals are trained to provide instructional consultation to their colleagues who request assistance of the team. It is a program with a standard training manual, training and implementation design, and procedures to evaluate team implementation and outcomes (Gravois et al., 2002). There are three phases of training and implementation within the IC Teams design. These phases are based on Fullan's (1991, 2001, 2007) three phases of school change: initiation, implementation, and institutionalization.

Phase 1 the initiation phase, of the IC Teams model, includes selection of the school sites, identification of the lead facilitator of each team, and introductory training of the facilitator, administrator, and one other select staff member, usually a classroom teacher, from the identified schools. In addition to the basic overview, the selected team facilitator for each school attends seven follow-up training sessions on topics such as problem-solving and case-documentation; instructional assessment in reading, math, and writing; behavioral assessment; small-group and classwide interventions; and team training and facilitation. During that time, the facilitator receives coaching by a trained instructional consultant through a full instructional consultation case. To do so, the facilitator audiotapes sessions with a teacher from his or her school, and sends the audiotapes to an assigned experienced coach who then provides written feedback and opportunities for reflection via email. In Phase 1, the facilitator is typically the only person in the building with skills in instructional consultation and practices those skills with select teachers in solicited cases or practices "homework" from the training sessions. Staff members begin to develop a basic awareness of IC Teams during this phase as the facilitator or the administrator shares brief information at faculty or grade level team meetings in order to solicit volunteers to join the team.

During that same year, but typically mid-year, an introductory 3-day training is held for team members and weekly follow-up team training is led by the IC Teams facilitator for the remainder of the school year. This begins Phase 2, the implementation phase, which may last for two or more years. During the first year of Phase 2, the facilitator and team members practice skills learned in training with other volunteer teachers. The facilitator may be the only person on the team taking official IC cases,

while the rest of the team practices skills learned in weekly training. The second year includes technical support from the Lab for IC Teams, continued weekly team training led by the IC Team facilitator, and implementation of the full IC Team delivery system and collaborative process model with teachers with legitimate student concerns. All team members are expected to act as instructional consultants or "case managers" for at least one teacher. Teams are evaluated to provide formative feedback about the implementation of the critical dimensions of the IC Teams delivery system and process variables.

As teams begin to implement the process with high levels of integrity for two to three years, as indicated by annual evaluation, they move into Phase 3, the institutionalization phase. In this phase, the IC Teams process is embedded into the school's mission, budget, and personnel structure. It becomes aligned with other school and district initiatives, and processes are put in place in order to sustain the team over time.

Intervention Implementation

As described in the intervention design, the selected treatment schools were involved in various phases of implementation depending on the year of initiation of the project for their particular school. During the fall of the 2005-2006 school year, the 17 randomly selected Phase 1 schools identified lead facilitators who were given a full-time position to attend IC Teams training and to begin to apply skills learned at the training with teachers in their buildings. The 17 facilitators attended the 3-day introductory training and received 4 of the 7 follow-up training sessions, and two-day training in team facilitation skills. All of the 17 facilitators received online coaching for one instructional

consultation case with a teacher in their school and 14 of the 17 facilitators began taking instructional consultation cases with additional teachers in the building. Facilitators worked with a range of 1 to 10 teachers within their buildings from September 2005 to January 2006. The new team members were then trained in December and through the spring semester they practiced initial skills learned with select teachers, not yet taking full instructional consultation cases or implementing the full team model.

During that same year, the other 11 non-randomly selected IC Teams schools were either in their second or third year of implementation, i.e., Phase 2. The 11 facilitators had already received Phase 1 training and delivered initial Phase 2 training to their teams during either the 2003-2004 or 2004-2005 school year and were working to further develop the skills of their team members to apply skills in instructional consultation with teachers in their school. The 11 IC Teams ranged in size from 6 to 15 members. The teams differed in the amount of team members engaged in instructional consultation, with the number of team members taking cases ranging from 1 to 12 by January of 2006. As a result, the range of teachers consulted with in each school varied from 1 to 17.

Evaluation of the implementation of the IC Teams model was conducted in the Phase 1 (n = 17) and Phase 2 (n = 11) schools during the 2005-2006 school year to assess adherence to the consultation process and team model. Interviews and record reviews were conducted with the principal of each of the treatment schools, each IC Team, and individual case managers and teachers, using the Level of Implementation (LOI) Interview administration and scoring procedures (Fudell, 1992; Gravois, Fudell, & Rosenfield, 2005). Data collected were aggregated to create an overall LOI score for each

school. Treatment schools ranged from 60% to 99% implementation of the IC Teams model. Of the 28 total treatment schools, 24 exceeded the benchmark of 80%, indicating an acceptable level of implementation of the key components of the IC Teams model.

It is important to note that, although the LOI scores across the Phase 1 and 2 schools look similar, the data represent different numbers of case managers implementing the process in each school. Implementation data from the Phase 1 schools represents the work of the one facilitator since team members did not take cases during the first year of training as expected, whereas Phase 2 schools' LOI scores reflect the work of the facilitator and all team members with an active case. Any Phase 1 outcomes should be interpreted as effects of having one trained instructional consultant in a school building, as opposed to a whole team, whereas Phase 2 schools' LOI scores represent the work of 1 to 12 members, depending on the number of team members who had decided to take a case by that point in the school year. Tables 2 and 3 summarize the level of use of the IC Teams in each of the schools by phases at the point in which the survey was conducted (January 2006).

Information presented in Table 2 and 3 were collected through a review of the teams' Systems Tracking Form, a form that is regularly used at each team meeting to document the status of all of the team members' consultation cases. The form includes information about the teachers that request assistance of the team as well as the team members that are assigned to each teacher for ongoing consultation. These data were compared to information from the LOI interviews and school demographic files to determine the percentage of team implementation, the number of teachers in the school,

the number of team members in each school, and to calculate the percentage of teachers served by the team during that year.

Table 2

Level of Implementation and Use of Phase 2 IC Teams by School by January 2006

School Code	Years in Project	Phase	Level of Implementation for 2005-2006	# of Team Members	# of Team Members with Active Cases	# of Teachers Served	% of Teachers Utilized the ICT
54	3.5	Phase Two	94%	12	10	16	28%
61	2.5	Phase Two	97%	10	10	17	41%
55	2.5	Phase Two	88%	16	12	17	33%
70	3.5	Phase Two	94%	12	8	11	18%
44	2.5	Phase Two	97%	9	5	9	25%
35	3.5	Phase Two	91%	6	4	8	17%
75	2.5	Phase Two	92%	13	4	7	15%
62	2.5	Phase Two	99%	8	6	6	14%
7	2.5	Phase Two	93%	8	1	5	12%
28	3.5	Phase Two	74%	7	2	3	7%
77	3.5	Phase Two	93%	15	1	1	2%
	Phase Two Mean		92%	11	6	9	19%

As seen in Tables 2 and 3, the levels of use of the IC Teams by teachers, as indicated by the percentage of teachers utilizing the team, varied between schools, from as little as two percent to as much as 41% in Phase 2 schools and from three percent to 29% in Phase 1 schools. Hall, Loucks, Rutherford, and Newlove (1975) state that the reason for such variation is that innovation adoption is a "process rather than a decision point" (p.52). They recognize that other variables such as the organizational climate will

effect the implementation and use of any new innovation. The IC Teams training and implementation plan accounts for this long-term nature of change in that it would expect the level of implementation and use to increase during the first three to five years of adoption as the facilitator and team members continue to develop their skills in consultation (Rosenfield & Gravois, 1996).

Table 3

Level of Implementation and Use of Phase 1 IC Teams by School by January 2006

School Code	Years in Project	Phase	Level of Implementation for 2005-2006	# of Team Members	# of Team Members with Active Cases	# of Teachers Served	% of Teachers Utilized the ICT
74	0.5	Phase One	81%	8	1	10	29%
82	0.5	Phase One	85%	9	1	7	17%
43	0.5	Phase One	90%	11	1	6	15%
79	0.5	Phase One	84%	12	1	4	9%
13	0.5	Phase One	60%	6	1	6	15%
15	0.5	Phase One	89%	5	1	6	21%
20	0.5	Phase One	92%	7	1	3	7%
33	0.5	Phase One	74%	8	1	5	14%
67	0.5	Phase One	86%	10	1	4	9%
2	0.5	Phase One	87%	9	1	3	8%
4	0.5	Phase One	82%	8	1	4	11%
23	0.5	Phase One	90%	7	1	3	7%
58	0.5	Phase One	81%	7	1	--	5%
97	0.5	Phase One	89%	7	1	3	5%
86	0.5	Phase One	79%	8	1	2	3%
60	0.5	Phase One	87%	10	1	1	3%
66	0.5	Phase One	86%	8	1	1	3%
Phase One Mean			84%	8	1	4	11%

Note. Dashes indicate that data were not reported on this variable by this school.

The data presented in Table 2 and 3 indicates a small increase in levels of implementation and use between Phase 1 to Phase 2, with implementation increasing from an average of 84% in the Phase 1 schools to 93% in the Phase 2 schools. Likewise, the percentage of teachers utilizing the team in Phase 1 schools was 11% and slightly more, 19% in Phase 2 schools. While the implementation of the collaborative consultation process may be high in both Phase 1 and 2 schools, it is not indicative of a high level of use at this point so any interpretations of the outcomes should take this into account.

Data Collection Procedures

All teachers were sent a web-based survey via email by project staff in January of 2006. An introductory email was sent outlining the purpose of the survey and the steps taken to ensure privacy of the information. Teachers were informed that they would utilize their individual school system's badge numbers to log on to the internet survey. Email addresses and badge numbers were given to researchers from the school system in separate files to maintain participants' anonymity. Teachers were informed that information to link the badge numbers with individual teacher names and data were not available to the research staff, and would not be reported individually, only in the aggregate. Information about the procedures of participating in the study was provided within the cover page of the emailed survey. The survey took approximately 20 to 30-minutes to complete. It consisted of 80 items including questions about demographics, school collaboration, school organizational focus, teaching efficacy, job satisfaction, and instructional practices. In a prior communication with all the teachers, teachers were thanked in advance for their participation and received a notepad as a token of

appreciation. Teachers who did not complete the survey in the time period allotted were sent a reminder email and encouraged to participate.

De-identified student roster information, including FARM status, gender, race, ELL status, special education status collected by the school district was forwarded to the research staff during the summer of 2006 for analysis.

Measures

Instructional Practices. The Instructional Practices Survey (see Appendix B), one section of the teacher survey, was developed for the larger study by the project staff and then piloted with a small group of six elementary school teachers. Items were revised based on feedback. The survey was designed with five a-priori subscales with 4-items in each: (a) planning of instruction, (b) delivery of instruction, (c) management of instruction, (d) assessment of instruction, and (e) assessment of behavior. Items were created to assess the effective principles of instruction reviewed in the literature that are hallmarks of the IC Teams training (see Appendix C). For the first 16 items, the response category values for the survey ranged from 1 to 5 on a Likert scale (1= *Almost Never, 2 = A Few Lessons a Week, 3 = A Couple Lessons a Day, 4 = Almost Every Lesson Per Day, 5 =Every Lesson Per Day).* The last 4-items utilized a different response category system. Values continued to range from 1 to 5 on a Likert Scale (*1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always)*.

Exploratory factor analysis was employed to determine the factor structure of the measure and reliability estimates of the factors were calculated (Kaiser & Rosenfield, 2006). Inspection of the scree plot indicated one major factor. Two and three factor solutions were also explored, with the three factor solution being the most theoretically

grounded. The three-factor solution yielded three factors with an eigenvalue over one, accounting for 47% of the variance in the respondents' scores. The three factors that emerged were: (a) General Instructional Practices, composed of items such as "I develop my lesson so that I do not have the student work on too much unknown information at once"; (b) Individualized Instruction, including items like "I assess and flexibly group students by skill"; and (c) Behavior Assessment and Intervention, with items such as "I observe the antecedents and consequences of students behaviors." Due to the scree plot inspection indication of one major factor, the overall scale was used as the primary dependent variable, but the three-factors were also explored for research questions of interest. For more details regarding the items and their placement within the factor structure, see Appendix D. Reliability estimates (alpha coefficients) were high for all factors and the composite score as demonstrated in Table 4.

Table 4

Means for Total Scale and Subscales

Factor-Based Scale	*M*	*SD*	A
Total Scale	3.92	.12	.91
Factor 1	4.11	.59	.88
Factor 2	3.86	.75	.85
Factor 3	3.76	.70	.76

While the reliability for each factor appears adequate, other aspects of the validity of this measure have yet to be explored. For example, the distribution of each scale was slightly negatively skewed. The means for each scale ranged from 3.76 to 4.11 (*SD*s = .12 to .75) indicating the possibility of a ceiling effect. Shadish and others (2002) provide this as a possible threat to statistical conclusion validity and caution about drawing inferences about covariance between variables when a ceiling effect occurs. Additionally, construct

validity, the extent to which this measure actually taps the construct of effective instructional practices, has yet to be investigated. Potential threats to the construct validity of this measure may include inadequate explication of the constructs or mono-method bias (Shadish et al., 2002).

Measures of Teacher, Class, and School Characteristics. Demographic information was collected from the teachers directly by asking them to report their years of experience, professional role, and educational background in the teacher-report survey. Class demographic information was collected from school records. De-identified student rosters were obtained, with teacher codes, so that percentages could be calculated for class compositions. Information about students' race, gender, state achievement test scores from the current year, and special education status were included. School demographic data, such as size, racial diversity, and percentage of students receiving free and reduced lunch was calculated by aggregating the available student data.

Research Design

In order to determine the effect of IC Teams on teachers' instructional practices, a quasi-experimental design was used, since one group consisted of non-randomly selected schools. This design is frequently referred to as a nonequivalent comparison group design (Shadish, Cook, & Campbell, 2002). Compared to randomized trials, the major weakness of a quasi-experimental nonequivalent comparison group design is a selection threat to internal validity. Because the early treatment and control groups were not equivalent on key variables, an expectation is that it is difficult to know whether the observed outcome is due to the treatment or some unmeasured prior existing difference among the groups (Shadish et al., 2002).

Teachers within schools are not independent cases and are nested within schools. Therefore, hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002) was used to analyze the effects of the predictor variables at both the individual and school levels. This allowed for a better understanding of the other individual (Level-1) and contextual (Level-2) factors that might, in addition to the implementation of IC Teams, be related to differences among schools in the use of effective instructional practices. HLM was employed to avoid aggregation bias, misestimated standard errors, and heterogeneity of regression problems that are typical in one-level analysis procedures.

Data Analysis Procedures

Power, the probability of detecting a difference between groups if such a difference actually exists, is affected by the number of groups, the clustering within groups, and the ability to model variance within and between groups (Spybrook, Raudenbush, Liu, & Congdon, 2006). In order to determine the minimum effect sizes needed to ensure power meets or exceeds .80, which is generally agreed upon within the research community as adequate, a power analysis was conducted using Optimal Design Software (retrieved June 7, 2007 http://sitemaker.umich.edu/group-based/optimal_design_software). Power and effect size estimates were calculated with a range of teachers per school because each school differed in the number of teachers on staff and the number who responded to the survey. The number of teachers per school ranged from 11 to 33. For power to be .80, the minimum detectable effect sizes for 45 schools with the number of teachers in each school, ranging from 11 to 33 on the Instructional Practices Survey and with estimated intraclass correlations ranging from .02 to .03, ranged from .28 to .19 and .29 to .21 respectively.

Table 5

Correlations among Teacher- Level Data

Predictor	Overall Instructional Practices n=977	General Instruction n=977	Individualized Instruction n=977	Behavior Assessment & Intervention n=977
Six or More Years of Teaching Experience	.12**	.12**	.05	.14**
Teacher's Level of Education	.06	.03	.06	.07*
Primary (K-2) Teacher	.10**	.06	.12**	.06
Class Size	-.08*	-.05	-.08**	-.07*
Percent of Students Receiving Free and Reduced Meals	-.01	-.00	-.00	-.01
Percent of Students in Class Receiving Special Education	.05	.02	.05	.05
Percent of Students in Class from Historically Disadvantaged Backgrounds	.01	.00	.02	-.00

Note. * = Correlation is significant at the 0.05 level (2-tailed). ** = Correlation is significant at the 0.01 level (2-tailed).

Variables and their relationships with one another were investigated. Appendix E and F provide descriptive information for each of the variables of interest in the current study and Tables 5 and 6 provide information regarding the correlation between variables at the teacher and school level. Variables that were not significantly correlated with the outcome variables were dropped from the model. At Level 1, the dummy variable for teachers' years of experience greater than 6 years, the dummy variable for primary grade

level, and standardized class size were retained due to significant correlations with the dependent variable composite score and 2 of the 3 scale scores. These categorical dummy variables were created due to hypotheses generated from the literature that beginning teachers differ from more experienced (Rivkin et al., 2005) and primary teachers from intermediate (Van Scoy, 1994), as well as visual inspection of histograms and bimodal distribution of the variables. At Level 2, none of the school level variables were correlated with the aggregates of the dependent variables and thus were dropped from the between school model with the possibility of adding them in if more controls were needed. See Appendix E for a more detailed description of the decisions made for each variable.

Table 6

Correlations among School- Level Data

Predictor	Overall Instructional Practices n=45	General Instruction n=45	Individualized Instruction n=45	Behavior Assessment & Intervention n=45
Size of School	-.14	-.09	-.14	-.19
Percent of Students in the School Receiving Free and Reduced Meals	.01	-.02	.08	-.01
Percent of Students in the School From Historically Disadvantaged Backgrounds	-.05	-.08	.01	-.03
Percent of Students in the School Receiving Special Education Services	-.06	-.06	-.06	-.01
Average School Student Achievement Composite, Standardized	.05	.11	-.00	-.03

Note. * = Correlation is significant at the 0.05 level (2-tailed). ** = Correlation is significant at the 0.01 level (2-tailed).

For ease of analysis, composite and continuous variables were transformed into z-scores for standardization to ease interpretation in HLM. Analysis of the distributions of the outcome variables indicated a slight negative skew for each variable. Attempts to correct for skewness were made by conducting logarithmic transformations, but none seemed to significantly change the distribution so data were kept in the original form. The predictor variables of interest in the current study did not appear to be normally distributed so transformations were made. Teachers' years of experience were not evenly distributed across all five response categories, so group means on the instructional practices composite were compared to determine if a more meaningful categorical coding was necessary. See Table 7 below for a description of the overall instructional practices means by years of experience. An analysis of variance was conducted to determine that the groups did significantly vary in relationship to instructional practices, $F(4, 966)= 5.43$, $p<.001$. Therefore, the variable was recoded into a dummy variable to indicate if the teacher had six or more years of experience because that was thought to explain additional variance in the within-school model.

Table 7

Instructional Practices by Years of Experience

Years as a Teacher	*M*	*N*=971	*SD*
1 year or less	-.35	96	1.07
2 to 5 years	-.08	268	.98
6 to 10 years	.01	202	1.03
11 to 20 years	.19	204	.94
20 or more years	.07	201	.97

Similarly, teachers' grade level was not normally distributed and categories were thought to relate in more meaningful ways to the outcome variable using a different coding system. Group means on the instructional practices composite were compared and found to differ significantly ($F(5, 971)= 2.60$, $p<.05$). See Table 8 below for a description of the overall instructional practices means by grade level. As a result, the variable was recoded into a dummy variable to indicate if the teacher was a primary grade level teacher because that was thought to explain additional variance in the within-school model.

Table 8

Instructional Practices by Grade Level

Grade Level	*M*	*N*=971	*SD*
Kindergarten	.15	127	.98
1st grade	.08	182	.97
2nd grade	.07	182	.95
3rd grade	-.04	168	.96
4th grade	-.04	161	1.01
5th grade	-.22	157	1.09

Once the final predictor variables were established, multicollinearity was explored. Variance inflation factors (*VIF*) were found to be lower than seven, and partial correlations lower than zero-order correlations, as expected. Table 9 presents the results of the multicollinearity inspection.

Table 9

Multicollinearity for Instructional Practices Outcome

Level 1 Predictor Variables	Zero Order	Partial	VIF
Six Years or More Teaching Experience	.12	.11	1.00
Primary Grade (K-2) Teacher	.10	.09	1.00

Missing data were accounted for at the individual and school level. At the individual level, missing data were recoded into a format that would be interpreted by HLM as missing data (i.e., SYSMIS). Missing data analysis concluded that there were very few missing items on the teacher self-report. An analysis of each item indicated that only 3 to 15 teachers out of the entire sample neglected to complete certain items. There did not seem to be a pattern as to which item or respondent had more missing responses. One school in the control group was a new school during the 2005-2006 school year so did not have school achievement data from 2004-2005 to use as a control. In order to maintain statistical power, the school remained in the study. No corrections were needed since school average achievement was not necessary as a control for the final model.

To estimate the extent of variability between schools in teachers' reported instructional practices with school level characteristics, an unconditional model was created. To create the fully unconditional model, no predictors were specified at the

individual or school level. In short, the variance of the dependent variable, instructional practices, was partitioned in terms of between-school variance and individual variance.

Next, a within-school model was created for each outcome variable of interest by adding individual teacher predictors at Level 1 to model reported instructional practices, and leaving Level 2 fully unconditional. All predictors were group-mean centered because the outcome variables were standardized and as such group and grand-mean centering would produce the same outcomes. In order to understand how each variable predicts the outcome between schools, the effects of teacher years of experience, primary grade level, and class size on instructional practices were allowed to vary by keeping each error term free at Level 2. Non-significant predictors were dropped from the final model and the slopes of the remaining variables were fixed.

Finally, a between-school model was created by adding Level 2 predictors to the model. First, the treatment variables, Phase 1 and Phase 2 IC Teams implementation, were added uncentered at Level 2 to determine if they had any effect upon instructional practices independent of contextual factors. School level variables were to be added as controls as necessary.

Chapter 4: Results

Fully Unconditional Model

This analysis resulted in an intra-class correlation of 0.03 (ICC = between-school variance/total variance = (.03/.03 + .97) for the main outcome variable, meaning that approximately 3% of the variance in reported overall instructional practices exists between schools. The intraclass correlations for the general instructional practices subscale and the individualized instructional practices subscales were similar to that of the composite. There was slightly less variation between schools on the behavior assessment and intervention practices scale (ICC =.02).

Table 10

Fully Unconditional Model

Item	σ^2	τ	ρ	λ	*p*
Overall Instructional Practices Score	.97	.03	.03	.41	<.01
Factor 1: General Instructional Practices	.97	.03	.03	.36	.01
Factor 2: Individualized Instructional Practices	.97	.03	.03	.41	<.01
Factor 3: Behavior Assessment & Intervention Practices	.98	.02	.02	.30	.03

Note. σ^2 is the within school variance. τ is the between school variance. ρ is the intraclass correlation for the item. λ is the reliability estimate, which estimates the ratio of true score to observed score variance in estimating the school mean for this item. N = 977 Reg Ed Teachers within 45 schools

Within-School Model

Predictors at Level-1 were group-mean centered and specified as having random effects in order to determine if any of the relationships between the predictor variables and the outcome variables significantly vary by school. Results indicated that teachers

who have 6 or more years experience have significantly higher scores on the composite measure of instructional practices than those with less years of teaching experience with an effect size of .29 (*SE* = .07, *p*=.00). This relationship between years of teaching and instructional practices did not vary significantly between schools, so slopes were fixed to zero for future modeling.

Table 11

Within School Model of Instructional Practices, Group Mean Centered with Freed Effects

Fixed effects				
Variable	Coefficient	Standard Error	p-Value	
Instructional Practices Composite, γ_{00}	.00	.04	.99	
Six or More Years Experience, γ_{10}	.29	.07	.00	
Primary Grade Teacher, γ_{20}	.11	.06	.06	
Class Size Z-score, γ_{30}	-.34	.04	.36	
Random effects				
Variable	Variance	Df	p-value	Reliability
Instructional Practices Composite, u_{0j}	.03	44	.01	.36
Six or More Years Experience, u_{1j}	.03	44	.42	.11
Primary Grade Teacher, u_{2j}	.02	44	>.50	.08
Class Size Z-score, u_{3j}	.00	44	>.50	.05
Level 1 error, R	.94			

Note. Level 1 variables group-mean centered with freed effects.

The relationship between primary grade level and instructional practices was also positive with an effect size of .11 (*SE* = .06, *p* = .06), but did not appear to relate significantly at the .05 level to overall instructional practices when group-mean centered. Because it was significant at the .10 level, it was retained as a control with a fixed slope

in subsequent modeling. Class size did not relate significantly with instructional practices with an effect size of -.34 (*SE* = .04, *p* = .36). Consequently, class size was dropped from the within-school model. When years of experience and primary grade status were group-mean centered with fixed slopes, both significantly predicted overall instructional practices, with effect sizes of .23 (*SE* = .07, p = .00) and .17 (*SE* = .06, *p* = .01) respectively. This means that, on average, teachers with six or more years experience scored .23 of a standard deviation higher than teachers with less experience on the instructional practices measure and primary grade teachers, on average, scored .17 of a standard deviation higher than intermediate grade teachers. Tables 11 and 12 list the findings for the first and second within-school models.

Table 12

Final Within School Model for Instructional Practices, Group Mean Centered with Fixed Effects

Fixed effects				
Variable	Coefficient	Standard Error	p-Value	
Instructional Practices Composite, γ_{00}	.00	.04	.96	
Six or More Years Experience, γ_{10}	.23	.07	.00	
Primary Grade Teacher, γ_{20}	.17	.06	.01	
Random effects				
Variable	Variance	Df	p-value	Reliability
Instructional Practices Composite, u_{0j}	.03	44	.00	.43
Level 1 error, R	.95			

Note. Level 1 variables grand-mean centered with fixed effects.

The same procedures were used to investigate the within-school model for each of the factors of the *Instructional Practices Survey* (see Appendices H through J for tables

of the findings for each model). The same within-school findings did not necessarily hold true for each factor. Teachers' years of experience significantly predicted general instructional practices (*ES* = .23, *SE* = .07, *p* = .00) and behavioral intervention and assessment practices (*ES* = .29, *SE* = .07, *p* = .00), but did not significantly predict individualized instructional practices (*ES* = .10, *SE* = .08, *p* = .17). Being a teacher of a primary grade had benefits for individualized instructional practices (*ES* = .23, *SE* = .06, *p* = .00), but not generalized instructional practices (*ES* = .11, *SE* = .07, *p* =.11) or behavioral assessment and intervention (*ES* = .12, *SE* =.06, *p* =.06).

Between-School Models

Phase of implementation of IC Teams was entered in as a predictor at the school-level (Level 2) uncentered with teachers' years of experience and grade level taken into account at teacher-level. It was found that school-level treatment, Phase 1 or Phase 2, did not significantly predict reported overall instructional practices when taking into account teacher grade level and years of experience. This was true for all of the factor scales as well. The effect sizes for Phase 1 and Phase 2 treatment on overall instructional practices, general, and individualized practices were close to zero and not statistically significant, but were in the desired direction with effect sizes ranging from .01 to .10. For behavioral assessment and intervention practices, Phase 1 schools fared slightly better than Phase 2 schools with effect sizes at .00 (*SE* = .09, *p* = .96)and -.02 (*SE* = .09, *p* = .84) respectively, but neither were statistically significant and not in the desired direction.

Table 13 below summarizes the findings for overall instructional practices, while results for the other three factors can be found in Appendices H through J. The final model explains two percent of the variance within schools and was not able to explain

any of the variance between schools. This is likely because there was very little variance between schools (ICC = .03) to explain in terms of this outcome measure. However, there may be other school level predictors that would account for the remaining between school variance. Also, it is possible that with more variance explained at the within-school level, more modeling of the small variance between schools might be possible.

Table 13

Between School Model for Instructional Practices

Fixed effects				
Variable	Coefficient	Standard Error	p-Value	
Instructional Practices Composite, γ_{00}	-.04	.05	.49	
Phase One, γ_{01}	.10	.09	.31	
Phase Two, γ_{02}	.01	.11	.89	
Six or More Years Experience, γ_{10}	.23	.07	.00	
Primary Grade Teacher, γ_{20}	.17	.06	.01	
Random effects				
Variable	Variance	Df	p-value	Reliability
Instructional Practices Composite, u_{0j}	.04	42	.00	.44
Level 1 error, R	.95			
Proportion of variance explained				
Proportion of tau explained	.00			
Proportion of sigma-squared explained	.02			

Note. Level 1 variables grand-mean centered with fixed effects, Level 2 variables uncentered.

Chapter 5: Discussion

The aim of this study is to determine if teachers within Instructional Consultation Teams schools report more frequent use of overall effective instructional practices than those in control schools. Of interest were the effects of having one trained instructional consultant or facilitator representing Phase 1 of IC Teams implementation in a school building, or having a fully trained IC Team, Phase 2 implementation. The main effects of IC and IC Teams for overall instructional practices were close to zero and not statistically significant. Main effects for the subscales, generalized instruction, individualized instruction, and behavioral assessment and intervention, were also non-significant. This may be because there was little variance between schools in terms of instructional practices as measured by the *Instructional Practices Survey* and thus there were few school effects to model.

The length of time exposed to the IC Teams model and the degree to which IC Teams were implemented or used may be contributing factors to the lack of observed school effects. The schools in the current study had been implementing IC Teams for one to three years, with varying levels of use. The literature on school innovation suggests that school-level change takes a minimum of two to four years and that large-scale change efforts can take up to five to ten years, with the amount of use being a key variable in the timeline (Fullan, 2007). Gravois and his colleagues (2002) have discussed the need for training and common practice in consultation to build over time to form what Fullan (2002) refers to as a "critical mass", a sufficient number and representation of the school staff who are "skilled and committed to the change" (p. 89). This critical mass then fosters organizational support for consultation delivery, but also in individual

teacher's use of the innovation or in this case, consultation services. In their analysis of levels of use, Hall and his colleagues state that an individual does not use an innovation as effectively or efficiently the first or second time as they do after four or five cycles of use (Hall et al., 1975). They go on to say that one of the key reasons many program evaluations fail to find significant results is attributable to low levels of use of the innovation in the early stages of implementation when most projects are evaluated. As such, they state that it is "unreasonable to anticipate significant gains" (p. 56).

In regards to levels of use, exploration of the effect of IC Teams on teacher practices should also take into account teachers' own personal use of the IC Team. This is similar to the findings of Silva (2007), who found positive and significant differences in student achievement in IC Teams schools at the classroom level, but not at the individual student level. She suggested that treating all of the students equally may have obscured individual effects for those whose teachers did access the IC Team; she recommended studying differences between teachers who make a voluntary request for IC Teams assistance versus those teachers who request assistance or receive assistance from a control team. The current research was not designed for such an investigation; therefore, future research should explore this potential relationship.

Although no significant main effects were found for IC Teams, two teacher variables were found to significantly predict teachers' overall reported use of good instructional practices. Teachers who had six or more years of experience and who were primary grade teachers were more likely to report use of overall good instructional practices. Specifically, teachers with more years of experience reported more use of general effective instructional practices such as connecting to prior knowledge, providing

frequent feedback, and keeping success rates high during lessons. More experienced teachers also reported strong behavioral assessment and intervention skills such as graphing and charting students' behaviors and assessing behaviors in the context in which they occur. Although the research on the contribution of teacher years of experience is inconclusive, there have been many studies that have documented the positive effect of experience on instructional practices and student achievement. While this effect may not be a consistent linear effect after six or more years, it does typically demonstrate differences between beginning teachers and more experienced teachers (Louis et al., 1996, Rivkin et al., 2005; Walsh & Tracy, 2004), as was demonstrated in this study.

In addition to experience, the grade level taught was also a significant correlate with certain instructional practices. Kindergarten through second grade teachers reported using more individualized instructional practices, such as frequent diagnostic instructional assessment and cooperative learning strategies, when compared to intermediate grade teachers (3rd through 5th grade). This is also consistent with the general assumption in schools that instruction and class environments change as students progress through the grades (Eccles, Midgeley, & Adler, 1984) and a recent study that found primary teachers to use significantly more individual feedback and communication, small group instruction, and manipulatives than intermediate teachers (Van Scoy, 1994). The fact that these particular teacher variables significantly relate to the instructional practices in ways also described in the literature lends some credence to the construct validity of these scales.

Experience and grade level also only explained a small portion of the variance among teachers within a school, so there may also be other important teacher qualities or

other variables to consider when building models to better explain variance in effective instructional practices. For example, the literature on effective instruction or teacher qualities related to student achievement suggests characteristics such as collaboration with others (Goddard et al., 2007), engagement in professional development experiences (Louis et al., 1996), and personal or professional efficacy for teaching (Ross, 1994), to name a few. Teachers' willingness to seek help of others or exhaust all resources in order to improve their own practices to help a student succeed (Butler, 2007) should also be considered.

Another potential explanation for the non-significant treatment effect could be a difference in knowledge of best practices between the two groups. It may be possible that as teachers become more aware of best practices of assessment and instruction through work with an instructional consultant or the effect of IC Teams within a building, they may be more critical of their own skills and less likely to report frequent use of these practices than those that have not had this experience and are not aware of what they are not doing. This phenomenon has been described by Dochy (1992) who found that students with little prior knowledge were more likely to rate themselves high because they did not know what was unknown, whereas students with more prior knowledge rated themselves lower because they were more aware of what knowledge they were missing. This concept of knowledge monitoring is a component of metacognition and has been defined as the ability to differentiate between what you know and what you do not know (Tobias & Everson, 1997). Kruger and Dunning (1999) reported on four studies conducted with undergraduate students in which they conducted a series of experiments with groups of high and low skill for the prescribed tasks and asked each group to rate

their own skill level. Over the four studies, their findings consistently suggest that people with low skill for the task, but who still possessed a minimal threshold and knowledge-base, also had less metacognitive skills to accurately self-assess their performance. Interestingly enough, they also described "the burden of expertise" (p. 1131), which follows that just as the lower performing group inflated their own abilities, the higher performing group tended to undercut their own abilities when comparing themselves to their peers. It is not clear if this was operating for the teachers of this particular study, but is something that warrants additional exploration in future research.

Limitations

A limitation of this study is that only teacher self-reports were used to assess instructional practices; this mono-method design is a threat to internal validity (Shadish et al., 2002). There are also potential issues with the measure selected. The *Instructional Practices Survey* was newly constructed and the subscales appear to be subject to a ceiling effect. The measure may not adequately differentiate between teachers differing use levels, since teachers may have a difficult time honestly assessing the frequency of their use of select strategies or practices. Additionally, it is unclear if the items themselves actually tap good practices in instruction across all of the elementary grade levels. In the future, other measures such as direct observation or scenario-based-tasks should be considered to test the construct validity of the instructional practices measure and provide another type of data to examine changes in practices.

An additional limitation is the threat to internal validity due to selection of the early treatment group. This project included the 11 Phase 2 schools selected to participate in IC Teams prior to the randomized trial, and those schools differed in meaningful ways

prior to the addition of the innovation; these differences may be related to the outcome variable of interest, instructional practices, in unmeasured ways that were difficult to control for in the multi-level analysis, given the data that were collected. As the longitudinal study is continued, experimental research should be conducted to explore teacher and student outcomes of IC Teams to improve the internal validity of the findings. More importantly, as the study continues, it will allow more time for increases in the overall level of implementation and use of the IC Teams in the treatment schools. Due to the low levels of use reported in this study, this is likely the largest factor impacting the findings at this time.

Conclusion

Despite the lack of statistically significant findings, this study represents an important contribution to the literature because it is the first of its kind and size to employ quasi-experimental multilevel analyses to investigate teacher-level outcomes. While the findings were not significant, replication is recommended in subsequent years of the project as implementation and use is increased. More attention to the construct validity of the measurement of the instructional practices construct may be required in order to understand the effect IC Teams has upon the behaviors of teachers that interact with the team or in buildings in which the model is implemented.

Author Note

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This research is supported in part by grant number #R305F050051 from the Institute of Education Sciences, U.S. Department of Education. Opinions expressed do not necessarily reflect the opinions or policies of the U.S. Department of Education. The development of the data used in this research would not have been possible without the members of the Instructional Consultation research team at the University of Maryland (Sylvia Rosenfield, Todd Gravois, Gary D. Gottfredson, Deborah Nelson, Denise Stringer, Amy Silverman, Jessica Koehler, Samantha Sedlik, Michael Rocque, Kate Bruckman, Phuong Vu) or the Prince William County School System Administration (Kathy Aux, Tommy Carter, Jennifer Coyne-Cassata, Margaret Gheen) and of course the IC Teams administrators, facilitators, and team members.

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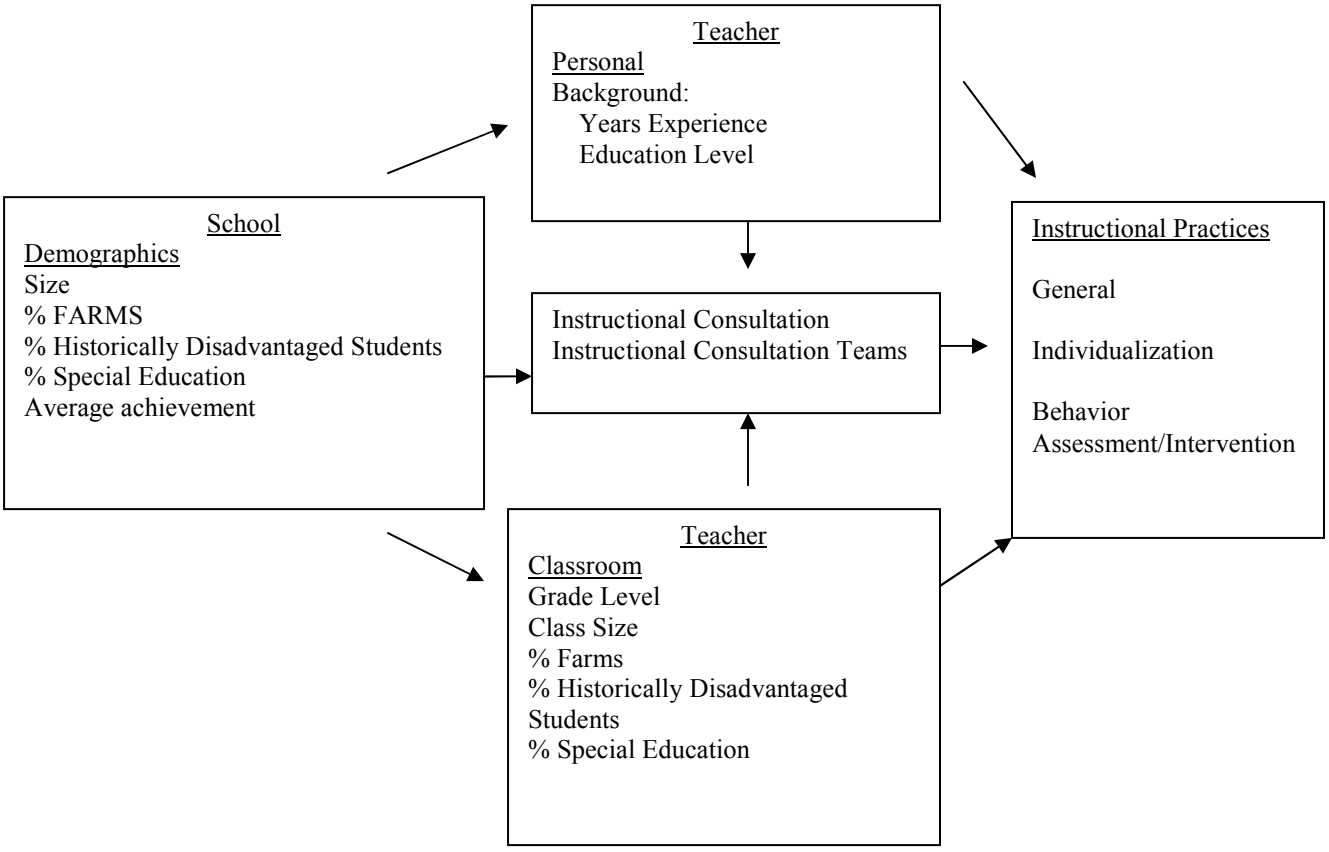
Appendix

Appendix A. Conceptual Map



Appendix B. Instructional Practices Survey

Instructional Practices

We are interested in learning more about the instructional practices that teachers use in their classrooms when working with students who are experiencing educational and/or behavioral difficulties. Listed below is a set of statements that describe a variety of common classroom instructional practices. Please describe your level of use of each of the classroom practices when working with a student who is a struggling learner. Please rate using the following scale:

1 = Almost never (2 to 3 lessons a week)
2 = A few lessons a week (4-10 lessons a week)
3 = A couple lessons per day (10-15 lessons a week)
4 = Almost every lesson per day (15 -20 lessons a week)
5 = Every lesson per day (20+ lessons a week)

Planning

When *planning lessons* for a student or students who are experiencing *academic* difficulties…

I assess the level of challenge and success an academic task will provide.

I develop my lesson so that I do not have the student work on too much unknown material at once.

I consider the student's existing knowledge and prerequisite skills.

I preview materials to ensure that students will be able to read text with at least 93-97% level of accuracy.

Delivery

When *delivering instruction* to a student or students who are experiencing *academic* difficulties…

I monitor the student's understanding of the content or a skill during activities and make adjustments accordingly.

I supervise the student's practice of a new skill to give corrective and confirming feedback during practice activities.

I ensure that the student practices new skills at a success rate of 80% or higher when completing initial learning tasks.

I ensure that student practice is continued to the point of rapid, automatic, correct responses during independent activities (90-100% success rate).

Management

When *managing lessons* for a student or students who are experiencing *academic or behavioral* difficulties…

I use classroom structures (e.g., learning centers, students working in pairs, etc.) to free my time to work individually with students who need my help.

I have students work in pairs or small groups.

I ensure that the student's engagement is high (90-100% on-task) during independent work activities.

I ensure that disruptions or interruptions are held to a minimum.

Assessment

Instructional

When *assessing* a student or students who are experiencing *academic* difficulties…

I assess the student's performance on classroom tasks

I assess the student to pinpoint the most important instructional needs.

I set and monitor progress towards short-term goals

I assess and flexibly group students by skill or objective.

We are interested in learning more about the instructional practices that teachers use in their classrooms **when working with students who are experiencing behavioral difficulties**. Listed below is a set of statements that describe a variety of common classroom instructional practices. Please describe your **level of use** of each of the classroom practices when working with a student who is a struggling learner. Please rate using the following scale:
1 = Never
2 = Rarely

3 = Sometimes
4 = Often
5 = Always

Behavioral
When *assessing* a student or students who are experiencing persistent *behavioral* difficulties…

I assess the student's academic skills in the subject areas in which the behaviors are occurring.

I define the behavior in specific and observable terms.

I observe and analyze the antecedents and consequences of the behaviors

I collect and graph information about the student's increase in appropriate behaviors.

Appendix C. Instructional Practices Survey Design

Principles of Effective Instruction Tapped by each Survey Item

Principle of Effective Instruction	Corresponding Survey Item
Maintaining Instructional Levels & Staying within Limits of Working Memory	I monitor the student's understanding of the content or a skill during activities and make adjustments accordingly.
	I ensure that the student practices new skills at a success rate of 80% or higher when completing initial learning tasks.
	I develop my lesson so that I do not have the student work on too much unknown material at once.
	I preview materials to ensure that students will be able to read text with at least 93-97% level of accuracy.
Assessing and Activating Prior Knowledge	I consider the student's existing knowledge and prerequisite skills.
	I assess the level of challenge and success an academic task will provide.
	I assess the student to pinpoint the most important instructional needs.
	I set and monitor progress towards short-term goals
	I assess the student's performance on classroom tasks
Repetition with Corrective and Confirming Feedback	I supervise the student's practice of a new skill to give corrective and confirming feedback during practice activities.
	I ensure that student practice is continued to the point of rapid, automatic, correct responses during independent activities (90-100% success rate).
Classroom Management	I ensure that the student's engagement is high (90-100% on-task) during independent work activities.
	I ensure that disruptions or interruptions are held to a minimum.
	I assess and flexibly group students by skill or objective.
	I use classroom structures (e.g., learning centers, students working in pairs, etc.) to free my time to work individually with students who need my help.
	I have students work in pairs or small groups.
Behavioral Assessment & Intervention	I observe and analyze the antecedents and consequences of the behaviors
	I define the behavior in specific and observable terms.
	I assess the student's academic skills in the subject areas in which the behaviors are occurring.
	I collect and graph information about the student's increase in appropriate behaviors.

Appendix D. Instructional Practices Factor Loading, Three Factor Solution

Instructional Practices Scale	Factor Loadings		
	1	2	3
Factor 1: General Instructional Practices			
I monitor the student's understanding of the content or a skill during activities and make adjustments accordingly.	**.70**	.29	.12
I supervise the student's practice of a new skill to give corrective and confirming feedback during practice activities.	**.69**	.30	.13
I consider the student's existing knowledge and prerequisite skills.	**.66**	.18	.10
I ensure that the student practices new skills at a success rate of 80% or higher when completing initial learning tasks.	**.65**	.35	.19
I ensure that student practice is continued to the point of rapid, automatic, correct responses during independent activities (90-100% success rate).	**.59**	.37	.22
I develop my lesson so that I do not have the student work on too much unknown material at once.	**.59**	.11	.12
I assess the level of challenge and success an academic task will provide.	**.57**	.23	.20
I preview materials to ensure that students will be able to read text with at least 93-97% level of accuracy.	**.52**	.27	.17
I ensure that the student's engagement is high (90-100% on-task) during independent work activities.	**.47**	.34	.17
I ensure that disruptions or interruptions are held to a minimum.	**.40**	.16	.14
Factor 2: Individualized Instruction			
I assess the student to pinpoint the most important instructional needs.	.35	**.70**	.23
I set and monitor progress towards short-term goals	.36	**.66**	.22
I assess and flexibly group students by skill or objective.	.22	**.64**	.20
I assess the student's performance on classroom tasks	.34	**.60**	.16
I use classroom structures (e.g., learning centers, students working in pairs, etc.) to free my time to work individually with students who need my help.	.21	**.50**	.17
I have students work in pairs or small groups.	.19	**.44**	.08
Factor 3: Behavior Assessment and Intervention			
I observe and analyze the antecedents and consequences of the behaviors	.19	.13	**.78**
I define the behavior in specific and observable terms.	.20	.11	**.76**
I assess the student's academic skills in the subject areas in which the behaviors are occurring.	.19	.23	**.62**
I collect and graph information about the student's increase in appropriate behaviors.	.09	.22	**.45**

Appendix E. Description of Variables

Teacher-level Dependent Variable		Decision/Transformation
Instructional Practices Composite	Instructional practices survey composite score, from teacher self-report survey administered in spring 2005. Items rated on a Likert-scale from 1-5. 1=Almost never, 2 = A few lessons a week, 3 = A couple lessons per day, 4 = Almost every lesson per day, 5 = Every lesson per day.	Slight negative skew (-.44). Attempted transformation by taking the inverse and using the log to attempt to correct the skew. Little change, went from -.44 to -.36 so no argument for transformation. Standardized to facilitate ease of interpretation
General Instructional Practices	Factor 1, General Instructional Practices scale, from teacher self-report survey administered in spring 2005. Composite score, items 1 though 8, 11, and 12. Items rated on a Likert-scale from 1-5. 1=Almost never, 2 = A few lessons a week, 3 = A couple lessons per day, 4 = Almost every lesson per day, 5 = Every lesson per day.	Slight negative skew. Attempted transformation, little change, so no argument for transformation. Standardized to facilitate ease of interpretation
Individualized Instructional Practices	Factor 2, Individualized Instructional Practices scale, from teacher self-report survey administered in spring 2005. Composite score, items 9, 10, 13 through 16. Items rated on a Likert-scale from 1-5. 1=Almost never, 2 = A few lessons a week, 3 = A couple lessons per day, 4 = Almost every lesson per day, 5 = Every lesson per day.	Slight negative skew. Attempted transformation, little change, so no argument for transformation. Standardized to facilitate ease of interpretation
Behavioral Assessment and Intervention Practices	Factor 3, Behavior Assessment and Intervention Practices scale, from teacher self-report survey administered in spring 2005. Composite score, items 17 through 20. Item rated on a Likert-scale from 1 to 5. 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 =Always.	Slight negative skew. Attempted transformation, little change, so no argument for transformation. Standardized to facilitate ease of interpretation
Teacher-level Predictors		
Years of Experience	Teacher years of experience as reported on the teacher self-report survey, 1= 1 year or less of experience, 2=2-5 years	Categorical, recoded into dummy variables since groups were not normally distributed and comparison of means indicated

	experience, 3 = 6 to 10 years, 4 = 11 to 20 years, 5 = 20 or more years	that the groups significantly differed in terms of ZIPTOT once teachers had 6 or more years of experience
Six or More Years of Experience	Dummy Variable, 1 = Teacher has 6 or more years of experience	Categorical, Significantly correlated with ZIPTOT, ZIPGEN, ZIBEH
Teacher's Education Level	Level of education as reported on the teacher self-report survey in spring of 2005, Response categories: 1=Bachelors Degree, 2=Bachelor's degree plus additional coursework, 3=Masters Degree, 4=Masters degree plus additional coursework, 5=Doctorate	Not correlated at all, dropped
Grade Taught	Teacher's assigned grade level for the 2004-2005 school year, 0=Kindergarten, 1=1st grade, 2=2nd grade, 3=3rd grade, 4=4th grade, 5=5th grade	Categorical, not normally distributed, correlated significantly with ZIPTOT, compared means to determine where groups differed in regards to ZIPTOT, recoded into dummy variable
Primary Grade (K-2) Teacher	Dummy Variable, 1 = Teacher teaches K, 1st , or 2nd grade	Categorical, correlated significantly with ZIPTOT & ZIPIND
Class Size	Number of students in teacher's class	Continuous, significant with all except IPGEN. Standardized to facilitate ease of interpretation
Percent of Students in Class Receiving Free and Reduced Lunch	Percentage of students in the teacher's classroom that receive free and reduced meals	Continuous, Bimodal, attempted transformation to categorical (high, medium, low), but there were no significant correlations either continuous or categorical. Dropped this variable.
Percent of Students in Class Receiving Special Education Services	Percentage of students in teacher's classroom that are eligible and receive special education services	Continuous, Not correlated, dropped.
Percent of Students in the Class from Historically Disadvantaged Backgrounds	Percentage of historically disadvantaged minority students in the teacher's classroom (non-white or Asian)	Continuous, Bimodal, attempted transformation to categorical (high, medium, low), but there were no significant correlations either continuous or categorical. Dropped this variable.

School-Level Predictors		
School Average Instructional Practices Composite	Average instructional practices, school aggregate of IPTOT	No transformation necessary. Standardized to facilitate ease of interpretation
School Average General Instructional Practices	School aggregate of IPGEN scale	No transformation necessary. Standardized to facilitate ease of interpretation
School Average Individualized Instructional Practices	School aggregate of IPIND scale	No transformation necessary. Standardized to facilitate ease of interpretation
School Average Behavioral Practices	School aggregate of IPBEH scale	No transformation necessary. Standardized to facilitate ease of interpretation
Phase One	Dummy Variable for treatment status by implementation phase in IC Teams Project, 1 = Phase 1 (17 Cohort 3 schools, randomly assigned during 2005-2006)	Categorical
Phase Two	Dummy Variable for treatment status by implementation phase in IC Teams Project, 1 = Phase 2 (11 Cohort 1 and 2 schools, non-randomly assigned during 2003-2005)	Categorical
Size	Number of students in the school	Continuous, not correlated with outcome variables, dropped from analysis
Percent of Students Receiving Free and Reduced Meals in the School	School SES as measured by the percentage of students receiving free and reduced meals	Continuous, not correlated with outcome variables. Standardized to facilitate interpretation. Dropped from analysis since not needed as a control.
Percent of Students from Historically Disadvantaged Backgrounds in the School	Percentage of historically disadvantaged minority students in the school (non-white and Asian)	Continuous, not correlated with outcome variables. Standardized to facilitate interpretation. Dropped from analysis since not needed as a control.
Percent of Students Receiving Special Education Services in the School	Percentage of students in special education services, all codes	Continuous, not correlated with outcome variables, dropped from analysis.
School Average Achievement Composite	Average school achievement in 2004-2005, Composite score, the average of all scaled scores	Continuous, not correlated with outcome variables, but will remain in as a control.

	from each grade level subtest. Grade 3 and 5 – English, Math, Science, History, and Writing. Grade 4 –History only.	Standardized to facilitate interpretation. Dropped from analysis since not needed as a control.

Appendix F. Variable Descriptive Data

Dependent Variable	N	Mean	SD	Minimum	Maximum
Overall Instructional Practices	977	3.85	.54	1.50	5.00
General Instructional Practices	977	4.03	.59	1.30	5.00
Individualized Instruction Practices	976	3.64	.69	1.17	5.00
Behavioral Assessment and Intervention Practices	975	3.76	.64	1.50	5.00
Teacher-Level Variables	N	Mean	SD	Minimum	Maximum
Six or More Years of Teaching Experience	977	.63	.48	.00	1.00
Primary Grade Teacher	977	.50	.50	.00	1.00
Number of students in class	977	24.01	2.86	13	32

Appendix G. HLM Equations

Level One (Individual)

$$Y_{ij} = \beta_{0j} + \beta_{1j}(X_{ij} - X_{ij..}) + \beta_{2j}(X_{ij} - X_{ij..}) + r_{ij}$$

Where:

Y_{ij} = spring 2006 teacher self-report scores on each of the instructional practices scales;

β_{0j} = intercept, or the average instructional practices score in the $_j$th school;

β_{1j} $(X_{ij}$-$X_{ij..})$ = group mean centered teacher years of experience 6 years or greater

β_{2j} $(X_{ij}$-$X_{ij..})$ =group mean centered Primary grade teacher

Level Two (School)

$$\beta_{0j} = \gamma_{00} + \gamma_{01} W_1 + \gamma_{02} W_2 + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

Where:

γ_{00} = the group mean for instructional practices across all teachers and schools;

γ_0 = the effect of being in Phase 1 on school mean instructional practices

γ_{02} = the effect of being in Phase 2 on school mean instructional practices

$\gamma_{10...}$ γ_{20} = the pooled within-school slope in regression of instructional practices on the individual level predictors

W_1 = Phase One IC Teams Implementation, uncentered, 1= Phase One, 0 = not Phase 1

W_2 = Phase Two IC Teams Implementation, uncentered, 1 = Phase Two, 0 = not Phase 2

Appendix H. General Instructional Practices Results

Within-School Model for General Instructional Practices

Fixed effects				
Variable	Coefficient	Standard Error	p-Value	
General Instructional Practices, γ_{00}	.00	.04	.95	
Six or More Years Experience, γ_{10}	.23	.07	.00	
Primary Grade Teacher, γ_{20}	.11	.07	.11	
Random effects				
Variable	Variance	df	p-value	Reliability
General Instructional Practices, u_{0j}	.03	44	.01	.36
Level 1 error, R	.96			

Note: Level 1 variables group-mean centered with fixed effects

Between School Model for General Instructional Practices

Fixed effects				
Variable	Coefficient	Standard Error	p-Value	
General Instructional Practices, γ_{00}	-.04	.05	.45	
Phase One, γ_{01}	.10	.09	.24	
Phase Two, γ_{02}	.02	.10	.86	
Six or More Years Experience, γ_{10}	.23	.07	.00	
Primary Grade Teacher, γ_{20}	.11	.07	.11	
Random effects				
Variable	Variance	df	p-value	Reliability
General Instructional Practices, u_{0j}	.03	42	.01	.36
Level 1 error, R	.96			
Proportion of variance explained				
Proportion of tau explained	.00			
Proportion of sigma-squared explained	.01			

Note: Level 1 variables group-mean centered with fixed effects, Level 2 variables uncentered.

Appendix I. Individualized Instructional Practices Results

Within-School Model for Individualized Instructional Practices

Fixed effects				
Variable	Coefficient	Standard Error	p-Value	
Individualized Instructional Practices, γ_{00}	.00	.04	.10	
Six or More Years Experience, γ_{10}	.10	.08	.17	
Primary Grade Teacher, γ_{20}	.23	.06	.00	
Random effects				
Variable	Variance	df	p-value	Reliability
Individualized Instructional Practices, u_{0j}	.03	44	.00	.43
Level 1 error, R	.95			

Note: Level 1 variables group-mean centered with fixed effects.

Between School Model for Individualized Instructional Practices

Fixed effects				
Variable	Coefficient	Standard Error	p-Value	
Individualized Instructional Practices, γ_{00}	-.04	.06	.44	
Phase One, γ_{01}	.10	.09	.27	
Phase Two, γ_{02}	.03	.11	.80	
Six or More Years Experience, γ_{10}	.10	.08	.18	
Primary Grade Teacher, γ_{20}	.23	.06	.00	
Random effects				
Variable	Variance	df	p-value	Reliability
Individualized Instructional Practices, u_{0j}	.03	42	.00	.43
Level 1 error, R	.95			
Proportion of variance explained				
Proportion of tau explained	.00			
Proportion of sigma-squared explained	.02			

Note: Level 1 variables group-mean centered with fixed effects, Level 2 variables uncentered.

Appendix J. Behavioral Assessment and Intervention Practices Results

Within-School Model for Behavioral Assessment and Intervention Practices

Fixed effects				
Variable	Coefficient	Standard Error	p-Value	
Behavioral Assessment & Intervention Practices, γ_{00}	-.00	.04	.98	
6 or more years experience, γ_{10}	.29	.07	.00	
Primary Grade Teacher, γ_{20}	.12	.06	.06	
Random effects				
Variable	Variance	df	p-value	Reliability
Behavioral Practices, u_{0j}	.02	44	.02	.33
Level 1 error, R	.96			

Note: Level 1 variables group-mean centered with fixed effects.

Between School Model for Behavioral Assessment and Intervention Practices

Fixed effects				
Variable	Coefficient	Standard Error	p-Value	
Behavioral Assessment & Intervention Practices, γ_{00}	.00	.05	.97	
Phase One, γ_{01}	.00	.09	.96	
Phase Two, γ_{02}	-.02	.09	.84	
Six or More Years Experience, γ_{10}	.29	.07	.00	
Primary Grade Teacher, γ_{20}	.12	.06	.03	
Random effects				
Variable	Variance	df	p-value	Reliability
Behavioral Assessment & Intervention Practices, u_{0j}	.03	42	.01	.36
Level 1 error, R	.96			
Proportion of variance explained				
Proportion of tau explained	.00			
Proportion of sigma-squared explained	.02			

Note: Level 1 variables group-mean centered with fixed effects, Level 2 variables uncentered.

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