EFFECTS OF PRESENTATION MODALITY ON TEACHERS' DATA INTERPRETATION ACCURACY AND PERCEPTIONS OF INTERVENTION AND CONSULTANT EFFECTIVENESS

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CHAPTER I

INTRODUCTION

School Psychologist Service Delivery

For over two decades now the trend in school psychology service delivery has been shifting away from the traditional refer-test-place model towards a more direct problem-solving approach. This paradigm shift has been facilitated in part by a growing body of research documenting the unreliability of traditional diagnostic and placement procedures, limited positive outcomes once placed, the over-identification of students identified, and the failure of traditional assessments to provide meaningful assistance to teachers (Gonzalez, Nelson, & Gutkin, 2004). To remediate these problems many educational stakeholders have been advocating for special education reform. In 1997, the federal government responded to these advocacy efforts by reauthorizing the Individuals with Disabilities Education Act (IDEA). This reauthorization recommended that educational services be provided to students who are difficult to teach prior to a formal special education evaluation. In 2004 IDEA was again revised to affirm that, "In determining whether a child has a specific learning disability (SLD), the local education agency may use a process that determines if a child responds to scientific, research-based intervention as part of the evaluation procedures…" (PL 108-446-614 (b)(6)(B)). Due to

these current educational trends more and more children suspected of having a disability, as well as children diagnosed with mild disabilities, are being served through intervention implemented in the general education classroom. Reform advocates have identified a number of benefits to educating these students in this setting (Shinn, Walker, & Stoner, 2002). However, research indicates that teachers might not know how to effectively intervene with these students (Pugach, 1985; Wilson, Gutkin, Hagen, & Oats, 1998). While various school personnel are available to help teachers better manage students with academic and behavioral difficulties, often times these personnel lack training in the areas of consultation and intervention design. School psychologists' training in school-based consultation and empirically-based intervention results in a broad range of skills that if utilized may be very beneficial to teachers in need of educational support.

School-Based Consultation

For many school psychologists, consultation is one of the primary job functions (Reschly & Wilson, 1995). Zins and Erchul (2002) describe school consultation as "a method of providing preventively oriented psychological and education services in which consultants and consultees form cooperative partnerships and engage in a reciprocal systematic problem-solving process guided by ecobehavioral principles" (p. 626). School psychologists often engage in consultation with teachers who in turn provide services to a student or group of students. This indirect service has two primary functions: First, to provide empirically based methods for changing a child's academic, behavioral, or social functioning; and second, to teach the educator skills to effectively deal with similar problems in the future. During the consultation process the school psychologist's role is to elicit an accurate description of the problem, analyze the problem, create an

empirically based intervention, train stakeholders on intervention implementation, and evaluate intervention outcomes. The teacher's role is to clearly describe the problem, implement the intervention, monitor progress, and evaluate intervention outcomes (Elliot & Sheridan, 1992; Kratochwill, Elliott, & Callan-Stoiber, 2002). Because consultation is voluntary, it is important to evaluate consultees' perceptions of the consultation process. Additionally, because the consultant and the consultee both have a stake in evaluating the effectiveness of interventions, it is important to identify factors that influence consultee perceptions of the intervention outcomes.

Teacher Perceptions

Research indicates that teachers view consultation as an important service provided by the schools (Gutkin & Curtis, 1990; Watkins, Crosby, & Pearson, 2001), and desire increased involvement in consultation activities (Cheramie & Sutter, 1993; Gilman & Gabriel, 2004). Research has also shown that teachers are sometimes resistant towards consulting with school psychologists about work-related problems (Gonzalez, Nelson, Gutkin, & Shwery, 2004). In an attempt to decrease teacher resistance and improve consultation service delivery, many researchers have focused on teacher perceptions and preferences toward consulting with school psychologists (e.g. Deforest & Hughes, 1992; Gonzalez et al., 2004; Slonski-Fowler & Truscott, 2004). This research has indicated that teachers are more likely to engage in consultation when the consultant is perceived as skillful (Bossard & Gutkin, 1983; Gonzalez et al., 2004; Gutkin, 1986; Knoff, McKenna, & Riser, 1991), the problem is perceived as less severe (Gutkin, Singer, & Brown, 1980), and when consultation is promoted by administration (Gutkin & Bossard, 1984).

Knoff et al. (1991) focused on specific consultant skills that teachers preferred in consultation. He and his colleagues found that teachers preferred consultants who were knowledgeable about how to organize and carry out the consultation process. They also found that teachers preferred consultants who had strong problem-solving and interpersonal skills. Additional research has also revealed that consultant interpersonal skills (Gutkin, 1986; Hughes & Deforest, 1993; Knoff, Sullivan, & Liu, 1995; Duhon, Mesmer, & Gotcher, 2007), vocabulary (Hyatt & Tingstrom, 1993), agreement with the consultee (Busse, Kratochwill, & Elliot, 1999) and gender (Gentry, 2007), can impact perceptions of consultants and consultation outcomes. Other factors such as the model of consultation and level of teacher involvement have been found to impact teachers' perceptions of consultation effectiveness (Busse et al., 1999; Deforest & Hughes, 1992; Erchul, 1987; Erchul, Covington, Hughes, & Meyers, 1995; Martens, Erchul, & Witt, 1992; Witt, Gresham, & Noell, 1996).

Components of Effective Intervention

Once teachers have requested consultation services, school psychologists then work with the teacher to remediate the problem through empirically-based intervention. Providing effective interventions is an essential component of school-based consultation, and a wealth of research has been dedicated to the topic. For over a quarter of a century now empirically supported interventions have been documented in the behavioral literature (Baer, Wolf, & Risley, 1968). Since that time various intervention components have been identified to systematically outline steps for designing, implementing, and evaluating interventions (Flugum and Reschly, 1994; Witt, VanDerHeyden, & Gilbertson, 2004; Upah, 2008; Batsche, 2008).

Intervention research has also led to the identification of a number of quality indicators that increase the probability of intervention effectiveness. Flugum and Reschly (1994) identified six intervention components that improve the probability of successful outcomes. Using graphs to document intervention outcomes was one of the six components identified. The intervention literature also suggests that intervention effectiveness be formatively and summatively assessed. Based on the intervention outcome data, assessment decisions, such as whether to continue, modify, or abandon an intervention should be made (Fuchs & Fuchs, 1986; Kazdin, 1982; Kratochwill et al., 2002; Marston & Tindal, 1995; Tilly 2002; Upah, 2008). The procedures used to monitor progress vary in rigor, precision, and comprehensiveness. However, for comparison purposes, an assessment process comparable to the one used during the problem identification stage has been recommended.

Once intervention data are collected progress may then be evaluated against a criterion performance level and/or against the data collected during the problem identification stage (Tilly, 2002). Measuring outcomes against a criterion level of performance provides information regarding whether a specific goal has been met. A baseline to outcome comparison is helpful to assess growth rate. In combination these pieces of information can be used to estimate when more long term goals will be met. Research suggests that repeated measurement and growth assessments should be frequently conducted (Fuchs & Fuchs, 1986; Kazdin, 1982; Tilly & Flugum, 1995; Upah, 1998).

Kazdin (1982) suggested that graphing these data can facilitate data analysis by making it easier to identify changes. Many others within the field have also documented

the value of graphing intervention data for analysis and decision making purposes (Deno, 2002; Flugum & Reschly, 1994; Fuchs & Fuchs, 1986; Tilly, 2002; Tilly & Flugum, 1995). Fuchs and Fuchs (1986) suggested that graphing data facilitates performance evaluation makes it easier for teachers to accurately analyze performance trends. However, results from a study by Utley, Zigmond, and Strain (1987) failed to identify any significant differences between teacher evaluations of intervention effectiveness when presented with either raw data or graphed data. Despite the lack of conclusive results *Best Practices in School Psychology IV* recommends that intervention graphs be used for formative and summative evaluation purposes (Upah & Tilly, 2002). While the use of graphs to monitor student progress and evaluate intervention success are widely used in practice, little is known about how these graphs impact teachers' perceptions and understanding of the intervention data.

Dynamic Data Presentation

To date, all of the school-based consultation and intervention literature focusing on the utility of visual aids during progress monitoring has utilized a paper or static presentation modality. However, recent research has documented several benefits to using a dynamic presentation modality (i.e. computer-based; Anglin, Vaez, & Cunningham, 2004; Betrancourt, 2005; Mayer, 2001; Park & Hopkins 1993; Rieber, 1990). One benefit to presenting information via computer presentation is that it has the capacity to sequentially or simultaneously display multiple pieces of information in an efficient and easy to interpret manner (Mayer, 2001). Another benefit is that it can provide graphical animation. Animation is defined as, artificially produced movements created by the rapid presentation of many successively different pictures, which result in

apparent motion. Instructional animation has been found to aid learning by focusing individuals' attention on important concepts (Mayer, 2001). This presentation format also has the capacity to demonstrate structural, functional, and procedural relationships among objects and events (Park & Gittleman, 1992). The instructional benefits to using this technology have been documented in the marketing, business, and educational literature (Baek & Layne, 1988; Mayer, 2001; Park & Gittleman, 1992; Reiber, 1990); however, to date this presentation format has not been investigated as a possible consultation tool.

Purpose of the Study

The primary purpose of this study was to investigate the impact of three data presentation modalities on teacher perceptions of intervention effectiveness and consultant effectiveness. An additional rationale for this study was to examine the effect that various data presentation modalities have on teachers' data interpretation accuracy. More specifically, the purposes related to mode of presentation and were established to determine if differences exist between: 1) a verbal presentation of intervention data with a raw data table, 2) a verbal presentation of the data in conjunction with a paper single subject graph of intervention data, and 3) a verbal presentation of the data in conjunction with an a sequentially presented computer-based single subject graph.

Significance of the Study

Identifying variables that impact teachers understanding of students progress and perceptions of intervention and consultation effectiveness have implications for both research and practice. While some research has documented the utility of graphing intervention outcomes for assessment purposes (Fuchs & Fuchs, 1986), no study to date

has assessed whether data presentation format affects teachers' perceptions of intervention or consultant effectiveness. In addition, most research assessing the value of intervention graphs utilized student samples as opposed to authentic teachers, presented graphs without providing contextual information, focused solely upon inter-rater agreement, and/or did not utilize a trend line or evaluate student performance against a criterion performance level. The current study utilized authentic teachers and graphs were presented within the context of school based consultation. In addition, the current study utilized baseline and outcome data, trend and aim lines, and a criterion performance level in combination with each other to evaluate short and long term goals. Also, research focused on school-based consultation has yet to evaluate potential differences between the traditional paper, or static intervention graph, often used during consultation, and the more novel computer generated dynamic presentation format.

This study adds to the literature base in that it was the first study to evaluate the impact that presentation modality has on teachers' perceptions of intervention and consultant effectiveness. Identifying the presentation format that produces the greatest correspondence between intervention outcome data and teacher perception of intervention effectiveness could improve service delivery.

CHAPTER II

REVIEW OF LITERATURE

History of Consultation

The psychiatrist Gerald Caplan was perhaps the first to apply systematic consultation methodology to the mental health field. In 1949 Caplan took on the task of providing mental health services to over 16,000 adolescent immigrants in facilities around Israel. In order to meet the diagnostic and treatment needs of youth referred for various emotional and behavior problems, Caplan and his small clinical staff devised a plan in which a small amount of expertise could be shared with facility caregivers. This service delivery model allowed Caplan and his staff to cover a larger caseload. While implementing this model, Caplan found that a large number of the referrals he was receiving were due to improperly trained facility caregivers. Based on these observations Caplan and his team began to focus consultation practices on the caretaker's perception of the referral concern and appropriate behavioral management techniques to help the caretaker better deal with the problem. He found that this method often provided caregivers with a better understanding of the problem and the skills to remediate similar problems in the future. Since Caplan's landmark work mental health consultation has been expanded upon and applied in a variety of settings (Erchul & Martens, 2002).

School records dating back to as early as the 1920s indicate that some psychologists working in the schools were engaged in a form of school-based

consultation (French, 1990), although it wasn't until the 1960s that this service delivery method began to enter the main stream (Gutkin & Curtis, 1990). However, with the passage of Public Law 94-142, the Education for All Handicapped Children's Act, the role of the school psychologist became further restricted to assessment and diagnostic practices (Erchul, 1997). Following the passage of Public Law 94-142 concerns about the growing number of students receiving special education, the effectiveness of special education services, and the cost of special education were raised by many educational stakeholders (Gonzalez et al., 2004). To help alleviate these problems many within the school psychology profession called for service delivery reform. Many within the profession of school psychology affirmed that testing alone was time consuming and resulted in labels instead of interventions. Do to these issues many within the profession began to realize that the number of children who could benefit from expanded services, such as consultation, far exceeded the number who could benefit from traditional services (Reschly, Tilly, & Grimes, 1999).

The federal response to concerns about special education was slow, however many changes began to occur in the 1980s. Federal policy statements made during this era reflected a desire to increase mainstreaming and intervention services (Reschly et al., 1999). These policy changes continued with the reauthorization of the Individuals with Disabilities Education Act in 1997 (IDEA). This reauthorization recommended that educational support services be provided to students who are difficult to teach prior to a formal special education evaluation. In 2004, IDEA was again revised

to affirm that, "In determining whether a child has a specific learning disability (SLD), the local education agency may use a process that determines if a child responds to scientific, research-based intervention as part of the evaluation procedures…" (PL 108-446-614 (b)(6)(B)). The policy changes directed towards mainstreaming and classroom intervention emphasize the provision of consultative support to regular education teachers (Erchul & Martens, 2002, Reschly et al., 1999). School psychologists' training in empirically based intervention and consultation have made them ideal candidates for filling this support role.

When engaging in consultation school psychologists most often rely on Bergan's (1977) behavioral consultation model or one of its variants (Bergan & Kratochwill, 1990; Brown, Pryzansky, & Schulte, 1998; Erchul & Martens, 2002; Wickstrom, Jones, LaFleur, & Witt, 1998). Bergan's original consultation model was based on principles of operant and classical conditioning, and observational learning/modeling. His model was later expanded upon to include a wider range of assessment and intervention practices from behavioral ecology and cognitive–behavioral perspectives (Erchul & Martens, 2002).

Problem-Solving Consultation

In *Best Practices in School Psychology IV,* Zins and Erchul (2002) describe consultation as "a method of providing preventively oriented psychological and educational services in which consultants and consultees form cooperative partnerships and engage in a reciprocal, systematic problem-solving process guided by ecobehavioral principles" (p. 626). Consultation is widely used in the schools to remediate behavioral problems as well as academic deficits. Bergan and Schnaps (1983) described

instructional consultation as a process in which behavioral consultation methodologies are applied for the purpose of "modifying teacher behavior to enhance the learning of all students" (p. 105).

School psychologists often engage in consultation with teachers who in turn provide services to a student or group of students. This indirect service has two primary functions: First, to provide empirically based methods for changing a child's academic, behavioral, or social functioning; and second, to provide the educator with the skills to effectively deal with similar problems in the future. To help facilitate these changes Bergan (1977) created a four stage problem solving model consisting of a problem identification, problem analysis, plan implementation, and problem evaluation stage. Each of these stages included specific goals and objectives that must be met before the next stage begins. Another vital consultation component that was originally included in the problem identification stage, but was later added as a unique initial stage focuses on establishing a positive consultation relationship (Bergan & Kratochwill, 1990; Kratochwill et al., 2002).

During the relationship entry stage the consultant and the consultee identify a uniting need or goal. It is during this stage that the consultant is expected to explain the consultation process and individual roles and responsibilities to the consultee. During the problem identification stage the consultant evaluates consultee concerns and works with the consultee to identify, describe, and operationalize a target problem. Following this discussion provisional goals, data collection procedures, and follow-up meetings are discussed. After preliminary (baseline) data have been collected the third stage, problem analysis, begins. At this stage the target problem is reexamined, the intervention plan is

developed, and if necessary the consultant trains the consultee on how to implement the intervention. After these steps are completed a plan is put into practice. While the plan is being implemented intervention and treatment integrity data are collected. During this stage the consultant and consultee meet periodically to monitor the client's progress and determine if the intervention needs modifying. The final stage of Bergan's model, problem evaluation, involves a formal assessment of client functioning and intervention effectiveness. During this stage goals are evaluated, and the decision of whether to continue, modify, or terminate the plan is discussed by the consultant and the consultee (Bergan, 1977; Bergan & Kratochwill, 1990).

Consultation Effectiveness Research

Due to the complex nature of consultation, research focusing on the effectiveness of consultation has proven difficult to conduct, and as a result many studies devoted to this topic have been conceptually and methodologically unsound (Erchul & Martens, 2002; Gresham & Noell, 1993). Despite the methodological shortcomings, past research indicates that consultation is an effective treatment method (Busse et al., 1995; Sheridan, Welch, & Orme, 1996; Sibley, 1986). Sibley (1986) conducted an extensive literature review of both published and unpublished research to determine the impact of school consultation on consultees and clients. Another purpose for the study was to determine the impact of these changes based on the consultation model used. Sibley's review identified 63 school consultation studies from 1966-1984. These studies were then coded by two raters based on the consultation model used, the setting, outcome source, and outcome nature. Based on these codings a meta-analysis was conducted to identify weighted means and effect sizes. Results from these analyses indicated an average effect

size of .60 for consultees and .91 clients. Sibley also found that published research had a significantly higher mean effect than unpublished research.

Another meta-analytic review of the school consultation literature was conducted by Busse et al. (1995). However, he and his colleagues limited their review to studies which utilized single subject designs. Based on their review they were able to calculate single subject effect sizes for 23 cases of teacher consultation. These effect sizes ranged from .55 to 2.90 and yielded a main effect size of .95.

The most recent comprehensive review of the school consultation literature was conducted by Sheridan et al. (1996). These researchers reviewed and critiqued 46 consultation outcome studies published in professional journals from 1985-1995. The purpose for their review was to identify: (a) the types of the consultation models used; (b) the consultation targets; (c) objective dependent measures; (d) the experimental designs used; (e) data related to consumer satisfaction, social validity, and consultation integrity; and (f) follow-up and generalization procedures.

After reviewing the articles the researchers concluded that at least some positive results were identified in 76% of the studies. Following this general analysis, a review of use and outcome by consultation model was conducted. Based on this review the researchers concluded that 46% of the articles focused on the effects of behavioral consultation or one of its variants (e.g. problem-solving or conjoint behavioral consultation). Another 11% of the articles investigated the effects of a mental health model, 4% the effects of the an organizational/development model, and the other 28% of the articles did not identify a specific consultation model. Based on this analysis and the outcome analysis the researchers concluded that behavioral consultation studies most

consistently reported positive results (89%). At least one positive consultation target findings was reported in 57% of the mental health consultation studies reviewed and 29% of the unidentified model studies.

The aforementioned meta-analysis and consultation review studies consistently documented the utility of using consultation to remediate client and consultee problems in the school setting. These studies also demonstrate the consistent use of behavioral practices when analyzing the problem, developing an intervention, and evaluating intervention outcomes. Based on these outcomes it can be concluded that school consultation is an efficient and effective service.

School Based Intervention

Providing effective interventions is vital to the success of consultation, and a wealth of research has been dedicated to the topic. For over a quarter of a century now empirically supported interventions have been documented in the behavioral literature (Baer et al., 1968). Since that time various intervention components have been identified to systematically outline steps for designing, implementing, and evaluating interventions (Tilly & Flugum, 1995; Upah, 1998; 2008). These intervention strategies all address the major problem-solving stages addressed in Bergan and Kratochwill's (1990) consultation model.

Flugum and Reschly (1994) identified six intervention quality indicators that were previously identified as being related to positive client outcomes. The six quality indicators identified by Flugum and Reschly included: (1) a behavioral definition of the target behavior, (2) a direct baseline measure, (3) a systematic intervention plan, (4) collection of treatment integrity data, (5) graphing intervention results, and (6) a

comparison of post-intervention performance to baseline data. To assess the utility of these intervention components the authors created a questionnaire containing the aforementioned quality indices and five questions focusing on intervention effectiveness. The questionnaire was completed by 360 regular education teachers and 422 related service personnel who had recently utilized prereferral intervention services for a student who was not eligible for special education services. Related service personnel included school psychologists (52%), special education consultants (19%), school social workers (17%), speech-language pathologists (5%), and other or unidentified professionals (8%).

Results from the completed questionnaires revealed that five of the six specific quality indices were infrequently utilized during the intervention process. Specifically, less that 10% of the teachers and educational staff reported that intervention graphs were utilized. Less than half of the respondents also suggested that a behavioral definition of the target behavior and/or baseline data were not used during consultation. In addition, about half of the respondents indicated that a procedural intervention protocol was identified and more than seventy percent reported that the intervention was implemented as planned (Flugum & Reschly, 1994).

Following this analysis, correlations between the aforementioned quality indices and outcome measures were evaluated. Four of the six quality indicies were found to significantly correlate with one or more of the outcome measures. The quality indices pertaining to the inclusion of an intervention protocol and treatment fidelity were both significantly correlated with the dichotomous outcome measures "behavior improved" (.31, $\rho < .01$; .31 $\rho < .05$) and "student functioned better" (.37, $\rho < .05$; .31, $\rho < .05$). The quality index focused on graphing was significantly correlated with the outcome item

indicating “degree of improvement” (.31, $\rho<.05$), despite the relatively low percentage of cases were graphs were utilized. The quality index relating to the “direct comparison” of baseline data to outcome data was significantly correlated with the “behavior improved” item (.23, $\rho<.05$; Flugum & Reschly, 1994).

Results from this study indicated that the inclusion of the six quality indicators are related, to some extent, to respondents’ evaluations of intervention effectiveness. However, a major limitation to this study was that it relied upon self report and dichotomous items, which may have inflated correlation values. To further examine the quality indicators proposed by Flugum and Reschly, Upah (1998) collected and evaluated permanent products of each quality indicator.

In Upah’s (1998) study, permanent products and outcome questionnaires were collected from 145 cases over the period of twenty seven weeks. Before the study began the participants were dived up into three groups based on school location. Case information was collected from general education teachers, students, and other service professionals (school psychologists, educational consultants, and school social workers). Each teacher-professional dyad turned in one completed case, containing all intervention materials, at the end of each nine week period. Each group was exposed to three of four conditions (baseline, data collection protocol, training and protocol, and follow-up and protocol). The data collected at the end of each phase was rated based on the physical presence of the indicator and the quality of the product. Intervention outcomes were then rated by participants and later by the researchers.

Results from this study provided further evidence supporting the utility of the quality indices previously identified. Significant Pearson’s R correlations were found

between the quality of the intervention (number of quality indices present and rated quality of product) and intervention outcomes (visual analysis data as rated by a research dyad, σ =.51 and expert rating, σ =.55). In summary, these studies indicate that there is a positive relationship between intervention quality and student outcomes. Interventions are more likely to be successful when they incorporate the intervention components suggested by Flugum and Reschly (1994), Tilly (1995), and Upah (1998).

Evaluating Intervention Outcomes

Best practice recommends that intervention data be frequently collected and evaluated to identify whether an intervention plan is working. Intervention data can be collected via curriculum-based measurements, checklists, frequency counts, observation, permanent products, rating scales, portfolios, time duration, and time latency (Steege, Brown-Chidsey, & Mace, 2002). Historically, the procedures used by educators to evaluate program effectiveness have varied widely in rigor, precision, and comprehensiveness. However, educational reform over the past decade has facilitated the development of more structured systems of monitoring student progress (Erchul & Martens, 2002).

Bergan and Kratochwill's (1990) behavioral consultation model employs evaluation procedures adopted from applied behavioral analysis research. This approach often involves the use of single-case experimental designs. Polaha and Allen (1999) identified several benefits to using these designs. The benefits identified by these authors were: (1) Single case research design is more cost effective than group designs, (2) data can be analyzed without applying advanced statistical procedures, (3) student progress is documented, and (4) formative intervention evaluation allows for the identification of

needed adjustments. The systematic reporting of data allows consultees and consultants to make decisions about whether a particular intervention is having an impact on the client functioning (Tawney & Gast, 1984).

School psychologists and other behavioral analysts' rely heavily on graphed data during intervention evaluation. During these evaluation sessions decisions such as whether to continue, modify, or abandon an intervention are made. Kazdin (1982) suggested that graphing intervention data can facilitate data analysis by making it easier to identify changes. Graphing intervention outcomes allows for data organization during the collection process and provides a detailed quantitative summary of the clients functioning.

Upah and Tilly (2002) identified three reasons for graphing intervention data. First, graphs provide a visual representation of the intervention data. This provides observers with an efficient, compact, and detailed summary of client performance. More specifically, they provide observers with information regarding the sequence of experimental conditions, the time spent in each condition, the target variables, and the relationship between variables. Second, graphing results during progress monitoring may have implications for inferences made about the effectiveness of an intervention. Sulzer-Azaroff and Mayer (1991) explained that intervention stakeholders may be reinforced when they observe graphic evidence that an intervention is producing the desired effect. This reinforcement may maintain or strengthen stakeholder participation in intervention implementation. Finally, graphing of student performance data provides a measure of implementation accountability (Upah & Tilly, 2002).

Cooper, Heron, and Howard (2007) identified a number of basic principles that allow for successful interpretation of graphed data. First, these authors recommend that data points and data paths be easily identifiable. Second, different experimental conditions should be indicated by lines or data path breaks. Third, graphic clutter should be kept to a minimum. Additionally, to reduce clutter the authors suggest only plotting information that is absolutely necessary for evaluation. They also recommend that descriptive labels and legends be identified on the graph. Johnson and Pennypacker (1993) stated, "It is impossible to interpret graphic data without being influenced by various characteristics of the graph itself" (p.320). Therefore, the graph should be created using the proportions and scales that most accurately portray the data.

Visual Analysis

Cooper and his colleagues (2007) defined visual analysis as "a systematic approach for interpreting results of behavioral research and treatment programs that entails visual inspection of graphed data for variability, level, and trend within and between experimental conditions" (p.708). Visual analysis is primarily conducted to answer two questions. First, did the behavior improve in a meaningful way and second, to what extent can the behavior change be attributed to the intervention? When attempting to answer these questions data characteristics such as level, trend, mean shifts across phases, and variability of data are defined below:

Level: The level of data refers to the degree of the data as specified by the ordinate scale value. More specifically, level is the absolute (mean, median, or range) vertical axis value at which the data converge (Tawney & Gast, 1984).

Variability: Data variability can be defined as the spread of data within a phase or condition. High variability within a phase may indicate that the intervention lacks experimental control. This type of variability is likely to produce inaccurate predictions of future behavior. This study utilized graphs with low variability within phases.

Trend: The data trend refers to the angle or direction of the data across time. Data trends may be accelerating, decelerating, or flat (zero trend). A trend line can be visually depicted by drawing a straight line bisecting the data. This method known as the freehand method is efficient, but is not always accurate. Another more precise method for computing trend lines utilizes a least squares regression formula (Cooper et al., 2007). This study utilized graphs with accelerating and zero trend levels.

Mean Shift: Mean shift can be defined as the data level change between phases. A substantial mean shift between phases indicates a significant change in the occurrence of the behavior (Tawney & Gast, 1984). The graphs in this study did not display a large mean shift between the baseline and intervention conditions.

The most commonly used method for displaying intervention outcome data is the simple AB line graph. These graphs contain baseline data (A) which is quantified data of the clients target behavior prior to intervention. Following intervention implementation baseline data is compared to the data collected during intervention (B; Cooper et al., 2007; Steege et al., 2002). This baseline-to-outcome comparison allows for a pretreatment-to-posttreatment growth assessment. Another evaluation method frequently used by teachers and school psychologists requires student performance to be evaluated against a criterion performance level. Measuring outcomes against a criterion level of performance provides valuable information regarding whether a specific goal has been

met. These evaluation methods can also be used in combination with each other to estimate when long term goals will be met (Tilly, 2002).

Cooper et al. (2007) stated:

> The effects of an intervention that produce dramatic, replicable changes in behavior that last over time are readily seen in a well designed graphic display. People with little or no formal training in behavioral analysis can read the graph correctly in such cases. (p.149)

Visual analysis of intervention outcome data provides a relatively efficient and uncomplicated means for determining intervention effectiveness. In addition, research indicates that these graphs are associated with positive outcomes (Fuchs & Fuchs, 1986).

Fuchs and Fuchs (1986) conducted a meta-analysis to investigate the effects of formative evaluation procedures on student achievement. To locate suitable studies for the analysis, key terms were identified and a computer and manual search of applicable journals was conducted. Studies that employed a control group to investigate the effects of academic formative evaluation on preschool, elementary, and middle school students' achievement were included in the meta-analysis. Based on this criteria, 21 articles were analyzed. The method of data presentation was among the variables assessed. Studies in which teachers were required to graph student data were differentiated from those where data were simply recorded. In total, 96 pertinent effect sizes were identified.

Based on an analysis of weighted effect sizes Fuchs and Fuchs (1986) found that the degree of effect of formative evaluation was associated with, among other things, the method of data presentation. The mode of data presentation variable yielded a significant chi-square statistic (χ^2 =16.47, *df*=1). Unbiased effect sizes (UESs) associated with

graphed data (mean=.70) were significantly higher than those of recorded data (mean=.26). Based on this finding the authors offered two possible explanations which they suggest may be occurring in isolation or in combination with one another. First, a graphic display may allow teachers to analyze student performance trends more accurately and frequently; or second, graphs may facilitate more frequent performance feedback directly to pupils.

While Fuchs and Fuchs (1986) and other aforementioned researchers (Flugum & Reschly, 1994; Upah, 1998) have identified various benefits to using graphs to monitor student progress, the results from these studies have been correlational in nature. Therefore, no cause and effect relationship can be established. The positive effects attributed to the graphing of outcome data may be due to other variables, such as level of intervention integrity, consultation model, or consultant characteristics. In addition, other researchers focusing on the utility of graphs have suggested that visual analysis is an unreliable method for evaluating intervention outcomes (DeProspero & Cohen, 1979; Jones, Weinrott, & Vaught, 1978; Kapp, 1983; Utely et al., 1987).

Results from a study by Jones et al. (1978) suggest that visual analysis of graphed data is not a reliable method of evaluation due to poor agreement across analysts. Jones and his colleagues came to this conclusion after comparing inferences based off visual and statistical analysis methods. To make this comparison the authors presented 24 published intervention graphs to a panel of 11 judges. The judges consisted of full time researchers, professors, and graduate students with a minimum of three years of research experience. Each judge was asked to visually analyze the graphed data and determine whether or not a meaningful (reliable) change in level was demonstrated between

baseline and intervention phases. The graphs consisted of a variety of experimental designs such as AB, ABAB, ABCB, ABCBC, and ABACADEA designs. Time-series statistical analyses of the graphed data found that 20 of the 24 graphs had a significant lag 1 autocorrelation (.40 to .93; $p<.05$) and nine of these correlations were above .70. An analysis of the autocorrelations and judges' ratings indicated poor mean agreement (.60). In addition, analysis of the intercorrelations of the judges' agreement yielded values from .04 to .70, with a median of only .39.

A subsequent investigation by DeProspero and Cohen (1979) focused on specific variables related to poor interrater agreement. These authors manipulated the pattern of mean shift, degree of mean shift, within phase variability, and trend. Potential participants in this study included a pool of 250 behavioral journal reviewers. One-hundred and eight of the initial 250 returned completed survey packets for a response rate of 43%. Each of the 250 potential participants were randomly mailed one of four packets containing 9 ABAB graphs. The participants were asked to visually analyze each graph and then respond to the following question: "How satisfactory a demonstration of experimental control do you consider this to be?" (p. 576). The average interrater agreement of the judges was .61 with a standard deviation of .26. Attempts by the authors to identify specific variables that affect interrater agreement were not realized due to the distribution of variance. Instead the results from this study indicated that the raters appeared to weigh the four factors as a whole rather than individually.

Knapp (1983) attempted to extend the work of Jones et al. (1978) and Deprospero and Cohen (1979) by examining the effects of cumulative plot, semi log paper, and frequency polygon graphing techniques across three presentation formats. The

presentation format varied in the way that baseline and intervention data were separated (space, vertical line, or connected). The graphs presented within groups also varied in the degree of mean shift between phases. Participants consisted of 12 post graduate members of a behavioral journal editorial board, 12 graduate student behavior analysts, and 12 undergraduate students with at least one course in behavioral analysis. The experiment was administered to each participant individually. During the individual session participants were given a booklet containing 147 graphs. Each booklet contained nine graphs for each of the three graph types. The booklet also contained three repetitions of each graph and 12 other graphs used in previous visual analysis research (Jones et al., 1978).

The overall intrarater agreement, as measured by ratings on the three repetitions of 45 different graphs, indicate that subjects consistently produced the same ratings across the repetitions 77% of the time. No significant differences were found among the three education/experience groups. Subject responses (change or no change) to the graphs were analyzed using a three-factor analysis of variance (ANOVA) with repeated measures on techniques and degree of shift. Results from this analysis identified significant main effects for the following areas: graphing technique $F(4,132)=9.8$, degree of mean shift groups $F(8, 264)=151.2$, and their interaction $F(32, 1056)=4.5$ at $p<.05$. Semilogarithmic charts produced the least consensus, but only on "no change" judgments. In addition, line graphs with no path separation between baseline and intervention data were found to produce the greatest consensus. Based on the aforementioned results the authors concluded that diverse graphing techniques produced different perceptions of change at critical mean shifts (Knapp, 1983).

Bailey (1984) examined the impact of lines of progress and semilogarithmic on special education graduate students' ratings of charted data. More specifically, students were asked to evaluate the significance of change in level and/or slope in each phase of four graphs. In this study 13 graduate students rated each of the 19 phase changes in all four graphs. Data in the first graph was plotted on equal level charts. The second graph contained the same data however split middle trend lines were added to the data in each experimental phase. On the third graph data points were plotted on a semilogarithmic percent charts. The fourth chart was identical to that in the third set however a trend line was drawn through each phase.

Following subject analyses of the data inter-rater agreement and ratings of significance were evaluated. A randomized factorial design exploiting a three-factor ANOVA was conducted to determine the effects of chart type, lines of progress, and change type on interrater agreement. This analysis identified a significant main effect for trend line ($F = 41.48$; $df = 1$; $p < .01$) and significant effect for the blocked variable phase changes ($F = 2.67$; $df = 18$; $p < .01$). Interrater agreement among the equal interval charts without trend lines was 73% for level and 66% for trend changes, with trend lines agreement increased to 85% and 84%. Interrater agreement among equal semilog charts with no trend lines was 77% for level and 71% for trend, with trend lines agreement increased to 83% and 90% (Bailey, 1984).

A second randomized block design, blocking for students, which exploited a three-factor analysis was employed to determine the effects of chart type, trend lines, and change type on ratings of significance of effects after phase changes. Ratings of significance for each phase change were defined as the percentage of raters who indicated

that a significant change in performance had occurred. Significant main effects were found for chart type, line of progress, and change type. A significant three-way interaction was also found. Judgments of significant trend and level changes both increased from 68% and 51% to 81% and 77% when trend lines were added to the equal interval graphs. When determining the significance of changes via a semilogarithmic graph level increased from 62% to 67% when trend line were added, while significant trend changes declined from 45% to 31% when trend lines were added (Bailey, 1984).

Based on these results Bailey (1984) concluded that chart type, trend lines, and change type are all interrelated and different combinations of these have differing effects on interrater agreement and ratings of significance. This study also provides support for the application of trend lines. Results from this study clearly indicate that the use of trend lines can increase interrater agreement. Overall the results from this study support the findings of Jones and his colleagues (1978), Deprospero and Cohen (1979), and Knapp (1983) which suggest that interrater agreement and ratings of significance are affected by graph characteristics. While these studies indicate relatively consistent findings several limitations were present throughout these investigations. These limitations undoubtedly limit the generalizability of their results.

In the previously reviewed studies (Deprospero & Cohen, 1979; Jones et al., 1978; Knapp, 1983) participants were evaluating graphic elements without any information about the target behavior or intervention. While this format allows for greater experimental control, it excludes contextual information that is typically provided during outcome evaluations. Vital background information, intervention conditions, intervention goals, subject characteristics, and other information that may help explain

the data was not incorporated into these investigations. In addition, these studies required participants to evaluate a large number of graphs and/or graph phases over a relatively short period of time. This consecutive review of multiple graphs may have provided participants with clues, or it is also possible that participants may apply different visual analysis methods when they know they must evaluate a large number of graphs. Another potential limitation of these investigations, with exception to Jones et al. (1978), was the rather generic or content free format of the graphs. The graphs also lacked information typically included such as graph title, axes labels, and in some cases an x and y axis scale. It is understandable that a generic graph be used for this type of research because it provides less restrictive results, however, it is an incomplete representation of the intervention graphs used in practice.

Despite their methodological shortcomings, the aforementioned investigations have raised questions regarding the reliability and accuracy of visual inspection methods. Due to these concerns Utley and colleagues (1987) sought to identify the minimum amount of documentation that teachers need to accurately analyze intervention outcome trends. The levels of documentation that these authors assessed were: (1) observation only; (2) observation and raw data; (3) observation, raw data and graphs; and (4) observation, raw data, and graphs containing a trend line. To assess these conditions 40 undergraduate and graduate special education students were randomly divided up into four groups and each group received one of the four levels of documentation.

Prior to the experimental condition each subject was presented with a self paced instructional packet. The packet included instructional material on graph creation and interpretation, as well as a practice task. The practice task involved the conversion of

raw data to graphic form, and the construction of a trend line using the six-day line of progress method. After returning the packet subjects participated in a criterion test. Subjects who made errors on this test were provided with remedial instruction (Utley et al., 1987).

Following this training all subjects read a written vignette describing a perceptive labeling intervention and then watched a series of 15 video intervention segments. Each segment consisted of six consecutive training sessions consisting of 10 labeling response trials. Each segment displayed either an upward, downward, or level performance trend. Prior to the videos subjects in groups two, three, and four were provided with their additional data materials and told to monitor their additional types of data. At the conclusion of each segment all participants completed a form describing what type of trend they observed (Utley et al., 1987).

Utley et al. (1987) analyzed responses using a two-way ANOVA. A significant main effect was found for level of documentation (F=6.28; df=3,36; p<.0015), indicating that the mean number of accurately identified trends varied between documentation groups. A post hoc analysis indicated that the observation only group significantly differed from groups three (observation, raw data, and graph) and four (observation, raw data, graph, and trendline). No main effect was identified for type of trend, however a significant interaction effect between type of trend and level of documentation was identified (F=3.84; df=6,72; p<.0022).

Closer inspection of this interaction by variable indicates that the large amount of variance in the observation only group led to the significant interaction. Participants in this group accurately identified upward trends (M=4.70; SD=.67) but were significantly

less accurate when identifying downward (*M*=4.20; *SD*=1.03) and level trends (*M*=3.30; *SD*=1.49). Based on these results, Utley et al. (1987) concluded that the collection of at least raw data is needed for teachers to make accurate evaluations of student performance trends. While teachers' trend accuracy did not significantly vary between groups two (raw data), three (graph), and four (graph with trend line), none of the groups performed with 100% accuracy.

Utley and his colleagues (1987) warned that this study should be viewed as a preliminary investigation. The simulated intervention may limit the generalization of the results. The back-to-back presentation of the simulated intervention sessions and the varying trend intervention may have made data interpretation easier. Another potential limitation is the relatively small group sample sizes (*N*=10). Given these limitations these results should be interpreted with caution. More research is needed to investigate whether graphed intervention data leads to a more accurate understanding of the problem.

Overall, research investigating the accuracy of visual analysts' interpretations of graphed data and the type of data needed to accurately identify outcomes has yielded inconsistent results (DeProspero & Cohen, 1979; Jones, Weinrott, & Vaught, 1978; Kapp, 1983; Utely, Zigmond, & Strain, 1987). Limited research does however indicate a relationship between graphed intervention data and positive outcomes (Flugum & Reschly, 1994; Fuchs & Fuchs, 1986; Utley, 1987).

Static Visual Displays

All of the studies reviewed to this point have presented graphed data via a static presentation design. That is, all graphs have been presented by means of a motionless format. To date all of the school-based consultation and intervention literature focusing

on the utility of graphs have used this presentation modality. During consultation graphs are typically interpreted in combination with the consultant's verbal description of the data. A wealth of research in the educational communications literature has led to the conclusion that images, such as the common intervention graphs, have a positive effect on knowledge acquisition when they provide a meaningful supplement to a verbal or textual explanation of the data (Anglin et al., 2004; Levie, 1987; Park & Hopkins, 1993). More specifically, illustrations such as graphs can function to focus attention, help an individual interpret or organize information, and can transform information to create a memorable arrangement (Levie, 1987). While the presentation of static intervention graphs has been linked to more accurate judgments of data (Utley et al., 1987) and positive student outcomes (Fuchs & Fuchs, 1986), recent research indicates that a more advanced presentation modality (i.e. computer-based) may be more beneficial (Anglin et al., 2004; Betrancourt, 2005; Mayer, 2001; Park & Hopkins, 1993; Rieber, 1990).

Dynamic Visual Displays

A benefit to presenting information via computer presentation is that it has the capacity to sequentially or simultaneously display multiple pieces of information in an efficient and easy to interpret manner (Mayer, 2001). Another advantage is that the computer has the faculty to provide dynamic or animated visual displays. Betrancourt and Tversky (2000; as cited in Betancourt, 2005) define computer animation as an "application which generates a series of frames, so each frame appears as an alteration of the previous one, and where the sequence of frames is determined either by the designer or the user" (p.313). Due to the novelty of this dynamic visual display (DVD), relatively few empirical studies have focused on its educational utility. However, numerous non-

experimental reports and a limited number of empirical studies in the educational technology and information systems literature have identified several benefits to using animated images over traditional static images (Anglin et al., 2004; Betrancourt, 2005; Park & Hopkins, 1993; Rieber, 1990). Historically, dynamic visual displays have been used in education to accomplish or aid in one of three functions: gaining attention, presentation, and practice (Rieber, 1990).

Most of the early research on dynamic images relied on film and television presentations. Freeman (1924; as cited in Anglin et al., 2004) conducted an extensive literature review and analysis of research focused on the effectiveness of visual instruction. Based on this review Freeman analyzed 13 articles which included various nonmotion (slides, still pictures, prints, and stereograph) and motion (video animated drawings, maps, and cartoons) instructional presentations. From his analysis Freeman concluded that animated instructional presentations are more effective than static presentations, however both should be used in conjunction with verbal instruction.

Collins, Adams, and Pew (1978) demonstrated the educational value of animation when comparing the effects of dynamic and static map displays. The main purpose of the study was to evaluate the effectiveness of the SCHOLAR computer program against a static labeled and static unlabeled geographic map. The SCHOLAR interactive computer-assisted program consisted of a dynamic map with flashing dots identifying city locations. The presentation of instructional information and teaching strategy were kept identical between groups, except for one feature. The Map-Scholar program answered questions verbally and with blinking dots on a map while answers in the other groups were presented verbally. The static conditions' question responses corresponded

to the static (paper) maps that were given to the participants prior to instruction. Participants in the study consisted of nine high school and nine university students. Each student completed a 20 item pretest, three tutorial sessions about three different countries, and 36-item posttest. During each tutorial session students were exposed to one of the three treatments using different maps.

The average instructional gains from pretest to posttest were analyzed using a 3X3 confounded factorial design. Based on this analysis a significant main effect for training condition was identified ($F(2, 28) = 6.05$, $p < .01$). A Newman-Keuls test reveled that the dynamic Map-SCHOLAR condition resulted in significantly higher post test scores ($p < .01$) than the static labeled map condition. These results, according to Collins and colleagues (1978), indicate that high school and university students learned significantly more with the dynamic map display than with either a static labeled or unlabeled map. Based on these findings the authors concluded that dynamic visual aids may be more beneficial than traditional static visual displays when they function to focus attention. Other research focusing on the attention getting quality of animation has yielded similar results (e.g. Chimera & Schneiderman, 1994; Cropper & Evans, 1968; Park & Gittelman, 1992; Park & Hopkins, 1993; Smith & Goodwin, 1971).

Overall, the educational technology literature through limited does indicate that dynamic visual displays can have the ability to focus attention and increase learning outcomes. These findings are supported by a wealth of information systems research which has mainly focused on the use of animation in web design (see Hong, Thong, & Tam, 2004). Dwyer (1987) explains these outcomes by suggesting that within complex images there exists a number of stimuli relevant to the information to be acquired.

During the visual analysis of these images untrained individuals spend a significant amount of time scanning for relevant stimuli and may inadvertently focus their attention on irrelevant stimuli (Dwyer, 1987). Dynamic images can function as a cue to guide and direct attention to specific image components (Chimera & Schneiderman, 1994; Collins et al., 1978; Nielsen, 2000; Park & Gittelman, 1992; Park & Hopkins, 1993; Smith & Goodwin, 1971). While the benefits to using animation have been documented in the educational literature (Anglin et al., 2004; Betrancourt, 2005; Park & Gittleman, 1992; Reiber, 1990) to date this presentation format has not been investigated as a possible consultation tool.

Research Questions and Hypotheses

1. During progress monitoring consultation, does data presentation modality affect the accuracy with which teachers interpret the data?

   Hypothesis: Teachers who are presented with a computer generated dynamic intervention graph will be more accurate in their analysis of intervention data than teachers who receive the static graph and raw data presentations.

   Hypothesis: Teachers who receive the paper (static) graph will be more accurate than teachers who receive the raw data presentation.

2. Are teacher ratings of intervention effectiveness influenced by the type of visual aid used during progress monitoring consultation?

   Hypothesis: Positive ratings of intervention effectiveness will increase with presentation clarity (i.e., raw data → static graph →dynamic graph).

3. Does data presentation mode impact teacher ratings of consultant effectiveness during progress monitoring consultation?

Hypothesis: There will be a positive correlation between data presentation clarity and teacher ratings of consultant effectiveness. Specifically, it is hypothesized that teachers who observe the dynamic data presentation will produce the highest ratings of consultant effectiveness, and the teachers who are presented with the static graph will generate higher ratings than those receive the data table presentation (i.e., raw data → static graph →dynamic graph).

CHAPTER III

METHOD

The purpose of this chapter is to provide an explanation of the variables under study, research design, participants, procedure, instrumentation, and analysis procedures utilized for the study.

Research Design

The purpose of this study was to identify and evaluate the effects of presentation modality on teacher ratings of intervention and consultant effectiveness. It was also the intent of this study to determine if presentation modality impacts the accuracy with which teachers interpret objective intervention outcome data during progress monitoring consultation. To evaluate these effects, two frequently used school-based consultation visuals, data tables and single-subject graphs, were utilized along with a dynamic computer generated single-subject graph. These three visuals were evaluated with upward trend and zero trend intervention outcome data. Therefore, visual aid and intervention outcome served as the independent variables and teacher ratings of intervention and consultant effectiveness, as well as teacher data interpretation accuracy, served as the dependent variables.

To evaluate the independent variables a between-groups, 3x2 factorial design was utilized. Due to the novelty of the computer-based presentation format in school

consultation which has thus far been untested in authentic situations, as well as the multiple confounding variables which could affect teacher ratings during the consultation process, this study utilized video vignettes. A total of six video vignettes, which consisted of a progress monitoring consultation session, were used. The videos were identical with exception of their combination of the independent variables. Each of the six videos was presented to groups of teachers and ratings over the abovementioned dependent variables were collected and analyzed.

Participants

Participants for this study included elementary school teachers from both rural and suburban districts in a south central state. Teachers who taught kindergarten through sixth grade were targeted for the study as they were the most likely to encounter the academic issue presented in the study. All participants were authentic and valid potential consultees who had experience working with children in an educational setting. A total of 147 participants agreed to take part in the study; however, six participant surveys were deemed unusable due to their not meeting the completion requirements for inclusion. Therefore, a total of 141 usable teacher surveys were utilized for analyses.

Procedure

In order to solicit participation for the study, principals, superintendents, and teacher in-service directors around a southwestern state were contacted. After receiving approval from the appropriate authority, data collection dates were scheduled. Data collection dates were set based on scheduled teacher in-service or faculty meetings where a large number of teachers met as a group. On data collection days a team of eight researchers went to the meeting site, solicited participants, and collected data

immediately following the faculty or in-service meeting. Prior to data collection the primary researcher solicited participation by reading from a script (see Appendix A), which provided a brief rational for the study and participant expectations. Individuals who agreed to participate then received a participation consent form (see Appendix B) with a group number located on the back corner. In order to ensure random group assignment the consent forms were shuffled prior to the distribution. After all participants completed the consent forms the head researcher instructed participants to locate the number on the back of the form and to go to the research assistant who held up a paper with their corresponding number.

The assistants then escorted the participants into a classroom and directed them to sit at a desk facing a projector screen. Next, the assistants collected consent forms and read a short script asking participants to remain quite and seated until dismissed. After reading the script the assistants played one of six video vignettes. Immediately following the video, participants were asked to complete a survey based on the video they had just observed. Once all individuals had completed the survey, the research assistants collected the surveys, read from a script describing the purpose and function of the study, and dismissed the participants back to their meeting.

Videos

The video vignettes presented to participants featured an enactment of a progress monitoring consultation session. In the videos an individual identified as a school psychologist (consultant) presented intervention data while facing and speaking to the camera as if they were a teacher consultee. The videoed consultant was a female school psychology graduate student in her late twenties. The consultant actor was selected based

on her knowledge and experience with school-based consultation and acting experience. Video production took place at the Oklahoma State University Educational Technology studio on two afternoons. Extreme care was taken to maintain consistent lighting, appearance, and sound quality over the two day period. Following video production raw video footage was digitally edited using Apple Final Cut Pro to ensure consistency between the video vignettes. See Appendix C for sequence, video components, and time estimation information.

Scripts

All six videos began with an identical written introduction that introduced the consultation scenario and provided pertinent background information. More specifically, the written introduction requested that participants imagine themselves in a scenario where they were 3rd grade teacher who had requested consultation in order to help a student who was not showing progress in reading. The vignette explained that previously administered Curriculum Based Assessment (CBA) results indicated that the student's word recognition and decoding skills were at grade level but that his reading fluency and comprehension skills were significantly below grade level. The vignette also indicated that the teacher (participant) had attempted to remediate the student's reading difficulties, but was not successful. This portion of the vignette also explained that the consultant and teacher had already met to discuss the problem, review baseline data, and come up with an intervention. In addition, the vignette expressed that both short and long term goals had been collaboratively developed, and that a time to review student progress and intervention outcomes had been scheduled. See Appendix D for the complete written introduction script.

Following the written introduction, a scene with a school psychologist in an office setting appeared. The school psychologist was seated at a table with a laptop computer sitting on the table to her right. A label marked "School Psychologist" was briefly displayed at the bottom of the video screen to identify the character. Once the label disappeared, the consultation session commenced with a brief greeting, analysis of the problem, and description of the intervention. During this portion of the video the consultant indicated that reading fluency had been the targeted skill and that a repeated readings intervention with daily progress monitoring had been implemented.

Next, the consultant presented one of the six visuals of the data and orally reviewed baseline information. During the baseline review the consultant identified the student's number of words read correct per minute (WRCPM), on three mutually exclusive trials, and the mean of the three baseline scores. Following this explanation, the consultant provided a brief comparison of the target child's baseline words read correct per minute (WRCPM) to the mean WRCPM of his 3rd grade peers. The consultant then reviewed short-term and long-term goals and provided an explanation as to why the goals had been selected. The short-term goal identified by the consultant was to improve the student's reading fluency by a rate of two words read correctly per week on leveled progress monitoring probes. The long-term-goal was to have the student reading at a rate that fell at or above the 16th percentile (one standard deviation) after eight weeks of intense intervention.

Subsequent to the goal review, the consultant verbally reviewed the progress monitoring data in conjunction with the visual aid. During this portion of the vignette, daily session WRCPM totals and weekly mean scores from a six week period were

presented. Therefore, a total of 30 daily progress monitoring scores and six weekly mean scores were identified. After presenting all of the progress monitoring data, the consultant identified the student's average growth rate and requested feedback. Next, the words "You may now complete your survey briefly appeared on the screen." See Appendix E for the complete upward trend script and Appendix F for the complete zero trend data script.

Independent Measures

Presentation modality and intervention outcome served as the independent variables for this study. The presentation modality or visual aid variable consisted of three levels which were data table, static single subject graph, and computer generated animated single-subject graph. The intervention outcome variable consisted of upward trend and zero trend intervention data. Combinations of the aforementioned variables resulted in a total of six experimental groups. Therefore a total of six different video vignettes, which included one of six different combinations of the independent variables, were created. The only verbal variation occurred between the upward and zero trend vignettes, when the consultant reviewed specific data scores. The only visual variation between the videos was the visual aid used by the consultant to present the data and the intervention outcome scores.

Data Tables

In the data table vignettes the consultant presented a single piece of paper that contained a table of information. This information included baseline and progress monitoring scores as well as normative data, goal information, and growth rates. In the table each piece of data was presented numerically with the appropriate label. The data

table was created using *Microsoft Word XP*. See Appendices G and H for a complete copy of the upward and zero trend data tables.

Single Subject Graphs

In the dynamic and static graph vignettes, the consultant displayed the data on a single subject line graph. On these graphs baseline scores, normative data, progress monitoring scores, and long long-term goal information were presented as data points, and growth rates and weekly means appeared as lines on the graph. The dynamic and static graphs contained identically formatted information, however, the visual presentation of the information varied between presentation modality. Specifically, in the static graph vignettes all of the data was displayed on a single piece of paper; In the dynamic graph vignettes the data appeared sequentially, on a computer generated graph, as the consultant verbally reviewed it. Both the dynamic and static graphs were created using *Microsoft Excel XP*. The creation of the dynamic graphs' sequential animation was created using *Microsoft PowerPoint XP*. See Appendices I and J for the complete upward and zero trend single subject graphs.

Dependent Measures

Teacher accuracy at interpreting progress monitoring data and teacher perceptions of intervention and consultant effectiveness served as the dependent variables in this study. Teacher accuracy at interpreting intervention outcome data was evaluated with concrete, correct or incorrect, items that focused on specific pieces of information presented by the consultant. Consultant effectiveness and intervention effectiveness items evaluated teachers' perceptions of effectiveness with Likert scale ratings of generic statements.

Data Interpretation Accuracy (DIA) Questions

Teachers' accuracy at interpreting progress monitoring data was measured with items that specifically addressed the students functioning in relation to the short and long term goals identified during the consultation session. The items were purposely developed around the outcome data presented in the consultation vignettes. In order to develop and validate these measures a multistep procedure was employed. Prior to item development a through literature review and analysis of previous consultation research was conducted in order to clearly determine the parameters of data interpretation accuracy. After this review, a pool of twelve items was developed by the author. Next, these items were presented to a committee of five for review. Each committee member had expertise in an educationally related field and had experience consulting in the schools. The committee was utilized in revising item content and response format. The final scale consisted of eight items that were formatted as questions. Six of eight of the items included dichotomous (Yes or No) response options and two items followed a multiple choice response format. Responses were determined to be correct or accurate if they corresponded with the information presented in the consultation vignettes. See Appendix K for a complete list of the data interpretation accuracy items.

Modified Outcome Indices

Teachers' perceptions of intervention effectiveness were assessed with the five outcome indices developed by Flugum and Reschly (1994). These outcome indices have been used in a number of studies for the purpose of assessing perceptions of intervention effectiveness. In order to increase response variance, question responses where changed from their original dichotomous (questions: 1, 3, and 4) and three-point Likert (question:

2) formats to five-point Likert-type responses. In order to make this change possible, small wording changes were also made. The first question was changed from, "Did the behavior improve?" to "The student's behavior improved." The second question, "The degree of improvement was: small, moderate, or large?" remained unaltered, however a five-point Likert-type scale was placed above the "small, moderate, large" responses. Question 3, "Were the goals of the intervention accomplished?" (Yes-No) was changed to "The goals of the intervention were accomplished." Question 4, "Did the student function better?" (Yes-No) was altered to "The student is functioning better." On these modified questions, responses ranged form one ("Strongly Disagree") to five ("Strongly Agree"). The fifth question "To what did the overall functioning of the student change?" was originally designed with a five-point Likert-type response set and therefore was not altered. An index score formula of the original outcome indices was created to maintain item weight within the index score. Cronbach's alpha for unaltered five-item scale was .89 (MacLeod et al., 2001); although, the internal consistency of the modified outcome indices has not been documented. For a complete copy of the Modified Outcome Indices see Appendix L.

Measures of Consultant Effectiveness

Consultant effectiveness variable was evaluated with items from the Consultant Effectiveness Scale (CES; Knoff et al., 1995), Consultant Evaluation Form (CEF; Erchul, 1987), and the unpublished Consultant Rating Profile (CRP). Items from the abovementioned scales were selected based on their applicability and alignment with the manipulated variables. Three additional items were also added in order to further evaluate consultant communication, as consultant communication is a variable has been

found to impact perceptions of consultant effectiveness. Consultant communication items were adapted from the instructional communication literature. In this study, the sum of scores obtained on all of the items comprised the dependent variable. See Appendix M for a complete list of the consultant effectiveness items.

Reduced Consultant Effectiveness Scale (RCES). The original CES was developed in order to discriminate between effective and ineffective consultants. The original CES contained a total of 52 items that had been organized into the highly related factors of Interpersonal Skills, Problem-Solving Skills, Consultation Process and Application Skills, and Ethical and Professional Practice Skills. A total of nine items from the 14 item Problem-Solving Skills factor and the 11 item Consultation Process and Application Skills factor were utilized for the RCEF. Items were selected based on their presence and applicability in the videoed consultation session.

The response format of the original CES required participants to rate consultant characteristics on a scale from 1 ("not at all") to 5 ("to a very large degree"); however, the original five-point Likert scale format was changed to a seven-point format, ranging from 1 ("Strongly Disagree") to 7 ("Strongly Agree"). Also, slight wording changes were made to selected items to make them specific to the observed consultant. For example, the item "is specific" was changed to "the consultant was specific" and the item "good at problem solving" was changed to "the consultant was good at problem solving". The previously mentioned modifications were made in order to make the response format of CES items consistent with the other consultant effectiveness items. The Chronbach's alpha for the original Problem-Solving Skills (ά =.97) and Consultation Process and Application Skills factors (ά =.97) were both excellent (MacLeod, et al. 2001), however

the consistency of the reduced factors, or in combination with the other consultant effectiveness items, is not known.

Reduced Consultant Evaluation Form (RCEF). The CEF was designed to measure perceptions of consultant effectiveness and has been widely used in both research and practice. On the CEF participants rate statements describing the consultant on a scale of 1 ("Strongly Disagree") to 7 ("Strongly Agree"). Higher ratings indicate increased satisfaction with consultation and a more positive evaluation of consultant effectiveness. Three-items from the original twelve-item CEF were incorporated into the final survey. The RCEF items addressed consultant helpfulness, usefulness of information, and willingness to engage in future consultation. Erchul (1987) reported a Cronbach's alpha of .94 for the complete twelve-item scale, indicating very good internal consistency.

Reduced Consultant Rating Profile (RCRP). The CRP is an unpublished scale that has been utilized by school psychology graduate programs and practitioners for research, training, and performance feedback purposes. This measure evaluates perceptions of consultant effectiveness and satisfaction with the consultation process. Items within the CRP focus on consultant skill, helpfulness, communication, and control. CRP items also address perceptions of intervention effectiveness, value of the consultation process, and consultee's willingness to engage in future consultation with the consultant. Like the CEF, the CRP requires that participants rate statements on a scale of one ("Strongly Disagree") to seven ("Strongly Agree"). Three items from the original 10-item CRP were utilized for the current study. RCRP items focused exclusively on perceptions of consultation value, consultant communication, and future consultation requests.

Additional consultant effectiveness items. The relationship between consultant communication and consultee perceptions of consultant effectiveness have been well documented within the school-based consultation literature and the CES and CEF as both contain items that specifically address aspects of consultant communication. In order to further evaluate consultant communication during progress monitoring consultation three additional items were added. These items were: (1) "The consultant clearly expressed the information," (2) "The consultant's presentation was easy to understand," and (3) "I had difficulty following what the consultant was saying." The response format of these items was identical to the CEF, CRP, and modified CES.

Demographic Questionnaire

A demographic questionnaire was also used to collect additional information from participants. The demographic form included questions regarding participant education, years of teaching experience, grade or position currently held, and consultation experience. See Appendix N for a complete list of the demographic questions included in the final survey.

CHAPTER IV

RESULTS

This chapter provides an objective report over participant demographics as well as psychometric properties of individual items and the combined scales. This chapter also provides a detailed description of the analytic procedures used to evaluate the stated research questions as well as their associated results. SPSS version 19.0 for Windows and Microsoft Excel (2010) were used for all statistical computations.

Descriptives

A total of 145 participants volunteered to participate in the current study; however, four participant surveys were deemed unusable due to their being incomplete. Therefore, a total of 141 usable teacher surveys were utilized for analyses. As shown in Table 1, a majority of participants were female (92.9%) and a majority were Caucasian (87.8%). As to their position, the majority of participants taught either first, second, third, fourth, or fifth grade (84.2%), whereas 5.0% taught kindergarten and 2.9% taught pre-kindergarten. Additionally, 7.2% of participants taught special education and only 0.7% were reading specialists. All participants held at least a bachelors' degree and were state certified (100.0%). An additional one-third of participants also reported having a master's degree or higher (34.8%). Participants' ages ranged from 22 years to 70 years (M = 41.70, SD = 12.03) and their years of experience ranged from 0 to 47 years (M = 14.33, SD = 10.70). As to the number of referrals made and the number of interventions

sought, analyses revealed several outliers. These participants (six for referrals and seven for interventions) were excluded from any analyses regarding referrals or interventions. Therefore, the number of referrals made ranged from 0 to 12 (M = 2.64, SD = 3.06) and the number of intervention sought ranged from 0 to 25 (M = 4.02, SD = 4.79).

Participants were equally distributed across the conditions. For example, 50.4% of participants were in the effective graph condition and 49.6% were in the ineffective graph condition. As to presentation mode, participants were again equally divided across the three conditions: 34.0% were assigned to the dynamic condition, 33.3% were assigned to the static condition, and 32.6% were assigned to the table condition. Finally, as shown in Table 2, participants were equally distributed to one of the six conditions (e.g., effective graph, dynamic mode of presentation).

Confirmatory Analyses

Frequencies and percentages for each of the eight questions that evaluated teachers' data interpretation accuracy were calculated. See Table 3 for a complete list of DIA item frequencies and percentages. Overall, a majority of participants correctly answered the first DIA question regarding students' reading rate after the eighth week of intervention (77.3%). A majority of participants also correctly answered the second DIA question that assessed participants' evaluation of the slope of the data (92.2%), and the third question over the student's reading rate (70.9%). Furthermore, a majority of participants also correctly responded to the questions about the student meeting his weekly goal during the first week of intervention (63.8%), the third week of intervention (73.0%), and the fifth week of intervention (68.1%). Fewer participants correctly responded to the multiple choice item that required them to identify the week in which

the student made the largest words read correct per minute gain (57.4%). Finally, a little over half of the participants also correctly estimated the time period in which the student would reach a reading rate that falls within 16th percentile (56.7%). These accuracy items were summed to create an accuracy score. As seen in Table 4, participants' accuracy scores ranged from 2.00 to 8.00 (M = 5.60, SD = 1.52).

Principal component analyses with a Verimax rotation were utilized in order to confirm the factor structure of the reduced consultant effectiveness measures. As shown in Table 5, the nine items selected from the RCES loaded onto two separate factors which are consistent with the structure of the original CES. The combined RCES factors explained 72.61% of the total variance. The three items from the RCEF loaded onto a single factor and explained 85.41% of the variance. The three RCRP items also loaded onto a single factor and explained 78.07% of the total variance. Lastly, the additional consultant effectiveness items also loaded onto a single factor and explained 63.28% of the total variance. Analyses of Inter-item reliability resulted in RCES, RCEF, and RCRP Cronbach's alphas that ranged from .858 to .917, which indicates excellent internal consistency. Cronbach's alpha of the additional consultant effectiveness items was .695 which also falls within acceptable range.

Total scores on each of the reduced consultant effectiveness measures were calculated by the summing raw scores for each item. As shown in Table 6, RCES total scores ranged from 12.00 to 61.00 (M = 41.80, SD = 11.23), RCEF total scores ranged from 3.00 to 21.00 (M = 12.86, SD = 4.94), and RCRP total scores ranged from 3.00 to 21.00 (M = 12.50, SD = 4.81). Participants' responses on the additional consultant effectiveness items resulted in total scores which ranged from 4.00 to 21.00 (M = 14.46,

SD = 3.79). In order to create a Combined Measure of Consultant Effectiveness (CMoCE) score, participants' consultant evaluation scores from each of the four scales were summed together. Participants' scores on the CMoCE ranged from 23.00 to 123.00 (*M* = 81.62, *SD* = 22.53).

A Principal Component Analysis with Verimax rotation was also conducted on the MOI items to confirm its factor structure. See Table 7 for a complete list of MOI item Eigenvalues and the corresponding reliability coefficient. The five modified outcome indices items loaded onto a single factor and explained 74.61% of the total variance. The Cronbach's alpha for the five items was .899 indicating good internal consistency. To create an overall modified outcome indices score, the five items were summed. Participants' modified outcome indices scores ranged from 5.00 to 24.00 (*M* = 14.10, *SD* = 5.36), see Table 4.

Preliminary Analyses

Crosstabulation with Pearson Chi square analyses were conducted to determine if any significant relationships existed between categorical variables (e.g., teaching position held, highest degree held, data trend, and presentation mode). Analyses of intercorrelations between categorical variables are presented in Tables 8-11. There were no significant relationships between position held, highest degree held, data trend, and presentation mode, all *p*s *ns.* No significant relationships between position held, highest degree held, presentation mode, and data trend were identified, all *p*s *ns.* There were also no significant relationships between highest degree held, presentation mode, data trend, and position held, all *p*s *ns.* Finally, no significant relationships between position held, data trend, presentation mode, and highest degree held, all *p*s *ns.*

In addition to the crosstabulation analyses, analyses of variance (ANOVAs) and multivariate analyses of variance (MANOVAs) were conducted to determine the effect of highest degree and position held on the various scales. As presented in Table 12, an ANOVA revealed that position held did not have a significant effect on CMoCE scores, F (3, 135) = 1.57, p = .199, η^2 = .034. Furthermore, a separate ANOVA revealed that highest degree did not have a significant effect on CMoCE scores, F (1, 139) = .03, p = .860, η^2 = .000. A MANOVA was conducted to determine the effect of teacher position on consultant effectiveness subscale scores (see Table 13). The results revealed that position held did not have an overall significant effect on the subscale scores, F (12, 392) = 1.72, p = .061, η^2 = .050. In addition, position held did not have a significant effect on RCES, RCEF, or RCRP scores as all *p*s *ns*. However, position held did have a significant effect on additional consultant effectiveness subscale scores, F (3, 135) = 3.34, p = .021, η^2 = .069. According to a Dunnet T3 post hoc analysis, participants who were in a position as a specialist or special education teacher had significantly higher additional consultant effectiveness item subscale scores (M = 16.64, SD = 3.64) than those who taught pre-kindergarten or kindergarten (M = 11.00, SD = 2.94; Cohen's D = 1.61).

An additional MANOVA was conducted to test the effect of highest degree held on consultant effectiveness subscale scores (see Table 14). Results from the MANOVA revealed that highest degree held did not have a significant effect on consultant effectiveness scores F (4, 136) = .85, p = .497, η^2 = .024, nor were there any significant effects on the individual subscale scores, all *p*s *ns*.

Additionally, as presented in Table 15, separate ANOVAs were conducted to determine the effect of position and highest degree held on modified outcome indices

scores. The results revealed that neither position held nor highest degree held had a significant effect on modified outcome indices scores, all *p*s *ns*. Finally, two separate ANOVAs were run in order to test the effect of position held and highest degree on participants' overall accuracy scores (see Table 16). The results revealed that neither had a significant effect on overall accuracy scores, all *p*s *ns*.

As part of the preliminary analyses, Pearson Product Moment correlations were carried out in order to determine if there were any significant relationships between demographic characteristics and the consultant effectiveness scores, modified outcome indices scores, and participants' overall data interpretation accuracy scores (see Table 17). No significant relationships between participants' age, years of experience, number of referrals, and number of interventions when compared to the consultant effectiveness scores, modified outcome indices scores, and participants' overall accuracy scores were found, all *p*s *ns*.

A separate Pearson Product Moment correlation was performed to determine if there were any significant relationships between participants' consultant effectiveness scores, modified outcome indices, and overall data interpretation accuracy scores. As identified in Table 18, MOI total scores were significantly positively correlated with CMoCE scores, as well as consultant effectiveness subscale scores, (*r*s ranging .220 to .530, *p*s < .01). These correlations suggest that participants with higher ratings on the MOI tended to have higher ratings on the measures of consultant effectiveness. Furthermore, MOI scores were significantly negatively correlated with DIA scores ($r = -.405$, $p < .001$), indicating that participants with higher MOI scores tended to have lower accuracy scores than those with lower modified outcome indices total scores.

As also shown in Table 18, CMoCE scores and consultant effectiveness subscale scores were significantly positively correlated with each other (*r*s ranging from .647 to .956, *p*s < .001) indicating that participants with higher scores on one of the scales tended to have higher scores on the other scales.

Primary Analyses

Research Question One

A series of logistic regressions were conducted to predict participants' accuracy from presentation mode on eight DIA questions (see Table 19). The overall model for predicting participants' accuracy on the first DIA question (student's reading rate after the eighth week of intervention) from presentation mode was significant, X^2 (2) = 11.74, *p* = .003, *pseudo* R^2 = .122. Furthermore, table presentation mode was a significant predictor of participants' ratings of the student's grow rate after the eighth week of presentation. Participants who received the table mode of presentation were .155 times less likely to correctly answer this question when compared to participants who received the dynamic mode of presentation (*Odds Ratio* = .155, *p* = .002). Static mode of presentation was not, however, a significant predictor of participants' accuracy for this question (*Odds Ratio* = .298, *p* = .053). The overall model predicting participants' accuracy on the second DIA question (slope of the data) was not significant, X^2 (2) = 4.83, *p* = .089, *pseudo* R^2 = .080, nor were there any significant individual predictors, all *p*s *ns.*

Additionally, the overall model for predicting participants' accuracy on the third DIA question ("student's reading rate") was not significant, X^2 (2) = 3.87, *p* = .145, *pseudo* R^2 = .039, nor were there any significant predictors, all *p*s *ns.* The overall model

predicting participants' accuracy on the fourth DIA question ("student met his weekly goal during the first week") from presentation mode was significant, X^2 (2) = 12.81, p = .002, *pseudo* R^2 = .119; however, no significant predictors were identified, all *p*s *ns.* The overall model predicting participants' accuracy on the fifth DIA question ("student met his weekly goal during the third week") from presentation mode was not significant, X^2 (2) = .59, p = .746, *pseudo* R^2 = .006, nor were there any significant predictors, all *p*s *ns*. The overall model predicting participants' accuracy on the sixth DIA question ("student met his weekly goal during the fifth week") from presentation mode was also not significant, X^2 (2) = 2.17, p = .338, *pseudo* R^2 = .021, nor were there any significant predictors, all *p*s *ns*.

The overall model for predicting participants' accuracy on the seventh question ("Which week of the intervention did the student make the largest WRCPM gain?") from presentation mode was not significant, X^2 (2) = 1.81, p = .405, *pseudo* R^2 = .017, nor were there any significant predictors, all *p*s *ns*. Finally, the overall model predicting participants' accuracy on the eighth DIA question ("reach a reading fluency rate within the 16th percentile") from presentation mode was significant, X^2 (2) = 12.80, p = .002, *pseudo* R^2 = .116. Furthermore, table presentation mode was a significant predictor of participants' accuracy of which period the student would reach the long-term reading fluency goal. Participants who received the table mode of presentation were approximately one-fifth times less likely to correctly answer this question (*Odds Ratio* =.218, p = .001), compared to those who received the dynamic mode of presentation. Static mode of presentation was not, however, a significant predictor of participants' accuracy for this question (*Odds Ratio* = .547, p = .171).

A multiple linear regression analysis was also conducted to predict participants' overall DIA scores from presentation mode (see Table 20). The overall model was significant, F (2, 138) = 12.56, $p < .001$, and explained 15.4% of the variance ($R^2 = .154$). Furthermore, table mode of presentation was a significant predictor of correct interpretation of the data (*Beta* = -.429, $p < .001$). The results indicate that participants who received the table mode of presentation were less likely to correctly interpret the data compared to those who had received the dynamic mode of presentation. Finally, static mode of presentation was not a significant predictor of participants' accuracy, *Beta* = -.112, $p = .217$.

Research Question Two

A two (Data Trend) x three (Presentation Mode) ANOVA was conducted to examine the effects and potential interaction on participants' overall MOI scores (see Table 21). As expected results from this analysis revealed that data trend had a significant effect on participants' MOI scores, F (2, 135) = 219.34, $p < .001$, $\eta^2 = .619$. More specifically, those who received the effective graph had significantly higher MOI scores (M = 18.27, SD = 3.02) than those who received the ineffective graph (M = 9.87, SD = 3.61). However, the results did not reveal significant differences between the presentation modes, nor was the interaction between presentation mode and data trend significant, all *p*s *ns.*

Preliminary analysis on the MOI identified a bimodal distribution of data; therefore, it was necessary to split participants' modified outcome indices into a "low" (i.e., a score of 15 or below) versus "high" distribution (i.e., 16 or above). A logistic regression was then conducted to predict participants' "low" versus "high" modified

outcome indices scores from presentation mode and data trend. As shown in Table 22, the results revealed that the overall model was significant, X^2 (3) = 92.50, $p < .001$, *pseudo-*R^2 = .643. Furthermore, data trend was a significant predictor of high MOI scores. The results revealed that those presented with an effective graph were almost 60 times more likely to have high modified outcome indices scores, compared to those who were presented with an ineffective graph (*Odds Ratio* = 59.75, $p < .001$). Presentation mode was not a significant predictor of "high" versus "low" modified outcome indices scores, all *p*s *ns.*

Research Question Three

For the final research question an ANOVA was conducted to examine the effects of presentation mode on scores from the CMoCE. As shown in Table 23, presentation mode had a significant effect on scores from the CMoCE, F (2, 138) = 7.84, $p = .001$, $\eta^2 = .102$. According to a Dunnet's T3 post hoc analysis, participants who received the table mode of presentation had significantly lower overall consultant effectiveness scores (M = 71.74, SD = 21.12) than those who were presented with the dynamic (M = 89.29, SD = 21.21; Cohen's D = .78) or static (M = 83.47, SD = 22.07; Cohen's D = .83) presentations.

Finally, a MANOVA was conducted to examine the effects of presentation mode on consultant effectiveness subscale scores (see Table 24). MANOVA results indicated that mode of presentation had an overall significant effect on consultant effectiveness subscale scores, F (8, 268) = 2.18, $p = .029$, $\eta^2 = .061$. Furthermore, mode of presentation had a significant effect on RCES scores, F (2, 138) = 6.37, $p = .002$, $\eta^2 = .084$. A Dunnett T3 post hoc analysis indicated that participants who received a dynamic mode of

presentation had significantly higher RCES scores (M = 45.29, SD = 10.41) than those who received the table mode of presentation (M = 37.33, SD = 10.76; Cohen's D = 1.27). Mode of presentation also had a significant effect on RCEF scores, F (2, 138) = 7.77, p = .001, η^2 = .101. A Dunnett T3 post hoc analysis indicated that participants who received a table mode of presentation had significantly lower RCEF scores (M = 10.61, SD = 4.51) than participants who received a dynamic presentation (M = 14.40, SD = 4.87; Cohen's D = 1.17) and participants who received a static presentation (M = 13.49, SD = 4.71; Cohen's D = 1.08).

Additionally, mode of presentation also had a significant effect on RCRP scores, F (2, 138) = 7.07, p = .001, η^2 = .093. A Dunnett T3 post hoc analysis indicated that participants who received a table mode of presentation had significantly lower RCRP scores (M = 10.54, SD = 4.86) than either participants who received a dynamic mode of presentation (M = 14.02, SD = 4.65; Cohen's D = 1.14) or the static mode of presentation (M = 12.87, SD = 4.36; Cohen's D = 1.04). Finally, mode of presentation had a significant effect on the combined additional consultant effectiveness item scores, F (2, 138) = 4.37, p = .014, η^2 = .060. According to a Dunnett T3 post hoc analysis, participants who received a dynamic mode of presentation had significantly higher combined additional consultant effectiveness item scores (M = 15.58, SD = 3.68) than those who received the table mode of presentation (M = 13.26, SD = 3.49; Cohen's D = 1.23).

Summary

The current study examined whether presentation mode and/or data trend had a significant effect on participants' data interpretation accuracy and their ratings of intervention and consultant effectiveness. As demonstrated in Research Question 1, mode of presentation was a significant predictor of overall accuracy scores; specifically those who received the table mode of presentation were less likely to correctly interpret the data than those who received the dynamic or static mode of presentation. As demonstrated by results from Research Question 2, data trend had a significant effect on participants' MOI scores; specifically those who received effective graphs had significantly higher modified outcome indices scores than those who received ineffective graphs. However, presentation mode did not have a significant impact on ratings of intervention effectiveness. Finally, as demonstrated by analyses from Research Question 3, presentation mode had a significant effect on the overall consultant effectiveness scores; specifically those who received the table mode of presentation had significantly lower overall consultant effectiveness scores than those who received either the dynamic or static mode of presentations. When looking at the individual subscale scores, the trend in which participants who received the table mode of presentation typically had significantly lower consultant rating subscale scores than those who received dynamic mode of presentation and in most cases, those who received the static mode of presentation.

CHAPTER V

DISCUSSION

Findings and Interpretation

This chapter provides a review and discussion over results from the current study as they apply to the stated research questions. Limitations to the current study and implications for future research are then presented. Finally, suggestions for additional research that could extend the school consultation literature base are discussed.

Research Question One

The current study examined whether data presentation modality affects the accuracy with which teachers interpret intervention data. Based on previous research it was hypothesized that teachers who were presented with a computer generated dynamic intervention graph would be more accurate in their analysis of intervention data than teachers who receive the static graph and raw data presentations. A second hypothesis was that teachers who were presented with the paper (static) single subject graph would be more accurate than teachers who were presented with a table of raw data scores.

Results from the current study found that mode of presentation significantly impacts teachers' understanding of the intervention data. Specifically, results from a multiple regression found that presentation mode was a significant predictor of teacher's accuracy scores. As hypothesized, those who received the table mode of presentation were less likely to correctly interpret the data than those who received the dynamic or

static mode of presentation. Results from logistic regression indicated that teachers who received the table of intervention scores were 15.5% less likely to correctly determine whether the long term goal would be met within the specified time period, than those who received the dynamic single subject graph. In addition, those who received the table of intervention scores were 21.8% less likely to correctly predict the time period in which the student would meet his long term goal.

Overall, the finding that single subject graphs improve individual's ability to interpret intervention data is consistent with previous research in the behavioral sciences. The current study also extends previous research in several ways. Previous research evaluating the value of single subject graphs utilized student samples, presented graphs without providing contextual information, focused solely upon interrater agreement, and/or did not utilize a trend line or evaluate student performance against a criterion performance level. The current study extends the literature base in that authentic teachers were used and graphs were presented within the context of school based consultation. In addition, the current study utilized baseline and outcome data, trend and aim lines, and a criterion performance level in combination with each other to evaluate short and long term goals. Also, this was the first study to evaluate the utility of dynamic graphs during school based progress monitoring consultation. While statistically significant differences between the traditional static and more novel dynamic graphs were not found, visual analyses of the odds ratios indicate that the groups of teachers who received the dynamic graphs were slightly more accurate than those who received the static graph.

Research Question Two

A second purpose of this study was to evaluate whether teacher ratings of intervention effectiveness are influenced by the type of visual aid used during progress monitoring consultation. It was hypothesized that positive ratings of intervention effectiveness would increase with presentation clarity and novelty. (i.e., raw data → static graph →dynamic graph).

As predicted, data trend had a significant effect on participants' ratings of intervention effectiveness. Specifically, those who received effective graphs had significantly higher modified outcome indices scores than those who received ineffective graphs. Overall, presentation mode did not have a significant impact on ratings of intervention effectiveness.

Research Question Three

A third reason for conducting the current study was to determine whether presentation mode impacts teacher perceptions of consultant effectiveness during progress monitoring consultation. It was hypothesized that teachers who observed the dynamic data presentation would produce the highest ratings of consultant effectiveness and that teachers who were presented with the static graph would generate higher ratings than those who received the data table presentation (i.e., raw data → static graph →dynamic graph). Overall, presentation mode had a significant effect on consultant effectiveness scores. Specifically, those who received the table mode of presentation had significantly lower overall consultant effectiveness scores than those who received either the dynamic or static mode of presentations. When looking at the individual subscale scores, the trend in which participants who received the table mode of presentation typically had significantly lower consultant rating subscale scores than those who

received dynamic mode of presentation and in most cases, those who received the static mode of presentation. Previous research has demonstrated that a number of consultant variables, such as problem-solving skills (Knoff et al., 1991), interpersonal skills (Gutkin, 1986; Hughes & Deforest, 1993; Knoff et al., 1991; Knoff et al., 1995; Duhon, Mesmer, & Gotcher, 2007), vocabulary (Hyatt & Tingstrom, 1993), agreement with the consultee (Busse et al., 1999) and gender (Gentry, 2007), impact perceptions of consultants and their interventions. The current study adds to the literature base with the novel finding that consultant tools, in this case data presentation format, can affect ratings of consultant effectiveness. This result further supports the notion that consultant effectiveness is a multidimensional construct and has implications for training and practice. For example, consults who are looking to present themselves as more effective or bridge the gap with a resistant teacher may want to present intervention data via a single subject graph over a simple presentation of raw scores.

Comparisons between the static and dynamic graphs did not yield statistically significant results; however, an evaluation of group means did indicate differences which were approaching significance. More specifically, teachers who received the static graph had slightly lower ratings of consultant effectiveness (M = 83.47, SD = 22.07) than those who received the dynamic graph (M = 89.29, SD = 21.21).

Summary of Main Findings

The following is a summary of the main findings of this study:

1. Teachers who received the static and dynamic graphs were more accurate than teachers who receive the raw data presentation.

2. Data interpretation accuracy results indicated no significant differences between the dynamic and static intervention graphs.
3. Results from teachers' ratings of intervention effectiveness showed no significant differences between the dynamic, static, and table presentation formats.
4. Teachers presented with the dynamic or static intervention graphs had higher ratings of consultant effectiveness than those who were presented with the table of intervention data.
5. Consultant effectiveness results indicated there were no significant differences between the dynamic and static intervention graphs.

Limitations

As previously discussed, school based consultation is a process and there are a number of variables which have been found to impact consultee perceptions of the consultant and intervention outcomes. The numerous variables that present themselves during the consultation process have made sound empirical investigation difficult and many studies dedicated to consultation outcomes have utilized designs that have limited generalization. The current study also contained some conceptual and methodological elements that limited the scope of its outcomes. These limitations should be considered when drawing conclusions and generalizations.

One limitation of this study was that it utilized a hypothetical consultation scenario and a video vignette presentation format. The vignette format was selected in order to eliminate confounding variables and individually evaluate how presentation mode affects perceptions of consultation. It is possible that ratings may have been

different in authentic consultation. The video vignette format was selected over other formats, written or verbal, because it provided a more genuine representation of authentic school based consultation. While this format is widely utilized in consultation research, the vignette format may not capture all that happens during the consultation process.

The demographic characteristics of the sample and characteristics of the consultant actor are other methodological elements that may limit broad generalization. Participants came from rural and suburban districts in a single state in the south central region of the United States. It is possible that regionally specific professional, environmental, or other demographic variables may impact participant responses and ratings. For example, teachers working within a school or district that utilizes Response to Intervention and/or single subject graphs for decision making purposes may rate intervention and consultant effectiveness differently than those who have not had the same experiences. In addition, while demographic data indicate that the sample was representative of the regional population, participants were primarily Caucasian females. Variables such as participant gender or ethnicity also limit the generalizability of these results.

The rating scales utilized in the current study also limit the generalizability of the results. More specifically, rating scales were the only instruments used to evaluate teacher perceptions of intervention and consultant effectiveness. While the MOI items demonstrated strong psychometric properties, future research should attempt to use multiple assessment methods in order to get a more holistic picture of their perceptions during consultation. An additional limitation of consultant effectiveness measures was that reduced scales were utilized. Factor and inter-item reliability analyses of the reduced

scales revealed solid psychometric properties, however, the reduced scales only measured specific qualities (communication and skill) of the consultant. Also, while the sample size was more than adequate for most analyses, the sample was not large enough to evaluate the factor structure of the Combined Measure of Consultant Effectiveness (CMoCE); therefore, results from the CMoCE should be interpreted with caution.

Recommendations

Results from the current study bring to light multiple opportunities for future investigation in the area of consultation research. Consultation research should continue to focus on tools and strategies to improve teachers understanding of the data. Identifying variables that improve teachers understanding of intervention data is especially important given the recent educational shift towards more direct problem-solving approaches, such as response to intervention and data based decision making. Additional evaluation of presentation modality with different target behaviors, interventions, and populations would be beneficial. Replication of results from the current study would further support the utility of graphing intervention outcomes. Also, while statistically significant differences between the static and dynamic graphs were not found, data interpretation accuracy was slightly higher when presented with the dynamic graphs of upward trend data as opposed to static graphs of the same data trend. Further comparative investigations between dynamic and static graphs with different data sets and various intervention designs may yield significant results.

Further examinations of consultant techniques and tools that affect perceptions of consultant effectiveness also have implications for training and practice. Identifying variables that improve teacher perceptions of the consultant effectiveness may reduce

teacher reluctance to engage in consultation and improve intervention implementation integrity. Based on results from the current study data presentation modality can impact ratings of consultant effectiveness. This is a novel result and, until now, untested in empirical investigation. Additional research is needed to validate or refute this finding.

Future research should also attempt to evaluate teachers' perceptions of consultant effectiveness during authentic consultation. Video vignettes were utilized for the current study and while this design is frequently used in order to promote methodological control, it cannot be said that these outcomes would be the same in authentic face to face consultation. Therefore, additional research evaluating teacher's ratings of consultant effectiveness during authentic consultation is important before broad generalizations can be made.

Finally, the consultation literature base would also benefit from additional research that uses other assessment methods, such as open ended questions, qualitative comments, and/or checklists, to evaluate teachers' perceptions about effective consultants and their preferences toward consultation. In addition, further investigation should be conducted in order to refine and develop consultant effectiveness rating scales that exclusively evaluate the different variables that have been found to impact ratings.

Conclusion

Overall, results from the current study further validate the utility of graphing data when evaluating intervention outcomes. Specifically, graphing intervention data allows teachers to make more accurate judgments about goal attainment and to help them make more accurate predictions about when the goal will be reached. The study also extends the literature base with the abovementioned findings within the context of school based

consultation and with the novel result that presentation modality can affect teachers' ratings of consultant effectiveness. These findings are significant for both training and practice. Results from this study will provide helpful information to individuals who function as academic and behavioral consultants in the schools and those responsible for training future school psychologists.

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APPENDIX A

RESEARCH RECRUITMENT SCRIPT

A research team from the OSU School Psychology program is seeking in-service teacher participation for a study designed to evaluate school psychology consultation. Participation in this study will take a total of 10-15 minutes. During this time participants will be ask to observe a two part video vignette of a consultation session with a school psychologist. In this video the school psychologist will review the results from an instructional intervention. Following the video you will be asked to answer some questions about what you observed.

The purpose of this study is to add to the research that exists in the area of school psychology consultation. This study will help identify areas that can be changed to improve the consultation process. Participation in this study is completely voluntary and item responses will be kept anonymous. If you are interested in participating in this study please raise your hand and one of the assistants will give a consent form. Please read and sign the consent forms and we will begin shortly.

APPENDIX B

PARTICIPANT CONSENT FORM

Dear Participant:

We appreciate your participation in this study. In this package of materials you will find a questionnaire related to a video scenario between a teacher and school psychologist. We are interested in your judgment of the teacher-school psychologist interaction in the video. Please watch the video carefully and complete the questionnaires that are included. Thank you for your time and participation.

I, _____ hereby authorize or direct Nic Gotcher M.S., Dr. Gary Duhon, and/or their research assistants, to perform the following treatment or procedure:

Present me with a video scenario of a teacher consulting with a school psychologist about intervention possibilities for an elementary school student and a questionnaire to complete in reference to the teacher and school psychologist interaction in the video. My participation should take approximately 15 to 20 minutes. I understand that my participation is completely voluntary, there is no penalty for not choosing to participate, that I may withdraw from the study at any time with no penalty to me, and that my participation and responses will be completely confidential. There is minimal risk or possible discomfort to me for participating. I understand that only aggregate data are to be used and that my individual responses will not be identified. I understand that the researchers will assign me an identification number to be used only for the purposes of this study and only the researchers will have access to it. My responses will be kept confidential under lock and key in the primary investigator's office. All of my responses and my ID number will be destroyed at the completion of the project. I understand that this study may help educators and other professional who work with students with learning problems to better understand factors related to the expectations adults have for them.

This is done as part of an investigation entitled:

Teacher' Preferences toward Consultation with School Psychologists

I may contact Dr. Gary Duhon at xxx-xxx-xxxx or at xxxxxx@okstate.edu. I may also contact Sue Jacobs, IRB Chair, Oklahoma State University, 415 Whitehurst, Stillwater, OK 74078. Phone: xxx-xxx-xxxx.

I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Date:_____ Time:_____ (a.m./p.m.)

Signed: _____
Participant

I certify that I have personally explained all elements of this form to the subject or his/her representative before requesting the subject or his/her representative to sign it.

Signed: _____
project director or his authorized representative

APPENDIX C

VIDEO SEQUENCE, COMPONENTS, AND TIME INFORMATION

Major elements of the progress monitoring video scripts

Event Sequence	Presentation Format	Time Approximations
Background Information & Problem Identification	Written	64 seconds
Greeting + Problem Summary	Verbal	26 seconds
Baseline Presentation	Verbal + Visual	32 seconds
Student Baseline – Norm Comparison	Verbal + Visual	38 seconds
Intervention Review	Verbal	21 seconds
Goal Identification	Verbal + Visual	42 seconds
Presentation of Intervention Data	Verbal + Visual	147 seconds
Growth Rate Discussion	Verbal + Visual	27 seconds

APPENDIX D

VIDEO INTRODUCTION SCRIPT

Please put yourself in the following scenario: You are a 3rd grade teacher and you have a student in your class named Daniel. You have been concerned about Daniel's reading achievement and lack of reading progress for quite some time now. Results from school wide reading screeners indicate that Daniel's reading fluency and comprehension scores are within the very low range. However, both formal and informal assessment results indicate that Daniel's word recognition and decoding skills are at grade level. After several unsuccessful attempts at remediating Daniel's reading difficulties, you decide to request consultation services from a school psychologist at your school. During the initial meeting between you and the consultant, you describe Daniel's current level of functioning and collaboratively come up with an intervention to improve his reading fluency. You also schedule a time to review Daniel's progress and the effectiveness of the intervention. You are about to view the follow-up progress monitoring consultation meeting between the consultant and yourself (Daniel's teacher).

APPENDIX E

UPWARD TREND CONSULTANT SCRIPT

Greeting

Good morning. Thank you for meeting with me today.

It has been a while since we met last and I just wanted to take today to review the intervention data and determine whether we should continue, modify, or terminate the repeated readings intervention that you are running with Daniel. I was looking over the outcome data that you gave me the other day and it appears that you have been running the intervention daily. Well, let's look at the data and see how Daniel is progressing.

Baseline Review

Data table or graphic appears on the screen for the remainder of the video.

The baseline data that I collected earlier this semester was congruent with what you had reported. Daniel's baseline words read correct per minute were 49, 55, and 52. The mean or average of these three scores is 52 words read correct per minute, which is well below the number of words that Daniel should be reading at this point in the year.

On average Daniel's same grade peers are reading about 71 words correct per minute. Based on previous curriculum based assessments we know that they are growing by about .15 words per day. We also know that 84 percent of Daniel's peers are reading 61 words correct per minute or more on grade level standardized curriculum based assessments. Based on the discrepancy between Daniel's reading fluency and the average reading fluency rate of other 3rd graders, we decided that intervention was warranted.

Due to Daniel's low reading fluency with grade level text we determined that Daniel would benefit from increased practice with level appropriate reading passages. Based on results from an informal reading inventory and Daniel's oral reading baseline scores, we decided upon a repeated readings intervention and daily progress monitoring.

Goal Expectations

Based on Daniel's baseline average of 52 words read correct per minute both short and long term goals were set. Due to the discrepancy between Daniel's and his peers' reading fluency we decided that a short term goal would be to increase Daniel's reading fluency by two words per week or every five sessions. If Daniel consistently meets this goal he

will have an oral reading fluency rate that falls within the 16th percentile of his peers after eight full weeks of intervention. Therefore, a long term goal of 68 words read correct per minute after the eighth week of intervention was established.

Intervention Outcome Data Presentation

Now let's look at the intervention outcome data to assess the effectiveness of the intervention.

During the first week of intervention Daniel's daily words read correct per minute were 53, 52, 55, 54, and 56. The mean of these five scores is 54 words read correct per minute.

During the second week of intervention Daniel's words read correct per minute scores were 53, 57, 55, 56, and 57. Giving us a weekly average of 55.6 words read correct per minute.

Daniel's progress monitoring scores for week three were 55, 56, 57, 55, and 58. Giving him a weekly average of 56.2.

During the fourth week of intervention Daniel's words read correct per minute were 57, 58, 58, 57, and 58, giving him a week four average of 57.6.

Daniel's progress monitoring scores for week five were 59, 60, 59, 58, and 60. The average of these scores is 59.2.

During week six of intervention Daniel's progress monitoring scores were 60, 59, 60, 59, and 61, which averages out to 59.8 words read correct per minute.

Based on Daniel's response to intervention an average growth rate of .261 words per day was identified. This information will allow us to predict future growth and to assess whether long term goals will be met if the student continues to progress at the same rate. Based on this information, we need to decide whether the intervention should be continued, modified, or altogether abandon.

The words: "You may now complete the survey" appear at the bottom of the screen.

APPENDIX F

ZERO TREND CONSULTANT SCRIPT

Greeting

Good morning. Thank you for meeting with me today.

It has been a while since we met last and I just wanted to take today to review the intervention data and determine whether we should continue, modify, or terminate the repeated readings intervention that you are running with Daniel. I was looking over the outcome data that you gave me the other day and it appears that you have been running the intervention daily. Well, let's look at the data and see how Daniel is progressing.

Baseline Review

Data table or graphic appears on the screen for the remainder of the video.

The baseline data that I collected earlier this semester was congruent with what you had reported. Daniel's baseline words read correct per minute were 49, 55, and 52. The mean or average of these three scores is 52 words read correct per minute, which is well below the number of words that Daniel should be reading at this point in the year.

On average Daniel's same grade peers are reading about 71 words correct per minute. Based on previous curriculum based assessments we know that they are growing by about .15 words per day. We also know that 84 percent of Daniel's peers are reading 61 words correct per minute or more on grade level standardized curriculum based assessments. Based on the discrepancy between Daniel's reading fluency and the average reading fluency rate of other 3rd graders, we decided that intervention was warranted.

Due to Daniel's low reading fluency with grade level text we determined that Daniel would benefit from increased practice with level appropriate reading passages. Based on results from an informal reading inventory and Daniel's oral reading baseline scores, we decided upon a repeated readings intervention and daily progress monitoring.

Goal Expectations

Based on Daniel's baseline average of 52 words read correct per minute both short and long term goals were set. Due to the discrepancy between Daniel's and his peers' reading fluency we decided that a short term goal would be to increase Daniel's reading fluency

by two words per week or every five sessions. If Daniel consistently meets this goal he will have an oral reading fluency rate that falls within the 16th percentile of his peers after eight full weeks of intervention. Therefore, a long term goal of 68 words read correct per minute after the eighth week of intervention was established.

Intervention Outcome Data Presentation

Now let's look at the intervention outcome data to assess the effectiveness of the intervention.

During the first week of intervention Daniel's daily words read correct per minute were 52, 49, 54, 52, and 55. The mean of these five scores is 52.4 words read correct per minute.

During the second week of intervention Daniel's words read correct per minute scores were 49, 54, 50, 53, and 54. Giving us a weekly average of 52 words read correct per minute.

Daniel's progress monitoring scores for week three were 51, 52, 53, 49, and 53. Giving him a weekly average of 51.6.

During the fourth week of intervention Daniel's words read correct per minute were 52, 55, 52, 50, and 49, giving him a week four average of 51.6.

Daniel's progress monitoring scores for week five were 52, 55, 52, 49, and 54. The average of these scores is 52.4.

During week six of intervention Daniel's progress monitoring scores were 52, 49, 56, 51, and 52, which averages out to 52 words read correct per minute.

Based on Daniel's response to intervention an average growth rate of .0 words per day was identified. This information will allow us to predict future growth and to assess whether long term goals will be met if the student continues to progress at the same rate. Based on this information, we need to decide whether the intervention should be continued, modified, or altogether abandon.

The words: "You may now complete the survey" appear at the bottom of the screen.

Baseline	Words Read Correct Per Minute (WRCPM)
Baseline #1	49
Baseline #2	55
Baseline #3	52
Average=52	

Reading Fluency Norms	
Average (Mean)	71 WRCPM
16th Percentile	62 WRCPM
Average (Mean) Growth Rate	.15 Words Per Day

Weekly Goal: Daniel will improve his reading fluency average by two words read correct per week.

Long Term Goal: Daniel's reading fluency rate will fall at or above the 16th percentile after the 8th week of intervention or 40th intervention session.

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 1	1	53
	2	52
	3	55
	4	54
	5	56
Average=54		

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 2	1	53
	2	57
	3	55
	4	56
	5	57
Average=55.6		

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 3	1	55
	2	56
	3	57
	4	55
	5	58
Average=56.2		

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 4	1	57
	2	58
	3	58
	4	57
	5	58
Average=57.6		

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 5	1	59
	2	60
	3	59
	4	58
	5	60
Average=59.2		

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 6	1	60
	2	59
	3	60
	4	59
	5	61
Average=59.8		

Daniel's daily average growth rate: .264

Baseline	Words Read Correct Per Minute (WRCPM)
Baseline #1	49
Baseline #2	55
Baseline #3	52
Average=52	

Reading Fluency Norms	
Average (Mean)	71 WRCPM
16th Percentile	62 WRCPM
Average (Mean) Growth Rate	.15 Words Per Day

Weekly Goal: Daniel will improve his reading fluency average by two words read correct per week.

Long Term Goal: Daniel's reading fluency rate will fall at or above the 16th percentile after the 8th week of intervention or 40th intervention session.

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 1	**1**	**52**
	2	**49**
	3	**54**
	4	**52**
	5	**55**
Average=52.4		

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 2	**1**	**49**
	2	**54**
	3	**50**
	4	**53**
	5	**54**
Average=52		

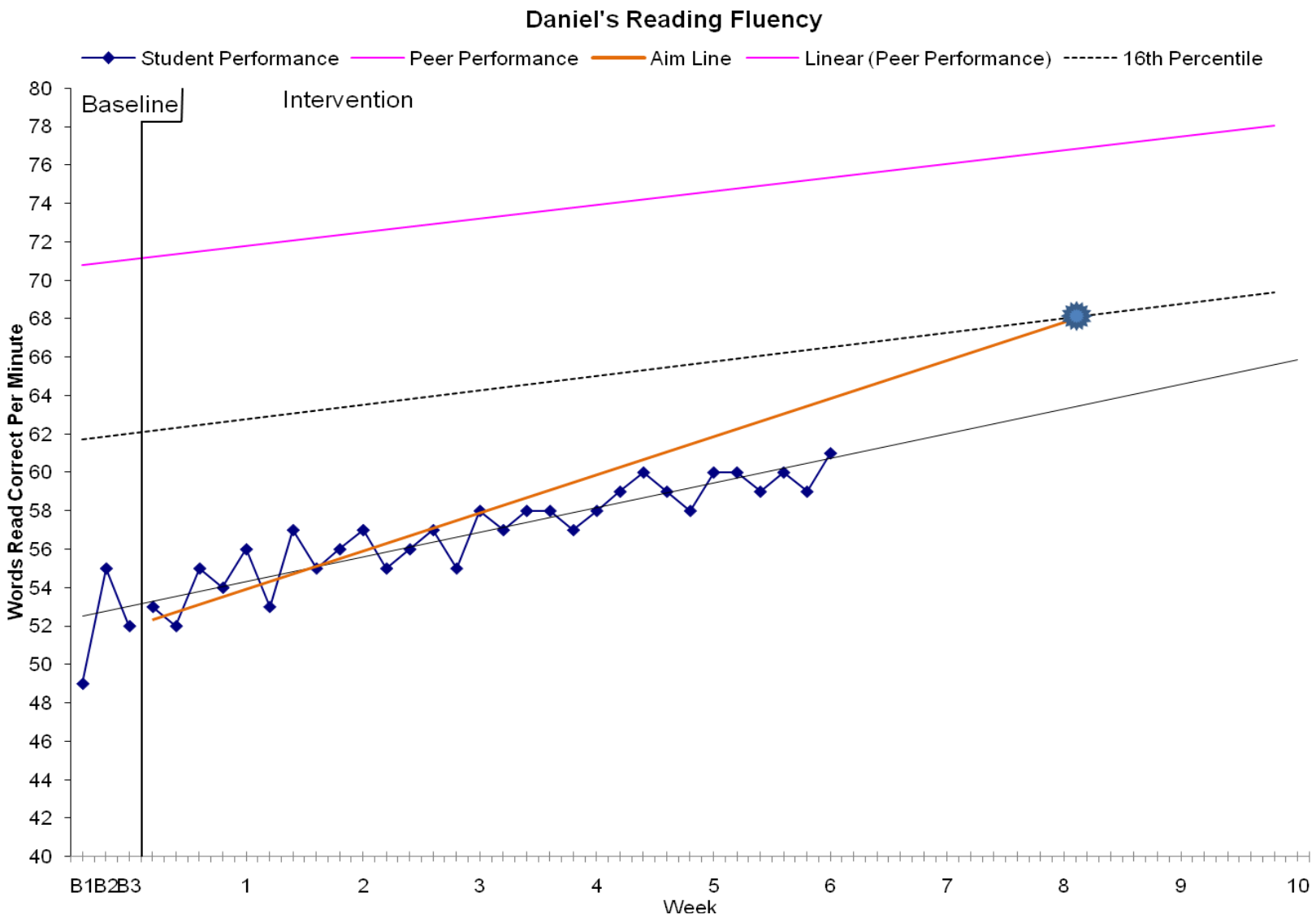
Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 3	**1**	**51**
	2	**52**
	3	**53**
	4	**49**
	5	**53**
Average=51.6		

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 4	**1**	**52**
	2	**55**
	3	**52**
	4	**50**
	5	**49**
Average=51.6		

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 5	**1**	**52**
	2	**55**
	3	**52**
	4	**49**
	5	**54**
Average=52.4		

Intervention Sessions		Words Read Correct Per Minute (WRCPM)
Week 6	**1**	**52**
	2	**49**
	3	**56**
	4	**51**
	5	**52**
Average=52		

Daniel's daily average growth rate: .0


Daniel's Reading Fluency
Student Performance
Peer Performance
Aim Line
Linear (Peer Performance)
16th Percentile
Baseline
Intervention
Words Read Correct Per Minute
80
78
76
74
72
70
68
66
64
62
60
58
56
54
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48
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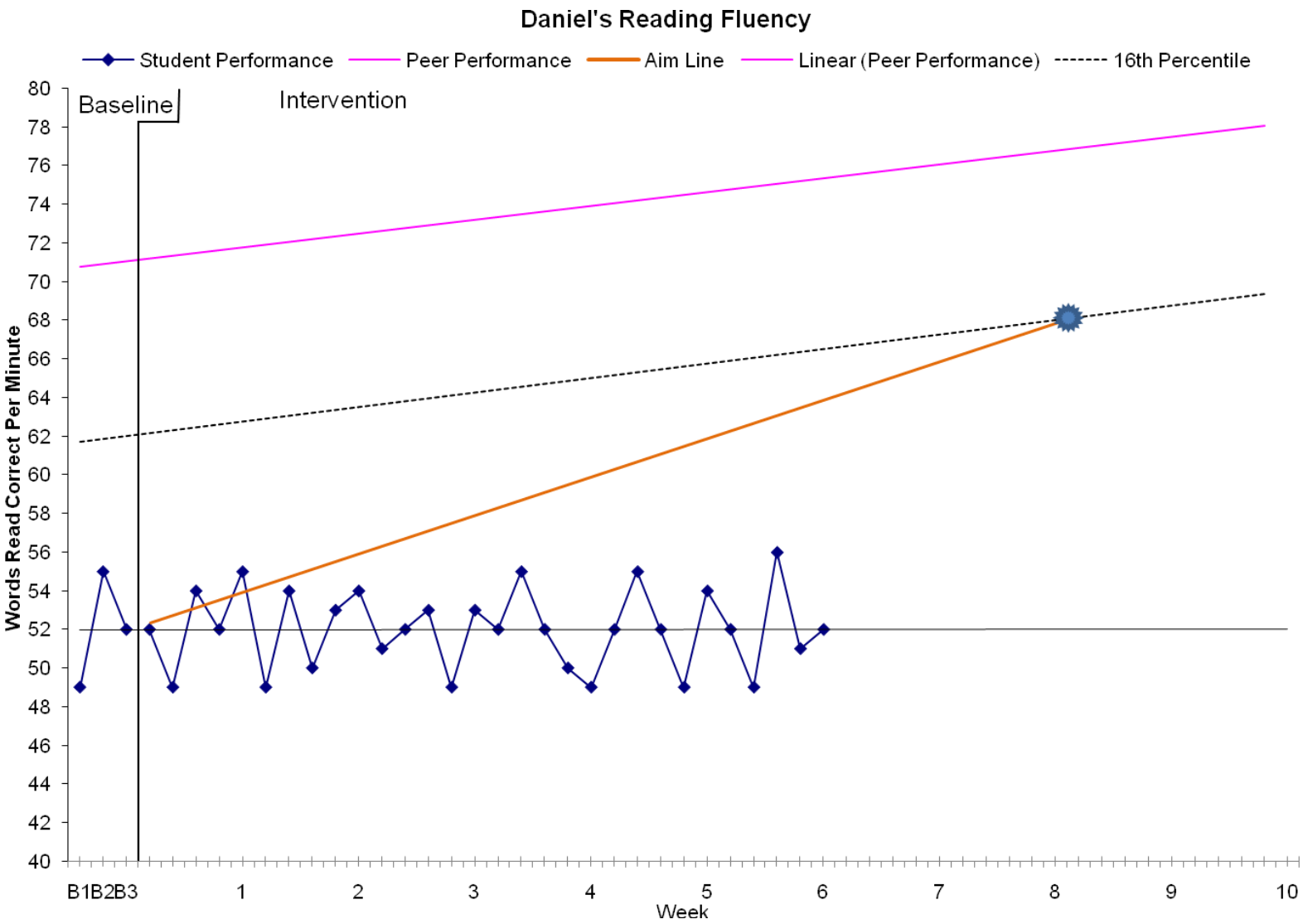
Daniel's Reading Fluency
Student Performance
Peer Performance
Aim Line
Linear (Peer Performance)
16th Percentile
Baseline
Intervention
Words Read Correct Per Minute
80
78
76
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52
50
48
46
44
42
40
B1B2B3
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Week

APPENDIX K

INTERPRETATION ACCURACY ITEMS

Please answer the following questions by circling the correct response.

If the student's growth rate remains consistent, will he be reading at a rate that falls at or above the 16th percentile after the 8th week of intervention?	**Yes**	**No**
Is the slope of the intervention outcome data trending upward?	**Yes**	**No**
If the student and peer growth rates remain consistent, will the student's reading rate ever be equal to the reading rate of his peers?	**Yes**	**No**
Did the student meet his weekly goal during the 1st week of intervention?	**Yes**	**No**
Did the student meet his weekly goal during the 3rd week of intervention?	**Yes**	**No**
Did the student meet his weekly goal during the 5rd week of intervention?	**Yes**	**No**

During which week of intervention did the student make the largest Words Read Correct Per Minute growth?

Week 1 Week 2 Week 3 Week 4 Week 5

If the student's growth rate remains consistent, during which period of time will the student reach a reading fluency rate that falls within the 16th percentile?

Never Week 5 Week 8 Week 11 After the 11th Week

APPENDIX L

MODIFIED OUTCOME INDICES

Please circle how strongly you agree with each statement.

1. The student's behavior improved.

1	2	3	4	5
Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

2. The degree of improvement was:

1	2	3	4	5
Small		Moderate		Large

3. The goals of the intervention were accomplished.

1	2	3	4	5
Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

4. The student is functioning better.

1	2	3	4	5
Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

5. To what degree did the overall functioning of the student change?

1	2	3	4	5
Much Worse	Worse	About the Same	Better	Much Better

APPENDIX M

CONSULTANT EFFECTIVENESS ITEMS

Reduced Consultant Effectiveness Scale

Circle how strongly you agree with each statement regarding the consultant.

Statement:	**Strongly Disagree**		**Slightly Disagree**		**Slightly Agree**		**Strongly Agree**
The consultant was good at problem-solving	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant was skillful	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant was a good facilitator	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant was an efficient user of time	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant demonstrated a willingness to get involved	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant was specific	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant documented for clear communication	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant identified clear goals	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant was a good communicator	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Reduced Consultant Effectiveness Form

For each of the following statements, circle the number that most accurately reflects your perceptions of the consultant.

Statement:	**Strongly Disagree**		**Slightly Disagree**		**Slightly Agree**		**Strongly Agree**
The consultant was generally helpful.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant offered useful information	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I would request services from this consultant again, assuming that other consultants were available.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Reduced Consultant Rating Profile

Statement:	**Strongly Disagree**		**Slightly Disagree**		**Slightly Agree**		**Strongly Agree**
Communication with the consultant was helpful.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultation process was a good use of my time.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I would recommend this consultant in the future	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Additional Consultant Communication Items

Statement:	**Strongly Disagree**		**Slightly Disagree**		**Slightly Agree**		**Strongly Agree**
The consultant clearly expressed the information	**1**	**2**	**3**	**4**	**5**	**6**	**7**
The consultant's presentation was easy to understand.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I had difficulty following what the consultant was saying.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

APPENDIX N

DEMOGRAPHIC QUESTIONNAIRE

Please answer the following about yourself.

1. Indicate your sex. Male or Female

2. Age____ 3. Ethnicity_____ 4. Years of experience as a teacher- _____

5. What grade are you currently teaching or educational position held:
   Grade: _____ or Other:_____ (e.g., special educ., reading spec, counselor, etc.)

6. Are you state certified? Yes or No
   If so, what are you certified to teach? _____

7. What is the highest education related degree that you currently have? _____

8. Over the past five years about how many times did you....
   a. refer a student to be tested for special education eligibility? _____
   b. seek academic intervention services for a student in need? _____

TABLES

Table 1

Frequencies and Percentages of Demographic Categorical Variables

	Frequency	Percent
Teacher Gender (140)		
Female	130	92.2
Male	10	7.1
Teacher Ethnicity (n=139)		
European American (Caucasian)	122	86.5
Native American	10	7.1
African American	6	1.7
Asian	1	.7
Hispanic	0	.0
Teacher Grade or Position (n=139)		
Pre-Kindergarten	4	2.8
Kindergarten	7	5.0
First	25	17.7
Second	24	17.0
Third	23	16.3
Fourth	23	16.3
Fifth	22	15.6
Special Education	10	7.1
Reading Specialist	1	.7
Years of Experience (n=141)		
0-4 yrs.	31	22.0
5-9 yrs.	25	17.7
10-14 yrs	27	19.1
15-19 yrs.	14	9.9
20-24 yrs.	12	8.5
25-29 yrs.	17	12.1
30+ yrs.	15	10.6
Certification Held		
Yes	141	100
No	0	0

Table 2

Means and Standard Deviations of Demographic Continuous Variables.

	N	Mean	*SD*	Min	Max
Age	138	41.70	12.03	22	70
Years of Experience	141	14.33	10.70	0	47
Seek academic intervention services	131	4.02	4.79	0	25
Refer for special education	134	2.64	3.06	0	12

Table 3

Frequencies and Percentages of Teacher Accuracy Items

	Incorrect		Correct	
	N	%	N	%
Will the student be reading at a rate that falls at or above the 16th percentile after the 8th week	32.0	22.7	109.0	77.3
Is the slope of the intervention data trending upward	11.0	7.8	130.0	92.2
Will the student's reading rate be equal to the rate of his peers	41.0	29.1	100.0	70.9
Did the student meet his weekly goal during the 1st week	51.0	36.2	90.0	63.8
Did the student meet his weekly goal during the 3rd week	38.0	27.0	103.0	73.0
Did the student meet his weekly goal during the 5th week	45.0	31.9	96.0	68.1
Which week of intervention did the student make the largest WRCPM gain	60.0	42.6	81.0	57.4
Will the student reach a reading rate that falls within the 16th percentile	61.0	43.3	80.0	56.7

Note: Frequencies not adding to 141 and percentages not summing to 100 reflect missing data.

Table 4

Means and Standard Deviations of Modified Outcome Indices and Data Interpretation Accuracy Scores

	N	Mean	*SD*	Min	Max
Data Interpretation Accuracy Items	141	5.60	1.52	2	8
Modified Outcome Indices Total	141	14.10	5.36	5	24

Table 5

Confirmatory Factor Analysis and Reliability Analysis of Consultant Effectiveness Scales

	Component Eigenvalue	α
Consultant Effectiveness Scale		.917
Good at Problem Solving	.790	
Skillful	.835	
Good Facilitator	.836	
Efficient User of Time	.789	
Demonstrated a Willingness to Get Involved	.780	
Specific	.399	
Documented for clear communication	.266	
Identified Clear Goals	.248	
Good Communicator	.662	
Consultant Evaluation Form		.915
Generally Helpful	.936	
Offered Useful Information	.905	
Would Request Services	.932	
Consultant Rating Profile		.858
Communication with the consultant was helpful.	.928	
Good Use of My Time.	.912	
Would Recommend this Consultant	.806	
Additional Consultant Effectiveness Items		.695
Clearly Expressed the Information	.902	
Presentation was Easy to Understand.	.905	
Had Difficulty Following the Consultant (Rev Coded)	.516	

Table 6

Means and Standard Deviations of Consultant Effectiveness Scales

	N	Mean	*SD*	Min	Max
Consultant Effectiveness Scale Total	141	41.80	11.23	12	61
Consultant Evaluation Form Total	141	12.86	4.94	3	21
Consultant Rating Profile Total	141	12.50	4.81	3	21
Additional Consultant Effectiveness Item Combined Score	141	14.46	3.79	4	21
Combined Measure of Consultant Effectiveness	141	81.62	22.53	23	123

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Table 7

Confirmatory Factor Analysis and Reliability Analysis of Modified Outcome Indices

	Component Eigenvalues	α
Modified Outcome Indices		.899
The Student's Behavior Improved	.844	
The degree of improvement was	.857	
The goals of the intervention were accomplished	.823	
The student is functioning better	.935	
Overall functioning of the student change	.855	

Table 8

Frequencies and Percentages of Grade or Position Held, Degree Held, Data Trend by Presentation Mode

	Dynamic		Static		Table			
	n	%	n	%	n	%	χ^2	p
Position Held							2.35	.885
Specialist or Spec. Ed.	3	6.4	3	6.4	5	11.1		
Pre-K or Kindergarten	2	4.3	3	6.4	2	4.4		
First - Third Grade	27	57.4	25	53.2	20	44.4		
Fourth- Fifth Grade	15	31.9	16	34.0	18	40.0		
Highest Degree Held							1.42	.491
Bachelor's	32	66.7	33	70.2	27	58.7		
Master's	16	33.3	14	29.8	19	41.3		
Data Trend							.271	.873
Effective Graph	24	50.0	25	53.2	22	47.8		
Ineffective Graph	24	50.0	22	46.8	24	52.2		

Table 9

Frequencies and Percentages of Grade or Position Held, Degree Held, Presentation Mode by Data Trend

	Effective Graph		Ineffective Graph			
	n	%	n	%	χ^2	p
Position Held					1.63	.654
Specialist or Spec. Ed.	5.0	7.1	6.0	8.7		
Pre-K – Kindergarten	3.0	4.3	4.0	5.8		
First -Third Grade	40.0	57.1	32.0	46.4		
Fourth - Fifth Grade	22.0	31.4	27.0	39.1		
Highest Degree Held					2.34	.126
Bachelor's Degree	42.0	59.2	50.0	71.4		
Master's	29.0	40.8	20.0	28.6		
Presentation Mode					.27	.873
Dynamic	24.0	33.8	24.0	34.3		
Static	25.0	35.2	22.0	31.4		
Table	22.0	31.0	24.0	34.3		

Table 10

Frequencies and Percentages of Degree Held, Presentation Mode, and Data Trend by Grade or Position Held

	Specialist		PreK - Kindergarten		First - Third Grade		Fourth - Fifth Grade			
	n	%	n	%	n	%	n	%	χ^2	p
Highest Degree									1.88	.598
Bachelors	6.0	54.5	6.0	85.7	46.0	63.9	32.0	65.3		
Masters	5.0	45.5	1.0	14.3	26.0	36.1	17.0	34.7		
Presentation Mode									2.35	.885
Dynamic	3.0	27.3	2.0	28.6	27.0	37.5	15.0	30.6		
Static	3.0	27.3	3.0	42.9	25.0	34.7	16.0	32.7		
Table	5.0	45.5	2.0	28.6	20.0	27.8	18.0	36.7		
Data Trend									1.63	.654
Effective	5.0	45.5	3.0	42.9	40.0	55.6	22.0	44.9		
Ineffective	6.0	54.5	4.0	57.1	32.0	44.4	27.0	55.1		

Table 11

Frequencies and Percentages of Grade or Position Held, Data Trend and Presentation Mode by Degree Held

	Bachelor's Degree		Master's Degree			
	n	%	n	%	χ^2	p
Position Held					1.9	0.6
Specialist	6.0	6.7	5.0	10.2		
PreK or Kindergarten	6.0	6.7	1.0	2.0		
First, Second, or Third Grade	46.0	51.1	26.0	53.1		
Fourth or Fifth Grade	32.0	35.6	17.0	34.7		
Data Trend					2.3	0.13
Effective Graph	42.0	45.7	29.0	59.2		
Ineffective Graph	50.0	54.3	20.0	40.8		
Presentation Mode					1.4	0.49
Dynamic	32.0	34.8	16.0	32.7		
Static	33.0	35.9	14.0	28.6		
Table	27.0	29.3	19.0	38.8		

Table 12

Means and Standard Deviations of Overall Consultant Effectiveness Score by Grade or Position Held and Degree Held

	n	Mean	*SD*	*F*	*p*
Position Held				1.572	.199
Specialist or Spec. Ed.	11.00	86.82	15.32		
PreK - Kindergarten	7.00	67.43	14.73		
First - Third Grade	72.00	83.68	22.04		
Fourth - Fifth Grade	49.00	78.92	24.86		
Highest Degree Held				.031	.860
Bachelor's Degree	92.00	81.63	23.94		
Master's	49.00	81.61	19.86		

Table 13

Means and Standard Deviations of Consultant Effectiveness Subscale Scores by Grade Taught or Position Held

	n	Mean	*SD*	*F*	*p*
RCES				1.65	.181
Specialist or Special Ed.	11	43.64	8.09		
PreK – Kindergarten	7	34.14	7.71		
First - Third Grade	72	43.00	10.88		
Fourth - Fifth Grade	49	40.57	12.48		
RCEF				.65	.583
Specialist or Special Ed.	11	13.73	4.24		
PreK – Kindergarten	7	10.86	3.93		
First - Third Grade	72	13.06	4.67		
Fourth - Fifth Grade	49	12.47	5.58		
RDRP				.87	.458
Specialist or Special Ed.	11	12.82	4.38		
PreK – Kindergarten	7	11.43	2.30		
First - Third Grade	72	13.00	4.74		
Fourth - Fifth Grade	49	11.71	5.19		
Add. CE Item Total				3.34	.021
Specialist or Special Ed.	11	16.64	3.64		
PreK – Kindergarten	7	11.00	2.94		
First - Third Grade	72	14.63	3.58		
Fourth - Fifth Grade	49	14.16	3.99		

Note: Multivariate Statistic-F (12, 392) = 1.72, p = .061, η2 = .050. Additional CE Item Total Cohen's D values; Specialist or Special Ed. vs PreK – Kindergarten = 1.61; Specialist or Special Ed. vs. First-Third Grade = 1.22; Specialist or Special Ed. vs Fourth-Fifth Grade = 1.25; PreK – Kindergarten vs. First-Third Grade = -.76; PreK – Kindergarten vs. Fourth-Fifth Grade = .77; and First-Third Grade vs. Fourth-Fifth Grade = 1.06

Table 14

Means and Standard Deviations of Consultant Effectiveness Subscale Scores by Degree Held

	n	Mean	*SD*	*F*	*p*
RCES				.28	.597
Bachelor's Degree	92	41.52	11.78		
Master's Degree	49	42.33	10.23		
RCEF				.28	.598
Bachelor's Degree	92	13.09	5.13		
Master's Degree	49	12.43	4.58		
RCRP				.00	.983
Bachelor's Degree	92	12.58	5.06		
Master's Degree	49	12.37	4.35		
Add. CE Item Total				.03	.874
Bachelor's Degree	92	14.45	3.91		
Master's Degree	49	14.49	3.61		

Note: Multivariate Statistic-F (4, 136) = .85, p = .497, $\eta 2$ = .024.

Table 15

Means and Standard Deviations of Modified Outcome Indices by Grade or Position Held and Degree Held

	n	Mean	*SD*	*F*	*p*
Position Held				1.194	0.315
Specialist or Spec. Ed.	11	13.91	6.43		
PreK – Kindergarten	7	15.57	4.50		
First - Third Grade	72	14.60	5.00		
Fourth - Fifth Grade	49	13.06	5.63		
Highest Degree Held				1.567	0.213
Bachelor's Degree	92	13.71	5.47		
Master's Degree	49	14.84	5.13		

Table 16

Means and Standard Deviations of Teacher Accuracy Scores by Grade or Position Held and Degree Held

	n	Mean	SD	*F*	*P*
Position Held				0.04	0.989
Specialist or Spec. Ed.	11	5.73	1.62		
PreK – Kindergarten	7	5.43	.98		
First - Third Grade	72	5.57	1.50		
Fourth - Fifth Grade	49	5.59	1.61		
Highest Degree Held				1.832	0.178
Bachelor's Degree	92	5.73	1.53		
Master's Degree	49	5.35	1.47		

Table 17

Pearson Product Moment Correlations of Modified Outcome Indices, Overall Consultant Effectiveness Scores, Consultant Effectiveness Subscale Scores, and Teacher Accuracy Scores with Age, Years of Experience, Number of Referrals for Testing, and Number of Referrals for Intervention

	Age	Years of Experience	Academic Intervention	Special Education Referrals
DIA Questions	-.041	.039	.011	-.071
MOI	.045	-.019	-.090	-.061
CMoCE	-.054	-.039	.043	.012
RCES	-.089	-.092	.114	.022
RCEF	-.050	-.045	-.049	.002
RCRP	-.048	-.015	-.018	.005
Add. CE Item Total	.069	.117	.008	-.005

Table 18

Pearson Product Moment Correlations between Modified Outcome Indices, Overall Consultant Effectiveness Scores, Consultant Effectiveness Subscale Scores, and Data Interpretation Accuracy Scores

	MOI Item Total	CMoCE Total	RCES Item Total	RCEF Item Total	RCRP Item Total	Add. CE Item Total Score
MOI Item Total						
CMoCE Total	.516					
RCES Item Total	.530	.956				
RCEF Item Total	.496	.915	.832			
RCRP Item Total	.498	.891	.771	.806		
Add. CE Item Total	.220	.787	.659	.647	.693	
DIAQ Total	-.405	-.099	-.123	-.058	-.122	.008 **

Note: *p < .05, ** p < .01.
Xxxxxxxx

Table 19

Summary of Logistic Regressions Predicting Teacher Data Interpretation Accuracy by Item from Data Presentation Modality

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8
Static	.298	.978	.688	.961	1.216	.711	.572	.547
Table	.155 *	.242	.409	.461	.849	.519	.713	.218 **
χ^2	11.744	4.834	3.865	12.811	.586	2.168	1.810	12.803
pseudo -R^2	.122	.080	.039	.119	.006	.021	.017	.002

Note: *Item 1* = reading rate after the eighth week of intervention, *Item 2* = slope of the data, *Item 3* = will the student's reading rate be equal to the peers, *Item 4* = student met his weekly goal during the first week, *Item 5* = student met his weekly goal during the third week, *Item 6* = student met his weekly goal during the fifth week, *Item 7* = week of intervention did the student make the largest WRCPM growth, *Item 8* = when will student reach a reading fluency rate within the 16th percentile

Table 20

Multiple Linear Regression Predicting Overall Teacher Accuracy Scores from Data Presentation

	B	*SE*	*Beta*	*t*	*p*
Static	-.358	.29	-.112	-1.24	.217
Table	-1.384	.29	-.429	-4.76	.000

Note: Summary of Multiple Linear Regression, $F(2, 138) = 12.56$, $p < .001$, $R2 = .154$

Table 21

Means and Standard Deviations of Teacher Ratings of Intervention Effectiveness by Data Trend and Data Presentation Modality

	Effective Graph		Ineffective Graph		Total	
	n	Mean	n	Mean	n	Mean
Dynamic Graph	23	19.25	24	10.04	49	14.65
		2.69		3.97		5.74
Static Graph	25	18.40	22	9.86	47	14.40
		2.93		3.63		5.39
Table	22	17.05	24	9.71	46	13.22
		3.17		3.36		4.92
Total	71	18.27	70	9.87	141	14.10
		3.02		3.61		5.36

Note: Summary of Analyses, Data Trend: $F(1, 135) = 219.34$, $p < .001$, $R^2 = .619$; Presentation Mode: $F(2, 135) = 1.28$, $p = .282$, $R^2 = .019$; Data trend x Presentation Mode: $F(2, 135) = .75$, $p = .476$, $R^2 = .011$

Table 22

Multiple Logistic Regression Predicting Teacher Ratings of Intervention Effectiveness (MOI) from Data Trend and Data Presentation Modality

	B	*SE*	Wald	Odds Ratio	*p*
Effective	4.090	.560	53.303	59.750	<.001
Static	-.137	.644	.045	.872	.832
Table	-1.069	.651	2.696	.343	.101
Constant	-2.045	.533	14.734	.129	.000

Note: Summary of Multiple Logistic Regression, X^2 (3) = 92.50, $p < .001$, pseudo R^2 = .154

Table 23

Means and Standard Deviations of Teacher Ratings on the CMoCE by Data Presentation Modality

	n	Mean	*SD*	*F*	*p*
Presentation Mode				7.84	<.001
Dynamic	48.00	89.29	21.21		
Static	47.00	83.47	22.07		
Table	46.00	71.74	21.12		

Note: Presentation Mode Cohen's D values: Dynamic vs. Static = .94; Dynamic vs. Table = .78; and Static vs. Table = .83.

Table 24

Means and Standard Deviations of Teacher Ratings on the Consultant Effectiveness Subscales by Data Presentation Modality

	n	Mean	*SD*	*F*	*p*
RCES				6.37	.002
Dynamic	48	45.29	10.41		
Static	47	42.62	11.25		
Table	46	37.33	10.76		
RCEF				7.77	<.001
Dynamic	48	14.40	4.87		
Static	47	13.49	4.71		
Table	46	10.61	4.51		
RCRP				7.07	.001
Dynamic	48	14.02	4.65		
Static	47	12.87	4.36		
Table	46	10.54	4.86		
Add. CE Item Total				4.37	.014
Dynamic	48	15.58	3.68		
Static	47	14.49	3.91		
Table	46	13.26	3.49		

Note: Multivariate Statistic- F (8, 268) = 2.18, p = .029, η2 = .061. RCES Cohen's D values: Dynamic vs. Static = 1.12; Dynamic vs. Table = 1.27; and Static vs. Table = 1.14. RCEF Cohen's D values: Dynamic vs. Static = .94; Dynamic vs. Table = 1.17; and Static vs. Table = 1.08. RCRP Cohen's D values: Dynamic vs. Static = .98; Dynamic vs. Table = 1.14; and Static vs. Table = 1.04. Additional CE Item Total Cohen's D values = Dynamic vs. Static = 1.12; Dynamic vs. Table = 1.23; and Static vs. Table = 1.09.

VITA

Nic B. Gotcher

Candidate for the Degree of

Doctor of Philosophy

Dissertation: THE EFFECTS OF PRESENTATION MODALITY ON TEACHERS' DATA INTERPRETATION ACCURACY AND PERCEPTIONS OF INTERVENTION AND CONSULTANT EFFECTIVENESS

Major Field: Educational Psychology

Biographical:

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Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: EFFECTS OF PRESENTATION MODALITY ON TEACHERS' DATA INTERPRETATION ACCURACY AND PERCEPTIONS OF INTERVENTION AND CONSULTANT EFFECTIVENESS

Pages in Study: 121 Candidate for the Degree of Doctor of Philosophy

Major Field: Educational Psychology

Scope and Method of Study: Identifying variables that impact teachers' understanding of student progress and perceptions of effectiveness have significant implications for improving service delivery. The present study investigated the impact of three presentation modalities (table, static graph, and dynamic graph) and data trend (upward and zero) on teachers' data interpretation accuracy and ratings of intervention and consultant effectiveness. Participants included 141 authentic teachers. A between-groups, 3x2 factorial design that utilized video vignettes of progress monitoring consultation sessions were used.

Findings and Conclusions: Results of this study indicate that presentation modality can significantly impact teachers' understanding of intervention data, as well as their perceptions of consultant effectiveness. Specifically, results from this study suggest that progress monitoring allow teachers to make more accurate judgments about student growth and more precise predictions about goal attainment. Results also suggest that presenting graphs can lead to higher ratings of consultant effectiveness. Statistically significant differences between the dynamic and static conditions were not identified. In addition, presentation mode did not have a significant effect on ratings of intervention effectiveness. Implications for practice and future research are discussed.

ADVISER'S APPROVAL: _____