THE EFFECTS OF FLUENCY-BASED AUTISM TRAINING ON EMERGING EDUCATIONAL LEADERS

by

Mary Lynch Barbera

A DISSERTATION

IN

LEADERSHIP

Submitted to the School of Graduate Studies of

Alvernia University in Partial Fulfillment of

the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

September, 2011

THE EFFECTS OF FLUENCY-BASED AUTISM TRAINING ON

EMERGING EDUCATIONAL LEADERS

by

Mary Lynch Barbera

A DISSERTATION

IN

LEADERSHIP

Submitted to the School of Graduate Studies of

Alvernia University in Partial Fulfillment of

the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

Approved

Scott Ballantyne, Ed.D., Chair

Mary B. Schreiner, Ph.D., Member

Mary Jane Weiss, Ph.D., BCBA-D, Member

Accepted

Kathleen V. Davis, Ph.D., Dean, School of Graduate Studies

September, 2011

Abstract

A substantial increase in the number of children being diagnosed with autism within the past decade has greatly expanded the need for qualified individuals to serve as therapists, teachers, and aides for these students. Leaders in corporate, community, and educational organizations are having a difficult time meeting the diverse training needs of students, parents, and staff. A servant-operant leadership approach provided a framework for the study. Using a quasi-experimental design, this study evaluated the effects of a fluency-based procedure used to train emerging educational leaders on one component needed when using the verbal behavior approach to teach children with autism. This study included a multivariate analysis of variance (MANOVA) that compared treatments with and without fluency procedures and determined if fluency-based procedures improved skill acquisition, application, written retention, and oral retention. Thirty-nine graduate education students completed the study with slightly more than half of the group receiving fluency training from the researcher. Results of the study indicated that participants in the experimental group learned, applied, and retained information significantly better than the control group. Discussion on the importance of leaders evaluating training and education programs and a call for future research on fluency-based training procedures are presented.

ACKNOWLEDGEMENTS

I would like to thank Dr. Scott Ballantyne, who served as my dissertation chairperson, for his ongoing assistance and support. Dr. Ballantyne was accessible, detail-oriented, and always kept me moving forward. I would also like to thank the other members of my committee, Dr. Mary Schreiner and Dr. Mary Jane Weiss. Dr. Schreiner's in-depth knowledge of special education and Dr. Weiss' international expertise in the field of autism were extremely valuable in this process. I was fortunate that each of the members of my committee provided unique feedback, helpful advice, and consistent support.

I would also like to thank Dr. Christopher Bloh who provided independent oversight of the project and also served as one of my three research assistants. Two other behavior analysts, Ms. Nina Baez and Ms. Julie Trebat, also deserve credit for volunteering their time to serve as research assistants.

In addition to Dr. Mary Jane Weiss, who graciously agreed to serve on my committee, I am also eternally grateful to several other professionals who mentored me over the past decade and encouraged me to learn about autism, verbal behavior, and/or fluency especially: Dr. Jack Michael, Dr. Mark Sundberg, Dr. Rick Kubina, and Dr. Bill Galbraith. Throughout my short autism career, I have truly stood on the shoulders of giants!

Finally, I would like to thank my husband, Charles, and my sons, Lucas and Spencer, as well as my parents, Ed and Marie Lynch, for their continuous love and encouragement while I finished this dissertation. Without the support of family, friends, and countless professionals, I would not have been able to attain this goal. For this, I am forever grateful.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

Autism

Autism or Autism Spectrum Disorders (ASD) is a group of complex developmental disorders referred to as pervasive developmental disorders in the Diagnostic Statistical Manual of Mental Disorders (DSM)-IV. While the autism spectrum is very wide and includes individuals with both mild and severe symptoms, three core features are present in all individuals with autism. These include impairments in social abilities, delays or difficulties with communication, and repetitive or restricted interests (American Psychiatric Association, 2000).

Autism was first identified in 1943 by Dr. Leo Kanner, a pediatric psychiatrist at Johns Hopkins Hospital. While it was originally a rare disorder with approximately 1 in 10,000 individuals affected with autism in the 1980s, ASD is currently being diagnosed in 1 out of every 110 children in the United States (Autism Society of America, 2011). This is an increase from 1 in 500 a decade ago and 1 in 150 just three years ago (Kogan et al., 2009). ASD is now more common than childhood cancer, juvenile diabetes, and pediatric AIDS combined (Autism Speaks, 2011). In addition to the emotional and human toll of the disorder, the financial impact to schools and society in general is staggering with the United States spending an estimated 90 billion dollars annually to care for and educate those affected (Autism Society of America, 2011).

Educational reform over the past decade, including the No Child Left Behind (NCLB) Act of 2001 and the Individuals with Disabilities Education Improvement Act (IDEIA) of 2004, required educational leaders to adopt research-based practices and to ensure their staffs were trained in the correct delivery of proven methods and strategies. This remains very difficult to accomplish when addressing autism, however, since the needs of students with autism vary so

greatly yielding no single best and universally accepted treatment for all students with autism (Simpson, 2005).

Training personnel to work with students with autism is an educational leadership issue in need of study. The surge in the diagnostic rate of autism has greatly expanded the demand for qualified individuals to serve as therapists, teachers, and aides for students with autism. According to a report by the National Research Council (NRC) published in 2001, there are no available data detailing the number of professionals or therapists who work with this population. It is also unknown as to how many personnel preparation training programs are available, which disciplines are involved in the training, or the number of people who receive autism-specific training annually (Scheuermann, Webber, Boutot, & Goodwin, 2003).

Applied Behavior Analysis

Applied Behavior Analysis (ABA) has been established as the most empirically validated treatment for students with autism (National Autism Center, 2009). Cooper, Heron, and Heward (2007) defined ABA as "a scientific approach for discovering environmental variables that reliably influence socially significant behavior and for developing a technology of behavior change" (p. 3). In 1999, ABA was recommended by the U.S. Surgeon General to treat children with autism (Rosenwasser & Axelrod, 2001) based largely on the seminal work of the late Dr. Ivaar Lovaas, a behavioral psychologist at UCLA.

In 1987, Lovaas published a study which included 59 young children with autism. Nineteen children made up the experimental group and received 40 hours of 1:1 behavioral intervention each week for two or more years. Dr. Lovaas showed that with intensive ABA programming during the formative years, almost half of the children with autism in the experimental group (9 out of 19) became indistinguishable from their peers by the time they

entered school (Lovaas, 1987). A follow-up study reported that the children in the experimental group continued to do well at the age of 13 (McEachin, Smith, & Lovaas, 1993).

In the past 20 years since these early ABA studies were completed, an entire generation of children with autism has grown up with the support of ABA with hundreds of studies supporting the efficacy of behavioral programming for children with autism (Barbera, 2007; Horner, Carr, Strain, Todd, & Reed, 2002). Even though some children with autism who receive intensive early behavioral intervention during the pre-school years can enter kindergarten with little to no support or need for additional services, the majority of students with autism enter school with significant impairments, especially in the area of communication (Lovaas, 1987; Simpson, 2005). These communication deficits and other weaknesses require on-going evidence-based practices and specific research-based teaching strategies to enable students to reach their fullest potential (Simpson, 2005).

The Verbal Behavior Approach

The Verbal Behavior (VB) approach, sometimes referred to as Applied Verbal Behavior is a type of ABA programming that utilizes ABA research as well as empirical studies based on the use of B.F. Skinner's Analysis of Verbal Behavior (Skinner, 1957) to teach children with autism and other developmental disorders (Sundberg & Michael, 2001). While many school and therapy programs continue to utilize Lovaas type ABA, this began to change in 1998 with the publication of *Teaching Language to Children with Autism or Other Developmental Disabilities* (Sundberg & Partington, 1998). Many ABA programs for children with autism are now utilizing an ABA/VB approach. While some have suggested that educational programming based on Skinner's classifications of verbal behavior have tremendously positive curricular advantages (Sundberg & Michael, 2001; Weiss, 2001), there has been criticism (Carr & Firth, 2005; Love, Carr, Almason, & Petursdottir, 2009). This criticism surrounds the fact that the VB approach,

which has a number of procedural variations, has been disseminated as a complete package mostly via workshops, non-peer reviewed articles (Barbera, 2009a), conference presentations (Barbera, 2009b; Carbone, 2004; Miklos, Dipuglia, & Galbraith, 2010), and books (Barbera & Rasmussen, 2007; Schramm, 2011; Sundberg & Partington, 1998).

Even though there is a modest amount of research supporting the components of the VB approach, without empirical validation of the VB package as a whole, Carr and Firth (2005) have suggested that the widespread dissemination of VB has occurred too prematurely. In a reply to Carr and Firth, Cautilli (2007), while agreeing on the need for treatment efficiency research on the VB approach, defended the use of ABA/VB programs stating that the "VB model rests on a considerable history of practice and research" (p. 20). The debate about whether more research should have preempted the wide usage of VB is a moot point; however, as the VB approach is currently being utilized, at least in part, in a large percentage of ABA programs for children with autism (Kates-McElrath & Axelrod, 2006; Love et.al, 2009).

While there are many experimental studies on components of the VB Approach (Cautilli, 2007; Prelock, Paul, & Allen, 2011; Reichow, Doehring, Cicchetti, & Volkmar, 2011; Sundberg & Michael, 2001), research is just beginning to emerge regarding the efficacy of full ABA/VB programs for students with autism in Pennsylvania public schools (Bondy, Esch, Esch, & Sundberg, 2010; Miklos et al., 2010). Part of the staff training within these schools involved in the Pennsylvania Verbal Behavior Project, has been an emphasis on developing competencies to ensure that each staff member can name verbal and non-verbal operants fluently at a rate of 20-25 correct responses per minute (Barbera, 2009b; Miklos & Dipluglia, 2010).

Without empirically validated training procedures for staff on all aspects of the VB Approach, many children may not have access to quality ABA/VB programming. Additionally, without standardized staff training on VB terms and procedures, validating the VB approach and

eventually comparing the VB approach with other types of ABA and non-ABA treatments will continue to be an insurmountable task.

The Importance of Fluency

Fluency is the "fluid combination of accuracy and speed" and can be equated with true mastery (Binder, 1990). Individuals who perform a skill quickly, accurately, and without hesitation are thought to be fluent performers (Fante, 2008; Binder, 1996; Kubina & Morrison, 2000). Since the 1960s, many individuals have suggested that fluent performance leads to better retention, increased endurance, and better ability to transfer and apply knowledge (Binder, 1990, 1996; Bucklin, Dickinson, & Brethhower, 2000; Kubina & Morrison, 2000).

Most conventional training programs, according to Binder and Bloom (1989) "actually prevent or retard fluency in one way or another" (p. 17). They suggest that fluency does not occur when trainers provide too little time for practice and/or require trainees to respond slowly or wait during question and answer segments. In addition, trainers often encourage participants to role play complex scenarios before simple steps in the scenario are fluent. This often causes the trainees to become frustrated and unable to retain the information or apply it to their jobs (Binder & Bloom, 1989).

Despite thirty years of applied fluency programs with a variety of populations justifying the importance of fluency, most people continue to be unaware of its utility. This is best demonstrated by the continued use of accuracy-only measures, such as percentage correct to assess knowledge and skills. If two trainees both score 100% on a post-test, but one trainee completes the test in ten minutes and the other takes thirty minutes, it would be logical to consider the first student to have mastered the material to a greater extent. Without considering speed of performance, true mastery cannot be accurately assessed (Bucklin et al, 2000).

Leadership Implications

This study has broad implications for leaders in corporate and community settings as well as in education since a critical role for all leaders is to ensure that effective and efficient training processes are in place for those they serve. Leadership has been studied for over a century with over 16,000 books written on the subject (Daniels & Daniels, 2007). Despite this intense interest, however, leadership remains a difficult subject to study partially because there remains no universal definitions of leadership or leader. Most definitions support the idea that leadership is a process that influences others (Yukl, 2006; Northhouse, 2007).

Many leadership styles (e.g. behavioral approach, contingency theory, situational approach) describe and measure leadership abilities in two main areas. The first broad area or leadership skill is the *relationship* they have with followers and the second is the way they determine, delegate, train, and monitor *tasks* (Northhouse, 2007). Using the relationship—task paradigm, this study utilized two different leadership styles; servant and operant leadership, to provide a leadership framework in which to design an appropriate study.

Teaching children in general and teaching children with special needs in particular can be framed through a servant leadership lens and has been tied to the concept of teacher as leader (Jackson & McDermott, 2009; Kerfoot, 2003; Williams, 2002). The scientific principles of applied behavior analysis, which are the basis for an operant leadership approach (Komaki, 1998), were also used throughout the development of the procedure and during the study. In this study a servant leadership model provided a relationship-oriented framework. The operant leadership approach based on the scientific principles of ABA was added to describe the tasks involved for the leader and follower. This multi-framed servant-operant leadership paradigm utilized in this study may yield important insights for advancing leadership within corporate,

community, and educational organizations. These two leadership paradigms as well as the rationale for combining them will be discussed more fully in subsequent chapters.

While this study focused on the effects of a fluency-based procedure on one component needed by adults utilizing a VB approach to teach children with autism, similar systematic analysis could be conducted with components of all types of training packages across many different fields. Leaders in educational systems, community agencies, and corporate environments are functioning in extremely competitive global climates (Daniels & Daniels, 2007). Because of this, leaders in every field need to ensure that relationships are nurtured to prevent excessive turnover of followers and also to foster discretionary effort. This focus on relationships can be fostered by using servant leadership as a foundation. Leaders also need to be task-oriented and, with the use of an operant leadership paradigm, they may be able to develop the most effective and efficient training packages and procedures. Using servant-operant leadership and the science of ABA, any skill can be broken down into component parts and taught using fluency-based training procedures. This dual leadership focus could be useful for all leaders in their stewardship of financial resources dedicated to training all humans across fields and within a variety of organizations.

In *Unlock Behavior Unleash Profits*, Braksick (2000) eloquently summarized the need for leaders in every industry to understand ABA:

> There is a science to human behavior that leaders need to learn and apply consistently everywhere. Leaders need to evaluate strategies, processes, and behaviors—their own and those of their customers, their employees, and their work cultures—by using the science of human behavior. (p. xvi)

Purpose of Study and Research Question

The purpose of this study was to examine the issue of fluency as it relates to training adults on one component needed to teach students with autism when utilizing B.F. Skinner's Analysis of Verbal Behavior (Barbera, 2009b; Miklos & Dipluglia, 2010). The research question being explored in this study is: Do emerging educational leaders learn, apply, and retain more autism verbal behavior information when they receive fluency-based training versus training without an emphasis on fluency?

Fluency building, a technique which has been shown in past studies (Binder, 1996; Binder & Watkins, 1990; Bucklin et al., 2000) to improve long-term retention and application of skills, was the independent variable. There were four dependent variables: post treatment knowledge, application rates, written retention and oral retention of verbal behavior information.

Emerging educational leaders were selected to serve as participants for three main reasons. The first reason for utilizing this population was that it was hypothesized that two homogeneous groups could be formed by seeking volunteers from four classes of graduate education students at Alvernia University. The sample was therefore convenient and accessible to the researcher for use in a quasi-experimental design study.

Second, since this training procedure was developed to teach new staff to work with students with autism, graduate students could simulate new staff. It was expected that these graduate students would not have the background knowledge on the specific topic of naming the verbal operants. These participants would therefore be similar to novice teachers, related service providers or paraprofessionals who were taught in the past or could be taught in the future with this method.

Lastly, and most importantly, it was determined that emerging educational leaders might be in a unique position after the study to potentially lead others within schools and teach them

about the importance of ABA, VB, and fluency. Since leadership is defined as "a process whereby an individual influences a group of individuals to achieve a common goal" (Northouse, 2007, p. 3), these current and/or future educational leaders could promote systematic changes to autism training within their respective schools as servant leaders.

Methodology Overview

Since participants were taught the experimental or control group material within one of their existing classes, randomizing individual participants to the control or experimental groups was not feasible. Instead of randomizing individuals, this quasi-experimental study randomized whole classes to either the experimental or control group. According to Gall, Gall, and Borg (2010), a quasi-experimental design can be used when randomization of individual participants is not possible or convenient. Quasi-experimental designs can yield powerful results especially if care is taken to assure that groups are as equivalent as possible.

There is very limited quantitative or qualitative research on fluency-based training procedures. This study will therefore contribute to the literature in several ways. Since there appears to be no studies examining the effects of fluency-based procedures on emerging educational leaders or adults working with children with autism, this study will be the first exploration with this focus. Additionally, this study will add to the literature on college students since there are only three other known studies (Bucklin et al., 2000; Fante, 2008; Orlander, Collins, McArthur, Watts, & McDade, 1986), which analyzed the effects of fluency-based training procedures with groups of college students utilizing quasi-experimental designs. Finally, this study will begin to explore the potential benefit of emerging educational leaders learning about ABA, VB, and fluency.

Before proceeding, it is important to provide definitions for some key terms that will be used in this study.

Definition of Terms

Application: One of the benefits of fluency. The ability to apply previously learned information or skills to a different situation or with different materials (Binder, 1996).

Applied Behavior Analysis: The science of changing socially significant behavior (Cooper, Heron, & Heward, 2007).

Component Skill: Skills that are a part of a more complex skill. E.g. Drawing straight lines down is a component skill of writing letters (Johnson & Layng, 1992).

Composite Skill: Skills made up of two or more simple or component skills E.g., addition mad minute completion is a composite skill involving component skills of 1:1 correspondence, number identification and writing numbers (Johnson & Layng, 1992).

Emerging Educational Leaders: Educators who have informal power and influence over others and are developing leadership knowledge and abilities to acquire more legitimate power (Bowditch & Buono, 1997; Hogan, Curphy, & Hogan, 1994).

Endurance: One of the benefits of fluency. The ability to maintain attention during a task over extended periods without distraction or fatigue (Binder, 1996).

Fluency: Accuracy plus speed. Results in application, endurance, and retention (Binder, 1996).

Imitation Skills: Copying the motor movements of another person. This is a non-verbal operant since the action does not involve verbal behavior. (Barbera & Rasmussen, 2007).

Intensive Teaching (IT): This refers to fast-paced VB instruction usually done at a table which involves mixing of verbal and non-verbal operants incorporating errorless teaching and error correction procedures throughout (Barbera & Rasmussen, 2007).

Operant: A behavior defined in terms of its antecedent and consequences. Four elementary verbal operants defined by B.F. Skinner in 1957 make up what traditional linguists label "expressive language." These four verbal operants are the mand, tact, echoic and intraverbal. The behavior in each of these operants is verbal. Non-verbal operants do not involve speech or other verbal behavior on the part of the listener. Matching, receptive and imitation skills are considered non-verbal operants (Barbera & Rasmussen, 2007).

Precision Teaching: A learning monitoring system or teaching technology with a focus on using frequent measurement of speed and accuracy of individual performance to guide instruction (Binder, 1996).

Receptive Skills: The ability to understand language and follow directions without a visual prompt. Because there is no verbal behavior required of the listener, this is referred to as a non-verbal operant (Barbera & Rasmussen, 2007).

Retention: The ability to remember information or engage in behavior after a period without practice (Binder, 1996).

Verbal Behavior: Any communication involving a listener including speaking, signing, exchanging pictures, pointing, writing, etc. (Barbera & Rasmussen, 2007).

Summary

In Chapter One, the challenges surrounding the rise in the diagnosis of autism and the issues surrounding training in the field of autism were described. Applied Behavior Analysis (ABA), Verbal Behavior (VB), as well as a brief discussion of fluency were presented. An overview was also given to support the multi-framed servant-operant leadership paradigm used in the development and implementation of the study. The purpose of the study, research questions, methodology, and the rationale for utilizing emerging educational leaders as the participants were also briefly described. Finally, key terms were defined.

CHAPTER 2: LITERATURE REVIEW

In this chapter the topic of leadership and how it relates to training will be explored. First, the concept of teachers as leaders will be presented followed by selected research on servant and operant leadership models. In addition, a review of pertinent literature on the topics of training and the empirical support of fluency in both the corporate and education fields will be presented.

Teachers as Leaders

A leader is someone that has influence over at least one follower (Northouse, 2007). Teachers teach and therefore influence their students every day. They may also influence the parents of their students as well as their own colleagues, the principal, and other administrators within the school setting. Kerfoot (2003) suggested that if you cannot teach, you cannot lead. Furthermore, any organization is simply a collection of people who are making things happen. A leader is responsible for teaching his or her followers more efficient ways of performing tasks and supporting the personal growth of his or her followers at the same time. Those who think broadly about leadership may view all teachers as leaders. Kerfoot (2003) stated:

> Everyone throughout the organization is expected to teach each other and learn from each other. A major part of this concept is that the leader is teacher. Teaching is not a top-down phenomenon. Teaching occurs everywhere in the organization....We can teach and learn from each other no matter where we are positioned on the organizational chart. (p. 385)

Hambright and Franco (2008) in describing their teacher leadership Master's degree program stated, "Teacher leadership is the cornerstone for both effective building leadership and classroom teaching" (p. 267). They also suggested that principals should support the "teacher as leader" paradigm shift and embrace teacher leaders who should be a part of team decision

making. This is especially true in the field of special education where the principal and other administrators are not as familiar with the most appropriate instructional processes (Bays & Crockett, 2007).

While many think only of principals or district administrators as educational leaders, some view teachers as school leaders who can have wide impact. Teacher leadership is "the process by which teachers, individually or collectively, influence their colleagues, principals, and other members of school communities to improve teaching and learning practices with the aim of increased student learning and achievement" (York-Barr & Duke, 2004, p. 288). In agreement with this view of leadership, Hopkins and Higham (2007) suggested that sustainable change within education systems must be led by those "close to the school" (p. 48) such as principals and veteran teachers. While the literature lacks research on how instructional leadership for special education occurs in school settings (Billingsley, 2007), determining the most efficient methods of instruction delivery and training teachers on these techniques has serious implications for both teachers and students (Bays & Crockett, 2007).

The participants in this study were enrolled in graduate education courses and were selected as potential participants based on their status as emerging educational leaders. Emergent means to "come into existence" or "come into view" ("Emergent," 2005) and it is a term used to indicate something is new or developing. Emergent leadership has also been described as "leaderlike" (Hogan et al., 1994) and having informal power and influence over the social network of the group (Bowditch & Buono, 1997). Borba (2009) supported the idea that teachers often become administrative leaders and suggests that the best way to prepare to become an extraordinary educational leader is to become a stellar teacher. This is recommended since an administrator without knowledge of best practices will be unable to effectively monitor, coach, and evaluate teachers. In *Teaching as Leadership*, Farr (2010) detailed common patterns

of the most effective teachers: "We see highly effective teachers embody the same principles employed by successful leaders in any challenging context" (p. 4).

Servant Leadership

There is literature suggesting that teachers often emerge as servant leaders (Kerfoot, 2003; Williams, 2002). According to Bass (2008), servant leadership emerged in the late 1970s and was formulated by Robert Greenleaf, based on his experiences as a corporate executive. In *Servant Leadership: A Journey into the Nature of Legitimate Power & Greatness*, Greenleaf (2002) credited the book *The Journey to the East* (Hesse, 1956), for giving him the idea of servant leadership. Leo, the servant in *The Journey to the East*, was never seen except when he was needed. He was described as unassuming. In the end, it was discovered that Leo was actually the leader of the Order. This book, and specifically the character Leo, eventually led to Greenleaf's interpretation that great leaders are servants first and to his coining of the term "servant leadership."

The closest definition Greenleaf (2002) provided is that the servant leader is servant first and leader second. He suggested that if leaders successfully use a servant leadership approach, followers should become "healthier, wiser, freer, more autonomous, and more likely themselves to become servants" (p. 62). Greenleaf (2002) stated his thesis: "Caring for persons, the more able and the less able serving each other, is the rock upon which a good society is built" (p. 62). He believed that this caring has historically been person to person but that caring now should be seen within institutions. "Servant leadership represents a significant departure from hierarchical systems of leadership often employed in educational and social service programs" (Tate, 2003, p. 33). The focus of the servant leader is to improve the skills of others so that everyone can continuously grow and learn. Many people who subscribe to the servant leadership model believe that caring and nurturing work environments lead to better outcomes, more successful

retention efforts, better consumer and employee satisfaction, and ultimately increased profits (Tate, 2003; Taylor, Martin, Hutchinson, & Jinks, 2007).

Greenleaf (2002) suggested that leaders within all institutions must seek out innovation and be open to change in order for change to occur. This is because, as Greenleaf (2002) pointed out, we live in an age against innovation where most institutions are "seriously hobbled with rigid, obsolete, and retrogressive patterns" (p. 241). Greenleaf (2002) admitted that the paradigm shift to improve society has some barriers. These include the fact that past efforts for system and societal improvements have been largely coercive and that a hierarchy with a single leader model is deeply entrenched within our society.

Teacher as Servant Leader

Kerfoot (2003) stated, "The leader as learner and the leader as teacher are very basic to the role of any leader but often overlooked" (p. 387). If a person is a servant leader, he or she is not controlling. Instead leaders create the infrastructure where everyone teaches and learns (Kerfoot, 2003; Williams, 2002). Herman and Marlowe (2005) suggested that teachers need to be servant leaders especially when working with students with special needs. They need to shift from a typical classroom hierarchy where authority and obedience is stressed to that of a community where leaders stress helping others by re-examining their greater role in improving human conditions.

In "Fearless Leading," Jackson and McDermott (2009) described that the root word for *administrator* is *minister*. Using the root word, they explain, takes the power out of the leader and replaces it with service. They state, "Schools need ministers—people who look out for the common good, are devoted to the school, and have the moral influence to improve conditions for learning and teaching" (p. 36).

Beazley and Beggs (2002) believed that the servant leadership model is consistent with other leadership theories such as systems thinking and the learning organization. In a dissertation using servant leadership as a framework combined with the principles of ABA, Kenneally (2007), a teacher and a Board Certified Behavior Analyst (BCBA), analyzed her own leadership behavior as she created programs to meet the needs of children with autism and their families. Kenneally (2007) stated, "My goals as a teacher and a leader are the same as I attempt to create better lives for those I serve" (p. 1).

Kenneally (2007) suggested that BCBA's who work with students with severe disabilities such as autism are adept at assessing problems, devising a plan which includes breaking skills down, teaching, and evaluating both short and long-term gains of the students. She admitted, however, that BCBA's, herself included, often have difficulty using those same ABA principles while they are serving in leadership positions. This is due to the fact that leadership activities often involve the need to work with employees, create programs, and run organizations effectively. Kenneally (2007) suggested that the principles of operant conditioning can and should be used to assist leaders as they operationalize other leadership theories such as servant leadership.

An Operant Leadership Approach

B. F. Skinner (1968) suggested that one of the reasons teachers or trainers fail is because the process of learning and teaching is not analyzed. Without this analysis, teaching cannot be improved. In *Leadership From an Operant Perspective*, Komaki (1998) is a behavior analyst who has spent decades researching the use of ABA principles to impact businesses. She proposed one should consider studying leadership from an operant perspective instead of studying the characteristics of leaders or the behavioral styles they use. Bass (2008) referred to this leadership paradigm as "contingent reinforcement leadership" (p. 366) and suggested that

this model was grounded in the universal and proven theory of operant conditioning (Komaki, 1998). Despite the support of Bass and the model outlined by Komaki in 1998 with 18 studies to support it, operant leadership is a largely unknown theory within the leadership literature. Before proceeding, a review of operant conditioning and operant leadership is necessary.

In *The Behavior of Organisms* published in 1938, Skinner described the experimental branch of behavior analysis and outlined his research with rats and pigeons in the 1930s. This work with animals led to Skinner's discovery that behavior was often influenced by consequences which followed the behavior. For example, if a rat pushed a bar and food was delivered, the rate of pushing the bar would increase if the rat was hungry and if pellets of food continued to be delivered with bar pushing. Skinner (1938) coined the term "operant" to describe behaviors that were influenced not only by antecedents that came before the behavior but also behavior was to a greater extent related to the consequences that followed behavior. This stimulus-response-stimulus, later described as antecedent-behavior-consequence, was termed a three-term contingency and became the foundation of operant conditioning which is important in the study of all behavior and learning (Cooper et al., 2007).

In 1953, Skinner pointed out that the study of behavior is very complex since it is an on-going and fluid process. Since behavior is constantly changing, it cannot be held constant for any period of time. Skinner (1953) also suggested that the study of human behavior outside of the laboratory was particularly challenging not only due to behaviors being in motion but also because environmental variables were difficult to control (Skinner, 1953).

Applied behavior analysis (ABA) can be traced back to 1968 with the publication of the first issue of the *Journal of Applied Behavior Analysis* as well as the publication of the classic article "Some Current Dimensions in Applied Behavior Analysis" (Baer, Wolf, & Risley, 1968), which described the discipline of ABA (Cooper et al., 2007). While behavioral science or ABA

is younger than other sciences such as physics and chemistry, the laws of behavior are always operating. Without knowledge of ABA, leaders in every field are at a disadvantage when managing behavior and implementing change within organizations (Braksick, 2000).

For both the behavior of the leader and the follower, leadership involves behaviors which can be changed and improved. ABA is a "scientific approach for discovering environmental variables that reliably influence socially significant behavior and for developing a technology of behavior change that takes practical advantage of those discoveries" (Cooper et al., 2007, p. 3). In short, it is the science of studying and improving human behavior (Cooper et al., 2007). Organizational behavior management is a branch of ABA that addresses the behavior of people within organizations (Mawhinney, 2005). As Daniels and Daniels (2006) summarized, "Business is behavior. Without behavior, no organizational accomplishments are achieved" (p. 27).

Komaki (1998) suggested that the use of operant conditioning and in particular the effects of positive reinforcement, can answer important leadership questions. The use of operant conditioning can guide leaders in effective measures to motivate subordinates, implement change processes, and ensure that work is produced in effective and efficient ways. According to Skinner (1968) all humans, including teachers, students, and educational leaders are subject to the contingencies of reinforcement.

Thousands of experiments support the "potency of consequences in motivating and, in particular, maintaining performance. In experiment after experiment, when consequences have been rearranged to be frequent and contingent on performance, dramatic improvements have resulted" (Komaki, 1998, p. 13). Braksick (2007) added:

> Employees seek opportunities to work with leaders who are positive and encouraging. This creates a cumulative effect for both types of leaders: positive leaders become more effective because they get more support, and negative leaders grow less effective because their people are less productive and do not give discretionary effort. (p. 80)

Komaki (1998) suggested leaders should monitor work samples by going to the place where the work is being done and collecting information about performance. These leaders who make visits can actually see the work, engage with the subordinates, assist with trouble shooting any process deficiencies, and give immediate feedback on a regular basis. Monitoring, Komaki (1998) believed, is one of the key functions of leadership: Effective leaders "are those who monitor and then, based on the information they obtain from monitoring take action" (p. 21). Monitoring also causes the leader and follower to discuss performance and this reciprocal interaction tends to influence the behavior of both (Daniels & Daniels, 2006).

Closely related to monitoring is the skill of *pinpointing* described by Daniels and Daniels (2006). Next to the use of positive reinforcement, these authors suggest that pinpointing is the single most important skill needed for leaders or anyone else who is attempting to change behavior. Pinpointing is the process of breaking down goals into component behaviors which can be precisely defined, objectively measured, and reinforced. A pinpoint needs to be precise enough to allow two independent observers to accurately measure the behavior and be reliable in their agreement. Defining employees as "lazy" or "having a bad attitude" are subjective terms that are not pinpoint behaviors and therefore cannot be reliably measured (Daniels & Daniels, 2006). They state, "When solving performance problems, people should think in terms of measurable, observable behavior rather than vague non-pinpointed interpretations of performance" (p. 116). Without the ability to objectively define desirable

behaviors, monitor, and pinpoint, it is unlikely that leaders will be able to effectively use positive reinforcement at the right times and frequency to increase behavior.

Effective leadership using the science of behavior includes monitoring and on-going feedback and produces discretionary effort of followers, which is defined as the "extra level of performance we exert when we want to do something, as opposed to when we have to do something" (Braksick, 2007, p. 6). Coercive leadership has the opposite effect in that followers perform out of fear (Murray, 2000). Working under a coercive model leads to performance that meets only the minimum requirements and does not "propel an organization to greatness" (Braksick, 2007, p. 7). Poor leadership causes followers to perform unsatisfactorily so the leader eventually exits and/or the organization collapses (Braksick, 2007). "Follower behavior, not leader behavior, defines leadership" (Daniels & Daniels, 2007, p. 5). Therefore, to determine if a leader is effective, tone should examine the behavior of the followers.

Blending Servant and Operant Leadership

In *Measure of a Leader*, Daniels and Daniels (2007) stated, "Effective leaders must first learn what matters to their followers.....A leader who is out of touch with the needs and goals of the individuals in the group has no appeal and no way to mobilize the group's efforts toward some common objectives" (p. 22). This demonstrates servant leadership and the leader needing to be a servant first. In *The Journey to the East (*Hesse, 1956*)*, Leo, like most servants, was very aware of the needs of the members of a group and this may have been the critical key to his role as leader.

Servant Leadership that is blended with an operant leadership approach creates visions that inspire sacrifice. Effective leaders also work hard to make sure these sacrifices are noticed and appreciated through the use of positive reinforcement. Because of the power of positive reinforcement, leaders who use the principles of ABA get even more discretionary effort and

sacrifices causing their organizations to continuously improve and excel. On the contrary, "if you cannot or do not positively reinforce others, there is little possibility that you will ever attain true leadership (Daniels & Daniels, 2007, p. 36).

Kenneally (2007) described her own leadership theories in action and used both a servant leadership framework as well as the principles of ABA and operant leadership. As a BCBA, Kenneally entered the autism field because she wanted to help children with autism reach their fullest potential. She was particularly adept at setting up home and school ABA programs for children with autism. Because she was fluent with ABA skills with children with autism, she was also comfortable and skilled in training staff on the procedures she needed to be implemented with the students.

Kenneally (2007) gave up a stable position within the education field to start her own ABA company. She and her partner worked hard to ensure that they were using a servant leadership model not only with their students, but also with their employees while they started a pre-school and several outreach programs. The leadership problems began when Kenneally attempted to implement sibling groups in three different locations. Because starting a sibling program was new to her, she did not break down the steps of organizing a new program so she could train staff effectively. Instead, she became frustrated with her staff, and the program failed in two of the three settings. Kenneally (2007) wrote in her journal:

> I spent years training staff to work with our children and was comfortable in that role. I could easily define the task and then teach the staff step-by-step skills until they were successful. In contrast this task (starting a sibling program) required numerous steps that I had not defined or mastered myself.... It was unfair of me to be angry when I did not teach them the skills. Would I have ever punished a student for not knowing a skill that I didn't

teach? No. Clearly, I have viewed the staff differently and held them to an unfair standard. (pp. 115, 152)

Kenneally (2007) admitted that her drive to meet the needs of students with autism and their families sometimes hindered her ability to lead others. She discovered through action research that her desire to serve others by itself was not enough. Once she added an operant leadership approach by utilizing ABA principles not only with her students but also with her staff, she was able to become a more effective servant leader.

Training

Training is a leadership issue that crosses all industries. In all organizations and companies, training is required regardless of the size of the company, number of employees, or whether the company is in the profit or non-profit sector. Additionally, educational establishments at all levels are in need of leaders who understand and can make proactive decisions about training.

With three million new employees entering the United States workforce each year, training is an important human resource activity and leadership issue. In addition to the task of training newly hired individuals, many employees have different training needs when changing jobs or careers. Even for employees who remain in their same jobs year after year, on-going training is often required for these individuals to remain safe and up-to-date in their positions (Cherrington & Middleton, 2008).

Organizations spend billions of dollars each year on employee training. Although the actual amount spent on training and employee development is unknown, some estimate that up to $300 billion is spent in the United States annually on formal training programs, with $60 billion being the figure cited most frequently (Pfau & Kay, 2002).

While some view training and education as synonymous, Cherrington and Middleton (2008) suggested the term "training" refers to the acquisition of specific skills or knowledge and involves a narrow range of responses. Unlike education, where individuals are encouraged to think broadly and respond to a particular situation in a variety of ways, the goal of training is for individuals to give the same response when asked the same question or faced with a similar situation.

While the costs of training employees are in the billions of dollars annually (Pfau & Kay, 2002), very few training programs in the human services field are evaluated formally. Instead, most training is evaluated informally by asking the participants to respond to whether or not they enjoyed the training. Often a Likert scale is used for trainees to rate the trainer's expertise, whether or not the participants felt the training met their expectations, and what they thought about the meeting facilities (Cherrington & Middleton, 2008).

When objective measures are used to evaluate training sessions, most often pre and post tests are the tools used. These are usually multiple choice tests, which do little to test true mastery of skills or perceptions of how effective training was to the participants (Cherrington & Middleton, 2008). Skinner (1968) stated that multiple choice tests are used because they are "easily processed in spite of the fact that they do not show whether the behavior is strong enough to be emitted without prompts" (p. 245). What is often ignored, Skinner (1968) suggested is measuring learner behavior that is more important and shows that the participant has mastered a skill but is difficult to tally or measure.

Even if an evaluation is completed, a compilation of the evaluation results is often not completed or communicated effectively to the trainers. In other words, the cost/benefit analysis of training programs is rarely calculated leading to inefficient use of resources (Cherrington & Middleton, 2008; Reid & Parsons, 2006). This "Train and Hope" model, first described by

Stokes and Baer in 1977, suggests that most training programs teach a skill but are not set up to evaluate or train participants on the retention, application, or generalization of the training material. Without ensuring that information is retained and can be applied to real life settings, most training sessions are not as effective and efficient as possible. Despite the obvious problems with lack of focus on whether training sessions are beneficial in the long-run, the "Train and Hope" phenomenon remains prevalent across industries (Kenneally, 2007; Komicki, 1998).

One reason for lack of application is that traditional training programs typically involve a large amount of lecturing. These types of training sessions continue to dominate the field despite the evidence showing the failure of "stand-and-deliver" type sessions and the importance of practice and on-going coaching (Joyce & Showers, 2002; Lerman, Vorndran, Addison, & Kuhn, 2004; Reid & Parsons, 2006). Joyce and Showers (2002) suggested that with lecture alone, trainees can expect to increase their skills by only 10% and application will be negligible. Even with demonstration and practice during the training, trainees typically apply less than 5% of what they learned. Bennett's meta-analysis (1987) suggested that without ongoing coaching in the classroom, teachers gain little from pre-service or in-service training sessions.

Autism-specific training is problematic in corporate, community, and especially within educational establishments. Since autism is considered a low incidence disorder, specialized training at universities on the topic has been very limited (Lerman et al., 2004). Furthermore, once teachers graduate and become certified, autism training opportunities do not usually improve as the education system is usually driven by theory and not by research on best practices (Lerman et al., 2004). Lerman et al. (2004) stated, "Typically, school districts provide little class-release time for teachers, and continuing education is restricted to a handful of didactic workshops" (p. 511). This focus on didactic workshops without a focus on the delivery of

research-based procedures remains to be a large and systematic educational leadership issue. Private therapy companies and non-profit autism organizations also require leaders who understand the complexity of training needs among all consumers. No matter what industry, leaders need to be aware of the issues surrounding training.

Joyce and Showers (2002) described five training components that they believe need to be present in order for teacher training to be effective. These include: theory, demonstration, practice, feedback, and ongoing on-site coaching. The first component of successful training includes giving trainees information about the theory of the skill or knowledge. Exploration of theory can take the form of readings, lecture, and/or discussions. The second component of successful training involves demonstration or modeling of a skill that can be displayed live with actual students, role played with adults, or shown via video clips. The trainees then need time to practice the skill being taught and receive direct performance feedback during the practice situation. Finally, since ongoing consultant or peer coaching has been shown to be effective in the transfer of training to the classroom setting, Joyce and Showers (2002) included this as an important component of an effective teacher training program.

On-going consultation or coaching, however, is costly and often not practical in school settings. After studying the effects of fluency training with paraprofessionals using direct instruction reading curricula with students with learning disabilities, O'Keefe (2009) concluded "Adding fluency practice to group training outside the implementation setting may enhance generalization and maintenance of skills, while being cost efficient, proactive, and sustainable in school settings" (p. 19).

Despite the evidence that lecture alone or lecture with demonstration and practice lead to little skill acquisition, retention, or application, many educational training opportunities consist of little to no practice. Additionally, the majority of training sessions are not followed by

ongoing classroom coaching. On-site guided practice or coaching by a trained consultant or by a peer is rarely provided most likely due to the fact that it is often cumbersome to coordinate and can be prohibitively expensive (O'Keeffe, 2009).

Instead of focusing on coaching after training sessions, perhaps a better focus would be on how to improve the retention and application from training sessions. The training research may be missing a critical element that is not discussed in the staff development and training research (e.g. Bennett, 1987; Cherrington & Middleton, 2008; Joyce & Showers; 2002). This important missing link is fluency.

Empirical Support for Fluency

Fluency training is an important component of a teaching technology known as *Precision Teaching* (PT) which was developed in the 1960s by Ogden Lindsley (Lindsley, 1992; Buklin et al., 1990; Binder, 1996). Lorbeer (2007) defined PT as "a learning monitoring system (which) has been used with learners of all ages to develop speed and accuracy, or fluency, in academic tasks" (p. x) Those who support PT believe that accuracy without speed does not lead to mastery. In addition, since fluent levels of performance leads to retention, endurance, and application, if skills are not fluent they will not be retained. Non-fluent skills will also not readily transfer to the work environment (Binder, 1990; Binder, 1996; Fante, 2008).

The effects of fluency have been studied to the largest extent within the educational field, although the proposed benefits of fluency are based primarily on applied programs, not on empirical evidence. There are, however, some important studies which have been conducted to lend considerable support for precision teaching and fluency (Bucklin et al., 2000).

The most commonly cited study showing the success of PT and fluency took place in the 1970s at the Sacajawea Elementary School in Great Falls, Montana. Over a 4-year period of time, some schools within the district offered their students 20-30 minute daily sessions of PT

while other schools did not. All the students within the school district, however, received similar instructional methods and curriculum. After receiving daily fluency training, the students who received PT scored between 19-40 points higher on standardized tests than the students who did not receive this intervention (Binder & Watkins, 1990; Bucklin et al., 2000; Fante, 2008).

Johnson and Layng (1992) also documented the success of fluency at the Morningside Academy in Seattle, Washington, a private school for students with learning disabilities. They described the usual scenario when a student arrives at Morningside after being unsuccessful in public school classrooms. It is not unusual for students entering Morningside to be gaining less than six months of academic progress per school year. With this lack of progress, students who enroll at Morningside are often several grade levels behind their same-aged peers. With direct instruction and PT technologies, students gain 2 to 3 years of academic progress per school year at Morningside. In fact, Morningside offers a money-back guarantee if students do not gain at least 2 years of growth in their weakest area in one school year. Since starting the school in 1980, less than 1% of tuition payments have been returned (Morningside Academy, 2011).

In addition to the success at Morningside Academy, Johnson and Layng (1992) also reported on a program using Morningside's method of instruction, which was piloted during the summer of 1991 at Malcolm X College. Students entering college in the fall of 1991 in need of remedial work in basic academic areas such as reading and math were invited to participate in this 6-week intensive course. In the six week session, students gained an average of two grade levels for every 20 hours of instruction (Fante, 2008), further supporting fluency as an important educational tool. Lorbeer (2007) also reported on the success of a similar annual summer program to prepare disadvantaged incoming college freshman at Jacksonville State University in Alabama.

Empirical support for fluency also exists in corporate training. According to Fante (2008), the published literature on fluency for staff or employee training is very limited. Dr. Carl Binder of Binder Riha Associates and colleagues documented two case studies showing the importance of fluency with employee training. In 1989, Binder and Bloom used a fluency-based training program within the banking industry. In this case study, banking trainees participated in a 2-hour coaching session where they learned about the basics of fluency and practiced fluency-building exercises. During the initial coaching sessions, some adults who had no previous experience being timed or practicing in an organized way initially experienced some "embarrassment, awkwardness and anxiety." With the help of the instructor who worked to "desensitize" these feelings, the participants quickly began to encourage and compete with fellow trainees (Binder & Bloom, 1989, p. 19). After the initial coaching session, trainees undertook a 4-week self-study program where they practiced stating banking product knowledge during fluency timings for a total of 10-15 hours. They were required to meet fluency aims as they learned about the banking service products. Post test results showed that the new trainees, who participated in the fluency training program, were able to correctly match banking services and statements of need 2.4 times faster than experienced bankers who had not completed the course (Binder & Bloom, 1989).

Similar benefits of using fluency-based procedures were also seen within a telephone company. In 2002, Binder and Sweeney documented a fluency program to improve the performance of employees in a customer call center of a wireless telephone company. Skills that were truly crucial for the job were defined and analyzed. These "need-to-know" component skills were taught to new hires in a different way. Prior to the fluency program implemented by Dr. Binder, newly hired employees spent 70% of their initial training time listening to lectures and 0% of the time on fluency practice exercises. With the implementation of the fluency

training program, only 25% of the training time was devoted to lectures, and more than half of the time was spent on fluency building exercises. Results from this training revealed that correct performance of the six trainees tripled each week on average. Qualitative results of the training package also indicated success:

> Traditional lecture-discussion-application training programs produced trainees who seemed familiar with but were overloaded by a huge amount of information: their general appearance by the end of the program was often passive, disengaged, and drained. In contrast, those completing the fluency program seemed engaged and proactive, aggressive in their motivation for performance and new learning, and remarkably fast moving in everything they did. There was no sense of fatigue or overload, quite the opposite of trainees who had completed conventional training. That energy and excitement transferred to their first weeks on the job, where they maintained the same pace, thus excelling at practically every task, including relatively complex applications and improvisations. For the first time, veteran representatives were asking new hires where to find certain information, and if *they* (the veterans) were going to be allowed to complete similar refresher trainings. (Binder & Sweeney, 2002, p. 19)

While the two Binder studies above were written as case studies and lack experimental control, these studies show the powerful effect fluency can have on employee training. A multiple baseline study was also published by Binder and two colleagues in 2005 (Pampino, Wilder & Binder, 2005) with four construction foreman. Prior to the fluency training, the foremen made frequent errors when reporting job codes. When analyzing the errors, the researchers determined that the foremen's errors were related to the lack of fluency in two different areas. The foremen had difficulty remembering the job codes and also were making

errors when typing the codes on a spreadsheet. After a fluency program was implemented, all four foremen improved their performance significantly (Fante, 2008; Pampino et al., 2005).

Fluency Research with College Students as Subjects

Three known studies have also been conducted using college students as the participants. These three studies compared the retention of information learned with fluency programs versus retention of information presented in more traditional training programs. Orlander, Collins, McArthur, Watts, and McDade (1986) studied the retention of pathophysiology information among two groups of nursing students after an 8-month period. One group of nine students attended pathophysiology lectures totaling three hours per week for the semester while the experimental group using precision teaching methods practiced self-paced fluency-based instruction in the place of lectures. Unannounced retention tests, given to both groups eight months after the course ended, revealed that the fluency group was more proficient with the information. This group was 1.8 times more accurate and 1.8 times more fluent than the students taught traditionally (Orlander, et al., 1986).

In the second study (Bucklin et al., 2000), thirty undergraduate students were randomly assigned to learn Hebrew symbols and Arabic numerals and to distinguish these from non-sense symbols. One group was required to learn the task with 100% accuracy with no time requirement, while the second group was expected to reach 100% accuracy with a time requirement. The fluency students retained more 16 weeks after the training and also performed better on an application task involving the symbols and numbers. One limitation of the study was that the number of practice trials was not controlled; therefore, it is uncertain whether the improvement of performance was due to the fluency focus or more practice (Bucklin et al., 2000; Fante, 2008).

The final study measuring the retention effects of fluency training utilized three groups of twenty college students per group. The dissertation by Fante (2008) compared the retention of automotive product knowledge among participants who were exposed to non-fluency web-based programming with and without objectives and web-based fluency programming. Post testing immediately following training and then again four weeks and eight weeks after training revealed that the students involved in the fluency group were more accurate and fluent compared to the students from either of the non-fluency groups immediately following the training and on both retention tests. Like other studies; however, practice was not controlled and the fluency group spent 10-20 minutes more than the other two groups studying the material. Training satisfaction was also low across all three groups as the information was highly technical and most likely irrelevant to their future careers (Fante, 2008).

Criticism of Fluency Studies

There has been criticism of fluency-based procedures by some who suggest that fluency procedures do not have enough empirical data to support their widespread use (Doughty, Chase, & O'Shields, 2004; Heinicke, Carr, LeBlanc, & Severtson, 2010). Furthermore, Heinicke, Carr, LeBlanc and Severtson (2010) reported that the premature use of fluency procedures occurred because these treatments were disseminated through professional conference presentations rather than through peer-reviewed journals. In addition, most peer-reviewed literature on the use of fluency in the autism field have consisted of single subject case studies which lacked experimental designs and did not include inter rater reliability measures.

Doughty, Chase, and O'Shields (2004) suggested that most fluency studies do not control for practice, time, or rate of reinforcement. This is a significant limitation of fluency studies as it is difficult to determine if increases in performances are due to fluency-building or due to more time, more practice trials, and/or reinforcement rates.

Heinicke et al. (2010) described some of the barriers to implementing and evaluating fluency-based procedures. One barrier discussed by the authors is that researchers usually collect percentage correct data *or* fluency data but rarely collect or analyze both. These authors recommend researchers use both traditional percentage correct testing and fluency measures in order to bridge the gap between researchers who value fluency as an important variable and those who are unfamiliar with its possible utility. To address this recommendation, both traditional percentage correct written testing and oral fluency testing calculated as correct responses per minute were used in this study. No other known fluency studies in the field of autism have incorporated this recommendation.

While the research on using fluency procedures to train adults to learn job related skills is limited, the staff training studies and the precision teaching research within the educational field support the use of fluency procedures to aide in acquisition, retention, and application of new knowledge and skills (Binder & Watkins, 1990; Bucklin et al., 2000; Fante, 2008; Kubina & Morrison, 2000).

The following case study illustrates how fluency procedures were used with success to train adults to intensively teach students with autism. This case study also provides the background information and preliminary data which were instrumental in the design of this study.

Case Study: Autism Staff Training

The staff training challenges involved in autism classroom consultation include the fact that many teachers and paraprofessionals vary greatly in terms of experience with and knowledge of applied behavior analysis and verbal behavior (ABA/VB). In addition, only some team members typically attend large group training sessions and, as stated previously, it is uncertain what skills and knowledge staff members who do attend the sessions are able to apply

once they return to their classroom settings. Consultants almost always have limited consultation time and differ in terms of experience in giving performance feedback to staff members. Most importantly, without systematized training procedures in place, staff behavior is not changed efficiently and, furthermore, subjective descriptions such as "she's such a good (or bad) teacher" persist.

In preparation for a presentation at the 2009 Applied Behavior Analysis International (ABAI) conference, a systematic staff training procedure was developed (Barbera, 2009b). Utilizing this three-step system, teachers and paraprofessionals were rapidly trained (usually within one hour) to intensively teach children with autism. Several individuals were utilized to develop the three-step system as it was uncertain at the beginning of this task what techniques would lead to mastery. A two-hour training consisting of lecture and live demonstrations was attempted first with eight paraprofessionals taking part in the training with pre and post multiple choice testing. The change in pre and post test scores was not significant. Furthermore, the eight paraprofessionals were confused by the information and appeared unable to transfer much of the information provided at the training into their everyday jobs.

The next training intervention analyzed the training of N.N., a Speech and Language therapy student assigned to a public school autism classroom. N.N. viewed portions of an Intensive Teaching DVD (Pennsylvania VB Project, 2007) and took the same ten question test (Appendix C) immediately before and after viewing a 20-minute portion of the DVD. N.N. viewed the DVD segments involving a description of each verbal and non-verbal operant with video demonstrations of each operant. Watching a 20-minute portion of DVD produced a significant increase in pre and post test scores increasing N.N.'s scores from 40% correct at baseline to 80% correct. However, after watching the video, N.N. was unable to orally name the operants correctly during timed sessions, scoring on average 4 corrects and 9 incorrects in

one minute. The fluent rate was later determined to be 20-25 correct per minute (Barbera, 2009b; Miklos & Dipuglia, 2010).

After these two training interventions proved unsuccessful, a 3-step system was developed with a major focus on role playing, performance feedback, and fluency. The knowledge and skill of one teacher and one paraprofessional who were fluent with Intensive Teaching (IT) procedures were analyzed. Naming the verbal operants accurately and quickly was determined to be "Step 1" as this skill was the first component skill deemed to be critical for the composite skill of IT. According to Binder and Sweeney (2002), fluency-based programs analyze the component skills needed to form a composite skill. These small component skills need to be fluent in order for the individual to be able to master a composite skill. The composite skill in this case was IT with the first component skill being to fluently name the operants.

Once the three-step system was developed and trialed on N.N. and a few other teachers and paraprofessionals, A.M. served as the main participant for the case study. A.M. was a newly hired paraprofessional who started working in an autism classroom one month prior. While A.M. had watched others teach children with autism for a few weeks, she was not proficient in any of the teaching techniques. Step 1 involved A.M. watching two adults (one playing the role of the teacher and one playing the role of the student) in a simulated IT session. The teacher would provide the command or question from a pre-written list (Appendix G) and the simulated student would respond. The trainee would then orally state the name of the operant the simulated student was saying or doing. For example, if the simulated teacher said, "Meow says a ____" and the simulated student filled in "cat," the trainee would need to respond "intraverbal" in order for that trial to be considered correct. If the teacher said, "Touch

your head" and the student followed the direction by touching her head, the trainee would be expected to respond "receptive."

Step 2 involved two parts: The first part of step 2, which was labeled Step 2a, involved training A.M. to teach skills errorlessly using the sequence: 0-second prompt, transfer, distracter, check. For example, if the student was taught errorlessly to label or tact car, the instructor would hold up a picture of a car and say, "What is it?" followed immediately by "car." This immediate prompt is known as a 0-second prompt. After the student said "car," a transfer trial was then presented. This transfer trial would include the instructor again asking, "What is it?" but during the transfer trial no prompting of the word "car" would be added. Between one and three distracters or known skills such as clap hands or touch nose would be presented followed by a check trial. The instructor would present the check trial by holding up the initial picture of the car being held up with the question,"What is it?"

During Step 2b, A.M. was taught to correct errors using the sequence: Error, 0-second prompt, transfer, distracter, and check. A.M. played the role of the teacher during both parts of this step and the trainer assumed the role of the student with autism. Eight flashcards consisting of two tacts, two intraverbals, two imitation tasks, and two receptive skills were provided, and a baseline was obtained by first directing the trainee to "teach these eight skills errorlessly" and then told, "I'm going to make an error on all of these and I want you to correct the errors." A correct "run-through" was considered if the proper sequence was utilized with the aim being five or more correct run-throughs per minute. Training staff on this sequence enabled them to learn how to correct errors made by students with autism since students who correctly respond on a regular basis will progress more rapidly than students who give incorrect responses.

The training and fluency sessions took place in a small therapy room and involved the trainee practicing skills to fluency with an adult who played the role of the student with autism.

Role playing is a type of simulation activity commonly used, described, and researched in the medical education literature. Simulation activities such as live role playing are often used to teach medical and nursing students communication and technical skills (Nikendei et al., 2005). When training adults to work with students with autism, role playing with adult trainers instead of working with students with autism has several advantages. First, simulating activities with an adult will not cause harm to a student if the trainee makes errors. During the baseline testing before any teaching as initiated on steps 2a and 2b described above, A.M. made errors throughout the 1-minute baseline timings. If an actual student with autism would have been utilized, this could have had a negative impact on the student. Second, the adult actor or trainer is able to give the response required and is able to accept prompts given by the trainer. A student with autism, on the other hand, is often unpredictable, even if the teaching techniques are performed correctly. Third, the adult will not engage in problem behaviors during the training activity so component skills can be taught more efficiently.

Step 3 was the final step in the training package. This involved the trainee serving as teacher and the adult trainer playing the role of the student with autism. A 1-minute simulated intensive teaching session was run with two pre-selected "target skills" which needed to be taught errorlessly. The trainer, playing the role of the student, responded correctly to some of the tasks correctly but made at least three errors which the trainee needed to correct using the appropriate error correction procedure. The aim was five correct run-throughs per minute and A.M. mastered this step immediately without further training.

A.M. was able to retain the information on naming the verbal operants after the aim was raised from 15/minute to 20/minute. At 15 correct per minute, naming the operant task, a skill that A.M. did not use on a daily basis, was not maintained. At 20 correct responses per minute; however, the skill was maintained after a 4-week period. The use of the proper sequences for

errorless teaching and error correction procedures were utilized by A M. on a daily basis and generalized well across students and materials. These skills were easily maintained after a 4 week interval.

The findings of the case study revealed that lecture alone, as well as watching a DVD of lecture plus demonstration, produced some increase in knowledge but no ability for participants to fluently name the operants or teach intensively. A systematic three-step procedure was developed and implemented in less than one-hour with the main participant. While fluent levels on naming the operant tasks were not maintained with the aim of 15 correct per minute, knowledge was maintained when the aim was raised to 20 or more correct responses per minute. Errorless teaching and error correction procedures were well-maintained and generalized for A.M.

Since conducting the case study in 2008, this author has also piloted the 3-step procedure with approximately 25 additional teachers, paraprofessionals, and parents. While much of the focus of the original case study and expanded pilot were on quantitative data, there were qualitative data obtained. Many people trained since 2008 have displayed a wide range of emotions prior to the training, during the training procedure, immediately following the training, and weeks later. Some individuals were angry that they had to take a pre-test, embarrassed that they did not know the information, nervous about being timed, and anxious that they would not do well. A few people were even openly hostile at the outset of step 1 and one paraprofessional, with her arms crossed, stated "I don't see any reason I have to learn this." The vast majority of the trainees; however, were elated when they met the fluency aims and relieved to be done with the training. Many who were approached weeks or months after training stated that they were shocked that they learned the information so quickly and surprised that they were able to retain

the information with relative ease. A few participants reported that this had been the best training they had ever received.

In a recent interview with K.R. (personal communication, April 5, 2011), one of the 25 individuals who were trained using the 3-step procedure, who is now a trainer for a private ABA/VB agency near Philadelphia stated:

> Our agency has been using the 3-step procedure as an initial training for over a year. During the training session staff are trained to fluency on naming the operants and then trained on errorless teaching and error correction procedures. We have trained over 50 staff members using this procedure and all have been able to be trained to fluency! Of note, many of our new staff members are already BCBAs or ABA students pursuing their BCBAs. All have shared that they do not ever receive this level of training during their courses. In fact, we consistently receive feedback that this is the best training ever attended. Candidates feel they have learned more in the two hours we spend with them than over years of schooling, which is a compliment to the level of effectiveness of the 3-Step Training Procedure.

As Binder (1996) suggested, "Fluency represents a new paradigm in the analysis of complex behavior and the design of instruction" (p. 165). It is long overdue to focus on fluency as we develop and provide training sessions.

Summary

In Chapter Two a leadership model was presented to support the study on the effects of a fluency-based autism training on emerging educational leaders. First, the concept of teacher as leader was reviewed. It was suggested that emerging educational leaders utilize both a servant leadership approach since they need to foster strong relationships with students, parents, and other educators as well as an operant leadership approach as they manage tasks and procedures.

Since emerging educational leaders need both approaches, this chapter provided a rationale for utilizing a combined servant-operant leadership approach as a framework for the development of effective training procedures. The empirical support for fluency-based procedures and a case study on staff training on autism were also presented.

In the three remaining chapters, the methodology of the study will be described followed by a presentation of the results, discussion, conclusion, and recommendations for further research.

CHAPTER 3: METHODOLOGY

As demonstrated in the literature review, it was clear that more research was needed in many areas related to autism and the broad leadership implications regarding training in all fields. The servant-operant leadership approach provides a unique umbrella to test a very important issue regarding training. The efficient use of resources requires emerging leaders to understand new techniques and procedures that lead to better resource utilization. Since this is the first known experimental study analyzing the phenomenon of training on verbal behavior using fluency procedures and because participants could not be randomly assigned, a quasi-experimental design was selected.

Design

Since the 3-step VB training procedure described in chapter two had previously only been studied in a case study format and then informally piloted with 25 different individuals, studying one part of the 3-step procedure in a more rigorous format using a quasi-experimental design was the next logical step in developing empirical evidence in this field.

This study investigated whether skill acquisition oral correct responses per minute, application oral correct responses per minute, written percentage correct retention rate and/or oral retention correct responses per minute were dependent on participation in the experimental or the control group. A Multivariate Analysis of Variance (MANOVA) statistical procedure was selected to provide the evaluation. A MANOVA was chosen since this design tests for significant differences between the groups when there are two or more dependent variables (Mertler & Vannatta, 2005). Mertler and Vannatta (2005) suggested that considering more than one dependent variable was recommended since almost all worthwhile treatments would most likely affect subjects in more than one way.

According to Grimm and Yarnold (1995), MANOVAs address complex research questions and are increasingly popular. They stated, "The days of measuring a single dependent variable in a simple, between- groups design are quickly passing" (p. 1). A MANOVA procedure applied to a study with three dependent variables, for example, yields one test statistic. This is due to the fact that the MANOVA combines the three dependent variables in such a way that a new variable, known as the "linear composite" is established (Grimm & Yarnold, 1995, p. 4). By using a MANOVA with more than one dependent variable, instead of conducting separate one-way ANOVAs, a reduction of the risk of a Type 1 error occurs. A Type 1 error occurs when several one-way ANOVAs are conducted leading to what appears is significance between the groups at the normal alpha value of .05 but in reality there is no significant difference. With Type 1 errors, the null hypothesis is mistakenly rejected (Grimm & Yarnold, 1995; Pallant, 2007). MANOVAs can be one-way (with one independent variable), two-way (with two independent variables) or higher order factorial designs (Pallant, 2007).

A MANOVA has several assumptions including: fairly substantial and equal sample sizes among comparison groups, normality, few outliers, linearity and homogeneity of variance-covariance (Mertler & Vannatta, 2005; Pallant, 2007). The minimum sample size for a MANOVA is determined by the number of dependent variables. There must be more cases in each cell than there are dependent variables (Pallant, 2007). Mertler and Vannatta (2005) and Tabachnick and Fidell (2007) both suggested 20 in each cell as an appropriate sample size. Scatterplot graphs, histograms, skewness and kurtosis values, and Q-Q plots can all be used to test the assumptions of normality and linearity as well as to determine if outliers are a concern. Finally, the Box's M Test determines possible violation in the homogeneity of variance (Garson, 2011; Mertler & Vannatta, 2005). These assumptions will be checked and discussed further in chapter four.

In this study, there was one independent variable (experimental or control group). Therefore, a one-way MANOVA was chosen. Four dependent variables were studied including fluency level per minute using oral test 1 at the end of training, application rate using oral test 2 at the end of training, written percentage correct retention rate using written test 1, and oral rate retention correct responses per minute using oral test 1 during the retention phase of the study two to three weeks after training.

After the MANOVA test statistic is performed, post hoc testing will be completed. One-way Analysis of Variances (ANOVAs) will be used in post hoc testing to further analyze each dependent variable separately. According to Pallant (2007), separate one-way ANOVAs can be done as a follow-up to a MANOVA to determine where the significant differences lie. An ANOVA is a test used with one dependent variable to "compare the variance *between* groups (believed to be due to the independent variable) with the variability *within* each of the groups (believed to be due to chance)" (Pallant, 2007, p. 242). A large F ratio, Pallant (2007) suggested indicates high variability between groups and low variability within groups. This suggests that the variability between the groups is related to the independent variable and not due to chance.

Hypotheses

The following five hypotheses were utilized:

Null Hypothesis 1: There is no difference in the post-training fluency score means between experimental and control group participants.

Alternative Hypothesis 1: There is a difference in the post-training fluency score means between experimental and control group participants.

Null Hypothesis 2: There is no difference in the mean application rates between experimental and control group participants.

Alternative Hypothesis 2: There is a difference in the mean application rates between experimental and control group participants.

Null Hypothesis 3: There is no difference in the mean written retention rates between experimental and control group participants.

Alternative Hypothesis 3: There is a difference in the mean written retention rates between experimental and control group participants.

Null Hypothesis 4: There is no difference in the mean oral retention rates between experimental and control group participants.

Alternative Hypothesis 4: There is a difference in the oral written retention rates between experimental and control group participants.

Null Hypothesis 5: There is no relationship between post-test fluency rates, application rates, written retention rates and/or oral retention rates.

Alternative Hypothesis 5: There is a relationship between post-test fluency rates, application rates, written retention rates and/or oral retention rates.

Participants

The Institutional Review Board (IRB) at Alvernia University approved study number 0410-111 on September 28, 2010. A visual chart detailing the steps of the entire study is available in Appendix A.

After the IRB approval was obtained, participants were recruited by the researcher who attended the four targeted classes. To aid the reader in understanding in the design of the study, and the steps of the recruitment phase, a visual display is provided (Figure 1).

The four targeted classes were taught by three professors who had given permission to recruit students from their classes. These professors and courses included: Dr. Mary Schreiner for the *Educators as Researchers* course; Dr. Margaret Dougherty for both *Educators as*

Researchers and *Principal Internship* and Ms. Anne Douglas for her class, *Issues Concerning Special Education Programs*. All four classes met on four different evenings for 2 hours and 20 minutes each, and this amount of time was anticipated to be needed to complete the teaching session during one class period.

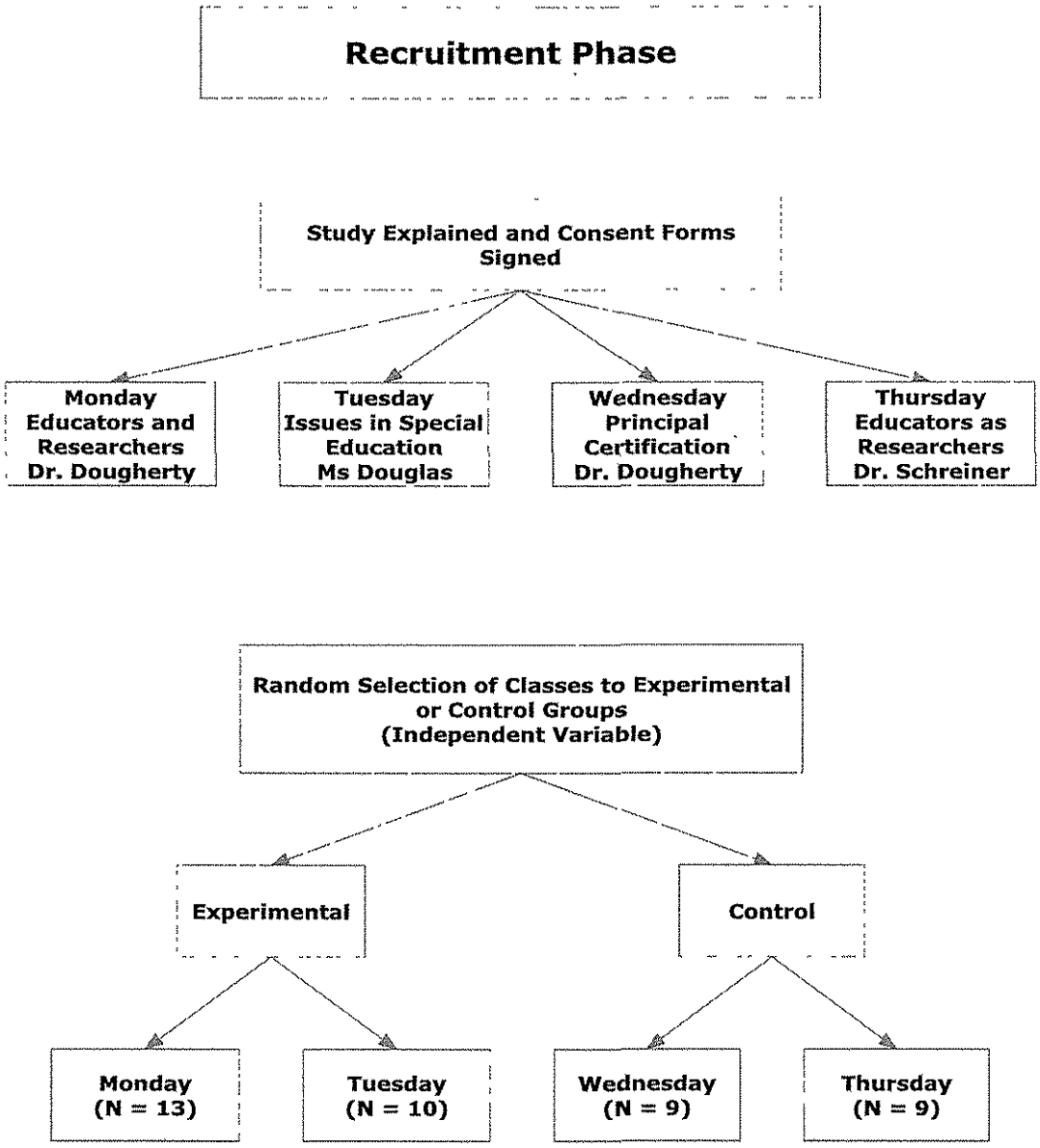


Figure 1. Visual representation of recruitment phase.

The professors who agreed to allow their classes to be part of the study believed that the opportunity to participate in doctoral research would be beneficial to their students. By participating in this controlled study, the emerging educational leaders in the control group would be exposed to a one-hour lecture on verbal behavior while the experimental group would receive hands-on fluency-based procedures to learn about verbal behavior.

The participants were current teachers pursuing master's degrees in education, principal certification and/or certification in special education. All participants could potentially use the information they learned in the study in the future with children with autism and other disabilities. All graduate students who agreed to participate would also experience many aspects of the research process including being exposed to the consent form procedures, witnessing inter rater reliability data being collected, and observing the researcher's concern for timing of the study and for the control of extraneous variables.

Two of the four classes were randomly selected by the researcher picking an "E" out of an envelope to be part of the experimental group, and the two other classes were selected by picking a "C" out of an envelope to be part of the control group. The courses meeting on Monday (*Educators as Researchers* with Dr. Margaret Dougherty) and Tuesday evenings (*Issues Concerning Special Education Programs* with Ms. Anne Douglas) were randomly selected to make up the experimental group. The classes which met on Wednesday (*Principal Internship* with Dr. Dougherty) and Thursday (*Educators as Researchers* with Dr. Mary Schreiner) evenings made up the control group.

The criteria for participation in the study were the following: 1) enrollment in one of four graduate level education classes chosen to participate in this study and 2) willingness to voluntarily participate. No compensation was provided. During a 15-minute recruitment period in each of the four classes, a brief overview of the study was presented. Participants were advised

that there would be no payment for participation and that the risks were minimal. The only known risk anticipated and disclosed was that during the study or testing, the participants might feel anxious or embarrassed during individual or group testing. To ease these feelings, it was conveyed during the recruitment process that no participant would be told their scores, and no test results would be shared with their professors. All students who agreed to participate were asked to sign the consent form (Appendix B). During the recruitment time, two participants disclosed that they were taking two targeted evening classes. One male participant chose to participate on Wednesday evening instead of the Thursday evening class, and one female student chose to participate on Tuesday evening instead of Monday evening. These two students were excused from one class each so they would not be exposed to more than one training session.

After the recruitment phase was completed, the main study phase which included the experimental or control training was delivered within a three week period. Students who chose not to participate in the study were given an alternative assignment for the study date or sat through the study but did not participate in the testing procedures. Participants who chose not to participate were not penalized in any way by the researcher or the professor.

Procedures: Main Study Phase

Figure 2 provides a visual flow chart of the main study phase. At the beginning of the training session, participants randomly selected a participant number out of an envelope. When they selected the slip of paper from the envelope with their participant number, they were instructed to list their age and years of teaching experience on the paper and this was collected by the research assistant.

Each participant was instructed to write their participant number on their copy of the consent form and to have this number available at all classes during the following month. As a backup, participants also wrote their names and participant number on a sheet of paper that was

passed around the class. This paper was kept in a sealed envelope and was handled and opened only by the research assistant. During three out of the four classes, one participant needed to utilize this backup system during retention checks.

All training and testing sessions were held in a classroom or an office at Alvernia University. Three of the four classrooms were in held in a newly renovated graduate education center with long conference tables with 4 students sitting at each table. In this building, students were tested individually after the 1-hour training sessions in an office area with a desk and three chairs. The fourth class was held in an older building. During the training and group written testing time periods, students were seated at individual desks. In this building, testing was completed in an empty classroom across the hall from the regular classroom. The door was closed for all testing to prevent other students from hearing and to protect each participant's privacy. Students were tested in order of their randomly selected participant numbers. All training sessions and testing were presented by the researcher with a Board Certified Behavior Analyst (BCBA) serving as a research assistant present at all times.

Three BCBAs volunteered and were scheduled to serve as research assistants (RAs) during the study. Each research assistant received individualized training until there was 100% interrater reliability in a simulated testing session. Interrater reliability is defined as "the extent to which two or more individuals evaluating the same product or performance give identical judgments" (Leedy & Ormrod, 2010, p. 93). One research assistant served as the simulated student with autism during all the individual tests. The research assistant took interrater reliability data during all the oral tests (dependent variable) and also obtained treatment integrity data during the four 10-minute training sessions.

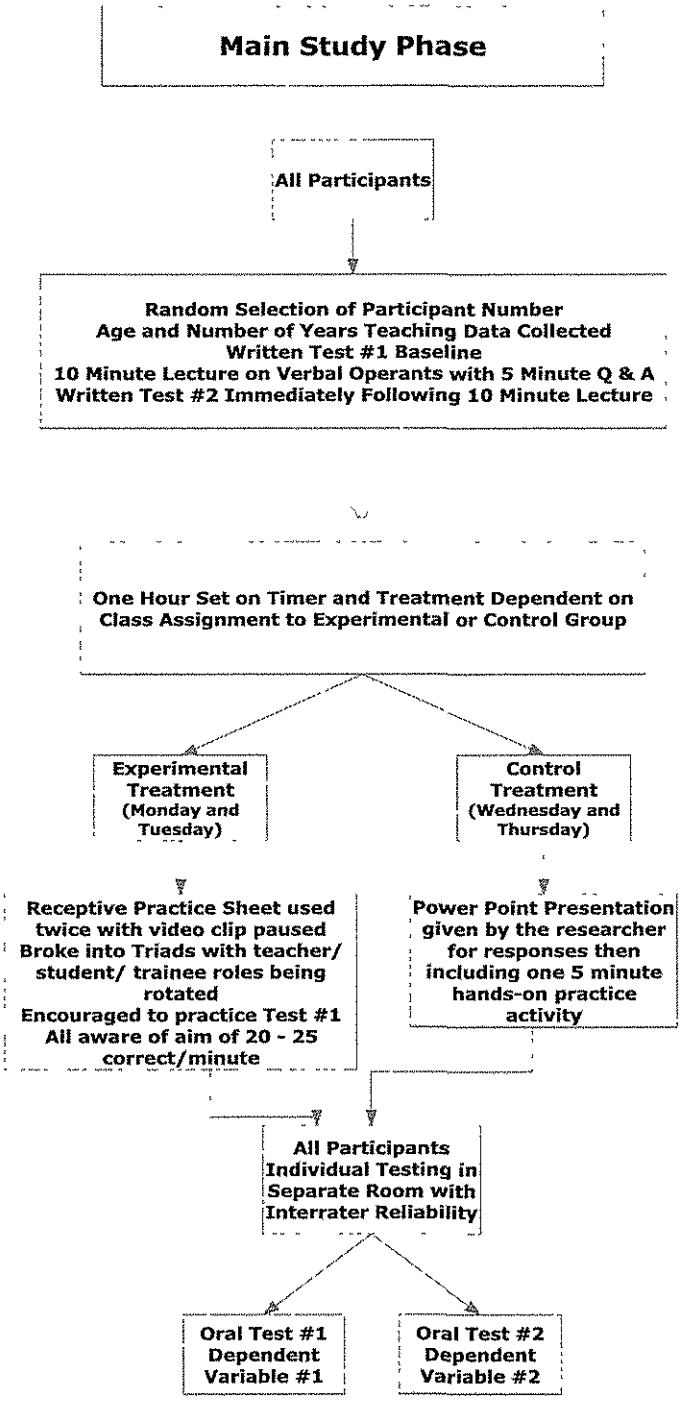


Figure 2. Visual representation of main study phase.

After the participants turned in their demographic information, all participants received written test number 1 (Appendix C) to determine a baseline score (W1 BL) followed by a short

(10 minute) lecture on the verbal and non-verbal operants given by the researcher with examples and demonstrations of each operant. The research assistant completed treatment integrity during this 10 minute training for all four classes (Appendix D). During the training, the researcher utilized two handouts (Appendices E and F). After 10-minutes of lecture time, there was a 5-minute period where the participants had the opportunity to ask questions. The same written test was given to the participants after this short training. This is referred to as Written Test 1 after training (W1 AT).

The experimental group then received one hour of fluency training on the procedure to orally name the verbal and non-verbal operants. After a review of the basic principles taught, the participants watched a youtube video (Barbera, 2010) with the researcher and a 12 year-old child without autism in a simulated teaching session. It should be noted that verbal operant staff training youtube clips, posted in May, 2010 by the researcher, were made unavailable to the public during the fall 2010 semester to avoid any participant being able to locate the clips and practice.

During the experimental class, the video was played for one trial. For example, the youtube clip illustrates the researcher saying "touch the grapes" while the simulated student touches the grapes. After the simulated student touched the grapes and then after each response, the researcher paused the video so that the participants could complete the practice sheet (Appendix G). While the clip was paused, the researcher explained each answer before playing the next part of the clip and answered any questions of the participants. The 1-minute video clip was played twice using the same procedure.

Next, the experimental participants were told to select students sitting nearby and to sit in groups of three. They then practiced the procedure with one participant serving the role of the teacher, one serving in the role of student, and one participant in each triad being trained to name

the operants. The researcher and research assistant assisted the triads in order that each participant practiced with the goal of orally naming the operant using script 1 at 20-25 per minute both going forward and backward on the script.

The control group received the first 10-minute teaching session in the same manner as the experimental group. They were also assessed with the same written test before and after the training, but they did not receive the same hands-on fluency training for one hour. Instead they received a live 1-hour presentation with power point slides (Appendix H) on verbal behavior. During the 1-hour lecture, a 5-minute hands-on small group verbal operant activity was included which involved a review of the verbal operant material presented during the 10-minute lecture (slide 15) as well as five minutes to complete the activity (slide 16) with one or two classmates and discuss each correct answer with the class.

After the 1-hour training time elapsed, each participant from both the experimental and control groups was individually tested outside of the classroom on the oral naming test in order of their participant number. During these oral tests, the researcher served as the teacher and the research assistant served as the simulated student. The researcher used oral test 1 (O1) (Appendix I) and told the trainee to name the operant displayed by the research assistant. The timer was set for one minute. The study participant was required to orally state the operant. If the trainer said "touch nose" and the research assistant touched nose, the trainee needed to say "receptive" in order for that trial to be marked correct. If more than 3 seconds elapsed between the operants, the teacher counted this as an error and moved to the next operant. Self-corrections were counted as errors. All participants received a second oral test (O2) (Appendix J) which measured application for the experimental group since they practiced the first oral script during the training.

After the participants were tested, the main part of the study was completed for that class. The participants were not permitted to take any materials or notes from the session. Each participant was also instructed not to review any information in between sessions or discuss the information with fellow students.

Procedures: Retention Phase

The last session occurred two weeks after the training for the Monday evening class (experimental) and Thursday evening (control) class and three weeks after the training sessions for the other two classes. Because of class schedules and previously scheduled activities, one of the control groups and one of the experimental groups needed to meet for the retention phase two weeks after the main study night and the other control group could only meet with the researcher three weeks after training. To control for this variable, the final experimental group class whose professor was flexible with scheduling, was slotted for the retention phase three weeks after training. Further analysis of the differences between two and three week retention was not planned due to the sample sizes within each class being too small which would have violated the sample size requirements for the MANOVA.

A visual display of the retention phase is provided in Figure 3. The retention sessions for all four classes began with the same written test referred to as Written Test 1 retention (W1R) (Appendix C) which was given to each participant within class. A new written test (W2R) (Appendix K) not previously used was administered to measure reliability of the instruments. These two written tests were followed by the two oral tests (Appendix I and J) given individually outside of the classroom with a research assistant serving as the simulated student. These oral tests were coded as O1R and O2R. The participants did not receive any feedback regarding their scores. A data collection form (Appendix L) was utilized to keep all information from the testing organized and available for review. After the retention data was obtained in all four

classes, each of the three instructors was given thank you letters (Appendix M) to distribute to participants.

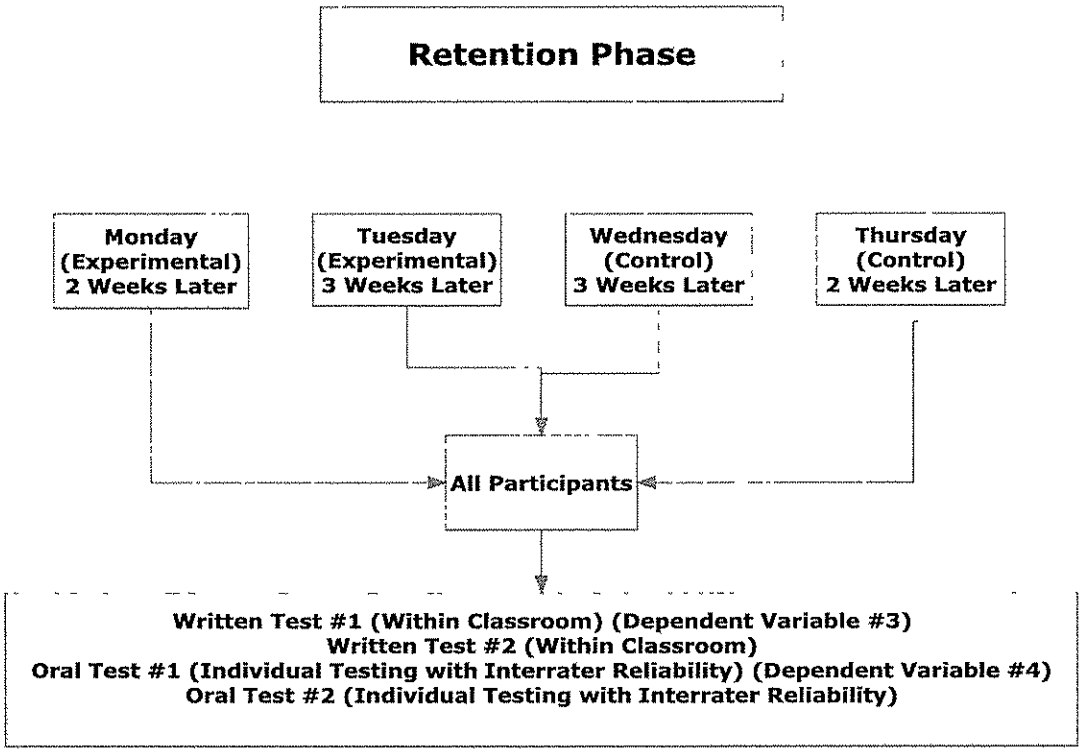


Figure 3. Visual representation of retention phase.

Once the data were collected, PASW Statistics 18.0 (Norusis, 2010) was utilized to analyze the data. Significance levels for all dependent variables were obtained in order to accept or reject the null hypotheses. A discussion of the results, limitations and ideas for future research follows.

CHAPTER 4: RESULTS

In this chapter, the results are presented addressing the research question: Do emerging educational leaders learn, apply, and/or retain more verbal behavior information when they receive fluency-based training versus training without an emphasis on fluency? Demographic information about the participants is first reported followed by the quantitative analyses addressing the hypotheses. The complete PASW data set is included in Appendix N.

Demographic Data

The participants in the study consisted of students in Masters of Education courses at Alvernia University who were enrolled in at least one of the four targeted classes. The four classes yielded 48 total potential participants. Four students chose not to participate and one student who signed the consent withdrew from the class in between the recruitment phase and the main study night. While 43 students completed the initial questionnaire and took part in the main study night, two participants (one experimental and one control) withdrew from the study immediately after the training before oral testing. One participant in the Tuesday evening experimental group class withdrew from the study before individualized oral testing began due to stress and anxiety which will be discussed later. The other control group participant who withdrew was late for class and subsequently missed the baseline written testing. This led to her needing to withdraw from the study as well.

Two students in the experimental group who participated in the main study night did not attend the class during the retention phase. The study ultimately included skill acquisition, application, and retention data from 39 participants. The experimental group consisted of 21 participants with 13 from Monday evening and 8 from Tuesday evening classes. The control group included 18 individuals with 9 from Wednesday and 9 from Thursday evening classes.

The participants provided their age and years of teaching experience. As shown in Table 1, the 39 participants in all four classes making up the experimental and control groups ranged in age from 26 years old to 58 years old with a mean age of 38. Years of teaching indicated that the mean length of teaching was 8 years with a range of 0 years of teaching to 29 years of teaching. Selected descriptive statistics regarding age and years of teaching are provided in Table 1.

Table 1

Age and Years of Teaching Experience for all Participants

Variable	Min.	Max.	*M*	*SD*
Age	26	58	38.13	9.32
Years Teaching	0	29	8.10	5.88

Note. $n = 39$.

Baseline Results

A one-way ANOVA was completed to compare the experimental and control group in terms of accuracy on a baseline written 10 question test (W1 BL) (Appendix C) and the same written test taken immediately after a 10-minute lecture that both the control and experimental classes received (W1 AT). Table 2 visually displays that only one of the 39 participants scored higher than 0 on the baseline 10-question written test and that person scored 20% correct. These data indicate the participants all began with no working knowledge of naming the operants and all scored significantly better after a 10-minute brief lecture with the mean of the control group slightly higher ($M = 60\%$) than the experimental group ($M = 57.1\%$).

Table 2

Comparison Between Groups on Baseline and Post 10-minute Lecture

Variable	*n*	Min. % Correct	Max. % Correct	*M* % Correct	*SD*
Written Baseline (W1 BL)					
Control	18	0	0	0	0
Experimental	21	0	20	0.95	4.36
Written Test After 10 min (W1 AT)					
Control	18	20	100	60.0	28.49
Experimental	21	10	100	57.1	23.48

Note. $n = 39$.

Table 3 displays no significant difference between the experimental and control groups on their baseline testing ($F(1, 37) = .854$, $p = .361$) or on the written test ($F(1, 37) = .118$, $p = .733$) they completed after both groups received the same 10-minute lecture on the verbal operants. Data output from PASW is included related to the baseline testing and testing immediately following the 10-minute lecture for both groups in Appendix O.

Table 3

One-Way ANOVA's Comparing Scores on Baseline and Post 10-Minute Lecture

Variable	*F*	*p*
Written Test 1 Baseline (W1 BL)	.854	.361
Written Test After 10 Min. Lecture (W1 AT)	.118	.733

Note. $n = 39$.

To assess normality between the experimental and control groups, one-way ANOVA tests were conducted for age and written test 1 after teaching. Age was selected as a broad demographic category. As shown in Table 4 and previously discussed, there were no significant differences between the experimental and control group in terms of age ($F(1, 37) = .025, p = .874$).

While 38 out of the 39 participants scored 0 on the baseline testing, written test 1 after the 10-minute lecture was chosen as a better indicator in determining if the groups were similar based on their ability to comprehend the information prior to the experiment. The level of comprehension of the verbal behavior information presented in a 10-minute lecture format prior to the experimental and control treatments. showed no significant difference between the participants in the two group ($F(1, 37) = .118, p = .733$) Skewness and kurtosis levels displayed in Appendix P indicate normal distribution with skewness values for age and written test scores post lecture falling within -1 and +1 and kurtosis values well within -2 and +2 (Garson, 2011; Maxwell & Delaney, 2004).

Table 4

One-Way ANOVA's Comparing Age and Written Test Post 10-min. Lecture Between Experimental and Control

Variable	*F*	*p*
Age	.025	.874
Written Test After 10 Min. Lecture (W1 AT)	.118	.733

Note. $n = 39$.

Cronbach's Alpha

While written test 1 (Appendix C), written test 2 (Appendix K), oral test 1 (Appendix I) and oral test 2 (Appendix J) were previously used in training situations and piloted with over 25 teachers and paraprofessionals, no reliability tests were calculated prior to this study. In order to assess reliability of the overall scales, Cronbach's alpha coefficients for overall scales were computed and are available in Table 5. According to Pallant (2007), Cronbach's alpha (α) coefficient should be above .7 and ideally higher than .8 to indicate that the instruments used are reliable. As shown in Table 5, for oral test 1 and 2 immediately after training, these scales had high reliability ($\alpha = .93$). Written tests 1 and 2 were also very reliable ($\alpha = .93$), as were oral tests 1 and 2 during retention checks ($\alpha = .97$). These data indicated that if a participant scored poorly on written test 1 during retention, he also scored poorly on written test 2 which was administered immediately following written test 1. Similarly, the oral tests appeared to measure the same knowledge and were reliable.

Table 5

Cronbach's Alpha on Oral and Written Tests

Tests	*Cronbach's Alpha*
Oral Tests 1 and 2 (O1 and O2)	.93
Written Tests 1 and 2 Retention Phase (W1R and W2R)	.93
Oral Tests 1 and 2 Retention Phase (O1R and O2 R)	.97

Note. $n = 39$.

Interrater Reliability

Three Board Certified Behavior Analysts (BCBAs) served as research assistants during the main study and retention check class periods. Prior to the study, the three BCBAs received

individual training from the researcher on recording treatment integrity data on the 10 minute training using Appendix D. Next the BCBAs were taught how to serve in the role as a student with autism and to record in short hand what each participant said after each trial during oral testing. For example, when the researcher said "touch the grapes," the research assistant needed to touch the picture of the grapes and then record "R" if the participants gave the correct answer of "receptive" or record a "T" or "E" if the participant incorrectly answered "tact" or "echoic." The researcher always served in the role of the simulated teacher and also recorded an initial to indicate the responses of each participant.

After the study was completed, the individual written and oral tests were graded with a "C" for correct or an "X" for incorrect. Number of corrects from the researcher's data sheet were compared to the number of corrects from the researcher assistant's sheet. Agreement was calculated by dividing the smaller total by the larger total of agreements for each participant in each of the four oral tests. The mean interrater reliability agreement across three research assistants and all participants was 97.8%.

MANOVA

As previously discussed, there was one independent variable (experimental or control group) and four dependent variables including correct responses per minute on oral test 1 and oral test 2 during the main study phase immediately following training, as well as percentage correct on written test 1 and correct responses per minute on oral test 1 during the retention phase. Because of multiple dependent variables, a one-way MANOVA was chosen. Several assumptions need to be checked before proceeding with the MANOVA. These include: fairly substantial and equal sample sizes among comparison groups, few outliers, normality, linearity, and homogeneity of variance-covariance (Pallant, 2007).

As described in the demographic data above, the control and experimental groups were randomly selected by class. Two classes were combined for the experimental group and two others were combined for the control group to meet the first assumption of fairly equal sample sizes. According to Tabachnick and Fidell (2007), a sample size of at least 20 per cell is appropriate for a MANOVA and this number should ensure robustness.

To check the assumption regarding few to no outliers, Box plots and the 5% Trimmed Means were utilized. Box plots for all of the tests displayed similar patterns with few to no outliers in either of the groups for all four tests. Box plots for all of the dependent variables are available in Appendix Q. For oral test 1, there was one outlier (participant number 10) from the control group and one outlier from the experimental group (participant number 38). There were no outliers for oral test 2 or for the written retention test and there was one outlier (participant number 18) in the control group on oral retention test. The 5% Trimmed Mean is another method for assessing whether outliers are of concern. The 5% Trimmed Mean is the calculated mean when PASW removes the top and bottom 5% of the cases (Pallant, 2007). If the 5% Trimmed Mean is similar to the Mean, this indicates that outliers are not a concern. In this study, all of the 5% Trimmed Mean Scores were almost identical to the means. For example, the 5% Trimmed Mean Score for oral test 1 for the experimental group was 21.48 while the actual mean for the experimental group was 21.19. As indicated in the box plot graphs as well as through the use of the 5% Trimmed Means, there were few to no outliers, therefore, the assumption regarding outliers was met.

The Q-Q plots and histograms included in Appendix R show that the data appear to be normal with few to no outliers. In the Q-Q plots, if the points are close to the straight line the data is normally distributed (Mertler & Vannatta, 2005). In addition to Q-Q plots, Maxwell and

Delaney (2004) suggested that the use of histograms is also an acceptable method for assessing normality. Based on these data, the assumption regarding normality is met.

Linearity is the next assumption that needs to be assessed as part of a MANOVA. Three scatterplot graphs included in Appendix S show one dependent variable on the X axis and another on the Y axis. The scatterplot graphs shown compare oral test 1 with oral test 2, oral test 1 administered during the main study night with oral test 1 during retention testing, and written test 1 with oral test 1 both administered during the retention phase. In all three of the scatterplot graphs, there is a positive linear relationship between the dependent variables. For example, most participants who scored high on correct responses per minute on oral test 1 also scored high on oral test 2. The written and oral retention tests also showed a positive linear relationship.

The Box M test of Equality of variances is used to assess whether the co-variances are equal. This information is included in Table 6. Since $p < .001$, this indicates that the co-variances are not equal and the null hypothesis related to equality of variances is rejected. According to Mertler and Vannatta (2005), "if the assumption of equal variances is violated, use Pillai's Trace" (p. 126). The Box M Test indicated a significance value of .001 indicating that the homogeneity of variance was violated. Since the null hypothesis using Box M was rejected, Pillai's Trace was used as the test statistic.

Table 6

Box's Test of Equality of Covariance Matrices

Box's M	*F*	*df1*	*df2*	*p*
34.70	3.058	10	6173.9	.001

Note. $n = 39$.

Since the assumptions are met, the use of a MANOVA is appropriate. As shown in Table 7, the MANOVA results show a significant difference ($F(4, 34) = 56.88, p < .01$) between the control group and the experimental group when all four dependent variables were combined.

The multivariate tests (Table 10) for Pillai's Trace indicates significant group differences. Pillai's for experimental versus control group is .870, $F(4, 34) = 56.88$ with $p<.001$. The PASW output is included for the MANOVA in Appendix T.

Table 7

Multivariate and Univariate Analyses for Measures

	MANOVA		ANOVA			
			O1[b]	O2[b]	W1R[b]	O1R[b]
Source	*df*	*F*[a]				
Both Groups	4	56.88***	234.17***	100.48***	8.16**	9.81**

Note. $n = 39$. O1 = Oral Test 1; O2 = Oral Test 2; W1R = Written Test 1 Retention; O1R = Oral Test 1 Retention. Mulivariate F ratios were generated from Pillai's statistic. [a]Multivariate, [b]Univariate, $^{**}p < .01$. $^{***}p < .001$

The MANOVA showed significant differences between the control and experimental groups when the four tests were combined. By examining the Analysis of Variance (ANOVA) results displayed in Table 7, there were also significant differences for oral tests 1 ($F(1, 37) = 234.17, p < .001$) and oral test 2 ($F(1, 37) = 100.48, p < .001$) on the main study night as well as significant differences for written retention test 1 ($F(1, 37) = 8.16, p < .01$) and oral retention test 1 ($F(1, 37) = 9.81, p < .01$) given to participants two to three weeks after the training sessions. While the MANOVA showed overall significance between the experimental and control groups when the dependent variables were combined, post-hoc testing was needed to determine the

significance of each of the four dependent variables. This was accomplished using the ANOVA results. Appendix T contains the data output for the MANOVA and ANOVAs.

Hypothesis Testing

Four dependent variables were studied including fluency level per minute using oral test 1 at the end of training, application correct responses per minute using oral test 2 at the end of training, written percentage correct using written test 1, and oral correct responses per minute using oral test 1 during retention checks two to three weeks after training.

For all five hypotheses in this study presented in chapter 3, the null hypotheses were rejected and the alternate hypotheses were accepted. The following are the hypotheses that were accepted with the data to support rejection of the null hypotheses for each.

Hypotheses 1 and 2: Comparison of Post Training Fluency and Application Rates

The first alternate hypothesis was: There is a difference in the post-training fluency score means between experimental and control group participants. This hypothesis was accepted and is supported by the data displayed in table 7 and 8.

Table 8

Mean Scores and Standard Deviations for Skill Acquisition (Oral Test 1) and Application (Oral Test 2)

	Tests			
	Acquisition		Application	
	Oral Test 1		Oral Test 2	
Group	*M*	*SD*	*M*	*SD*
Control	4.9/min	2.44	5.3/min	3.14
Experimental	21.2/min	3.76	16.7/min	3.86

Note. $n = 39$.

As displayed in Table 7 and 8, the fluency rates per minute for oral test 1, immediately after the one-hour training, showed a significant difference ($F(1, 37) = 234.17, p < .001$) in the means between the experimental group ($M = 21.2$) and the control group ($M = 4.9$).

There was also a significant difference ($F(1, 37) = 100.48, p < .001$) in the mean application rates per minute between experimental and control group participants, therefore, the second alternate hypothesis was also accepted. Application rates were measured by oral test 2 with the experimental group averaging 16.7 responses per minute compared to the control group with a mean of 5.3 responses per minute as shown in Table 8.

Hypothesis 3 and 4: Written and Oral Retention Rates

The third alternate hypothesis was accepted after evaluating the data from written test 1 given to all participants two to three weeks after training. This ANOVA compared mean written percentage correct scores between the experimental and control groups. As data from table 9 show, there was a significant difference in the mean retention rates between experimental and control group participants for written test 1 ($F(1, 37) = 8.16, p < .01$). The control group scored a mean of 23.9% correct while the experimental group's mean score on written test 1 was 44.8% during the retention phase two to three weeks after training.

Table 9
Mean Scores and Standard Deviations for Written and Oral Retention (Written Test 1 and Oral Test 1 –Retention Phase)

	Tests			
	Retention		Retention	
	Written Test 1		Oral Test 1	
Group	*M*	*SD*	*M*	*SD*
Control	23.9%	15.77	4.3/min.	2.54
Experimental	44.8%	27.32	9.8/min.	6.96

Note. $n = 39$.

The fourth hypothesis regarding oral correct responses per minute on retention was tested using oral test 1 two to three weeks after training. Table 12 shows the mean differences between the control and experimental groups in terms of both written and oral retention with the control group scoring on average 4.3 correct oral responses per minute while the experimental group scored 9.8 correct per minute. A one-way ANOVA produced an F-ratio indicating a significant difference ($F(1, 37) = 9.8, p < .01$).

Hypothesis 5: Relationship between Dependent Variables

The final alternate hypothesis was also accepted related to the positive relationship that exists between the four dependent variables. Table 10 indicates significant correlations between post-test fluency rates, application rates, written retention rates and oral retention rates. Correct responses per minute on oral tests 1 and 2 immediately after training was highly correlated with all four retention tests. There were significant positive linear correlations between skill acquisition, application, written retention and oral retention which were the four dependent variables. These data indicate that most participants who scored high on oral test 1 immediately after training also scored higher on written and oral retention than those participants with low

rates immediately after training. The data in table 10 show significant positive correlations between all of the instruments with $p < .01$ for all correlations. The PASW correlation output is available in Appendix U.

Table 10

Correlations for Six Tests

Measure	O1	O2	W1R	W2R	O1R
O2	.90	---	---	---	---
W1R	.52	.45	---	---	---
W2R	.51	.44	.86	---	---
O1R	.56	.50	.86	.85	---
O2R	.52	.45	.83	.77	.95

Note. n=39., $p < .01$.

The variables are defined as follows in the preceding table: O1 = Oral Test 1; O2 = Oral Test 2; W1R = Written Test 1 Retention; W2R = Written Test 2 Retention; O1R = Oral Test 1 Retention; O2R = Oral Test 2 Retention.

This study identified significant differences in skill acquisition as measured by correct responses per minute using oral test 1 ($F(1, 37) = 234.17$, $p < .001$), application as measured by oral test 2 ($F(1, 37) = 100.48$, $p < .001$), written retention rates using percentage correct scores on written test 1 ($F(1, 37) = 8.16$, $p < .01$), and on oral retention as measured by oral test 1 ($F(1, 37) = 9.81$, $p < .01$). These differences were dependent on being assigned to the experimental or control group. In addition, two additional tests which were not included in the MANOVA were also found to have means which were significantly different between the two groups. Written test 2 ($F(1, 37) = 7.43$, $p < .01$) and oral test 2 ($F(1, 37) = 6.44$, $p < .05$) were not used in the

MANOVA but were administered to all participants during the retention phase to test reliability of the tests and correlation between the instruments. All six tests used in the study were found to be significantly correlated with the other tests. Participants who scored high on one test were more likely to score high on different tests, and those that scored low on the initial tests immediately after training, scored low two to three weeks later. In addition, there is a significant correlation ($r = .86, p < .01$) between written percentage correct data and oral correct responses per minute data tested during the retention phase. This is a relevant finding since this is the first known study to compare traditional percentage correct tests with fluency correct responses per minute tests as recommended by Heinicke et al. (2010). The results of the MANOVA, including this correlation between the written and oral testing, will be discussed in the final chapter.

CHAPTER 5: DISCUSSION

Autism is a complex developmental disorder affecting 1 in 110 children in the United States (Autism Society of America, 2011). A substantial increase in the number of children being diagnosed with autism within the past decade has greatly expanded the need for qualified individuals to serve as therapists, teachers, and aides for these students. Furthermore, educational leaders at every level continue to have a difficult time meeting the diverse needs of students and staff.

Autism Training Programs

As stated previously, behavioral treatments based on the scientific principles of Applied Behavior Analysis continue to be the most empirically validated treatment for students with autism (National Autism Center, 2009). The VB approach is a distinct behavior analytic approach which is now being utilized on a wide-spread basis (Barbera & Rasmussen, 2007; Cautilli, 2007; Kates-McElrath & Axelrod, 2006; Love et al., 2009; Sundberg & Michael, 2001). In one survey (Love et al., 2009), the majority of early behavioral intervention supervisors who responded reported that their ABA programs were guided at least in part by the VB curriculum developed by Sundberg and Partington in 1998. Empirical validation of the components of VB as well as research supporting the VB approach package as a whole is clearly needed.

Reid and Parsons (2006), two leaders in the ABA staff training field, suggested that managers must ensure that all staff training procedures are *effective*, which is rarely done. They stated, "Managers simply assume training is having the desired impact, and are satisfied to know staff has participated in a respective training program" (p. 48). Two areas which need to be assessed in order to determine if a training program is effective include an increase in staff skill acquisition and enhanced consumer welfare. In addition to being effective, staff training

programs must also be *efficient.* This occurs when staff members are provided with the most effective training with the least amount of time and money investment (Reid & Parsons, 2006).

This quasi-experimental design study utilized a servant-operant leadership framework and evaluated the effects of a fluency-based procedure to train emerging educational leaders on one component needed for adults who utilize the VB Approach to teach children with autism. Since fluency building has been shown in past studies to improve long-term retention and application of skills, this quasi-experimental study included a multivariate analysis of variance (MANOVA) and several analysis of variances (ANOVAs) to compare treatments with and without fluency procedures to determine if fluency-based procedures improved skill acquisition application, written retention, and oral retention.

The component skill of naming verbal and non-verbal operants fluently was previously found to be a necessary pre-requisite skill when using B. F. Skinner's analysis of verbal behavior or the verbal behavior approach to teach students with autism (Barbera, 2009b; Miklos & Dipuglia, 2010). The operant-naming procedure was previously shown to be both effective and efficient with more than 25 adults in an informal pilot as well as during a more controlled case study (Barbera, 2007).

Previous research on fluency has shown positive effects in elementary students (Beck & Clement, 1991), students with learning disabilities (Johnson & Layng,1992), disadvantaged in-coming college students (Lorbeer, 2007), college students without learning disabilities (Bucklin et al., 2000; Fante, 2008; Orlander et al., 1986), and employees (Binder & Sweeney, 2002; Pampino et al., 2005). Prior to this study, however, no known studies were completed to show the benefits of fluency-based procedures when training emerging educational leaders on autism or verbal behavior. With the rise in the numbers of children being diagnosed with autism in

recent years, the need for effective and efficient training methods in the autism field is of utmost importance.

In the remainder of this chapter, the leadership implications are presented followed by a discussion of the results and hypotheses testing. Strengths and limitations of the study, additional findings, and implications are then presented. Recommendations for future research follow.

Leadership Implications

This study and results have major implications for leaders. Educational leaders in academia need to be aware that with the rising incidence of autism in schools, autism education at both the undergraduate and graduate levels is critical. Lerman et al. (2004) suggested that colleges of education have not prepared teachers to enable them to effectively teach students with autism: "Effective behavioral techniques are rarely emphasized in teacher education programs because the education system is driven by current dogma and theory rather than by research on best practices" (p. 511). They contended that applied behavior analysis has been empirically validated and should be a large part of pre-service education programs. This, they suggested, would ultimately benefit not only students with autism but all general and special education students.

In addition to teachers and paraprofessionals, leaders in schools including principals and administrators are affected by the rise in autism. These leaders have experienced the lack of education and limited training to which they and their staff members have been exposed. Due to financial constraints, administrators and teachers are often given little class-release time to attend continuing education programs to learn about autism or effective behavioral strategies (Lerman et al., 2004). Teachers in both special and general education need effective and efficient training in order to continue to serve the student population. In addition to using servant leadership,

school building leaders such as principals and teachers responsible for training should consider using an operant leadership approach to design, approve, and/or evaluate training programs. Therefore, it is critical that educational leaders at all levels ensure that pre-service education and continuing education autism trainings are carefully planned, conducted in the most effective and efficient manner, and evaluated so that time and financial resources are not wasted.

This study also has implications for leaders within corporate and community organizations. While this study focused on the pinpointing and measuring of autism/verbal behavior information with emerging educational leaders, similar procedures could be applied and studied in a variety of settings with any type of training material or new skill.

Leaders who use a servant-operant framework and the science of ABA can develop any training programs by starting with "need to know" skills at a level that is appropriate for their employees or consumers based on objective baseline information. These leaders also can use procedures outlined in this study to pinpoint, measure, and monitor skill acquisition. In addition, executives and managers within any field can utilize this study to set up systems to measure retention and application of any new material to ensure that training in education, community, and corporate settings are an effective and efficient use of scarce competing resources.

Hypothesis Testing/Analysis

Four dependent variables were studied including fluency level per minute using oral test 1 at the end of training, application correct responses per minute using oral test 2 at the end of training, written retention using percentage correct rate on written test 1, and oral retention rate using oral test 1 during retention checks two to three weeks after training.

For all five hypotheses in this study including one hypothesis for each dependent variable with an additional hypothesis related to interaction between the dependent variables, the null hypotheses were rejected, and the alternate hypotheses were accepted. The fluency rates per

minute for oral test 1 immediately after the one-hour training showed a significant difference in the means between the experimental group who averaged 21.2 correct oral responses per minute compared to the control group with a mean of 4.9 correct responses per minute ($F(1, 37) = 234.17, p = .000$). There was also a significant difference in the mean application rates between experimental and control group participants which were measured by oral test 2 with the experimental group averaging 16.7 responses per minute compared to the control group with a mean of 5.3 per minute ($F(1, 37) = 100.48, p = .000$).

Retention levels also showed significant differences in the mean retention rates between experimental and control group participants for all four retention tests for written test 1 ($F(1, 37) = 8.16, p < .01$) written test 2 ($F(1, 37) = 7.34, p < .01$), oral test 1 ($F(1, 37) = 9.81, p < .01$) and oral test 2 ($F(1, 37) = 6.44, p < .05$). These data showed a significant difference between the experimental and control groups in terms of skill acquisition, application written retention and oral retention of the verbal operant information provided with the experimental group out-performing the control group on every measure. The first four alternate hypotheses were therefore accepted.

The fifth alternate hypothesis was also accepted since there was a positive linear correlation between the four dependent variables indicating that the various tests measured the same knowledge. Participants who scored well on oral test 1, for example, also scored well on oral test 2 and were more likely to also do well during retention testing. Conversely, participants who scored poorly immediately after the training continued to struggle when tested two to three weeks later.

With all five alternate hypotheses accepted, this study showed significant differences between the experimental and control group in terms of skill acquisition, application, written retention and oral retention. The experimental group scored significantly higher on both

traditional percentage correct written tests as well as during fluency correct responses per minute one-minute oral test timings. These differences were seen both immediately following the training and two to three weeks later during retention testing.

Strengths of the Study

This was the first known study to use a servant-operant leadership framework to address training as a leadership issue. This literature review included servant and operant leadership models as well as some additional information on the benefits of incorporating ABA principles when developing training and leading people as well as programs.

This study addresses many of the criticisms of Doughty et al., (2004) and Heinicke et al., (2010) who have suggested that more controlled studies are needed before fluency-based procedures should be used on a widespread basis. Like the VB approach, fluency-based procedures have been disseminated primarily through professional conference presentations rather than through peer-reviewed journals. In addition, prior to this study, the use of fluency in the autism field has consisted mostly of single subject case studies which lacked experimental designs and did not include interrater reliability measures (Heinicke et al., 2010).

A quasi-experimental design was utilized in this study with a total of 43 graduate education students being assigned to the control or experimental groups. Two participants withdrew from the study before oral testing and two additional participants were absent during retention testing. Complete data were obtained for 39 participants with 21 in the experimental group and 18 serving in the control group. The two groups were found to be similar in terms of age ($F(1, 37) = .025, p = .874$). The control and experimental groups were also similar in terms of baseline knowledge which was 0% correct on the written baseline test for 38 out of the 39 participants. The experimental and control group also showed similarities in terms of their ability to learn content as measured by the written test given after a 10-minute brief lecture on the

verbal and non-verbal operants ($F(1, 37) = .118, p = .733$). These data indicate that the control and experimental groups consisted of individuals of similar ages and years of teaching, and with no prior background knowledge of the subject. While individual participants were not randomly assigned due to the study being done during class time, a random class assignment was utilized instead and this level of randomization appeared to be successful in creating homogeneous groups.

As mentioned previously and based on the suggestion of Heinicke et al. (2010) both traditional percentage correct written testing and oral fluency testing calculated as correct responses per minute were used in this study. This yielded significant correlations ($r = .86$, $p < .01$) between written percentage correct testing and oral fluency testing. While the researcher presented all training sessions, a research assistant trained in the procedure took interrater reliability data during the training and testing. Interrater reliabity was obtained for all of the oral testing with 97.8 % agreement between the researcher and three BCBA research assistants. All tests in the study were also found to have excellent reliability with Chonbach's Alpha indicating > .90 for all instruments.

Limitations of the Study

Unlike the other three experimental studies involving groups of college students (Bucklin et al., 2000; Fante, 2008; Orlander et al., 1986), this study did control for time with both the experimental and control group intervention lasting one hour. However, similar to these other studies, the current study did not control for practice. While the experimental and control groups each received the exact same amount of training time, there were differences between the control and experimental procedures in terms of hands-on practice. During the 1-hour time frame in this study, the experimental group practiced using oral test 1 in groups of three while the control group listened to a lecture and worked in small groups for only 5 minutes during a verbal

behavior operant naming activity. While each group was exposed to verbal behavior material for exactly one hour, the experimental group had much more opportunity for hands-on practice. This is a significant limitation as previous research has suggested that hands-on practice or active student responding is almost always more beneficial to trainees than listening to a lecture (Binder, 1999; Heward, 2006; Reid & Parsons, 2006).

An additional limitation of the study was that this researcher studied one part of a treatment package she created. She also conducted the training sessions and the study. To mitigate this potential conflict of interest, the use of a large group design with a control and experimental group was utilized. In addition, to address this potential conflict of interest, a trained research assistant was used who measured treatment integrity on the independent variable and took interrater reliability data on the dependent variable during all individual testing. In addition, Dr. Christopher Bloh, a doctoral level Board Certified Behavior Analyst (BCBA-D) voluntarily was involved in independently reviewing the data and written documentation of the results to provide a third check in order to continuously monitor potential conflict of interest. Throughout the study, Dr. Bloh adhered to the ethical guidelines of the Behavior Analysis Credentialing Board and signed a confidentiality agreement (Appendix T).

Self-reporting of the demographic information was also a potential limitation as this information was not able to be verified. Another limitation of the study was the researcher's lack of control over the participants within the same group or from different classes conversing with each other after they were tested and/or in between the main study night and the retention phase. The fact that the classes could not be scheduled for the retention phase either in a 2-week or 3-week timeframe was another limitation which should be noted. A final limitation was that participants could potentially study the information in between sessions. This was addressed by using a group design, carefully controlling the materials so that nothing was taken from the

room, not disclosing any individual scores to the professors and stressing to all participants the importance of not reviewing information or studying the material in between sessions.

Additional Findings

While conducting this study, several other findings were noted. As disclosed to the participants in the consent form (Appendix B), the only risk of participating in the study was that during the study or the testing, participants could experience stress, anxiety, and/or embarrassment. One participant (number 31) in the Tuesday evening class did have a negative, emotional reaction to the study and chose to withdraw immediately before her first individualized timed oral test. When analyzing participant 31's reaction, it was discovered that during the study, another student who was in participant 31's triad was also a co-worker of hers. Participant 31 stated that she had recently been sick and had not slept well for a few nights and this caused her to be flustered during the one-hour training and practice session. To add to her stress, her co-worker easily learned the material and scored highest in the class on the oral testing both on the main study night, as well as during retention checks. While both participants were unaware of their scores, it was obvious during the practice session that the co-worker was easily grasping the material. This made participant 31 even more anxious. When participant 31 came in to the separate classroom for oral testing, she was nearly in tears and stated "if I would have known this was going to be so stressful, I would have never given consent." At that point, the researcher, research assistant, and participant 31 all agreed she should withdraw from the study.

Another fact uncovered was that within both groups, there were some high performers and low performers who scored above or below the means on all of the testing. Two high performers included participant 42 from the experimental group who stated before the baseline written test that she worked at a school for children with autism and participant 10 from the control group who voluntarily shared with the researcher that she had a nephew with autism.

Both of these high performers may have had more motivation to learn the information and potentially were able to utilize the information in between the main study and retention nights. A male participant, number 37, from the experimental group who did well on the oral tests immediately after training but scored poorly on retention testing, voluntarily disclosed that he became a father for the first time in between testing sessions. He admitted that he was sleep deprived and this may have contributed to his lack of retention. These examples highlight the need to consider extraneous variables, which could impact individual learning or retention.

While measuring and comparing both traditional percentage scores and fluency measures within this study, there was another finding. While not discussed previously, during all of the written tests in this study, the participants had 3 minutes to complete each test. In addition to having a maximum time limit of 3 minutes for the retention written tests, each participant was given an individual timer and told to push start and stop and record the time it took them to complete written test 1 and 2 on their tests.

The reason this was not fully discussed or analyzed before this point was that only two participants in the experimental group scored 100% on the written retention tests and, since fluency includes accuracy *plus* speed, there was no point to analyzing this further within the results chapter. However, when considering future research, these additional findings may be important. The two participants who received 100% on three tests (with one participant scoring 100% on both written test 1 and written test 2 on retention), the time recorded was 1 minute and 3 seconds, 1 minute and 5 seconds, and 1 minute and 18 seconds. Since all the participants took written test 1 twice before the retention check class, the format was not new to them. Having individuals time duration of their own percentage correct tests may provide more useful data than could be obtained with group timed tests and could provide a bridge between traditional and fluency testing.

Implications

While the experimental group participants significantly out-performed the control group participants in this study, no participants in the study retained the information at fluent rates of 20-25 correct per minute. If this had been an actual staff training program on naming the verbal operants which was step 1 of the 3-step procedure described previously, all of the participants would have needed some review, re-teaching, and re-testing before steps 2 and 3 (errorless and error correction procedures and fluent intensive teaching) could have been added.

The fact that even the experimental group failed to retain high rates of naming the operants, may be due to the fact that a massed group practice design was used instead of a distributed self-paced design. According to Grote (1995), massed practice schedules involve a one-time lengthy exposure to material where distributed practice involves multiple short exposures over time. Studies have shown that distributed practice is generally superior (Binder, 1999; Grote, 1995; Seabrook, Gordon, & Solity, 2005). However, previous studies on massed versus distributed practice did not involve the variable of fluency.

The large group format could have also contributed to lack of fluent retention of the verbal operant information. During the informal pilot of the 3-step package (Barbera, 2009b), this researcher trained over 25 people individually or in groups of up to 3 per training. Unlike the pilot study, the large group format of training 9 to 13 participants at the same time and the time constraints of conducting the study within one class period made it difficult for the researcher to give all of the experimental participants individualized attention and assistance. There was also no time for individual re-mediation or follow up if an individual had difficulty grasping the concepts.

Additionally, the experimental group not maintaining fluent levels of performance on retention checks may have been due to the lack of using the information immediately with

children with autism and/or the lack of ability to study the information. In a real training situation with autism personnel, staff members usually begin or continue to work with children with autism immediately after a training session. This might lead to better understanding, application, and retention of the information than was seen in this study.

There were also no incentives for participants to do well. In order to dissuade both experimental and control participants from studying outside of the main session, errors were not corrected during the testing, no feedback was given, and they were not told their scores at any point. In the other fluency studies utilizing college students, Fante (2008) reported that money, grades and/or acknowledgement were given to the participants based on their fluency levels. This might be an important variable to consider for future research.

A final finding was revealed in the Wednesday evening Principal's certification class with Dr. Dougherty. After the one hour lecture was presented by the researcher, Dr. Dougherty asked the group of nine students preparing to become principals if they had ever received autism-specific training at their schools or within the courses at the university. Surprisingly, all nine students reported that this was the only autism lecture they had ever attended. This is an important finding since emerging educational leaders, especially those who will be serving as principals in the future need much more preparation and information about students with autism than is currently being offered.

Future Research

Much more research is needed on the operant and servant leadership models and the role of ABA in leadership and in the development of effective and efficient training packages. The results of this study support the fact that leaders in all fields cannot afford to continue to ignore conducting cost-benefit analyses on employee training programs. As Braksick (2007) pointed out:

> The ability to apply behavioral science consistently is a key distinguishing feature of great leaders. Leaders who naturally do this, or who have paused long enough to learn how, see two effects: first, they see employees who routinely exhibit discretionary effort and high degrees of commitment to "do what it takes." Second, they have consistent, sustainable, bottom-line business results that reflect their approach to effective leadership. (p.xvi)

The most effective and efficient training and education programs will lead to the most benefit within all segments of society. If fluency procedures are as important as this study and other studies show, more research is clearly indicated. One place to start is for leaders to determine the true "need-to-know" skills (Binder, 1999) for new or existing employees and then to develop training to teach these critical component skills to fluent levels.

Research is needed to determine the most beneficial ways to train people on any subject and clearly more research is needed on the effects of fluency-based procedures both in controlled and applied settings. As Binder (1999) suggested, "It is only because so few instructional designers are aware of fluency, how to measure it, and how to program for it, that so few training and educational programs produce it" (p. 4-4).

Joyce and Showers (2002) described five training components that need to be present in order for teacher training to be effective. These include: theory, demonstration, practice, feedback, and ongoing on-site coaching. Bennett's meta-analysis (1987) suggested that without ongoing coaching in the classroom, teachers gain little from pre-service or in-service training sessions. But neither Joyce and Showers nor Bennett's meta-analysis considered how fluency might help boost the dismal statistics of how little teachers typically learn or are able to apply from training sessions. Furthermore, on-going consultation and coaching in schools provided to teachers who are not fluent in necessary component skills may not be cost-effective.

Barbera (2009b) and O'Keefe (2009), after studying the effects of fluency with paraprofessionals, both concluded that adding fluency practice for adults outside of the classroom without students present could improve mastery, application, and retention of specific teaching skills. As suggested previously, the training research may be missing a critical element that is not discussed in the staff development and training research (Bennett, 1987; Cherrington & Middleton, 2008; Joyce & Showers; 2002). This important missing link is fluency. The five components recommended by Joyce and Showers (2002) could be studied with practice and feedback (with fluency-based procedures versus without fluency-based procedures) with both the time and hands-on practice variables controlled. One group could be exposed to timers and fluency aims, and the other group would practice for the same amount of time but would not be encouraged to go fast, would not use timers, and would remain unaware of any aim or goal.

Additional research is also needed on massed versus distributed practice to address important questions since for new or existing employees in any field, training is usually done in groups with limited time available and where self-pacing is not possible. Binder (1999) suggested that when self-pacing is not possible, each participant should receive practice materials preceding the in-service or training and take-away exercises and materials for self-study after the training. Massed practice with and without self-study before and/or after in-services needs much more analysis and comparison to distributed, self-paced programs.

With the heterogeneity of autism and the vast number of autism treatments and educational techniques, more attention needs to be given to training educational leaders, teachers, paraprofessionals, therapists, and parents on the subjects of autism, ABA and VB. Teachers and building leaders who utilize a servant-operant leadership approach to teach students and training staff need to be studied. This is especially true given the rapid rise in

numbers of students with autism as well as the advances in research and knowledge about the disorder (Mastergeorge, 2007).

More research is also needed specifically on staff training of autism personnel. The 3-step procedure (Barbera, 2009b) initially showing that adults could learn to name the verbal operants as well as learn how to intensively teach working with children with autism in approximately one hour needs much more analysis. This might be best accomplished through the use of a multiple baseline design across participants as researching individual behavior change (as opposed to group means) is the scientific method of choice within the field of applied behavior analysis (Cooper et al., 2007). More qualitative data and analysis of these data are also needed.

This study should also be replicated with the use of a quasi-experimental design with larger sample sizes and with a trainer who is not the researcher and creator of the 3-step package. This might be feasible by evaluating the 3-step procedure with another person such as K.R., the trainer who was quoted previously who is currently using the 3-step training package with success in a private ABA/VB company.

Whenever possible, researchers need to compare both fluency-based approaches and measures with more traditional accuracy measures. This could begin with short written tests with duration times being recorded by the person completing the test. Since the participants who scored 100% on the written retention tests in this study completed these tests in under 1 minute and 30 seconds, written test 1 or 2 could potentially be used as a screening tool with participants scoring 90% or greater in less than 1 minute and 30 seconds. Once a person received this score, he or she could be considered fluent with the basic information and then move on to take the oral test to determine if more fluency-based instruction was needed.

One future direction to expand this study is to develop an on-line assessment and training package so that the training could be self-paced. In an on-line format, more data could be collected without the need for a researcher and research assistant on site. This might enable researchers to predict high performers based on their written test scores after 10-minutes of lecture or after reading material. It also might enable researchers to better determine which participants can learn on-line and which participants may need to learn new material in large or small groups with hands-on practice guided by an instructor.

Fluency procedures also need to be studied on a variety of autism staff training components since naming the operants is only one piece of information needed to teach children with autism when utilizing ABA with Skinner's Analysis of VB. Autism personnel are trained on and expected to learn a vast amount of information and need to know how to implement a multitude of training protocols. Fluency-based procedures potentially could be utilized or studied with any training module.

Conclusion

In conclusion, the role of the leader in ensuring effective and efficient training across all fields is critical. If complex behavior is not broken down and if pivotal, component parts are not taught to fluency, employees and consumers may not be able to work in the most effective or efficient ways. With billions of dollars being spent on training annually, leaders have no choice but to immerse themselves in all aspects of training.

This study adds to the body of literature on the use of a combination of servant and operant leadership approaches to develop and examine a fluency-based procedure using a quasi-experimental design. It is the first known controlled study addressing the issue of using fluency techniques to train emerging educational leaders on applied behavior analysis/verbal behavior information.

This study showed that emerging educational leaders who received fluency-based procedures learned, applied, and retained verbal behavior information significantly better than the control group. Future research should focus on autism, verbal behavior, and the use of ABA principles by leaders. Servant and operant leadership approaches need continued research efforts as well in all fields since effective and efficient training procedures are essential to reduce costs and serve more individuals. More research is also needed to evaluate the potential value of adding fluency-based procedures to a wide variety of education and training programs in the corporate, community, and educational fields.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (4th ed).* Washington, DC: Author.

Autism Society of America (2011). *About autism.* Retrieved from http://www.autism-society.org/about-autism/

Autism Speaks. (2011). *What is Autism?* Retrieved from http://www.autismspeaks.org/whatisit/index.php

Baer. D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1,* 91-97. doi:10.1901/jaba.1968.1-91

Barbera, M. L. (2007). The experiences of "autism mothers" who become behavior analysts: A qualitative study. *Journal of Speech and Language Pathology – Applied Behavior Analysis, 2* (3), 287- 304. Retrieved from http://verbalbehaviorapproach.com/mom_bcba.pdf

Barbera, M. L. (2009a). Getting started with the verbal behavior approach. *Autism File Magazine*, 30, 108-112. Retrieved from http://verbalbehaviorapproach.com/autism_file.pdf

Barbera, M. L. (2009b). *The development of effective and efficient processes for training staff on naming the verbal operants, errorless teaching and error correction procedures.* Symposium presentation at the 35th Annual Convention of the Association of Behavior Analysts, Phoenix, AZ.

Barbera, M. L. (2010, May 23). Staff training #1 video. Retrieved from http://www.youtube.com/user/marybarbera#p/u/4/qxTlc3SJCbA.

Barbera, M. L., & Rasmussen, T. (2007). *The verbal behavior approach: How to teach children with autism and related disorders.* London: Jessica Kingsley.

Bass, B. M. (2008). *The Bass handbook of leadership: Theory, research, & managerial applications (4th Ed.).* New York: Free Press.

Bays, D. A., & Crockett, J. B. (2007). Investigating instructional leadership for special education. *Exceptionality, 15* (3), 143-161. doi:10.1080/09362830701503495

Beazley, H., & Beggs, J. (2002). Teaching servant leadership. In L. Spears & M. Lawrence (Eds.). *Focus on leadership: Servant-leadership in the twenty-first century.* New York: Wiley & Sons.

Beck, R., & Clement, R. (1991). The Great Falls precision teaching project: An historical examination. *Journal of Precision Teaching, 8*, 8-12.

Bennett, B. (1987). *The effectiveness of staff development training practices: A meta-analysis.* (Doctoral dissertation). Available from ProQuest Digital Dissertations database (AAT 8721226).

Billingsley, B. S. (2007). Recognizing and supporting the critical roles of teachers in special education leadership. *Exceptionality, 15* (3), 163-176. doi:10.1080/09362830701503503

Binder, C. (1990, September). Closing the confidence gap. *Training,* 49-56. Retrieved from http://fluency.org/Binder_Confidence_Gap.pdf

Binder, C. (1996). Behavioral fluency: Evolution of a new paradigm. *The Behavior Analyst*, *19*(2), 163-197.

Binder, C. (1999). *The Fluency building guide*. Santa Rosa, CA: Binder Riha Associates. .

Binder, C., & Bloom, C. (1989). Fluent product knowledge: Application in the financial services industry. *Performance and Instruction*, 28, 17-21. doi: 10.1002/pfi.4170280205

Binder, C., & Sweeney, L. (2002). Building fluent performance in a customer call center. *Performance Improvement*, *41* (2), 29-37. doi:10.1002/pfi.4140410207

Binder, C., & Watkins, C.L. (1990). Precision teaching and direct instruction: Measurably superior instructional technology for schools. *Performance Improvement Quarterly*, 3(4), 74-96. doi:10.1002/pfi.4160290911

Bondy, A., Esch, J., Esch, B., & Sundberg, M. (2010). Questions on verbal behavior and its application to individuals with autism: An interview with the experts. *The Behavior Analyst, 11*(3), 186-205.

Borba, M. F. (May/June 2009). What's teaching got to do with it? *Leadership*, 16-37.

Bowditch, J. L., & Buono, A. F. (1997). *A primer on organizational behavior.* New York: John Wiley & Sons, Inc.

Braksick, L. W. (2000). *Unlock behavior unleash profits.* New York: McGraw Hill.

Braksick, L. W. (2007). *Unlock behavior unleash profits (2nd Ed.).* New York: McGraw Hill.

Bucklin, B. R., Dickinson, A. M., & Brethower, D. M.(2000). A comparison of the effects of fluency training and accuracy training on application and retention. *Performance Improvement Quarterly,* 13(3), 140-163. doi:10.1111/j.1937-8327.2000.tb00180.x

Carbone, V. (2004). *Practical applications of verbal behavior research.* Paper presented at Autism Society of Berks County 5th Annual Conference, Reading, PA.

Carr, J. E., & Firth, A. M. (2005). The verbal behavior approach to early and intensive behavioral intervention for autism: A call for additional empirical support. *Journal of Early and Intensive Behavior Intervention, 2,* 18-27.

Cautilli, J. (2007). Validation of the verbal behavior package: Old wine new bottle—a reply to Carr & Firth (2005). *Behavior Analysis Review*, 2, 20-31.

Cherrington, D. J., & Middleton, L. Z.(2008). Human resource development. In D.J. Cherrington, & L. Z. Middleton (Eds.), *Human resource certification preparation program.* Provo: UT: Human Resource Certification Preparation, L.C.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis (2nd ed.).* Upper Saddle River, NJ: Prentice Hall.

Daniels, A. C., & Daniels, J. E. (2006). *Performance management: Changing behavior that drives organizational effectiveness.* Atlanta, GA: Performance Management Publications.

Daniels, A. C., & Daniels, J. E. (2007). *Measure of a leader.* New York: McGraw Hill.

Doughty, S. S., Chase, P. N., & O'Shields, E. M. (2004). Effects of rate building on fluent performance: A review and commentary. *The Behavior Analyst*, *27*, 7-23.

Emergent. (2005). In *Merriam-Webster's collegiate dictionary* (11th ed.). Springfield, MA: Merriam-Webster.

Fante, R. M. (2008). *A comparison of three training methods on the acquisition and retention of automotive product knowledge.* (Doctoral dissertation). Available from ProQuest Digital Dissertations database (AAT 3316922).

Farr, S. (2010). Teaching as leadership: The highly effective teacher's guide to closing the achievement gap. San Francisco: Jossey-Bass.

Gall, M. D., Gall, J. P., & Borg, W. R. (2010). *Applying educational research* (6th ed., Rev). Boston: Pearson.

Garson, G. David (2011). Testing of Assumptions. In *Statnotes: Topics in Multivariate Analysis.* Retrieved from http://faculty.chass.ncsu.edu/garson/pa765/statnote.htm

Greenleaf, R. K. (2002). *Servant leadership: A journey into the nature of legitimate power & greatness.* New York: Paulist Press.

Grimm, L. G., & Yarnold, P. R. (1995). *Reading and understanding multivariate statistics.* Washington, DC: American Psychological Association.

Grote, M. G. (1995). Distributed versus massed practice in high school physics. *School Science and Mathematics*, 95, 97-101. doi:10.1111/j.1949-8594.1995.tb15736.x

Hambright, W. G., & Franco, M. S. (2008). Living the "tipping point": Concurrent teacher leader and principal preparation. *Education, 129* (2), 267-272.

Heinicke, M. R., Carr, J. E., LeBlanc, L. A., & Severtson, J. M. (2010). On the use of fluency training in the behavioral treatment of autism: A commentary. *The Behavior Analyst, 33*(2), 53-60.

Herman, D. V., & Marlowe, M. (2005). Modeling the meaning in life: The teacher as servant leader. *Reclaiming Children and Youth, 14* (3), 175-178.

Hesse, H. (1956). *The journey to the East*. New York: Picador.

Heward, W. L. (2006). *Exceptional Children* (8th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Hogan, R., Curphy, G., J., & Hogan, J. (1994). What we know about leadership: Effectiveness and personality. *American Psychologist, 49* (6), 493-504. doi: 10.1037/0003-066X.49.6.493

Hopkins, D., & Higham, R. (2007). System leadership: Mapping the landscape. *School Leadership and Management, 27*(2), 147-166. doi: 10.1080/13632430701237289

Horner, R. H., Carr, E. G., Strain, P. S., Todd, A. W, & Reed, H. K. (2002). Problem behavior interventions for young children with autism: A research synthesis. *Journal of Autism and Developmental Disabilities, 26,* 359-383. doi:10.1023/A:1020593922901

Jackson, Y., & McDermott (October 2009). Fearless leading. *Educational Leadership,* 67 (2) 34-38.

Johnson, K. R., & Layng, T. V. (1992). Breaking the structuralist barrier: Literacy and numeracy with fluency. *American Psychologist*, 47, 1475-1490.

doi:10.1037/0003-066X.47.11.1475

Joyce, B., & Showers, B. (2002). *Student achievement through staff development* (3rd ed., Rev.). Alexandria, VA: Association for Supervision and Curriculum Development.

Kates-McElrath, K., & Axelrod, S. (2006). Behavioral intervention for autism: A distinction between two behavior analytic approaches. *The Behavior Analyst Today, 7 (2),* 242-252.

Kenneally, L. (2007). Shaping and evaluating behavior change: Across individuals and organizations. (Doctoral dissertation). Available from ProQuest Digital Dissertations database (AAT 3272677).

Kerfoot, K. (2003). Learning organizations need teachers: The leader's challenge. *Pediatric Nursing, 29* (3), 385-387.

Kogan, M. D., Blumberg, S. J., Schieve, L. A., Boyle, C. A., Perrin, J. M., Ghandour, R. M., … van Dyck, P. C. (2009). Prevalence of parent-reported diagnosis of autism spectrum disorder among children in the US, 2007. *Pediatrics*. doi:10.1542/peds.2009-1522

Komaki, J. L. (1998). *Leadership from an operative perspective.* New York: Routledge.

Kubina, R. M., & Morrison, R. M. (2000). Fluency in Education. *Behavioral and Social Issues, 10,* 83-99.

Leedy, P. D., & Ormrod, J. E. (2010). *Practical research: Planning and design* (9th ed.). Upper Saddle River, NJ: Pearson.

Lerman, D. C., Vorndran, C. M., Addison, L & Kuhn, S. C. (2004). Preparing teachers in evidence-based practices for young children with autism. *School Psychology Review, 33* (4), 510-526. doi:10.1901/jaba.2004.37-11

Lindsley, O. R. (1992). Precision teaching: Discoveries and effects. *Journal of Applied Behavior Analysis,* 25, 51-57. doi:10.1901/jaba.1992.25-51

Lorbeer, S. H. (2007). *Understanding the experiences of postsecondary faculty and*

students with Precision Teaching: A phenomenological approach. (Doctoral dissertation). Available from ProQuest Digital Dissertations database (AAT 3254746).

Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*, 3-9.

Love, J. R., Carr, J. E., Almason, S. M., & Petursdottir, A. I. (2009). Early and intensive behavioral intervention for autism: A survey of clinical practices. *Research in Autism Spectrum Disorders, 3,* 421-428. doi:10.1016/j.rasd.2008.08.008

Mastergeorge, A. M. (2007). Promoting learning for children with autism. *Leadership, 36* (4) 24-27.

Mawhinney, Thomas C. (2005). Effective leadership in superior-subordinate dyads: Theory and data. *Journal of Organizational Behavior Management*, 25 (4), 37-79.

Maxwell, S. E., & Delaney, H. D. (2004). *Designing experiments and analyzing data (2nd ed, Rev*). New York: Psychology Press.

McEachin, J. J., Smith, T., & Lovaas, O. I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal of Mental Retardation, 97*, 359-372.

Mertler, C. A., & Vannatta, R. A. (2005). *Advanced and multivariate statistical methods* (3rd ed., Rev.). Glendale, CA: Pyrczak Publishing.

Miklos, M., & Dipuglia, A. (2010, April). *A team training on training teams: Overview of key protocols for intensive teaching and basic mand training.* Paper presented at Pennsylvania Training and Technical Assistance Network (PATTAN), Harrisburg, PA.

Miklos, M., Dipuglia, A., & Galbraith, W. A. (2010, May). *Changes in student performance: Case studies in verbal behavior within a large-scale public school project.* Symposium presented at the 36th Annual Convention of the Association for Behavior Analysis, San Antonia, TX.

Morningside Academy Website (2011). Retrieved from http://www.morningsideacademy.org/about/indepth.php/

Murray, S. (2000). *Coercion and its fallout (3rd ed.).* Boston: Authors Cooperative, Inc.

National Autism Center. (2009). *National Standards Report - Addressing the need for evidence-based practice guidelines for Autism Spectrum Disorders.* Boston, MA: Author.

National Research Council. (2001). *Educating children with autism.* Washington, DC: National Academy Press, Committee on Educational Interventions for Children with Autism, Division of Behavioral and Social Sciences and Education.

Nikendei, C., Zeuch, A., Dieckmann, P., Roth, C., Schaefer, S., Volkl, M....Junger, J. (2005). Role-playing for more realistic technical skills training. *Medical Teacher, 27*(2), 122-126. doi:10.1080/01421590400019484

Northouse, P. G. (2007). *Leadership: Theory and practice* (4th ed., Rev.). Thousand Oaks, CA: Sage Publications, Inc.

Norusis, M. (2010). *PASW statistics 18 guide to data analysis: Statistical procedures companion.* Upper Saddle River, NJ: Prentice Hall.

O'Keeffe, B. V. (2009). *The effects of fluency training on implementation fidelity of a reading intervention conducted by paraprofessionals.* (Doctoral dissertation). Available from ProQuest Digital Dissertations database (AAT 3372897).

Orlander, C. P., Collins, D. L., McArthur, B. L., Watts, R. O., & McDade, C. E. (1986). Retention among college students: A comparison of traditional versus precision teaching. *Journal of Precision Teaching*, 6, 80-82.

Pallant, J. (2007). *SPSS survival guide: A step by step guide to data analysis using SPSS.* Sydney: Allen & Unwin.

Pampino, R. N., Wilder, D. A., & Binder, C. (2005). The use of functional assessment and frequency building procedures to increase product knowledge and data entry skills among foremen in a construction organization. *Journal of Organizational Behavior Management,* 25 (2), 1-36. doi: 10.1300/J075v25n02_01

Pennsylvania Verbal Behavior Project. (2007). *A beginning guide to the intensive teaching process of the verbal operants.* Harrisburg, PA. Pennsylvania Training and Technical Assistance Network.

Prelock, P. A., Paul, R., & Allen, E. M. (2011). Evidence-based treatments in communication for children with autism spectrum disorders. In B. Reichow, P. Doehring, D. Cicchetti, & F. Volmkmar (Eds.), *Evidence-based practices and treatments for children with autism.* New York: Springer.

Pfau, B. N., & Kay, I. T. (2002). *The human capital edge: 21 people management practices your company must implement (or avoid) to maximize shareholder value.* New York: McGraw Hill.

Reichow, B., Doehring, P, Cicchetti, D. V. & Volkmar, F. R. (2011). *Evidence-based practices and treatments for children with autism.* New York: Springer.

Reid, D. H., & Parsons, M. B. (2006). *Motivating human service staff: Supervisory strategies for maximizing work effort and work enjoyment (2nd ed.).* Morgantown, NC: Habilitation Management Consultants, Inc.

Rosenwasser, B., & Axelrod, S. (2001). The contributions of Applied Behavior Analysis to the education of people with autism. *Behavior Modification, 25,* 671-677. doi: 10.1177/0145445501255001

Scheuermann, B., Webber, J., Boutot, E. A., & Goodwin, M. (2003). Problems with personnel preparation in Autism Spectrum Disorders. *Focus on Autism and Other Developmental Disabilities, 18*(3), 197-206. doi:10.1177/10883576030180030801

Schramm, R. (2011). *Motivation and reinforcement: Turning the tables on autism.* Lulu.

Seabrook, R., Brown, G. D., & Solity, J. E. (2005). Distributed and massed practice: From laboratory to classroom. *Applied Cognitive Psychologist, 19*, 107-122. doi: 10.1002/acp.1066

Simpson, R. L. (2005). Evidence-based practices and students with autism spectrum disorders. *Focus on Autism and Developmental Disabilities, 20 (3),* 140-149. doi: 10.1177/10883576050200030201

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis.* New York: Appleton-Century.

Skinner, B. F. (1953). *Science and human behavior.* New York: The Free Press.

Skinner, B. F. (1957). *Verbal behavior.* New York: Appleton-Century-Crofts.

Skinner, B. F. (1968). *The technology of teaching.* New York: Appleton-Century-Crofts.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10,* 349-367. doi: 10.1901/jaba.1977.10-349

Sundberg, M. L., & Michael, J. (2001). The value of Skinner's analysis of verbal behavior for teaching children with autism. *Behavior Modification, 25,* 698-724. doi: 10.1177/0145445501255003

Sundberg, M. L. ,& Partington, J. W. (1998). *Teaching language to children with autism or other developmental disabilities.* Pleasant Hill, CA: Behavior Analysts.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education.

Tate, T. F. (2003). Servant leadership for schools and youth programs. *Reclaiming Children and Youth, 12* (1), 33-39.

Taylor, T., Martin, B. N., Hutchinson, S, & Jinks, M. (2007). Examination of leadership practices of principals identified as servant leaders. *International Journal of Leadership in Education, 10* (4), 401-419. doi:10.1080/13603120701408262

Weiss, M. J. (2001). Expanding ABA intervention in intensive programs for children with autism: The inclusion of natural environment training and fluency based instruction. *The Behavior Analyst Today, 2* (3), 182-186.

Williams, P. (2002). *The paradox of power.* New York: Warner Books.

York-Barr, J., & Duke, K. (2004). What do we know about teacher leadership?: Findings from two decades of scholarship. *Review of Educational Research, 74*, 255-316. doi: 10.3102/00346543074003255

Yukl, G. A. (2006). *Leadership in organizations* (6th ed., Rev.). Upper Saddle River, NJ: Prentice-Hall.

Appendix A

Recruitment Phase

Study Explained and Consent Forms Signed

Monday	Tuesday	Wednesday	Thursday
Educators as Researchers	Issues in Special Education	Principal Certification	Educators as Researchers
Dr. Dougherty	Ms. Douglas	Dr. Dougherty	Dr. Schreiner

Random Selection of Classes to Experimental or Control -- **(Independent Variable)**

Experimental		Control	
Monday	Tuesday	Wednesday	Thursday
(N = 13)	(N = 10)	(N = 9)	(N = 9)

Main Study Phase

All Participants

Random Selection of Participant Number

Age and Number of Years Teaching Data Collected

Written Test # 1 Baseline

10-minute lecture on Verbal Operants with 5-minute Q & A

Written Test #1 Immediately Following 10-minute lecture

1 Hour Set on Timer and Treatment Dependent on Class Assignment to Experimental or Control Group

Experimental Treatment	Control Treatment
Receptive Practice Sheet (Appendix __) used twice with video clip paused triads with teacher/student/trainee roles being rotated. Encouraged to practice with Test 1 All aware of aim of 20-25 correct/minute	Power point presentation (Appendix) given by the researcher for responses then broke into including one 5-minute hands-on practice activity

All Participants—Individual Testing in Separate Room with Interrater Reliablitity

Oral Test # 1 **(Dependent Variable 1)**
Oral Test # 2 **(Dependent Variable 2)**

Retention Phase

Monday	Tuesday	Wednesday	Thursday
2 weeks later	3 weeks later	3 weeks later	2 weeks later

All Participants
Written Test # 1 (Within Classroom) **(Dependent Variable 3)**
Written Test # 2 (Within Classroom)
Oral Test #1 (Individual Testing with Interrater Reliability) **(Dependent Variable 4)**
Oral Test #2 (Individual Testing with Interrater Reliability)

Appendix B

Initials_____ Date_____ Version: 09/23/09

ALVERNIA UNIVERSITY
INSTITUTIONAL REVIEW BOARD
CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Project Title: The Effects of Fluency-Based Autism Training on Emerging Educational Leaders

Why is this research being done?
This is a research project being conducted by Mary Lynch Barbera at Alvernia University. We are inviting you to participate in this research project because you are pursuing a graduate degree in education and are enrolled in a specific course this semester at Alvernia University and therefore are a potential participant. The purpose of this research project is to measure the effects of fluency when conducting autism training.

You are being asked to volunteer for this research study. You were selected as a possible participant because you are pursuing a graduate degree in education and are enrolled in one of four classes this semester. About 40 people will take part in this study. Approximately half of the participants will receive the fluency training and will make up the experimental group while the other half will receive a non-fluency training and will make up the control group. All participants will receive information that may be helpful when teaching students with autism and related disabilities in the future.

Please read this form and ask any questions that you may have before agreeing to take part in this study.

Procedures
If you agree to be in this study, you will be asked to do the following:
Attend class on the evening of the training to take short tests and receive the training and attend class two to three weeks later when the researcher returns for follow up testing. All sessions will take place at Alvernia University in a classroom or another room within the same building as class.

As part of the study, you will receive a short survey where you will be asked for your age and number of years of teaching experience. At both sessions, multiple tests of 1 to 5 minutes in length will be conducted to measure your knowledge and retention of the material. There will be written and oral assessments throughout the study and some of the tests will be timed. There will be no studying of the information in between sessions or additional time involved.

Length of Participation

Participation time will be a maximum of 6 weeks. Participation may be terminated by the participants during or after either session without penalty. Participation may be terminated by the investigator without regard to the participant's consent if the participant is unable to attend either of the sessions.

Confidentiality

Throughout the study, participants will be evaluated and your scores recorded by participant number only. Therefore, no information included in published or unpublished work will make it possible to identify you. Information about your performance on tests or probes will not be shared with your professors or counted towards your course grade.

RISKS

This study has the following risks. The only risk anticipated in this study is that the tests and timed 1-minute probes may make you feel embarrassed or anxious.

Benefits of being in the study include

Participating in this study may help you in educating children with autism and other developmental disabilities. Your participation will also allow you to experience the process of participating in graduate level research. The results may also help the investigator learn more about the use of fluency-based procedures for autism training. In the future, other people might also benefit from this study through improved understanding of the most effective ways to train people.

Rights

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you cannot attend session two within 3 weeks of the date of the first training session you will no longer be able to complete the study. For those who choose not to take part in the study, your professor will give you an alternative assignment to complete instead of attending class on the evening of the first training session.

Injury

Alvernia University does not provide any medical, hospitalization or other insurance for participants in this research study, nor will Alvernia University provide any medical treatment or compensation for any injury sustained as a result of participation in this research study, except as required by law.

Costs
There is no cost for participation.

Compensation
You will not be reimbursed for your time or participation in this study.

Contacts and Questions
This research is being conducted by Mary Lynch Barbera, Doctoral Candidate at Alvernia University. If you have any questions about the research study itself, please contact Dr. Scott Ballantyne at 400 St. Bernadine Street, Business/Education Building #4, Reading, PA 19607, 610-796-8288, scott.ballantyne@alvernia.edu.

If you have questions about your rights as a research participant, concerns, or complaints about the research and wish to talk to someone other than individuals on the research team or if you cannot reach the research team, you may contact Peggy Bowen, Ph.D., CTS, Chair of IRB, Bernardine Hall 1018 C, Alvernia University, 610.796.8483, Peggy.Bowen@Alvernia.edu.

You will be given a copy of this information to keep for your records. If you are not given a copy of this consent form, please request one.
Statement of Consent

I have read the above information. I have asked questions and have received satisfactory answers. I consent to participate in the study.

_____ _____
Signature Date

Appendix C

Test 1

Participant # _____
Date: _____
Time: _____

Instructor says/does	**Student says/does**	**Name operant of Student response**
With five pictures on the table says "Touch flower."	Student touches flower	
Holds up picture of a car and says "What's this called?"	Student says "car"	
While clapping says "Do this."	Student claps	
With five objects on the table says "Touch the one that you write with."	Student touches a pencil	
While knocking on the table says "Do this."	Student knocks on the table	
While touching her nose says "What's this called?"	Student says "nose"	
With no objects present says "What do you do with a pencil?"	Student says "write"	
"Say banana."	Student says "Banana."	
"What's your last name?"	Student says "Smith"	
"Say 1-2-7-9"	Student says "1-2-7-9"	

Appendix D

Naming of Verbal Operant Training for Staff—Treatment Integrity

1) Did instructor set timer for 10 minutes and have handouts and practice materials available? yes no

2) Using two pages of materials on verbal operants, did the trainer explain that a mand is request or demand—with antecedent MO, behavior being sign, say, gesture, picture exchange and the consequence being direct reinforcement?

yes no

3) Using the materials on the verbal operants, did the trainer explain that a tact is a label and you come in contact with a sensory stimuli (in the antecedent condition) and that non-specific reinforcement is given in the consequence condition? yes no

4) Using the materials on verbal operants , did the trainer explain that an echoic is an echo and involves a vocal, verbal stimulus in the antecedent condition and that non-specific reinforcement is given in the consequence condition?

yes no

5) Using the materials on the verbal operants, did the trainer explain that an intraverbal involves answering a wh question, filling in the blanks or word association responses. The antecedent is verbal stimuli (no visuals)?

yes no

6) Using the materials on the verbal operants, did the trainer explain that a receptive or listener responding skill involves no need on the part of the student to vocally respond. Instead, this operant involves the act of following someone's directions? yes no

7) Using the materials on the verbal operants did the trainer explain that the imitation response in non-verbal and involves imitation of the instructor's motor movement. In IT this response usually involves the verbal Sd "Do This." yes no

8) Did the trainer give three examples of each operant? yes no

9) Did the trainer stop the presentation after 10 minutes? yes no

10) Did the trainer provide 5 minutes for questions and answers? yes no

Verbal Operants

Verbal Operant	Antecedent	Behavior	Consequence
Mand	Motivative Operation (wants cookie)	Verbal behavior (says "cookie")	Direct reinforcement (gets cookie)
Tact	Sensory Stimuli (sees or smells cookie)	Verbal behavior (says "cookie")	Non-specific reinforcement (gets praised, for instance)
Intraverbal	Verbal stimulus (someone says:"What do you eat?"	Verbal behavior (says "cookie")	Non-specific reinforcement (gets praised, for instance)
Echoic	Verbal Stimulus (someone says "cookie")	Verbal behavior: repeats all or part of antecedent (says "cookie")	Non-specific reinforcement (gets praised, for instance)
Receptive (non-verbal operant)	Verbal stimulus (someone says "touch cookie")*	Non-verbal behavior (child touches cookie)	Non-specific reinforcement (gets praised, for instance)
Imitation (non-verbal operarnt)	Non verbal motor movement (someone claps)	Non-verbal behavior (child claps)	Non-specific reinforcement (gets praised, for instance)

Appendix F

Simple Definitions:

- Mand = request for an item, action or information (deMAND something)

- Tact = label of something you see, hear, touch, taste (must have a visual or some other sensory stimuli present—come in conTACT with something).

- Intraverbal = answering a question with no visuals (What, Tell me). Vocal response of student does not match teacher.

- Echoic = repeating what someone else says (Say_____) Vocal response of student matches teacher.

- Listener Responding = following directions (Touch, show me, give). No talking from student.

- Motor Imitation = imitating someone else's motor movements ("do this"). No talking from student.

Appendix G

Receptive Practice—Sheet 1

Four cards on the table. One instructor is teacher and another instructor is the student. Teacher presents command, student responds by saying or doing something. Learner names the verbal or non-verbal operant. Teacher counts correct versus incorrect responses per minute.

1) Touch the grapes /student touches grapes

Tact Intraverbal Echoic Receptive Imitation

2) What this called pointing to nose/ stud says "nose"

Tact Intraverbal Echoic Receptive Imitation

3) Do this while clapping/student claps

Tact Intraverbal Echoic Receptive Imitation

4) Show me the one that you eat/ student touches grapes

Tact Intraverbal Echoic Receptive Imitation

5) Do this (thumbs up)/student puts thumbs up

Tact Intraverbal Echoic Receptive Imitation

6) What's this called pointing to shirt/stud says "shirt"

Tact Intraverbal Echoic Receptive Imitation

7) What do you do with a bed?/ student says "sleep"

Tact Intraverbal Echoic Receptive Imitation

8) Say Banana/ student says "Banana"

Tact Intraverbal Echoic Receptive Imitation

9) What's your last name?/student says "Barbera"

Tact Intraverbal Echoic Receptive Imitation

10) Say 296/ student says "296"

Tact Intraverbal Echoic Receptive Imitation

11) Touch your head/student touches head

Tact Intraverbal Echoic Receptive Imitation

12) How many fingers am I showing (2)/stud says "2"

Tact Intraverbal Echoic Receptive Imitation

13) Do this (knock)/student knocks

Tact Intraverbal Echoic Receptive Imitation

14) Show me the one that's a (food)/stud. touches grapes

Tact Intraverbal Echoic Receptive Imitation

15) Do this (wave)/student waves

Tact Intraverbal Echoic Receptive Imitation

16) What's this called (pointing to timer)/stud. says "timer"

Tact Intraverbal Echoic Receptive Imitation

17) What does an airplane do? student says "flies"

Tact Intraverbal Echoic Receptive Imitation

18) Say I love you/student says "I love you"

Tact Intraverbal Echoic Receptive Imitation

19) What does a cow say?/student says "moo"

Tact Intraverbal Echoic Receptive Imitation

20) Say 356/student says "356"

Tact Intraverbal Echoic Receptive Imitation

21) Do this (blow)/student blows

Tact Intraverbal Echoic Receptive Imitation

22) Show me smiling/student smiles

Tact Intraverbal Echoic Receptive Imitation

23) Say apple/student says "apple"

Tact Intraverbal Echoic Receptive Imitation

24) What's this pointing to eye/student says "eye"

Tact Intraverbal Echoic Receptive Imitation

25) Shoes and _____/student says "socks"

Tact Intraverbal Echoic Receptive Imitation

Appendix H

Slide 1

Using the Verbal Behavior Approach to Teach Children with Autism

Mary Lynch Barbera, RN, MSN, BCBA

Slide 2

Lovaas Study

- Published in 1987
  - 59 children (3 years age or under) diagnosed with autism
    - 19 received 40 hours/wk 1 1 ABA for 2 years
    - 20 received 10 hours/wk
    - 20 received standard special education classrooms/OT/speech
    - 47% of those receiving 40 hours/wk of treatment became "indistinguishable from their peers by first grade"

Slide 3

ABA as the treatment of choice

- Applied Behavior Analysis (ABA) is the only scientifically validated treatment for autism and is recommended by the U.S. Surgeon General.
- ABA treatment became popular in the mid-1990's when Catherine Maurice, a parent of two children with autism who both "recovered" from autism using this approach, published two books detailing Lovaas type ABA therapy.

Slide 4

An Overview of ABA

Slide 5

Applied Behavior Analysis (ABA)

- Definition

Applied behavior analysis is the science of changing socially significant behavior.
(Cooper, Heron, and Heward)

Slide 6

Basic Behavioral Principles

Antecedent - any stimulus that happens *before* a behavior

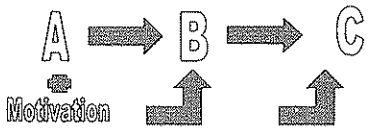
Behavior - an observable and measurable act of an individual

Consequence - any stimulus that happens *after* a behavior

Slide 7

Three (Really Four) Term Contingency

Antecedent--Behavior--Consequences



Motivation is now seen as playing a significant role in this model (Michael)

Slide 8

Examples of Three Term Contingency

- "Touch nose" – Child touches nose – receives piece of cookie
- "Do Puzzle" – Child falls to floor – Demand withdrawn

Slide 9

You use the principles of ABA all day long!

- ABA is used to:
  - Increase positive behaviors
    - Language, self care skills, academic skills.
  - Decrease negative behaviors
    - Tantrums, biting, kicking, crying

Slide 10

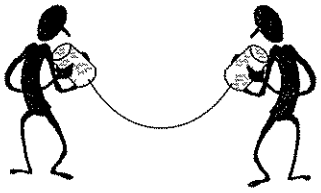
Using ABA and Verbal Behavior (VB) to Increase Positive Behaviors

- Increasing language and learning skills using the principles of ABA and B.F. Skinner's Analysis of Verbal Behavior

Slide 11

What is Verbal Behavior?

Behavior that is reinforced through the mediation of another person's behavior



Slide 12

Dual Path of Applied Behavior Analysis Research

LOVAAS (UCLA)	MICHAEL (WMU)
ABA Research *Plus* Discrete Trial Training (structure)	ABA Research *Plus* Discrete Trial Training *Plus* Skinner's Analysis of Verbal Behavior (function)

Slide 13

Common terms for the Verbal Operants

Mand = request
Tact = label
Intraverbal = conversation, answering a question, responding when someone else talks
Echoic = repeating what someone else says
Receptive or Listener Responding = following directions

Slide 14

What is "Coffee"???????

Is it a…

- **MAND?**
- **TACT?**
- **INTRAVERBAL?**

Slide 15

Verbal Operants

Verbal Operant	Antecedent	Behavior	Consequence
Mand	Motivative Operation (wants cookie)	Verbal behavior (says "cookie")	Direct reinforcement (gets cookie)
Tact	Sensory Stimuli (sees or smells cookie)	Verbal behavior (says "cookie")	Non-specific reinforcement (gets praised, for instance)
Intraverbal	Verbal stimulus (someone says:"What do you eat?"	Verbal behavior (says "cookie")	Non-specific reinforcement (gets praised, for instance)
Echoic	Verbal Stimulus (someone says "cookie")	Verbal behavior" repeats all or part of antecedent (says "cookie")	Non-specific reinforcement (gets praised, for instance)
Receptive (non-verbal operant)	Verbal stimulus (someone says "touch cookie")*	Non-verbal behavior (child touches cookie)	Non-specific reinforcement (gets praised, for instance)
Imitation (non-verbal operarnt)	Non verbal motor movement (someone claps)	Non-verbal behavior (child claps)	Non-specific reinforcement (gets praised, for instance)

Slide 16

Verbal Behavior Activity

As a result of	One has a tendency to	This is a
Seeing a grape	Saying "grape"	
Hearing a horn	Saying "truck"	
Someone saying "what says moo?"	Saying "cow"	
Wanting a push on the swing	Saying "push"	
Being told to "stand up"	Standing up	
Someone "winnie the"	Saying "pooh"	
Someone says "potty"	Saying "potty"	
Seeing a stranger	Saying "what's your name?"	
Seeing a tree	Saying "tree"	

Slide 17

Two other related skills:

Imitation: Given another person's motor action in the antecedent condition, the child performs the same action.

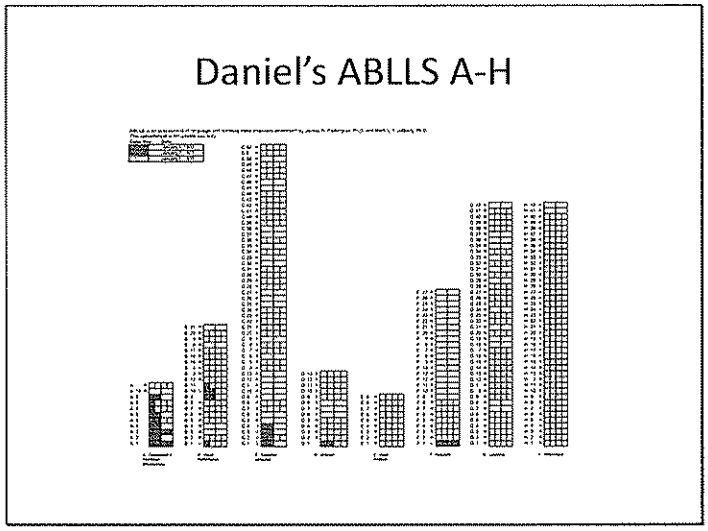
Match to Sample: matching activities involving either identical or non-identical items. (This is a very simplistic definition for a very critical skill area also referred to as conditional discriminations.)

Slide 18

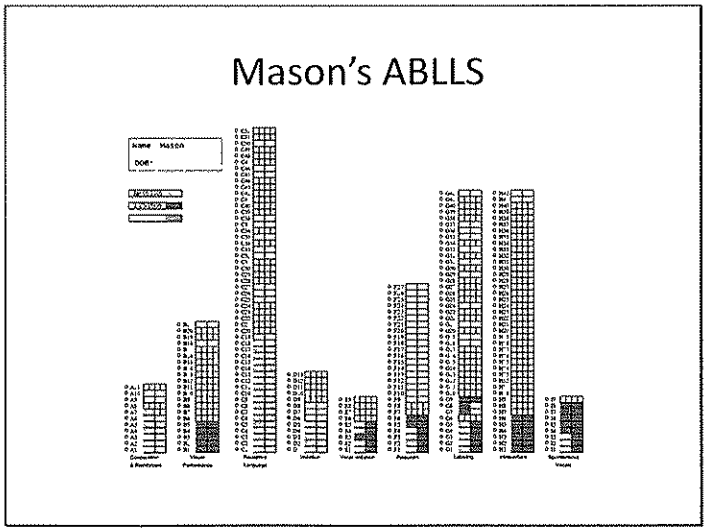
The Assessment Of Basic Language and Learning Skills

The ABLLS

Slide 19



Slide 20



Slide 21

Recommendations for Mason
after 1st observation

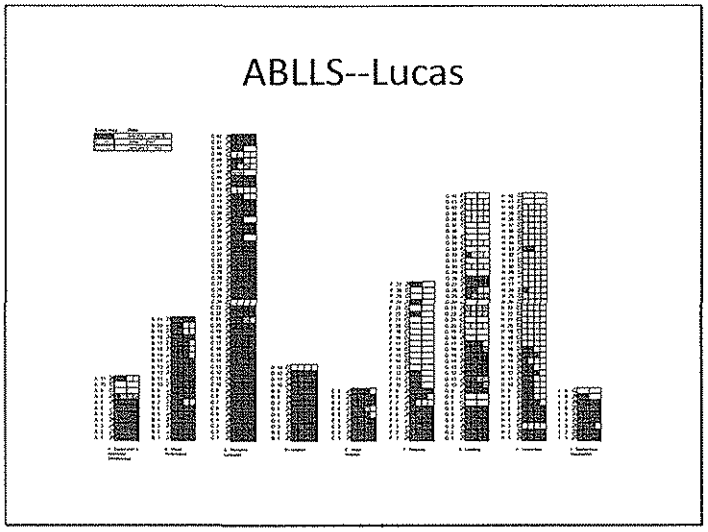
- Matching Identical Objects/Pictures (F/3)
- Increase Verbal Imitation using Mand
- Work on Fill-ins with songs
- Baseline Labels
- Set up Mand Sessions (2) 10-minute sessions/day
- Keep demands low (VR 3 or 4)

Slide 22

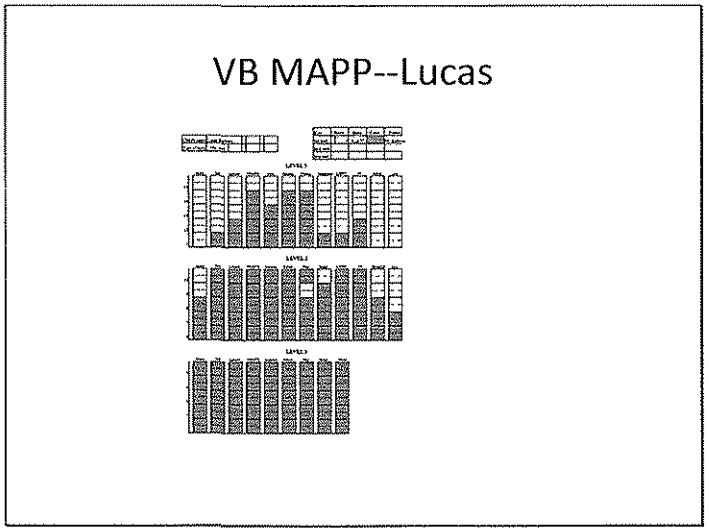
Recommendations for Mason
6 Weeks later

- Puzzles/easy toys (shape sorter)
- Matching—start categories –make sure he knows tacts of exemplars
- Prompt him to request actions and missing items
- Baseline labels (buy flash cards)
- Mix 80% easy to 20% hard w/VR 3
- Continue teaching songs
- Play doh and coloring
- RFFC to TFFC to IFFC with item as answer
- Count and Mand for access to tangibles

Slide 23

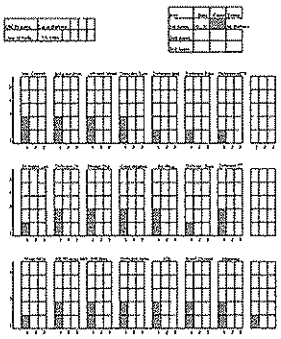


Slide 24



Slide 25

Language Barriers--Lucas



Slide 26

Recommendations for Lucas

- Intensive teaching and NET sessions
- VR 15 (with 80% easy/20% hard)
- Teach prepositions/pronouns
- Teach manding for attention/information
- Edmark reading program
- Teach coin and time identification
- Leisure and self care skills

Slide 27

Teaching the Mand

Slide 28

Why Teaching Mands is Important

- It helps children avoid frustration in communicating their needs and wants
- It is relatively easy to do because you are using the child's own motivation as a tool
- It is a natural first step in teaching communication

Slide 29

The Mand
(Requesting)

All mands have one thing in common: in the antecedent condition, there is a Motivative Operation (or motivation) in place.

A= thirst (MO)

B= "I want juice"

C= student gets juice

If a child does not want the item, you cannot teach them to mand for it.

Slide 30

Examples of contriving an MO

- Holding up an M&M within eyesight of the child
- Giving the child a bottle with a tight lid. In the bottle is his favorite toy.
- Giving the child a bowl of cereal with no spoon.
- Giving the child a toy that requires batteries but withholding the batteries
- Briefly turning on his or her favorite video.
- Giving a bit of his or her favorite snack to another child.

Slide 31

When Negative Behaviors Occur During Mand Training

Do not reinforce whining/crying or other negative behaviors

Count and Mand

Child has to learn that crying will not get them anything....appropriate manding will!

Slide 32

Keep Number and Effort of Demands Low at First

- Gradually fade in more difficult tasks
- Avoid escape oriented behaviors: effort and demands should always be outweighed by easy responding
- Make demands low at first: deliver reinforcement much more often than you ask the child to perform

Slide 33

Prevent and Correct Errors throughout the day!

Instructor: Points to an apple and says
What is it?
Child: "bird."
Instructor: "What is it—apple"
Child: echoes "apple"
Instructor: Right, what is it?
Child: "apple"
Instructor: Presents 2-3 easy demands and then "what is it?"
Child: "apple"

Slide 34

Some Take Home Points for Use With All Children (and Adults)

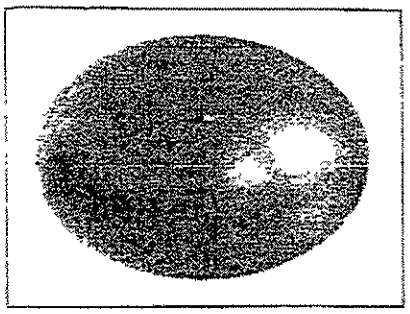
- Pairing
- Manding
- Once the child can mand for items, ease in demands gradually
- Prevent and Correct Errors throughout the day
- Don't reinforce problem behaviors

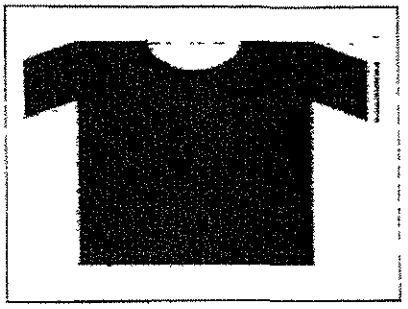
Appendix I

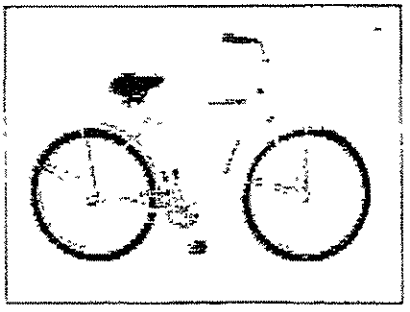
Oral Test Materials 1

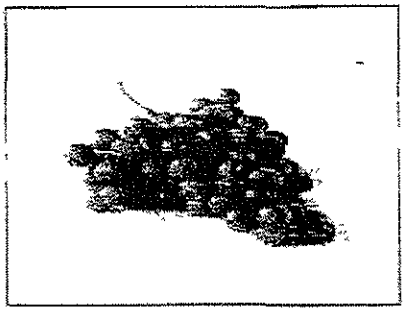
Sheet 1. Four picture cards (ball, shirt, bike, grapes) on the table. One instructor is teacher and another instructor is the student. Teacher presents Sd, student responds by saying or doing something. Learner names the verbal operants. Teacher counts correct versus incorrects per minute. Fluent rate is 20-25 correct/minute:

1) Touch the grapes
2) What this called (nose)
3) Do this (clap)
4) Show me the one that you eat
5) Do this (thumbs up)
6) What's this called touching picture (shirt)
7) What do you do with a bed?
8) Say Banana
9) What's your last name?
10) Say 296
11) Touch your head
12) How many fingers am I showing (2)
13) Do this (knock)
14) Show me the one that's a food
15) Do this (wave)
16) What's this called (timer)
17) What does an airplane do?
18) Say I love you
19) What does a cow say?
20) Say 356
21) Do this (blow)
22) Show me smiling
23) Say apple
24) What's this (eye)
25) Shoes and _____ (socks)







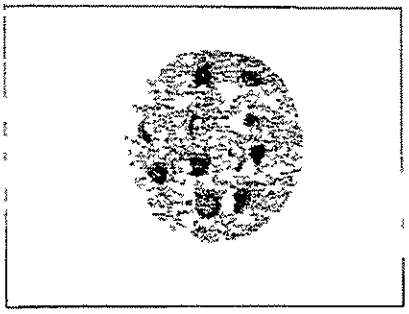


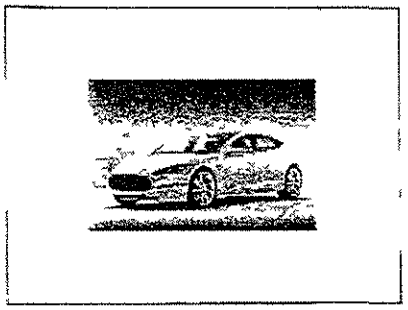
Appendix J

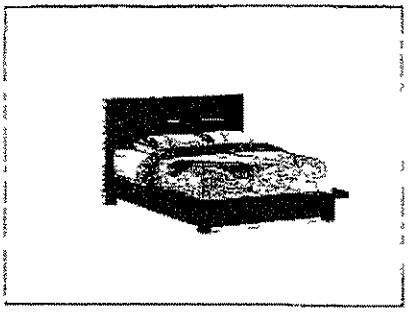
Oral Probe Materials 2

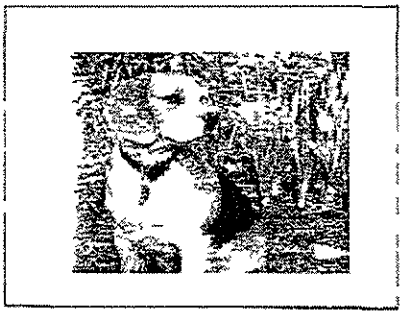
Sheet 2. Four cards on the table (cookie, care, bed, and dog). One instructor is teacher and another instructor is the student. Teacher presents Sd, student responds by saying or doing something. Learner names the verbal and non-verbal operants. Teacher counts correct versus incorrects per minute. Fluent rate is 20-25 correct/minute:

1) Do this (thumbs up)
2) What am I doing (knocking)
3) Show me the clapping
4) Touch the one with a feature
5) Say 356
6) What color is your mom's car?
7) What's this called (picture on table)
8) What do you do with a bed?
9) Say go fast
10) Do you have any pets?
11) Say 34
12) Touch your nose
13) What color is my hair (pointing to hair)
14) Do this (fold arms)
15) Show me the one that is a (food, toy, vehicle)
16) Do this (wave)
17) What's this called (chin)
18) What barks?
19) Say Tuesday
20) Do this (clap)
21) Knife, fork and _____
22) Say 45
23) What's this (nose)
24) Do this (fold hands)
25) Show me sleeping









Appendix K

Test 2

Participant # _____

Date: _____
Time: _____

Instructor says/does	**Student says/does**	**Name operant of Student response**
Say "car"	Student says "car"	
Holds up picture of a boat and says "What's this called?"	Student says "boat"	
While knocking says "Do this."	Student knocks	
With five objects on the table says "Touch the one that you eat."	Student touches apple	
While tapping on the table says "Do this."	Student taps on the table	
While touching her hair says "What's this called?"	Student says "hair"	
With no objects present says "What do you do with a bed?"	Student says "sleep"	
With five pictures on the table says "Touch banana."	Student touches "Banana."	
"What's your mother's name?"	Student says "Marie"	
"Say 1-2-3"	Student says "1-2-3"	

													Participant. #
													Experim or control
													Written Test 1 Baseline
													Written Test 1 After 15 min. Training
													Oral Fluency Sheet 1
													Oral Fluency Sheet 2
													Written Test 1 2-3 weeks later
													Written Test 2 2-3 weeks later
													Oral Fluency Sheet 1
													Oral fluency Sheet 2

Appendix M

Dear Students,

Thank you for agreeing to participate in my doctoral research project: "The Effects of Fluency-Based Autism Training on Emerging Educational Leaders." A special thank you also goes to Sister Margaret, Dr. Mary Schreiner, and Ms. Anne Douglas for allowing me to come to their classes to recruit participants and to complete the study.

The data collection phase is finished so I will now provide you with some details about the study. I will also be available to come to your classes in the spring to provide a full overview.

The study initially included 43 individuals but 2 participants withdrew from the study. Two additional students did not attend class on the retention check night so only their acquisition data was included.

Participants and Procedures
Monday night—N =13 (Experimental)
Tuesday night – N = 9 (main study night) and N =7 (retention) (Experimental)
Wednesday night –N = 9 (Control)
Thursday night – N = 9 (Control)

All four classes received a baseline written test with 40 out of 41 participants scoring 0 with one participant scoring 20%. All participants then received a 10-minute overview of the verbal operants with subsequent scores of 50-60% accuracy on average on the same written test. The control groups then received a 1 hour standard lecture on VB while the experimental groups received 1 hour of fluency timing practice on oral naming of the operants with a goal of 20-25 correct/minute. At the end of one hour, all participants were tested individually outside of the classrooms. A research assistant took intraobserver data on the dependent variable during all oral testing. Retention checks followed 2-3 weeks later with 2 written tests and 2 oral tests performed on all participants.

Preliminary Results

There were no significant differences in terms of age, teaching experience, initial baseline testing or test after 10 minute lecture (that both groups received).

Significant differences were found between experimental and control groups in terms of acquisition. The control groups named 5 operants/minute on average compared to experimental groups who named an average of 20 correct/minute on script 1 and 16 correct/minute on script 2.

Significant differences were also found between the experimental and control groups on retention checks. The control group scored 22% on average on two written tests while the experimental group scored 47%. Oral naming of the operants was also double for the experimental group (10 correct per minute compared to 5 correct per minute for the control group).

As a small token of my appreciation, I am giving you a copy of an article I wrote a few years ago called "Getting Started with the Verbal Behavior Approach." I also wrote a book entitled, *The Verbal Behavior Approach: How to Teach Children with Autism and Related Disorders* and have more information on my web site: www.vbapproach. If you are interested in learning more about autism and verbal behavior, please refer to these resources. Again thank you all for your participation in my research and feel free to contact me through my web site with any questions or comments.

All my best,

Mary Lynch Barbera, RN, MSN, BCBA
Doctoral Candidate
Alvernia University

Appendix N

Key for Data Set Table

Variable	Definition	Value
Age	Self-reported age of participants	Age in Years
Yrs. Teach	Participant's self-reported years of teaching experience grouped into four ranges	Teaching in Years
Con/Exp	Assignment to control versus experimental group based on random class assignment	1 = Control 2 = Experimental
Class	Class enrollment	1 = Wed. Principal Certification 2 = Thurs. Research Course 3 = Tues. Special ED Course 4 = Mon. Research Course
W1 BL %	Written Test 1 baseline before any training	% Correct on 10 question fill-in-the-blank test 20 = 20% or 2 out of 10 questions correct.
W 1 AT %	Written Test 1 administered after all participants received 10-minute training	% Correct on same 10 question fill-in-the-blank test 20 = 20% or 2 out of 10 questions correct.
O1	Oral Test 1 administered individually after 1 hour of experimental or control treatment.	Rate correct per minute 10 = 10 correct responses in 1 minute time period
O2	Oral Test 2 administered individually immediately after Oral Test 1	Rate correct per minute 10 = 10 correct responses in 1 minute time period
W1 R %	Written Test 1 administered during retention testing 2-3 weeks after training	% Correct on same 10 question fill-in-the-blank test 20 = 20% or 2 out of 10 questions correct.
W2 R %	Written Test 2 administered during retention testing immediately after Written Test 1	% Correct on same 10 question fill-in-the-blank test 20 = 20% or 2 out of 10 questions correct.
O1 R	Oral Test 1 administered individually after Written Testing	Rate correct per minute 4 = 4 correct responses in 1 minute time period.
O2 R	Oral Test 2 administered individually immediately after Oral Test 1	Rate correct per minute 4 = 4 correct responses in 1 minute time period.
Gen.	Gender of the participants	1 = female, 2= male
# Wk. Ret	Retention Testing 2 or 3 weeks after training	1 = 2 weeks, 2 = 3 weeks
Hi Lo Per.	Rating of High or Low Performer	1 = High (Higher than average on testing) 2 = Low (Average or lower on testing)
P #	Original Participant Number	Number randomly selected and used throughout study

Age	Years Teach	Con Exp.	Class	W1 BL %	W1 AT %	O1	O2	W1R %	W2R %	O1R	O2R	Gen	# wk ret	Hi Lo Per	P #
51	29	1	1	0	90	1	2	0	10	2	6	2	1	2	1
35	12	1	1	0	40	3	5	0	0	2	3	1	1	2	2
29	8	1	1	0	80	7	12	20	10	3	4	1	1	2	3
30	9	1	1	0	40	5	7	0	0	4	6	2	1	2	4
40	8	1	1	0	90	7	4	30	40	3	6	1	1	1	5
40	17	1	1	0	90	7	5	40	30	4	6	1	1	1	6
58	5	1	1	0	20	1	2	10	30	2	2	1	1	2	7
34	10	1	1	0	100	6	6	40	50	7	7	1	1	1	8
29	6	1	1	0	50	5	5	40	50	8	6	2	1	1	9
38	3	1	2	0	80	11	10	40	40	8	9	1	2	1	10
40	8	1	2	0	20	3	2	30	20	2	3	1	2	2	11
41	5	1	2	0	30	4	2	20	20	3	4	1	2	2	12
47	7	1	2	0	80	6	5	40	40	5	5	1	2	1	13
42	2	1	2	0	30	2	2	20	20	3	4	2	2	2	14
42	11	1	2	0	80	6	11	20	20	4	4	1	2	2	15
31	3	1	2	0	60	5	3	20	20	3	4	1	2	2	16
35	6	1	2	0	20	5	7	10	10	4	5	2	2	2	17
29	7	1	2	0	80	5	6	50	50	11	11	1	2	1	18
26	4	2	3	0	60	19	12	20	20	5	3	1	1	2	23
26	4	2	3	0	60	18	13	40	70	9	5	2	1	1	24
51	19	2	3	0	60	19	20	50	40	5	1	1	1	2	25

42	4	2	3	0	70	24	23	40	40	15	14	1	1	1	26
33	11	2	3	0	90	24	11	30	20	5	6	1	1	2	28
31	3	2	3	0	80	25	21	50	60	5	10	2	1	1	29
44	0	2	3	0	100	25	14	60	60	17	18	1	1	1	30
58	5	2	3	0	30	15	13	40	20	4	4	1	1	2	32
42	20	2	4	0	60	24	20	70	50	11	13	1	2	1	33
29	5	2	4	0	10	20	18	40	50	7	8	1	2	2	34
58	17	2	4	20	80	23	14	100	60	20	23	1	2	1	35
40	10	2	4	0	70	25	18	20	20	4	5	2	2	2	37
35	12	2	4	0	30	21	18	0	0	0	0	2	2	2	38
29	0	2	4	0	40	25	24	60	70	16	18	1	2	1	39
46	10	2	4	0	50	26	17	20	50	6	5	1	2	2	40
35	11	2	4	0	80	22	18	100	100	23	22	1	2	1	41
27	2	2	4	0	70	23	19	50	70	16	15	1	2	1	42
53	9	2	4	0	40	11	10	0	0	0	0	1	2	2	43
35	11	2	4	0	40	17	18	20	10	3	5	2	2	2	44
30	7	2	4	0	20	21	15	60	80	19	19	1	2	1	45
26	5	2	4	0	60	18	15	70	80	15	12	1	2	1	46

Appendix O

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Exp_Control	N	Percent	N	Percent	N	Percent
Written_BL	Control	18	100.0%	0	.0%	18	100.0%
	Experimental	21	100.0%	0	.0%	21	100.0%
Written_after_teaching	Control	18	100.0%	0	.0%	18	100.0%
	Experimental	21	100.0%	0	.0%	21	100.0%

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Written_BL	Between Groups	8.791	1	8.791	.854	.361
	Within Groups	380.952	37	10.296		
	Total	389.744	38			
Written_after_teaching	Between Groups	79.121	1	79.121	.118	.733
	Within Groups	24828.571	37	671.042		
	Total	24907.692	38			

Appendix P

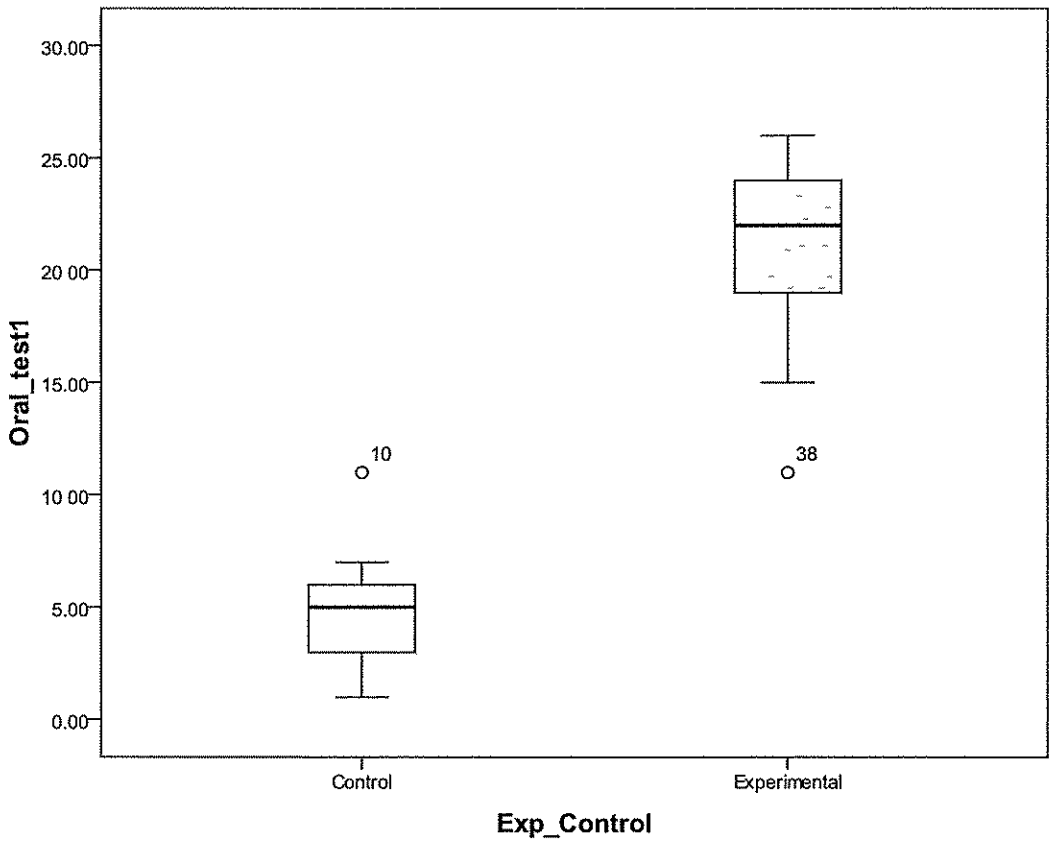
Descriptives

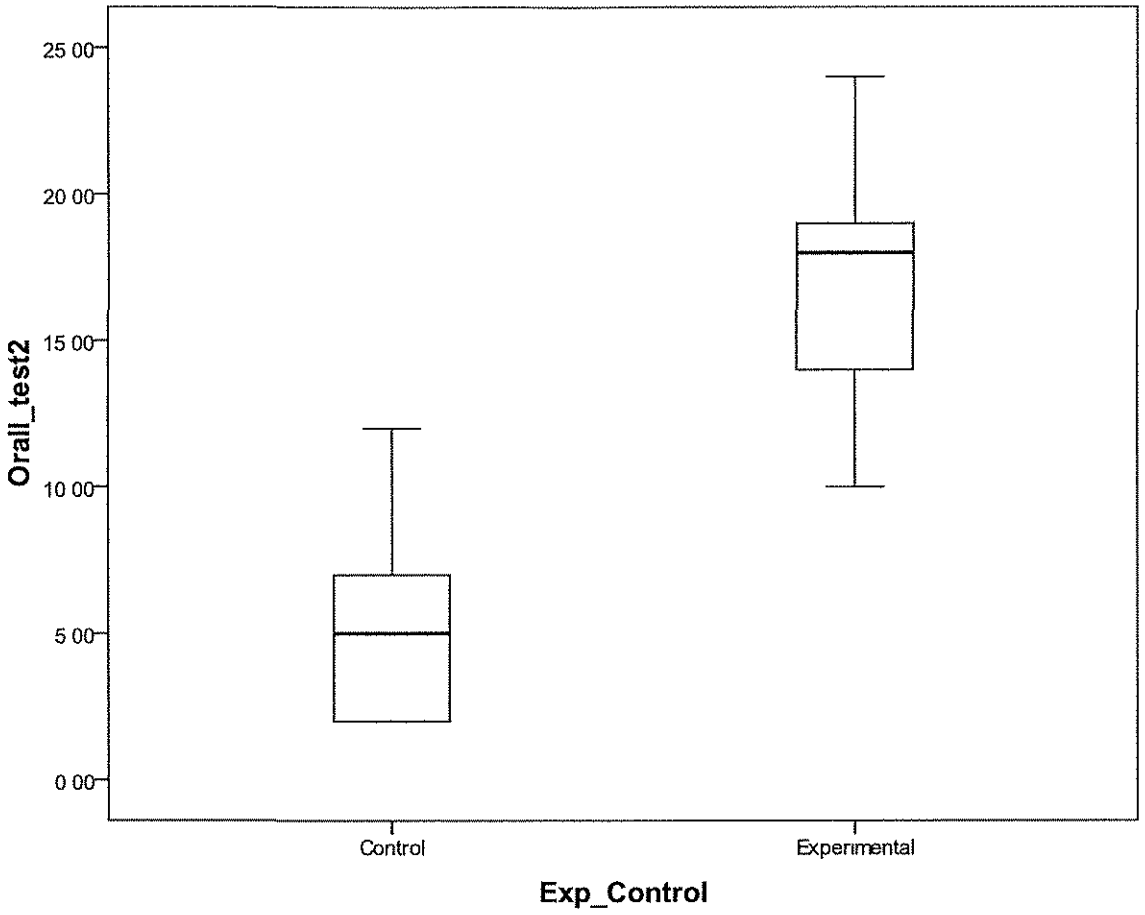
	Exp_Control			Statistic	Std. Error
Age	Control	Mean		38.3889	1.88759
		95% Confidence Interval for Mean	Lower Bound	34.4064	
			Upper Bound	42.3714	
		5% Trimmed Mean		37.8210	
		Median		39.0000	
		Variance		64.134	
		Std. Deviation		8.00837	
		Minimum		29.00	
		Maximum		58.00	
		Range		29.00	
		Interquartile Range		11.25	
		Skewness		.860	.536
		Kurtosis		.687	1.038
	Experimental	Mean		37.9048	2.29379
		95% Confidence Interval for Mean	Lower Bound	33.1200	
			Upper Bound	42.6895	
		5% Trimmed Mean		37.4497	
		Median		35.0000	
		Variance		110.490	
		Std. Deviation		10.51145	
		Minimum		26.00	
		Maximum		58.00	
		Range		32.00	
		Interquartile Range		16.00	
		Skewness		.668	.501
		Kurtosis		-.700	.972

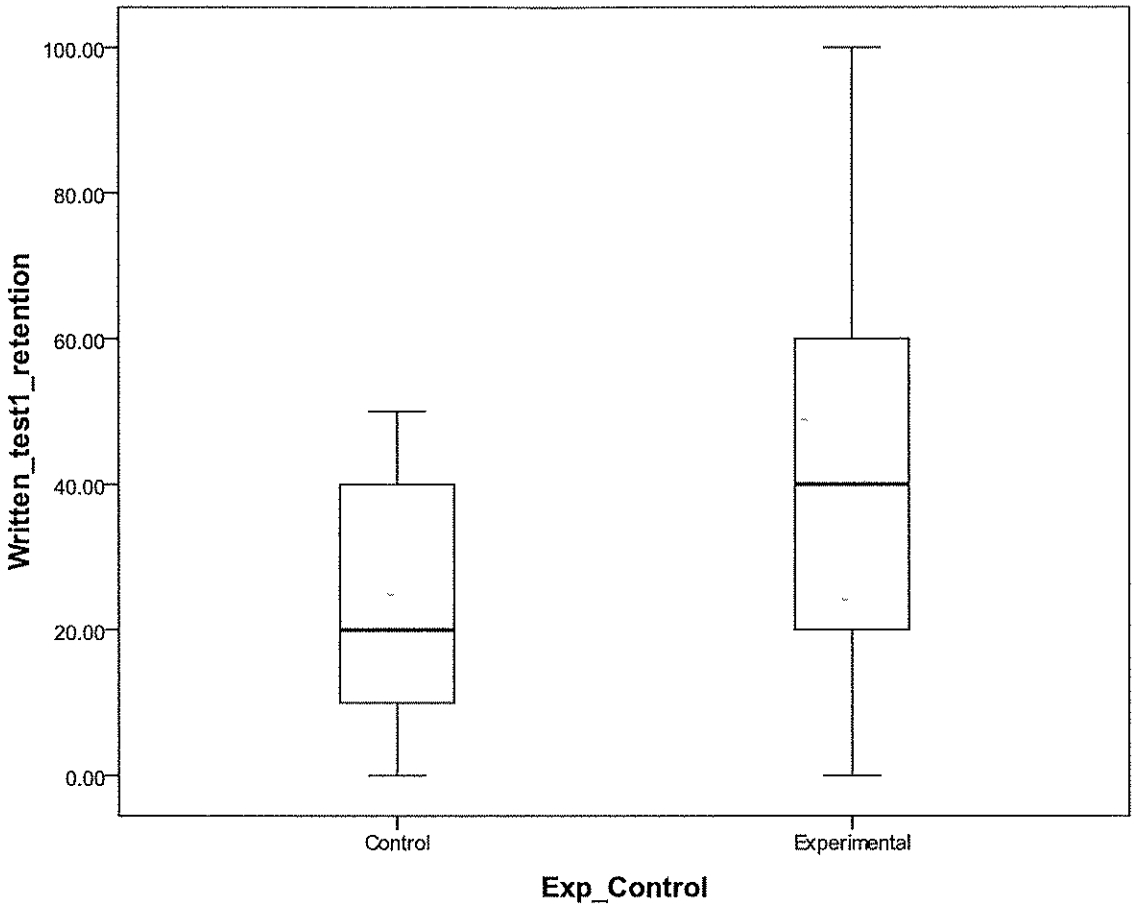
Descriptives

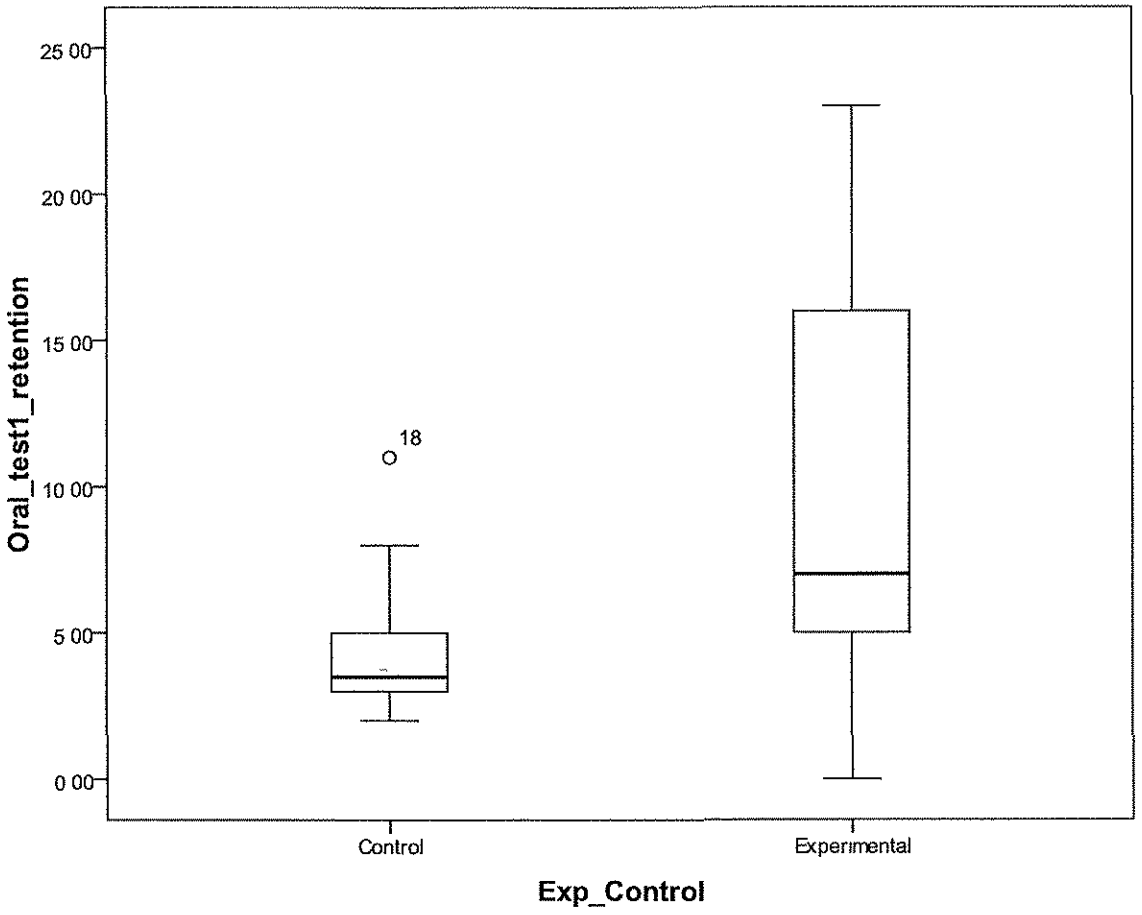
	Exp_Control			Statistic	Std. Error
Written_after_teaching	Control	Mean		60.0000	6.71551
		95% Confidence Interval for Mean	Lower Bound	45.8315	
			Upper Bound	74.1685	
		5% Trimmed Mean		60.0000	
		Median		70.0000	
		Variance		811.765	
		Std. Deviation		28.49148	
		Minimum		20.00	
		Maximum		100.00	
		Range		80.00	
		Interquartile Range		52.50	
		Skewness		-.223	.536
		Kurtosis		-1.651	1.038
	Experimental	Mean		57.1429	5.12431
		95% Confidence Interval for Mean	Lower Bound	46.4537	
			Upper Bound	67.8320	
		5% Trimmed Mean		57.3810	
		Median		60.0000	
		Variance		551.429	
		Std. Deviation		23.48252	
		Minimum		10.00	
		Maximum		100.00	
		Range		90.00	
		Interquartile Range		35.00	
		Skewness		-.235	.501
		Kurtosis		-.481	.972

Appendix Q

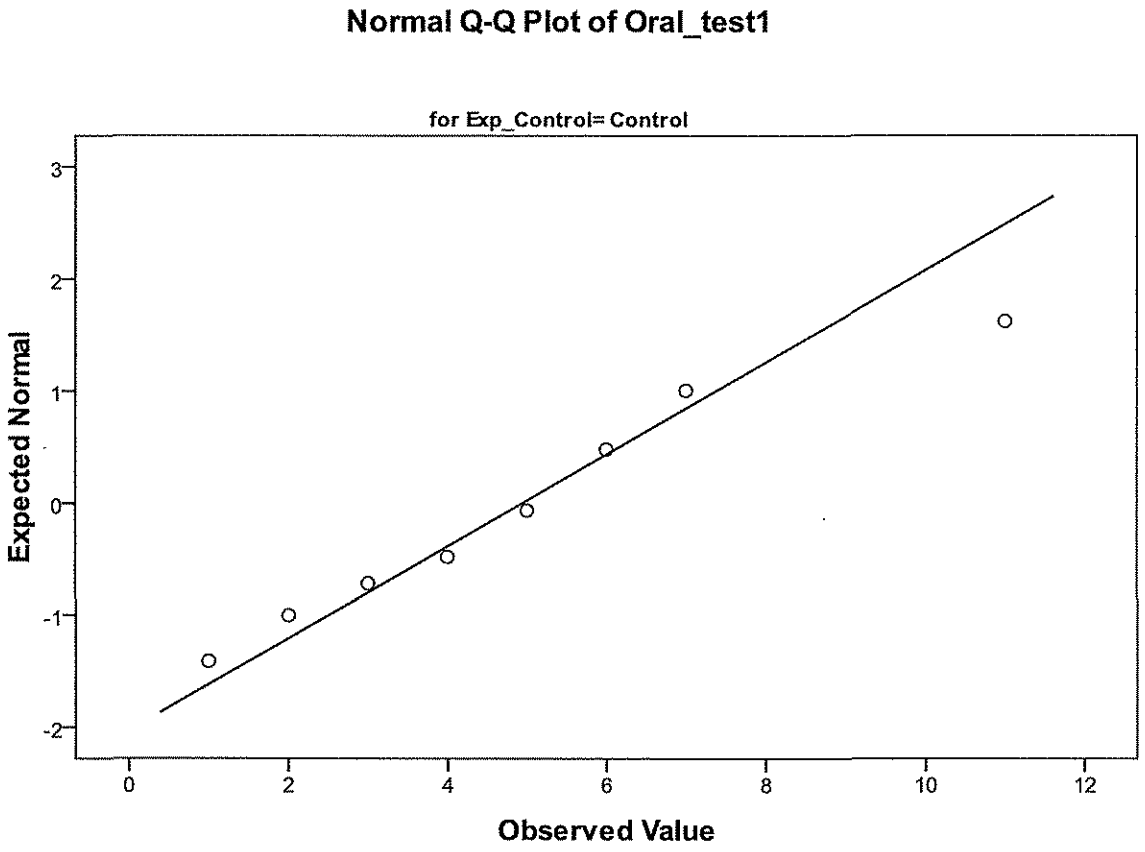

30.00
25.00
20 00
15.00
10 00
5.00
0.00
Oral_test1
10
38
Control
Experimental
Exp_Control

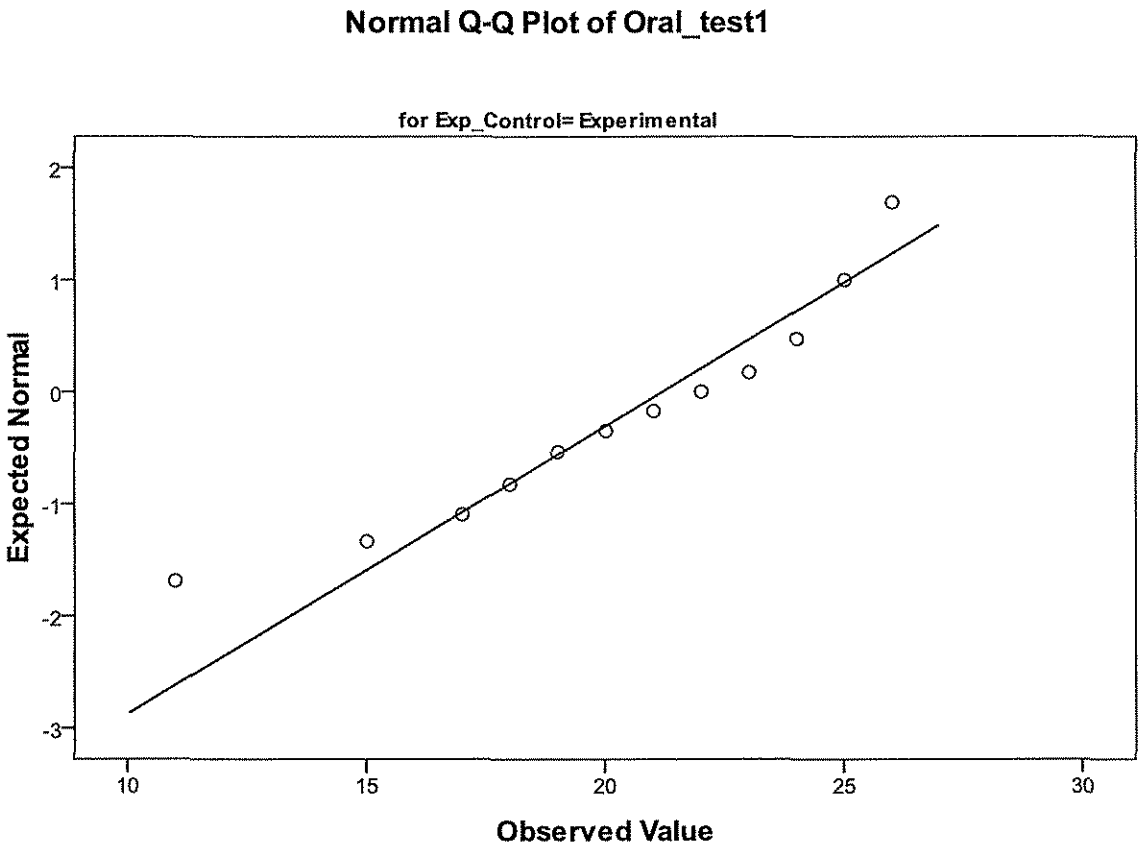

25 00
20 00
15 00
10 00
5 00
0 00
Orall_test2
Control
Experimental
Exp_Control

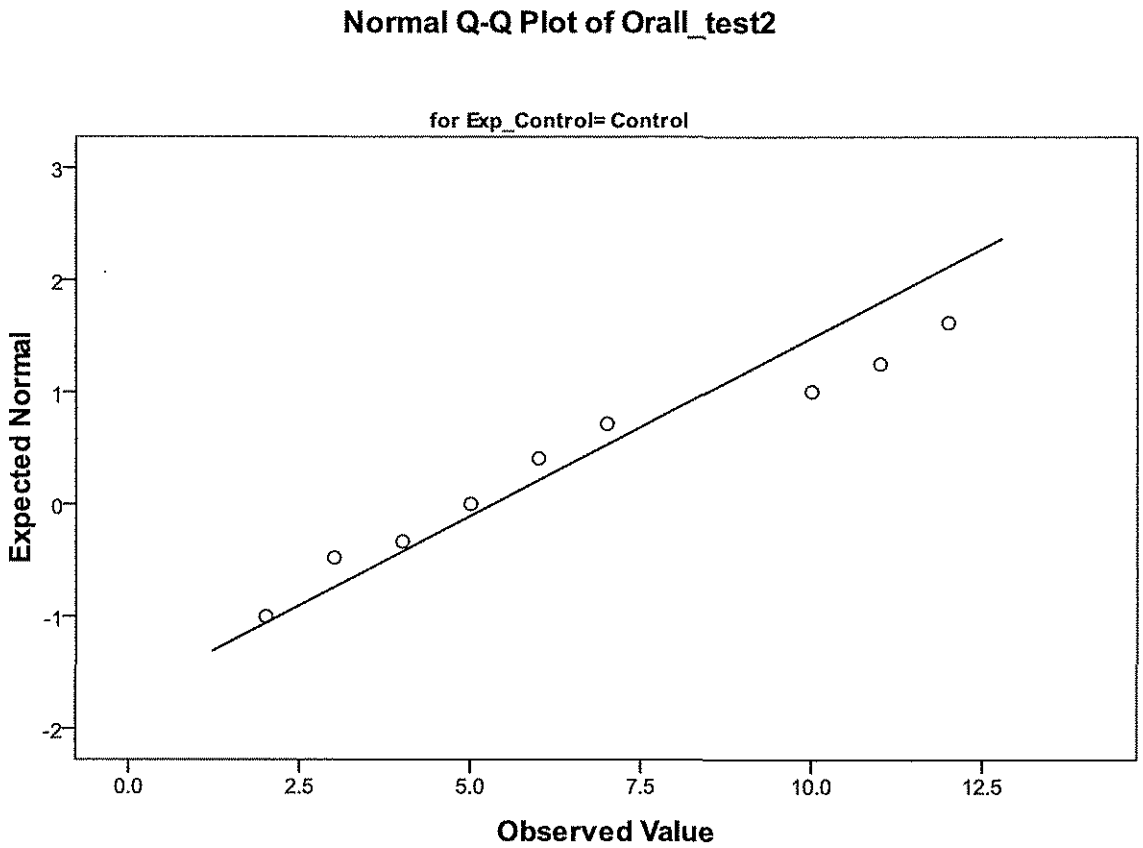

100.00
80.00
60.00
40.00
20.00
0.00
Written_test1_retention
Control
Experimental
Exp_Control

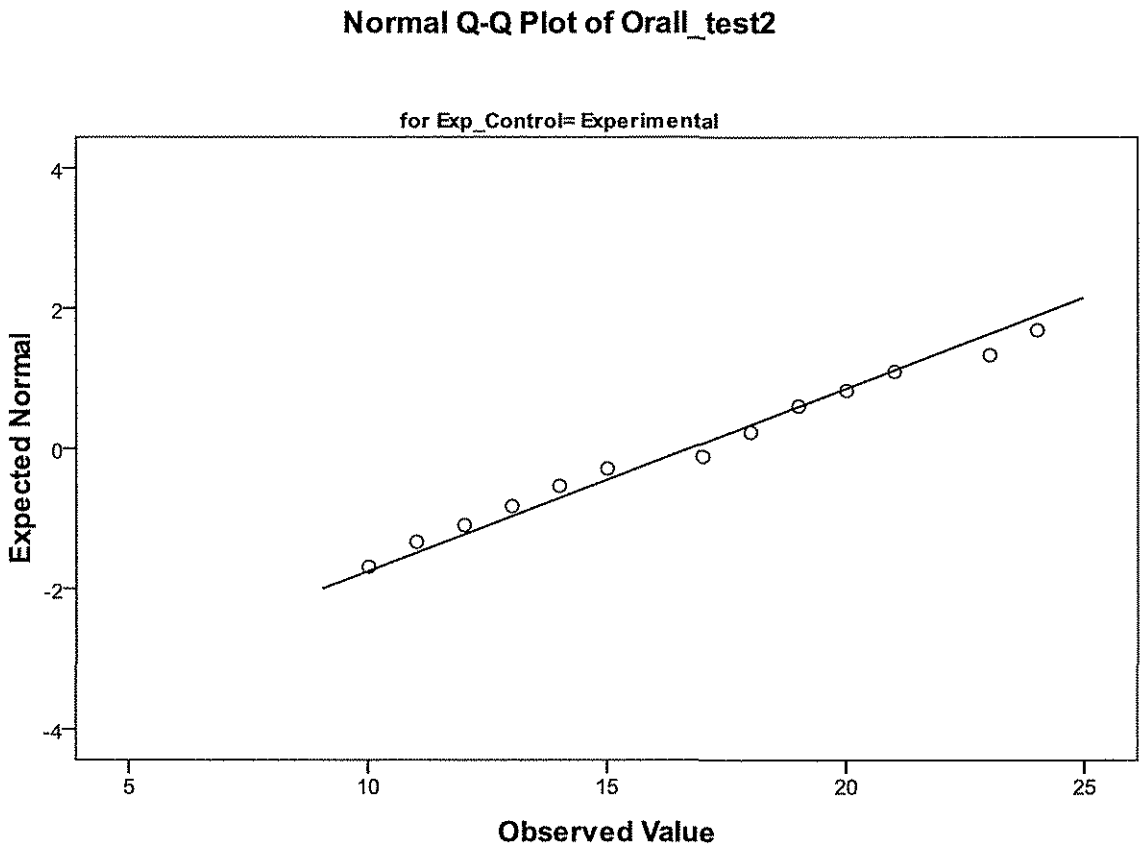

25 00
20 00
15 00
10 00
5 00
0 00
Oral_test1_retention
18
Control
Experimental
Exp_Control

Appendix R

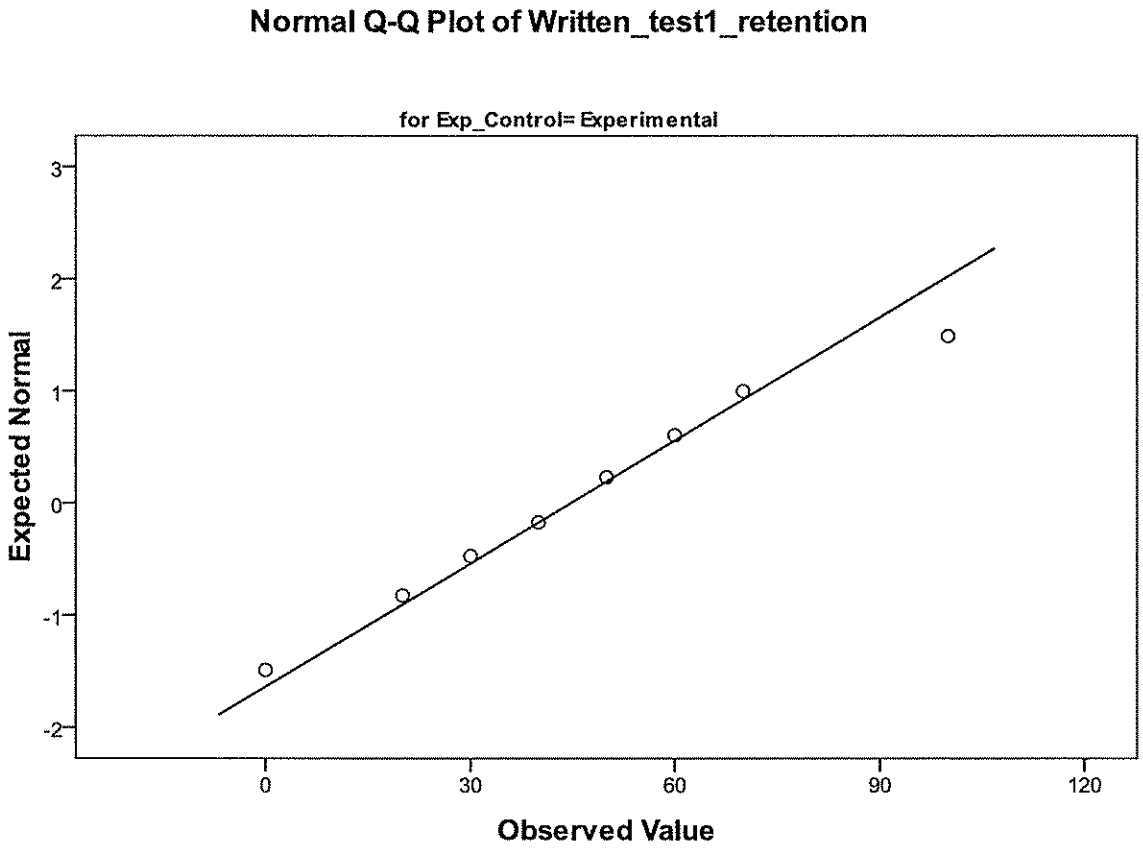

Normal Q-Q Plot of Oral_test1
for Exp_Control= Control
Expected Normal
3
2
1
0
-1
-2
0
2
4
6
8
10
12
Observed Value

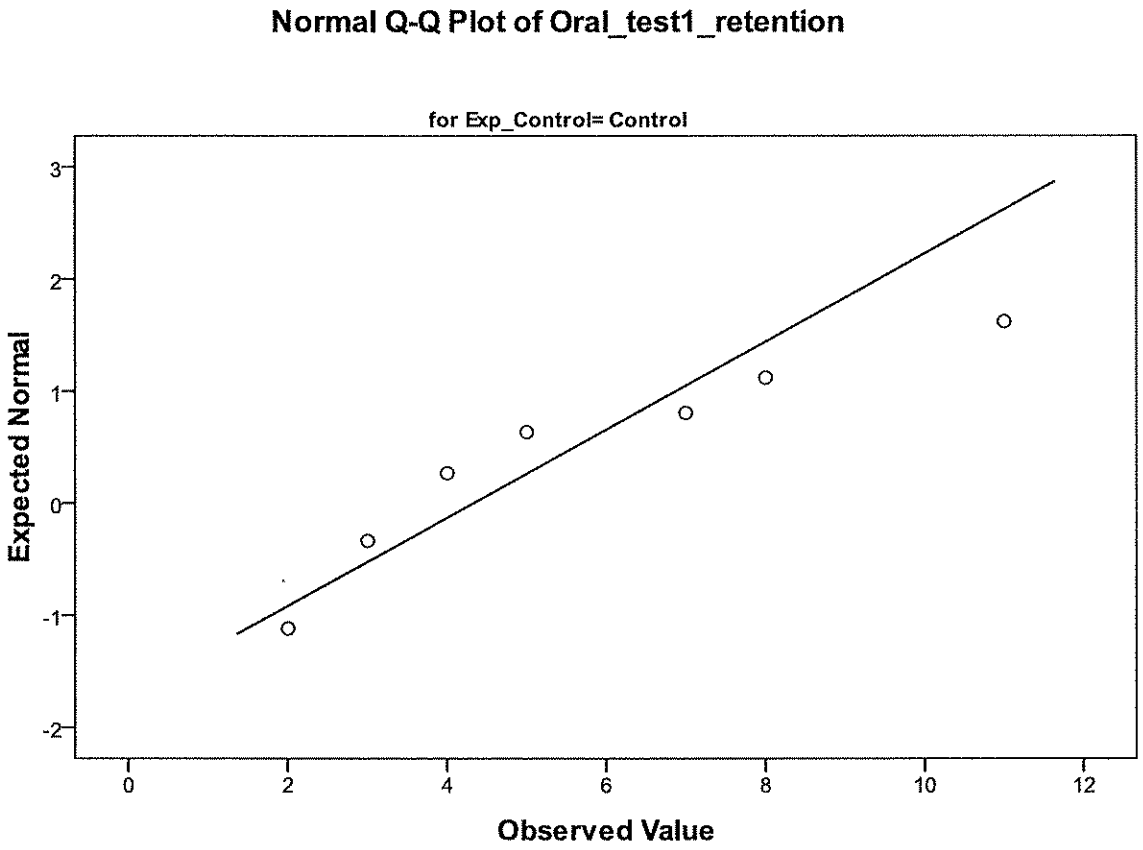

Normal Q-Q Plot of Oral_test1
for Exp_Control= Experimental
Expected Normal
2
1
0
-1
-2
-3
10
15
20
25
30
Observed Value


Normal Q-Q Plot of Orall_test2
for Exp_Control= Control
Expected Normal
3
2
1
0
-1
-2
0.0
2.5
5.0
7.5
10.0
12.5
Observed Value

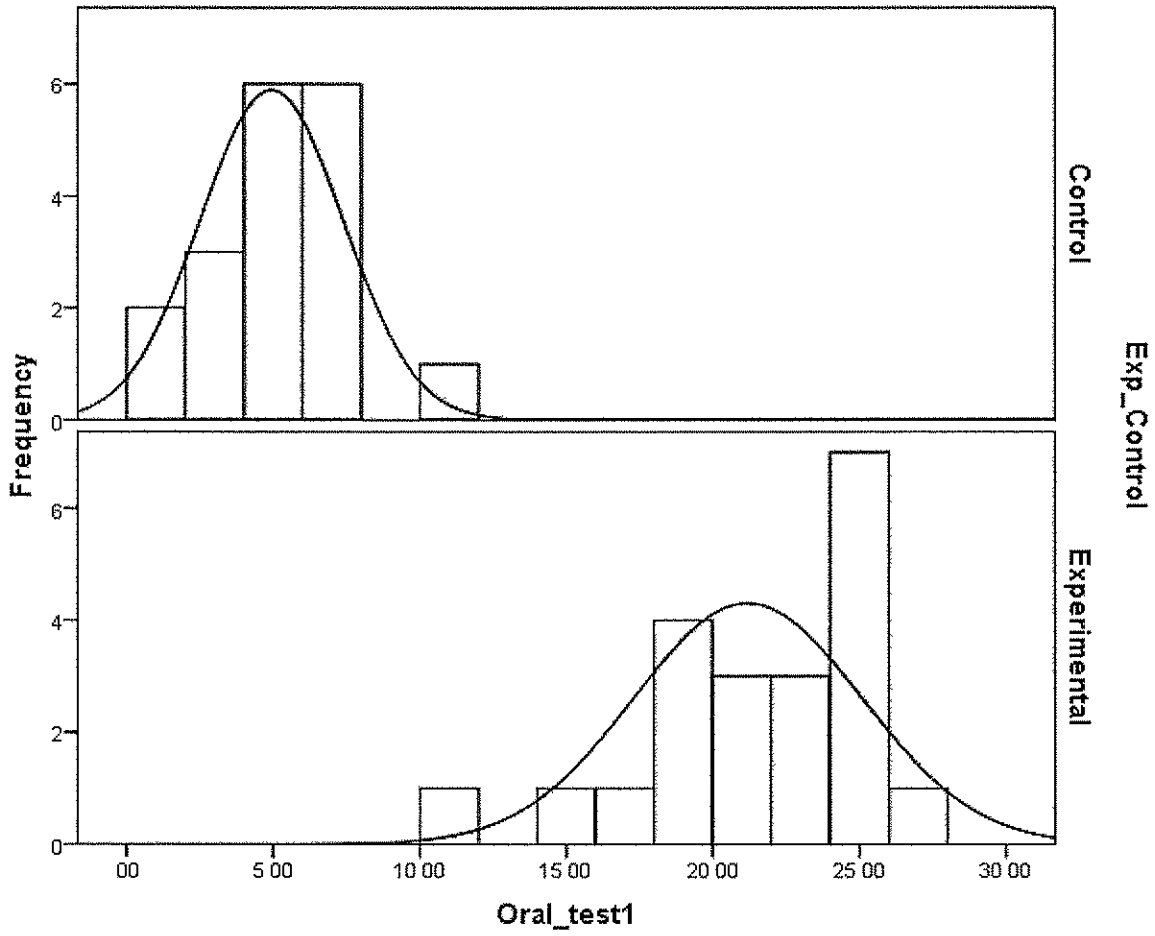

Normal Q-Q Plot of Orall_test2
for Exp_Control= Experimental
Expected Normal
4
2
0
-2
-4
5
10
15
20
25
Observed Value

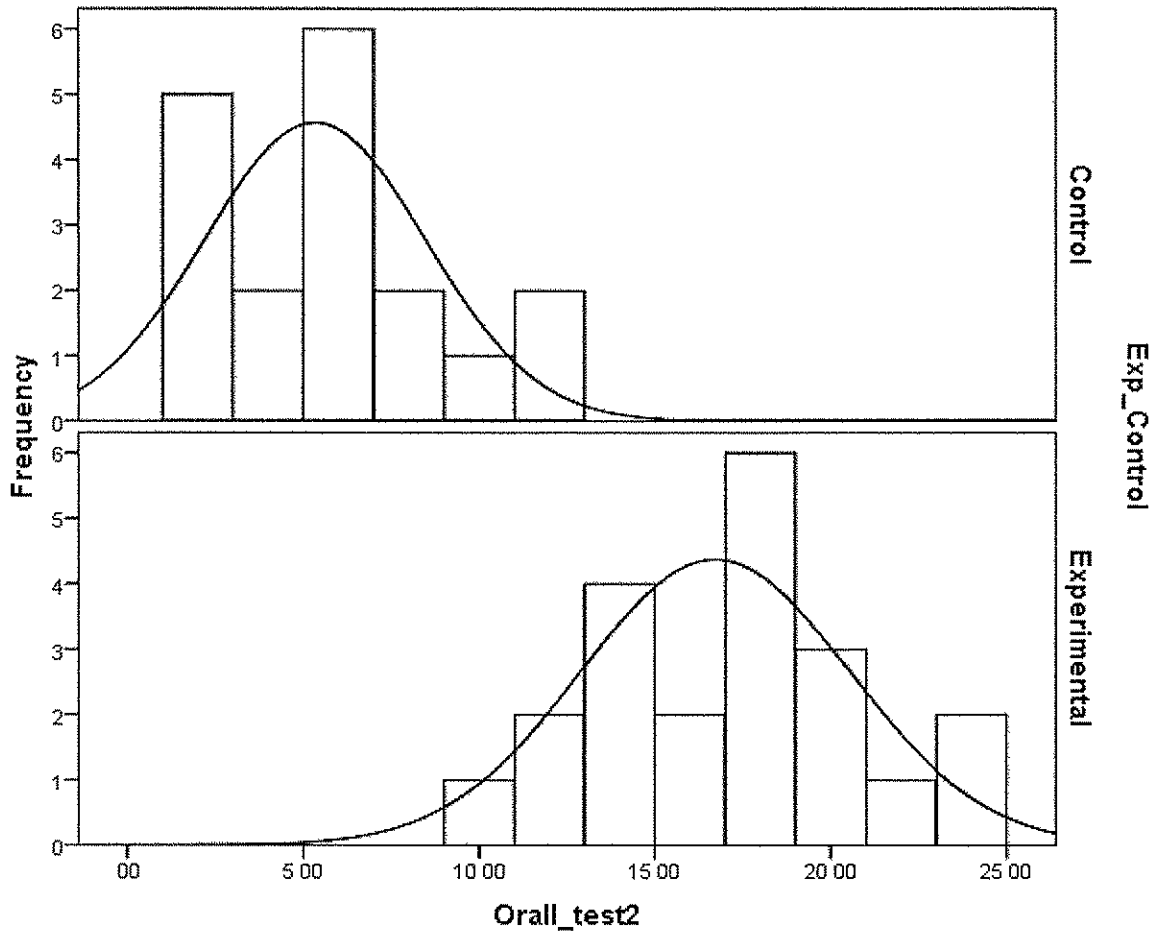

Normal Q-Q Plot of Written_test1_retention
for Exp_Control= Control
Expected Normal
2
1
0
-1
-2
0
20
40
60
Observed Value

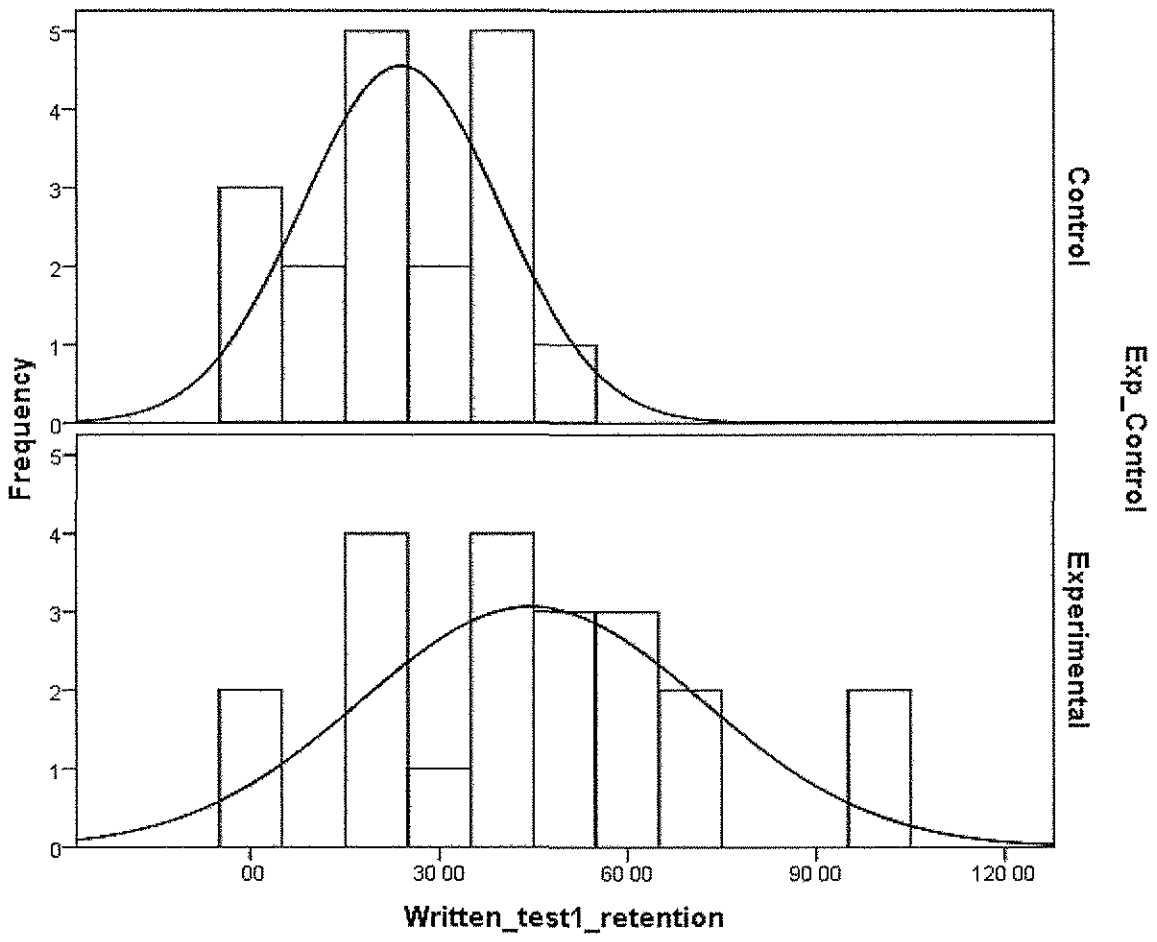

Normal Q-Q Plot of Written_test1_retention
for Exp_Control= Experimental
Expected Normal
3
2
1
0
-1
-2
0
30
60
90
120
Observed Value

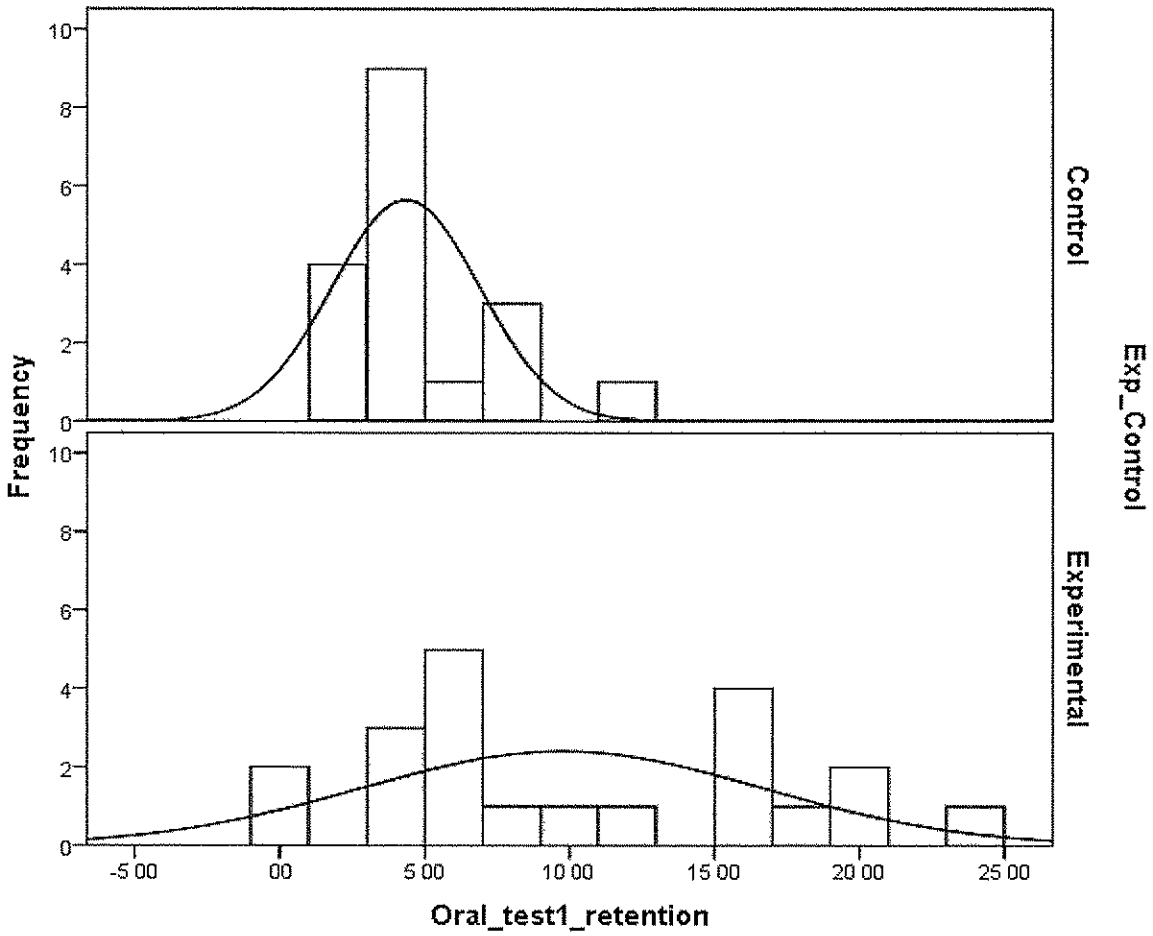

Normal Q-Q Plot of Oral_test1_retention
for Exp_Control= Control
Expected Normal
3
2
1
0
-1
-2
0
2
4
6
8
10
12
Observed Value


Normal Q-Q Plot of Oral_test1_retention
for Exp_Control= Experimental
Expected Normal
Observed Value
3
2
1
0
-1
-2
-5
0
5
10
15
20
25

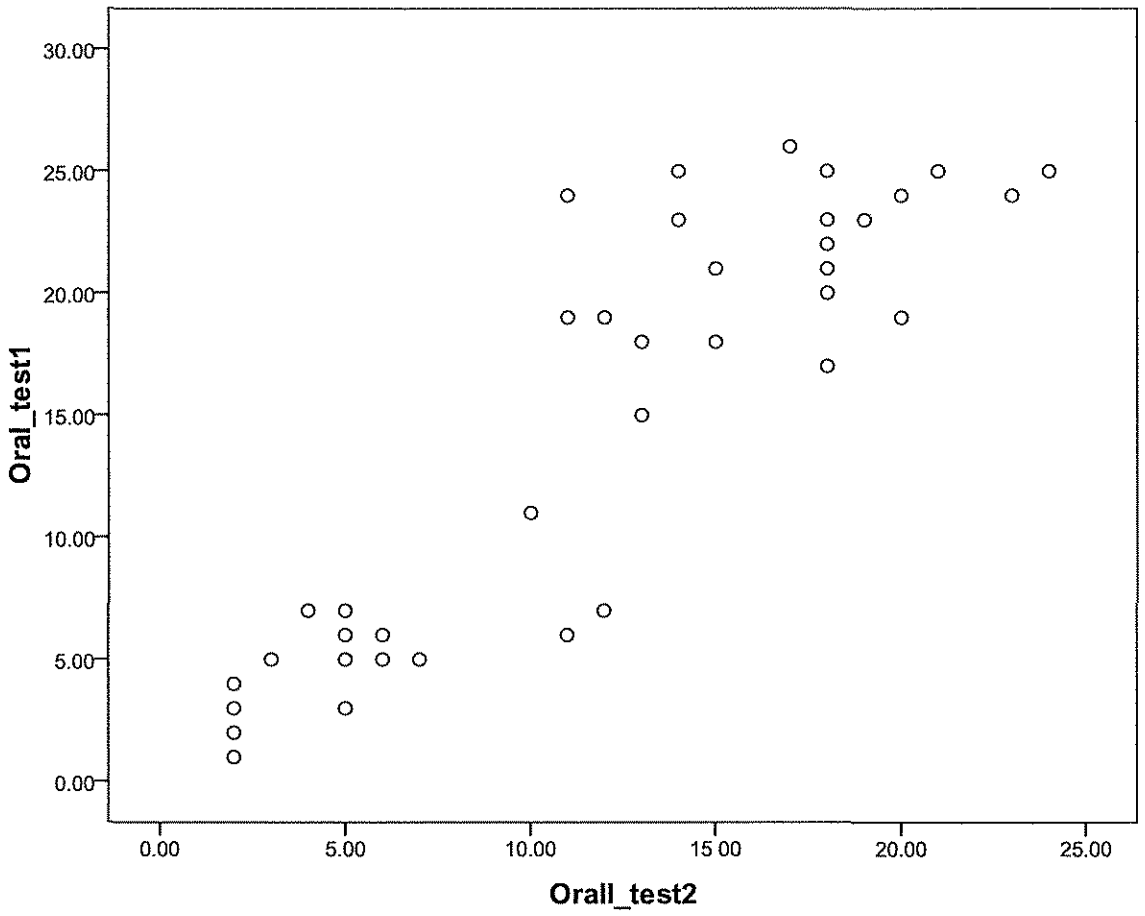

Frequency
6
4
2
0
Control
Experimental
Exp_Control
00
5 00
10 00
15 00
20 00
25 00
30 00
Oral_test1

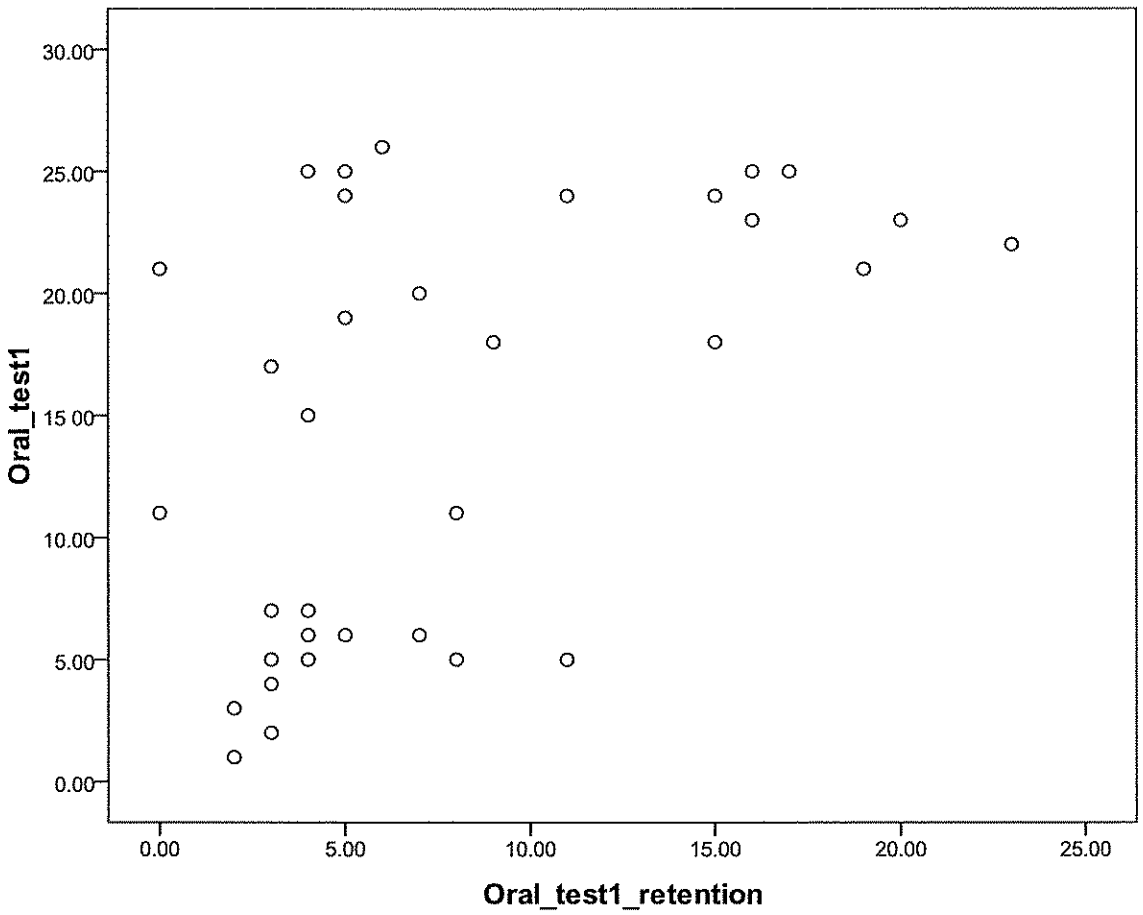

Exp_Control
Control
Experimental
Frequency
0
1
2
3
4
5
6
00
5 00
10 00
15 00
20 00
25 00
Orall_test2

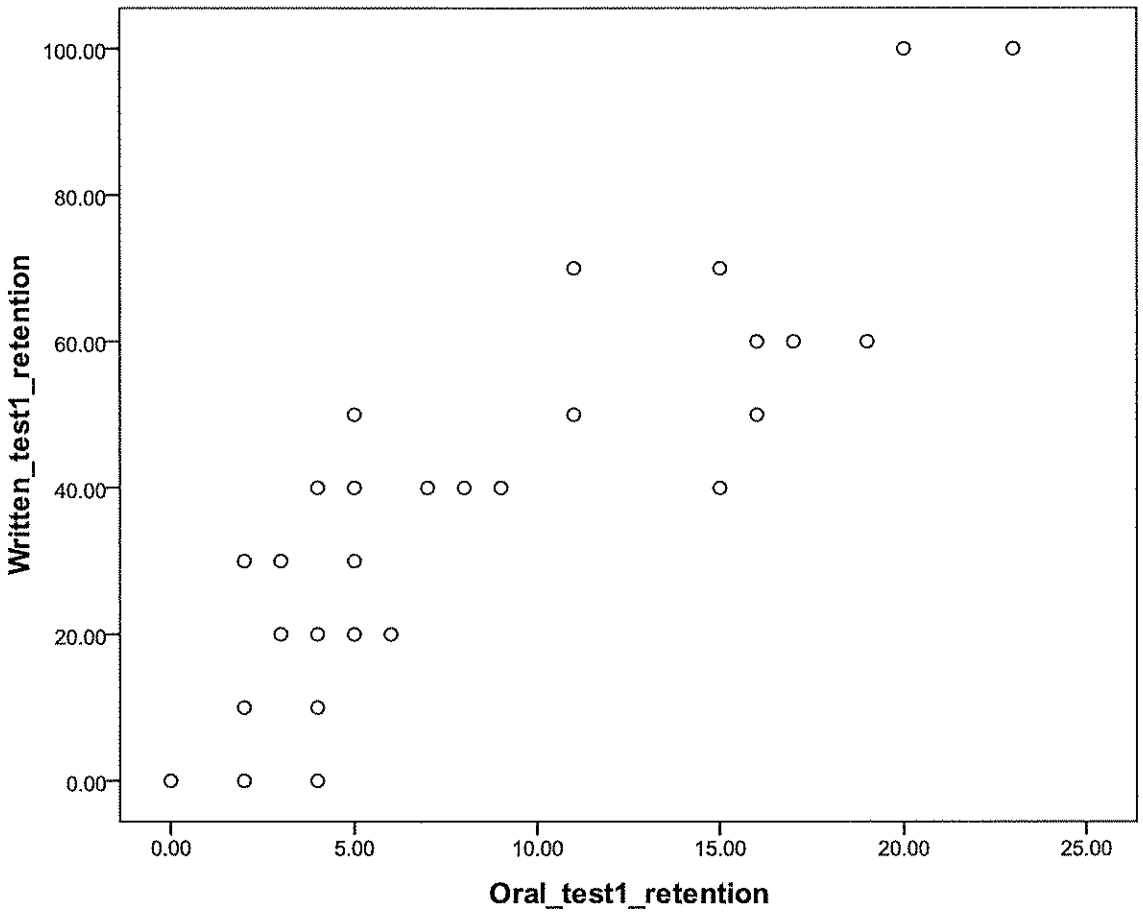

Frequency
5
4
3
2
1
0
Control
Experimental
Exp_Control
00
30 00
60 00
90 00
120 00
Written_test1_retention


Frequency
10
8
6
4
2
0
Control
Experimental
Exp_Control
-5 00
00
5 00
10 00
15 00
20 00
25 00
Oral_test1_retention

Appendix S


30.00
25.00
20.00
15.00
10.00
5.00
0.00
Oral_test1
0.00
5.00
10.00
15.00
20.00
25.00
Orall_test2


30.00
25.00
20.00
15.00
10.00
5.00
0.00
Oral_test1
0.00
5.00
10.00
15.00
20.00
25.00
Oral_test1_retention


100.00
80.00
60.00
40.00
20.00
0.00
Written_test1_retention
0.00
5.00
10.00
15.00
20.00
25.00
Oral_test1_retention

Appendix T

Descriptive Statistics

	Exp_Control	*Mean*	*Std. Deviation*	*N*
Oral_test1	Control	4.9444	2.43678	18
	Experimental	21.1905	3.89383	21
	Total	13.6923	8.82924	39
Orall_test2	Control	5.3333	3.14362	18
	Experimental	16.7143	3.83592	21
	Total	11.4615	6.72328	39
Written_test1_retention	Control	23.8889	15.77000	18
	Experimental	44.7619	27.31649	21
	Total	35.1282	24.80151	39
Oral_test1_retention	Control	4.3333	2.54374	18
	Experimental	9.7619	6.95633	21
	Total	7.2564	5.98998	39

Box's Test of Equality of Covariance Matrices[a]

Box's M	34.701
F	3.058
df1	10
df2	6173.992
Sig.	.001

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

Box's Test of Equality of Covariance Matrices[a]

Box's M	34.701
F	3.058
df1	10
df2	6173.992
Sig.	.001

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Exp_Control

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power[b]
Intercept	*Pillai's Trace*	*.947*	*152.262[a]*	*4.000*	*34.000*	*.000*	*609.049*	*1.000*
	Wilks' Lambda	.053	152.262[a]	4.000	34.000	.000	609.049	1.000
	Hotelling's Trace	17.913	152.262[a]	4.000	34.000	.000	609.049	1.000
	Roy's Largest Root	17.913	152.262[a]	4.000	34.000	.000	609.049	1.000
Exp_Control	Pillai's Trace	.870	56.883[a]	4.000	34.000	.000	227.532	1.000
	Wilks' Lambda	.130	56.883[a]	4.000	34.000	.000	227.532	1.000
	Hotelling's Trace	6.692	56.883[a]	4.000	34.000	.000	227.532	1.000
	Roy's Largest Root	6.692	56.883[a]	4.000	34.000	.000	227.532	1.000

a. Exact statistic

b. Computed using alpha = .05

c. Design: Intercept + Exp_Control

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power[b]
Corrected Model	Oral_test1	2558.125[a]	1	2558.125	234.178	.000	234.178	1.000
	Orall_test2	1255.407[c]	1	1255.407	100.479	.000	100.479	1.000
	Written_test1_retention	4222.772[d]	1	4222.772	8.158	.007	8.158	.794
	Oral_test1_retention	285.626[e]	1	285.626	9.805	.003	9.805	.862
Intercept	Oral_test1	6620.176	1	6620.176	606.029	.000	606.029	1.000
	Orall_test2	4711.407	1	4711.407	377.087	.000	377.087	1.000
	Written_test1_retention	45679.182	1	45679.182	88.250	.000	88.250	1.000
	Oral_test1_retention	1925.626	1	1925.626	66.105	.000	66.105	1.000
Exp_Control	Oral_test1	2558.125	1	2558.125	234.178	.000	234.178	1.000
	Orall_test2	1255.407	1	1255.407	100.479	.000	100.479	1.000
	Written_test1_retention	4222.772	1	4222.772	8.158	.007	8.158	.794
	Oral_test1_retention	285.626	1	285.626	9.805	.003	9.805	.862
Error	Oral_test1	404.183	37	10.924				
	Orall_test2	462.286	37	12.494				
	Written_test1_retention	19151.587	37	517.610				
	Oral_test1_retention	1077.810	37	29.130				
Total	Oral_test1	10274.000	39					
	Orall_test2	6841.000	39					
	Written_test1_retention	71500.000	39					
	Oral_test1_retention	3417.000	39					
Corrected Total	Oral_test1	2962.308	38					
	Orall_test2	1717.692	38					
	Written_test1_retention	23374.359	38					
	Oral_test1_retention	1363.436	38					

a. R Squared = .864 (Adjusted R Squared = .860)

b. Computed using alpha = .05

c. R Squared = .731 (Adjusted R Squared = .724)

d. R Squared = .181 (Adjusted R Squared = .159)

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power[b]
Corrected Model	Oral_test1	2558.125[a]	1	2558.125	234.178	.000	234.178	1.000
	Orall_test2	1255.407[c]	1	1255.407	100.479	.000	100.479	1.000
	Written_test1_retention	4222.772[d]	1	4222.772	8.158	.007	8.158	.794
	Oral_test1_retention	285.626[e]	1	285.626	9.805	.003	9.805	.862
Intercept	Oral_test1	6620.176	1	6620.176	606.029	.000	606.029	1.000
	Orall_test2	4711.407	1	4711.407	377.087	.000	377.087	1.000
	Written_test1_retention	45679.182	1	45679.182	88.250	.000	88.250	1.000
	Oral_test1_retention	1925.626	1	1925.626	66.105	.000	66.105	1.000
Exp_Control	Oral_test1	2558.125	1	2558.125	234.178	.000	234.178	1.000
	Orall_test2	1255.407	1	1255.407	100.479	.000	100.479	1.000
	Written_test1_retention	4222.772	1	4222.772	8.158	.007	8.158	.794
	Oral_test1_retention	285.626	1	285.626	9.805	.003	9.805	.862
Error	Oral_test1	404.183	37	10.924				
	Orall_test2	462.286	37	12.494				
	Written_test1_retention	19151.587	37	517.610				
	Oral_test1_retention	1077.810	37	29.130				
Total	Oral_test1	10274.000	39					
	Orall_test2	6841.000	39					
	Written_test1_retention	71500.000	39					
	Oral_test1_retention	3417.000	39					
Corrected Total	Oral_test1	2962.308	38					
	Orall_test2	1717.692	38					
	Written_test1_retention	23374.359	38					
	Oral_test1_retention	1363.436	38					

a. R Squared = .864 (Adjusted R Squared = .860)

b. Computed using alpha = .05

c. R Squared = .731 (Adjusted R Squared = .724)

d. R Squared = .181 (Adjusted R Squared = .159)

e. R Squared = .209 (Adjusted R Squared = .188)

Appendix U

Correlations

		Oral_test 1	Orall_test 2	Written_test 1_retention	Written_test 2_retention	Oral_test1_ retention	Oral_test2_ retention
Oral_test1	Pearson Correlation	1	.901**	.519**	.505**	.557**	.520**
	Sig. (2-tailed)		.000	.001	.001	.000	.001
	N	41	41	39	39	39	39
Orall_test2	Pearson Correlation	.901**	1	.449**	.435**	.496**	.450**
	Sig. (2-tailed)	.000		.004	.006	.001	.004
	N	41	41	39	39	39	39
Written_test1_retention	Pearson Correlation	.519**	.449**	1	.861**	.862**	.833**
	Sig. (2-tailed)	.001	.004		.000	.000	.000
	N	39	39	39	39	39	39
Written_test2_retention	Pearson Correlation	.505**	.435**	.861**	1	.851**	.772**
	Sig. (2-tailed)	.001	.006	.000		.000	.000
	N	39	39	39	39	39	39
Oral_test1_retention	Pearson Correlation	.557**	.496**	.862**	.851**	1	.950**
	Sig. (2-tailed)	.000	.001	.000	.000		.000
	N	39	39	39	39	39	39
Oral_test2_retention	Pearson Correlation	.520**	.450**	.833**	.772**	.950**	1
	Sig. (2-tailed)	.001	.004	.000	.000	.000	
	N	39	39	39	39	39	39

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

Appendix V

Confidentiality Agreement

It is understood and agreed to that the research project identified as IRB project 0410-111 of Alvernia University may contain confidential information and that it must be kept confidential

To ensure the protection of such information, and to preserve confidentiality necessary under National Institute of Health guidelines, it is agreed that

1. The Confidential Information to be disclosed can be described as and includes.

Includes all information provided or obtained from the dissertation project being completed by Mary Barbera through Alvernia University further identified by Alvernia University as Institutional Review Board project number 0410-111.

2. The Recipient agrees not to disclose the confidential information obtained from the project to anyone unless required to do so by law.

3. This Agreement states the entire agreement between the parties concerning the disclosure of Confidential Information. Any addition or modification to this Agreement must be made in writing and signed by the parties.

WHEREFORE, the parties acknowledge that they have read and understand this Agreement and voluntarily accept the duties and obligations set forth herein.

Recipient of Confidential Information:

Name (Print or Type) Christopher Bloch

Signature: Christopher Bloch, Ph.D

Date: 7/8/10

Discloser of Confidential Information:

Name (Print of Type) MARY BARBERA

Signature: Mary Barbera

Date: 7/7/10