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EFFECTS OF FUNCTIONAL COMMUNICATION TRAINING (FCT) ON THE COMMUNICATIVE, SELF-INITIATED TOILETING BEHAVIOR FOR STUDENTS WITH DEVELOPMENTAL DISABILITIES IN A SCHOOL SETTING

A DISSERTATION SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL OF EDUCATION IN CANDIDACY FOR THE DEGREE OF DOCTOR OF EDUCATION

PROGRAM IN CURRICULUM AND INSTRUCTION

BY

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ABSTRACT

Far less is known about the effects of functional communication-based toileting interventions for students with developmental disabilities in a school setting. Furthermore, the currently available toileting interventions for students with disabilities include some undesirable procedures such as the use of punishment, unnatural clinic/university settings as opposed to more natural school/home settings, and prompt-based as opposed to communicative, self-initiating skills. The current study examined the effectiveness of FCT on the incidence of communicative, self-initiated toileting and of toileting accidents without any punishment components, which were often considered as necessary in traditional toileting procedures. A multiple baseline design was used for the concurrent measurement of the target behaviors across the participants with the random assignment of the participants to the FCT intervention. The results of this study indicated that the present FCT intervention was effective in teaching of communicative, self-initiated toileting behavior in a school setting for some students with developmental disabilities. It seemed to be that the effects of the FCT intervention without punishment might take longer than the intervention with punishment. Future studies may explore how much parent participation and each participant’s cognitive functioning level are related to the degree of increasing communicative, self-initiated toileting behavior. In addition, the future research may focus on FCT intervention without punishment components for individuals with other developmental disabilities.
Chapter I

Introduction

This chapter will acquaint the reader with the literature on functional communication training (FCT), along with the rationale for the use of functional communication training (FCT) as a possible intervention to decrease or eliminate toileting accidents displayed by students with developmental disabilities in a school setting and to increase socially appropriate replacement behaviors such as communicative, self-initiated toileting behavior. First, the definition of challenging behaviors (e.g., stereotypy, aggression, disorders of physical regulation such as enuresis) is presented. Then, the definition of common developmental disabilities (i.e., mental retardation and autism) will briefly be discussed, followed by the discussion of enuresis (clothes/bed wetting). Some traditional treatment packages to address toileting problems will be discussed within the framework of applied behavior analysis (ABA), followed by some problems presented by traditional toileting methods. There also will be a short discourse on the conceptual framework of positive behavioral interventions and supports (PBIS), followed by a couple of specific PBIS components such as functional behavioral assessment (FBA) and functional communication training (FCT). The concluding section of this chapter discusses the problem and purpose of this study, the research questions and hypotheses to be examined, and limitations of this study.
Definition of Challenging Behaviors

According to the Diagnostic Statistical Manual of Mental Disorders (DSM-IV-TR), children with developmental disabilities are severely impaired by communication skills (American Psychological Association, 2000). Research has also suggested that children with developmental disabilities who exhibit challenging behaviors may do so as the result of communication skill deficits (Carr & Durand, 1985; Durand & Carr, 1992; Horner, Carr, Strain, Todd, & Red, 2002; Koegel, Koegel, & Dunlap, 1996). Due to their communication deficits, the individuals with developmental disabilities are observed to display a wide range of challenging behaviors such as aggression, stereotypy, and self-injury (Horner et al., 2002).

Meyers & Evans (1989) termed these challenging behaviors as “excess” behaviors and grouped them into six categories: stereotypy, self-injury, aggression, inappropriate social behavior, specific emotional disturbance, and disorders of physical regulation such as those focused on in the present study. Stereotypy, also known as self-stimulation, is defined as any repetitive behaviors that are reinforced or maintained by its sensory consequences. Examples of stereotypic behaviors include body rocking, finger flicking, hand flapping, tapping objects, etc. Self-injurious behaviors are defined as any behaviors that cause direct harm or injury on the behaving individual, and the behaviors can be positively reinforced (e.g., social attention) or negatively reinforced (e.g., removal of demands). Self-injurious behaviors might be an extension of self-stimulatory behavior (Carr & Durand, 1985). Aggression is defined as any behaviors that represent a danger to
the behaving individual and others. Examples of aggression include acts of physical violence against others and damaging property. These aggressive behaviors can cause severe injury and endanger the safety and effective functioning of a child in the environment, including community participation (Bambara & Kern, 2005; Horner et al., 2002; Lucshyn, Horner, Dunlap, Albin, & Ben, 2002).

If these severe challenging behaviors are not properly addressed, their impact on effective education, social development, and community inclusion can be detrimental (Fox, Dunlap, & Buschbacher, 2000; Horner et al., 2002; Lucshyn et al., 2002), preventing the individuals with disabilities from participating in the community, having positive interactions with others, and decreasing the amount of independence they have in their lives (Edmonson & Turnbull, 2002). Also, if these challenging behaviors are persistent, they can also lead to restrictive placements for the individual with disabilities and increase the odds of aversive interventions such as prolonged isolation/time out, excessively heavy medication, shock, surgery (e.g., removing teeth so that the person can not bite), or elaborate restraint.

However, challenging behaviors do not always include self-injury toward self, aggression toward others, or destruction of property in a physical sense. According to Meyer and Evans, any “excess behavior reflecting normal deviance” can be just as problematic to parents and educators as physical aggression (1989). These include inappropriate social behavior, specific emotional disturbance, and loss of self-regulation over bodily functions. Examples of inappropriate social behavior are stripping off
clothes, hoarding possessions, and masturbating in public. Specific emotional disturbance displayed by individual with developmental disabilities include phobia, depression, and social anxiety.

The last “excess” behavior category by Meyer & Evans (1989) represents the behaviors resulting from a failure to learn self-regulation over bodily functions such as enuresis. Although toileting problems displayed by individuals with developmental disabilities are due to a failure to train the individual, punishment procedures had been widely used in changing behavior (Kazdin, 1994; Meyer & Evans, 1989), from surgical techniques (e.g., cauterizing the child’s urethra with silver nitrate) to a variety of drug treatments to deal with the problem of enuresis (Heston, 1998; Schaefer, 1995).

Meyer & Evans also categorized the challenging behaviors displayed by individuals with developmental disabilities into one of three levels of seriousness: Level I, Level II, and Level III (1989). Toileting problems displayed by individuals with developmental disabilities may be categorized into the Level III behavior and may have the following characteristics:

(a) the behavior has been a problem for some time,

(b) the behavior interferes with community acceptance (e.g., wetting pants in public places), and

(c) an improvement in the behavior would generate another behavioral improvement (e.g., a reduction in wetting pants may lead to increased self-
esteem, independence, and overall quality of life; decreased financial cost; negative social stigma toward the individual with disabilities, etc.).

Although Level III “excess” behaviors are not serious enough to receive immediate attention, these behaviors can be as much problematic as severe challenging behaviors to parents and educators, interfering social integration, employment, family living, and normalized and integrated community participation of individuals with developmental disabilities (Horner, et al., 2002; Lucshyn et al., 2002; Meyer & Evans, 1989).

**Definition of Developmental Disability**

Developmental disability is a diverse group of severe, life-long conditions resulting from mental and/or physical impairments that arise before the age of 22 (American Psychological Association, 2000). Individuals with severe to profound developmental disabilities are affected with major areas of their life such as communication, self-help, socialization, mobility, and overall quality of life, and these problems usually last the individual’s lifetime long (APA, 2000). Two of the most commonly known developmental disabilities include mental retardation and autism.

**Mental retardation.** Mental retardation, also known as intellectual or cognitive disability, is the most commonly known developmental disability. According to the Individuals with Disabilities Education Act (IDEA), cognitive disability or mental retardation is defined by significantly subaverage general intellectual functioning, existing concurrently with deficits in adaptive behavior and manifested during the development period, that adversely affects a child’s educational performance (2004).
The American Psychiatric Association (APA) also defines mental retardation as “significantly subaverage general intellectual functioning…that is accompanied by significant limitations in adaptive functioning” and that appears before the age of 18 years (2000). More specifically, according to the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), three criteria must be met for a diagnosis of mental retardation: (a) an intelligence quotient (IQ) score of approximately 70 or below on an individually administered IQ test, (b) concurrent deficits or impairments in adaptive functional skills (i.e., the person's effectiveness in meeting the standards expected for his or her age by his or her cultural group) in at least two of the following areas: communication, self-help, social/interpersonal skills and more, and (c) the onset before the age of 18 (APA, 2000).

Individuals with mental retardation are not only challenged by their cognitive and adaptive functional skill limitations, but also a wide range of behavioral issues such as stereotypy (hand biting or hand flapping), short attention span, hyperactivity, and an inability to relate to other people.

**Autism.** According to the Individuals with Disabilities Education Act (IDEA), autism is a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before the age three, that adversely affects a child’s educational performance (2004). Other characteristics often associated with autism are engagement in repetitive activities or stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to
sensory experiences. American Psychiatric Association (APA) also defines autism as a severe, neuro-biologically based pervasive developmental disorder characterized by varying degrees of impairment in several areas of development: (a) communication, (b) social interaction, and (c) stereotyped behaviors (2000).

Pervasive developmental disorder (PDD), also known as autism spectrum disorder, is any one of a group of developmental disabilities marked by severe impairments in communication, social interaction, and stereotyped behavior (APA, 2000). Autism is one of the five pervasive developmental disorders. The other remaining disorders include Asperger syndrome, Rett syndrome, childhood disintegrative disorder, and pervasive developmental disorder-not otherwise specified (PDD-NOS). Manifestation of these pervasive disorders is typically apparent before the age of 3, and the problems last throughout an individual’s lifetime long.

Individuals with autism are not only challenged by communication and social skill deficits, they also display a wide range of challenging behaviors such as self-injury (e.g., head banging, biting or scratching themselves), destructive behaviors (e.g., physical aggression, property destruction), or odd responses to sensory stimuli (e.g., excessive fearfulness in response to obviously harmless objects, oversensitivity to sounds or being touched, or fascination with certain stimuli). Other challenging behaviors may include toileting problems, tantrums, abnormalities in mood or affect (e.g., giggling or weeping for no apparent reason, an apparent absence of emotional reaction), or abnormalities in eating (e.g., pica, limiting diet to a few foods).
**Enuresis**

Individuals with developmental disabilities have a higher rate of problems with enuresis. The term “enuresis” was originally come from Greek *Enourein*: to make water or to void urine. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), enuresis is defined as (a) repeated voiding of urine into bed or clothes, whether involuntary or intentional, (b) occurring twice per week for at least 3 consecutive months, (c) after the age of five years, when bladder control is normally achieved, and (d) not due to either a drug side effect or a medical condition (2000).

Most typically developing children usually care for their own toilet needs by the end of 60 months (Anderson, Jablonski, Thomeer, & Knapp, 2007). Although children grow, develop, and learn at their own pace, and each child may take a slightly different learning curve, most typically developing children are eventually toilet trained with the involvement of parents and day care providers to some degree (Anderson et al., 2007).

There are very few data regarding the typical age of bladder control for children with developmental disabilities. It was once regarded that since incontinence was an inevitable consequence of mental disabilities, these individuals were unable to be toilet trained (Hyams, McCoull, Sith, & Tyrer, 1992). The amount of support required increases for individuals with more severe developmental and multiple disabilities (Dalrymple & Ruble, 1992). While individuals with autism but without other developmental disability took about 1.2 years of toilet training to achieve daytime
bladder control, it required about 3 years of training for individuals with both autism and severe to profound developmental disability (Dalrymple & Ruble, 1992).

Theories about the underlying causes of enuresis are numerous, and none has been conclusively proven (Heston, 1998; Schaefer, 1995). Some argue that the cause of enuresis is smaller functional bladder capacities than a normal bladder (APA, 2000; Glicklich, 1951); insufficient anti-diuretic hormone (ADH) production that helps to regulate urination (APA, 2000); psychosocial stress (APA, 2000; Heston, 1998; Schaefer, 1995); or severe developmental delays such as autism or mental retardation (Heston, 1998).

Mower and Mower (1938) explained that the cause of enuresis is a simply faulty learning by a child to associate the sensation of a full bladder with the response of awakening and contraction of the urethral sphincters. The Mowers argue that learning to break the infantile habit of automatic reflex voiding was a very difficult task (1938), especially for the children with developmental disabilities (Schaefer, 1995).

Ellis (1963) explained the cause of enuresis from a different perspective. He stated that when individuals with developmental disabilities feel the sensation of a full bladder (stimulus), they urinate in their pants (response), which is positively reinforced by the feeling comfortable by relieving the distended bladder. Ellis stated that unless these individuals were taught to urinate in toilet, they were more likely to repeat their urinating-in-clothes behavior. To address the toileting problems displayed by individuals with developmental disabilities, earlier treatment packages ranged from
institutionalization of the patient to electroshock treatments, surgical techniques, psychotropic drugs, and applied behavior analysis.

**Applied Behavior Analysis (ABA)**

Applied behavior analysis (ABA) is the scientific application of operant conditioning principles to examine environmental determinants of human behavior (Skinner, 1953) and to improve an individual’s life (Baer, Wolf, & Risley, 1968). Operant conditioning, described by the modern behavioral psychologist B. F. Skinner, states that behavior follows a stimulus-response-reinforcement (S-R-R) contingency paradigm that is often referred to as antecedents-behavior-consequences (A-B-C) contingency (Skinner, 1953). In other words, antecedents (stimuli) set the stage for a behavior to occur, the behavior (response) occurs, and the consequence (possible reinforcement) follows.

Largely based on the principles of operant conditioning, applied behavior analysis (ABA) states that it is the maintaining consequences that reinforce the problem behavior. By manipulating the environmental consequences related to a specific problem behavior, one can increase (positive or negative reinforcement) or decrease (punishment or extinction) the likelihood of the behavior occurring again in a near future under similar or same antecedent conditions (Skinner, 1953).

Based on the principles of ABA, some promising toileting interventions had emerged. For example, Ellis (1963) developed a behavioral model which included a combination of positive reinforcement and punishment to toilet train individuals with
severe to profound developmental disabilities. In 1971, Azrin and Fox developed a more
intensive behavioral model based on positive reinforcement and punishment, called the
Rapid Toilet Training (RTT) method, to address toileting problems with severe and
profound developmental disabilities.

Although the toilet training packages based on the ABA principles produced
promising results, multiple studies report that the use of punishment procedures is
abundant in the traditional toilet training literature, whether it is a form of verbal
reprimands, physical prompts, or aversive overcorrection (Kroeger & Burnworth, 2009).
The use of punishment has raised the question on the necessity of including punishment
in teaching of toileting skills for individuals with developmental disabilities (Bettison,
1978; Cicero & Pfadt, 2002; Koeger & Burnworth, 2009; Lancioni, 1980; LeBlanc, Carr,
Crossett, Bennett, & Detweiler, 2005; Luiselli, 1997; Marholin, Luiselli, & Townsend,
1980; Post & Kirkpatrick, 2004; Soloviita, 2000).

One opinion in lieu of aversive, punishment-based procedures to address
challenging behaviors for individuals with developmental disabilities is positive behavior
intervention and supports (PBIS). The field of PBIS is an applied science that spawned
from ABA and focuses on the use of proactive/preventive, function-based educational
approach, as well as self-determination skills (e.g., choice making, self-management,
independence) (Bambara & Kern, 2005; Edmonson & Turnbull, 2002; Sugai, Horner,
Dunlap, Hieneman, Lewis, & Nelson, 2000) by employing a variety of proactive
strategies to identify the function of the challenging behavior and the functionally
alternative replacement behavior. One specific PBIS strategy is functional communication training.

**Functional Communication Training (FCT)**

Functional communication training (FCT) is one of the particular components of positive behavioral interventions and supports (PBIS) and a proactive, educative intervention to address problem behaviors that are a result of communication deficits (Carr & Durand, 1985; Durand & Carr, 1992). FCT focuses on identifying the function of problem behavior and teaching a socially appropriate replacement behavior that has the same function as the problem behavior (Carr & Durand, 1985; Durand & Carr, 1992). FCT provides an alternative way of expressing the students’ needs and wants appropriately, including the students with no/limited language skills. When individuals with autism were taught functional communication skills that produced the same function as their challenging behavior, there was a significant decrease in the frequency and intensity of the challenging behavior and broader generalization and greater maintenance of positive effects (Carr & Durand, 1985; Durand & Carr, 1992; Dunlap, Robbins, & Kern, 1994; Koegel & Koegel, 1996).

Meyer & Evans (1989) provides the following reasons for using proactive, educative interventions such as FCT over traditional aversive, punishment-based interventions:

1. Proactive interventions are humane, incorporating the rights of individuals to both effective treatment and freedom from harm.
2. Proactive interventions are effective, having greater empirical validity than the alternatives and resulting in significant and long-term behavior changes maintained in a variety of integrated community environments.

3. Proactive interventions are socially valid. That is, they are more acceptable and feasible to the plan implementers, compared to the traditional approaches.

4. Proactive interventions are legal, while some traditional procedures have been questioned and restricted by both legislation and regulation in various settings.

5. Proactive interventions are practical to implement on a day-to-day basis while certain punishment and aversive procedures reported in the literature clearly are not applicable for use in typical settings such as a school, home, or community settings.

6. Proactive interventions will contribute to promoting positive attitudes toward people with disabilities.

In order to develop effective functional communication-based interventions, a thorough assessment for identifying the function of problem behavior is the most critical step, the process known as functional behavioral assessment (FBA).

**Functional Behavioral Assessment (FBA)**

Functional behavioral assessment (FBA), another proactive strategy of positive behavioral interventions and supports (PBIS), is a process of identifying specific
variables or circumstances that trigger or maintain problem behaviors that impede a student’s ability to learn (Horner & Carr, 1997; Johnston & O’Neill, 2001; O’Neill, Horner, Albin, Sprague, & Newtons, 1997; Scott, McIntyre, Liaupsin, Nelson, Conroy, & Payne, 2005). Functional behavioral assessment (FBA) states that challenging behaviors serve a certain function or purpose for the individual, and the problem behavior has been reinforced over time (Fox, Dunlap, & Buschbacher, 2000; Horner, Carr, Strain, Todd, & Red, 2002). Within the functional behavioral assessment (FBA) and functional communication training (FCT) framework, problem behaviors are not caused by disabilities. Diagnostic labels or categories of problem behaviors are considered to be less relevant in identifying the variables for producing and maintaining problem behaviors (Koegel, Koegel, & Dunlap, 1996). The application of FBA information has increased the match between the intervention and problem behaviors by recognizing its functions and thus brought significant changes in increasing alternative replacement behaviors and decreasing problem behaviors (Fox, Dunlap, & Buschbacher, 2000; Horner & Carr, 1997; Scott et al., 2005).

The following sections of this chapter discuss the problem and purpose of the study, the research questions and hypotheses to be examined, and limitations of this study.

**Statement of the Problem**

The effectiveness of functional communication-based behavioral interventions in reducing severe challenging behaviors (e.g., aggression, stereotypy, and self-injury)
exhibited by individuals with developmental disabilities and replacing the challenging behavior with a socially appropriate replacement behavior is well documented (Carr & Durand, 1985; Durand & Carr, 1992; Horner et al., 2002). However, far less is known about the effects of functional communication-based toileting interventions for students with developmental disabilities in a school setting. Furthermore, the currently available toileting interventions for students with disabilities include some undesirable procedures such as the use of punishment, unnatural clinic/university settings as opposed to more natural school/home settings, and prompt-based as opposed to communicative, self-initiated toileting skills.

Multiple toilet training literature report that the use of punishment procedures is abundant, whether it is a form of verbal reprimands, physical prompts, or aversive overcorrection procedures (Bettison, 1978; Cicero & Pfadt, 2002; Koeger & Burnworth, 2009; Post & Kirkpatrick, 2004; Saloviita, 2000). While traditional toileting interventions included more aversive punishment procedures such as restitution overcorrection (i.e., a form of punishment where an individual overly and excessively restores the environment before the display of inappropriate behavior) and positive practice (i.e., a form of punishment where an individual overly and excessively practices an appropriate behavior), the more current toilet training interventions include “less aversive” punishment such as verbal reprimands (Kroeger & Brunworth, 2009). The use of punishment has raised the question on the necessity of including punishment in teaching of toileting skills for individuals with developmental disabilities (Bettison, 1978;

Traditional toileting skill instructions also were primarily delivered in intensive inpatient clinic settings, requiring intense time and energy of the staff to implement (Sadler & Merkert, 1977) and using specialized equipment such as urine-sensing apparatus (Azrin & Foxx, 1971) and edible reinforcers. In original Azrin & Foxx study, once the individuals with developmental disabilities seated on the toilet, they were to be seated for 20 minutes (1971). Some practical concerns over the amount of trainers’ time and effort required and ethical concerns over the use of punishment made traditional toileting interventions impractical to implement in a school setting (Cicero & Pfadt, 2002; Kroeger & Burnworth, 2009).

In traditional toileting interventions, the individual also was on a regular toileting schedule (scheduled toileting) and was prompted, either verbally or physically taken to the bathroom. While prompted toilet training procedures are the most frequently incorporated behavioral technique for teaching toileting skills to individuals with autism and other developmental disabilities (Azrin, Bugle, & O’Brien, 1971; Azrin & Foxx, 1971; LeBlanc et al., 2005; Van Wagenen et al., 1969), only a handful of studies so far have taught communication and self-initiated toileting skills to individuals with developmental disabilities (Cicero & Pfadt, 2002; Kroeger & Burnworth, 2009). Most of the toilet training literature note the importance of teaching communication (of the need
toilet) and self-initiation (for using the toilet) in order to maintain toileting success, but none of the reviewed studies addressed these critical communicative behaviors in a systematic way (Kroeger & Burnworth, 2009). Research suggested that self-initiated toileting with individuals with severe developmental disabilities was very hard to maintain (Hyams et al., 1992). There is virtually no research in teaching communication and self-initiated toileting skills within the functional communication training (FCT) framework to students with developmental disabilities in a school setting (Kroeger & Burnworth, 2009). This study addressed these issues and examined the self-initiated toileting behavior that FCT has on students with developmental disabilities in a school setting.

**Purpose of the Study**

The purpose of this study was to expand the current literature regarding the effectiveness of functional communication training (FCT) and to assess the effectiveness of FCT for teaching of communicative, self-initiated toileting skills for students with developmental disabilities in a school setting. Compared to the traditional toilet training interventions, the present study is unique in the following points:

First, the present study only included proactive and positive components within the framework of FCT, which is more reflective of our current educational practices (e.g., IDEA, 2004). It did not include such punishment-based techniques as physical restraint and overcorrection in teaching of communicative, self-initiated toileting skills for both ethical reasons and the observation of school policy and current federal regulations.
Second, the present study focused on teaching of communicative, self-initiated toileting skills, as opposed to prompted/scheduled toileting skills, to increase the student’s self-determination skills (e.g., choice-making, independence, and self-management).

Third, the present study was conducted in the student’s classroom, as opposed to intensive inpatient/outpatient clinic settings, adapting to the student’s normal daily routines and thus increasing the generalization factor. The present study eliminated specialized equipment such as urine-sensing apparatus and edible reinforcers (e.g., candies and soda) typically used in traditional toilet training sessions. The urine-sensing or bell-and-pad devices are often bulky for the student to wear during his/her school day and require the intense amount of time and energy of the school staff, which is impractical to implement in a natural school setting.

**Research questions.**

1. Could a FCT-based toileting intervention lead to increased incidence of communicative, self-initiated toileting behavior for students with developmental disabilities?

2. Could a FCT-based toileting intervention lead to decreased incidence of toileting accidents for students with developmental disabilities?

**Research hypotheses.**

1. It was hypothesized that a FCT-based toileting intervention would lead to the increase in the incidence of communicative, self-initiated toileting behavior.
2. It was hypothesized that a FCT-based toileting intervention would lead to the decrease or elimination in the incidence of toileting accidents.

**Independent variable.**

A functional communication training (FCT)-based toileting intervention

**Dependent variables (target behaviors).**

1. Communicative, self-initiated toileting behavior, which was defined as any event that the student requested to use the bathroom, verbally or using a picture symbol without any prompts given, and voided in the toilet as monitored by the sound of the fluid entering the toilet.

2. Toileting accident, which was defined as a wet diaper/Pull-up or visual observation of wetness on the pants. Wetness of the pants was defined as a wet spot on the student’s pants larger than a quarter size in diameter.

**Limitations**

The following section describes the possible limitations that may affect the validity of this study. These limitations include history, maturation, instrumentation, and procedural fidelity.

**History.** Any events during an experiment may influence the outcome of the study. Potential sources of history threats in this study include the actions of other school staff. The school staff other than the primary implementer (e.g., substitute staff) may attempt to intervene before the scheduled intervention time. To minimize history threats, a multiple baseline design was used by staggering the introduction of the independent
variable across participants. Furthermore, the current study was conducted a little over two month periods, which was a relatively short span of time. History was less likely to influence the outcome of the study.

**Maturation.** The passage of time may influence the effectiveness of an intervention. The changes in the students’ behavior may be due to the effects of maturation. Session fatigue is also a threat to the validity of the study. To address maturation threats, a multiple baseline design was used by staggering the introduction of the intervention to each participant. To avoid session fatigue, the length of each session was scheduled after considering each participant’s attention span. Furthermore, the study was conducted a little over two month periods, which was a short duration. Maturation was less likely to influence the outcome of the intervention.

**Instrumentation.** Instrumentation threats to the internal validity of this study include the measurement system such as independence of observers, recording procedures, observer bias, etc. To minimize instrumentation threats, behavioral terms were clearly and objectively defined. In addition, the observers were properly trained to increase interobserver reliability. In observation of school policy, 100 percent of observations were recorded by a second independent observer using the same behavioral definitions and the recording procedures used by a primary observer to increase the percentage interobserver agreement on the same behavior. Interobserver reliability was calculated by using a point-by-point agreement system.
**Procedural fidelity.** To ensure procedural fidelity, a second independent observer collected data on a primary implementer’s behavior during both baseline and intervention to ensure that the intervention procedures have been consistently followed. Some key procedural variables were selected and checked for at least 40% of all observation sessions. A detailed description of the intervention procedures was included for independent researchers to duplicate in order to extend the generalization of findings with other students with developmental disabilities in different settings.

**Summary**

This chapter familiarized the reader with the literature on functional communication training (FCT), along with the rationale for the use of FCT as a possible intervention to decrease or eliminate toileting accidents displayed by students with developmental disabilities in a school setting and to increase socially appropriate replacement behaviors. Challenging behaviors such as enuresis (bed or clothes wetting behavior) and aggression were defined, along with the definitions of some common developmental disabilities such as autism and mental retardation.

Traditional toileting treatments were discussed within the framework of applied behavior analysis (ABA), followed by some problems presented by traditional toileting methods. In addition, a couple of specific positive behavioral interventions and supports (PBIS) components were discussed such as functional behavioral assessment (FBA) and functional communication training (FCT) as a proactive, educational intervention. The
concluding section of this chapter discussed the problem and purpose of this study, the research questions and hypotheses, and limitations of this study.

In the next chapter, more detailed review of functional communication training (FCT) and developmental disabilities will be discussed, along with the history of enuresis and followed by the conceptual framework for the intervention addressed within this study. It will start with the history of the applied behavior analysis (ABA), including the problems associated with traditional toileting interventions based on ABA. There will be a short discussion on the positive behavior interventions and supports (PBIS), followed by two critical components of PBIS: functional behavioral assessments (FBA) and functional communication training (FCT). The process of conducting FBA and the significance of its inclusion within the law of the IDEA 2004 will be presented, followed by developing a FCT intervention based on the information from the FBA process.

In the following chapter three, the research design and data collection methodology used in this study are presented. In the chapter four, the results of each data collection instrument used in the study are presented, along with each participant’s target behavior change. In the final chapter five, the discussion, implications and limitations of the study will be presented, followed by the directions for future research.
Chapter II

Review of Literature

Introduction

This chapter will provide the reader with the literature on functional communication training (FCT) in details, along with the rationale for the use of FCT as a possible intervention to decrease or eliminate toileting accidents and to increase socially appropriate replacement behaviors for students with developmental disabilities in a school setting. It will begin with background information on such developmental disabilities as mental retardation and autism, followed by a discussion on enuresis, including the definition, cause, and early treatments. There will be a discourse on classical conditioning, operant conditioning, and applied behavior analysis (ABA), including the toileting interventions based on the principles of ABA. Some punishment techniques used in the traditional toileting interventions will be discussed, including the problems with the use of aversive, punishment-based interventions.

Positive behavioral interventions and supports (PBIS) as a theoretical framework for functional communication training (FCT) is presented. Finally, the process of FCT, including a functional behavioral assessment (FBA) is highlighted. The FCT-based intervention includes proactive and educative components, such as reliance on
prevention, function-based, and self-determination skills (e.g., independence, choice-making, and self-management).

**Mental Retardation**

Mental retardation, also known as intellectual or cognitive disability, is the most commonly known developmental disability. The American Psychiatric Association (2000) defines mental retardation as “significantly subaverage general intellectual functioning…that is accompanied by significant limitations in adaptive functioning” and that appears before the age of 18 years. More specifically, according to the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), three criteria must be met for a diagnosis of mental retardation: (a) an intelligence quotient (IQ) score of approximately 70 or below on an individually administered IQ test, (b) concurrent deficits or impairments in adaptive functional skills (i.e., the person's effectiveness in meeting the standards expected for his or her age by his or her cultural group) in at least two of the following areas: self-help, communication, social/interpersonal skills and more, and (c) the onset before the age of 18 (APA, 2000).

The average intelligence quotient (IQ) score on popular intelligence tests is 100, with a standard deviation of 15 on the Wechsler Adult Intelligence Scale (WAIS) or the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV), or a standard deviation of 16 on the **Stanford-Binet Intelligence Scales (SB)**. When an individual scores two standard deviations below the test average, the individual is usually considered to have subaverage intelligence. In the past, the definition exclusively
focused on intelligence quotient (IQ) scores, but now a low IQ is not in itself sufficient for diagnosing mental retardation (APA, 2000). In order to be diagnosed as mental retardation, the individual now must be marked by deficiencies in functional adaptive behavior skills, in addition to an IQ score below 70.

Functional adaptive behavior skills are the level of skills in various areas of everyday situations such as self-help (e.g., using the bathroom), communication, or social skills. Limitations in adaptive functional skills are assessed by a standardized test (e.g., the Vineland Adaptive Behavior Rating Scales), based on observations of the individual’s behavior in his or her daily routines. The last criterion to be met for a diagnosis of mental retardation is that the limitations or impairments must be manifested before the age of 18 (APA, 2000).

There are four different degrees of mental retardation, varying in severity: mild, moderate, severe, and profound. Mild retardation corresponds to IQ scores from 70 to 50 ranges. The individuals with mild mental retardation are capable of learning basic academic skills and with some assistance may achieve self-supporting lives. Moderate mental retardation ranges from 49 to 35. The individuals with moderate mental retardation require considerable amounts of support in order to fully participate in school, home, and community. Severe mental retardation corresponds to IQ scores from 34 to 20, and profound mental retardation corresponds to the IQ level below 20. Individuals with severe and profound mental retardation require constant supervision throughout their entire life.
Autism

According to the latest edition of the Diagnostic Statistical Manual of Mental Disorders (DSM-IV-TR), autism is a severe, neuro-biologically based pervasive developmental disorder characterized by varying degrees of impairment in several areas of development: (a) communication, (b) social interaction, and (c) stereotyped behaviors (APA, 2000). Autism typically appears during the first three years of life and lasts throughout an individual’s lifetime long.

Pervasive developmental disorder (PDD), also known as autism spectrum disorder, is any one of a group of developmental disabilities marked by severe impairments in communication, social interaction, and stereotyped behavior (APA, 2000). Autism is one of the five pervasive developmental disorders, and other remaining disorders are Asperger syndrome, Rett syndrome, childhood disintegrative disorder, and pervasive developmental disorder-not otherwise specified (PDD-NOS). Manifestation of these pervasive disorders is typically apparent before the age of 3.

Three criteria for a diagnosis of autism must be met: (a) communication deficit, (b) social skills deficit, and (c) the presence of stereotyped behavior, interests, and activities (APA, 2000). The symptoms must be manifested before the age of 3. Individuals with autism also display a wide range of challenging behaviors such as self-injury (e.g., head banging, biting, scratching), destructive behaviors (e.g., physical aggression, property destruction), and odd responses to sensory stimuli (e.g., excessive fearfulness in response to obviously harmless objects, oversensitivity to sounds or being
touched, or fascination with certain stimuli). Other challenging behaviors include toileting problems, tantrums, abnormalities in mood or affect (e.g., giggling or weeping for no apparent reason, an apparent absence of emotional reaction), or abnormalities in eating (e.g., pica, limiting diet to a few foods).

Although many of these challenging behaviors are typical characteristics of autism, they are not used as a diagnostic criterion of the disorder. However, if these challenging behaviors are not properly addressed, their impact on effective education, social development, and community inclusion can be detrimental (Fox, Dunlap, & Buschbacher, 2000; Horner et al., 2002; Lucshyn et al., 2002; Reichle, 1990).

**Enuresis**

The term “enuresis” was originally come from Greek *Enourein*: to make water or to void urine. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), enuresis is defined as (a) repeated voiding of urine into bed or clothes, whether involuntary or intentional, (b) occurring twice per week for at least 3 consecutive months, (c) after the age of five years, when bladder control is normally achieved, and (d) not due to either a drug side effect or a medical condition (APA, 2000).

Enuresis is further classified by diurnal enuresis (daytime wetting), nocturnal enuresis (nighttime wetting), and diurnal and nocturnal enuresis (both daytime and nighttime wetting); and as primary or secondary enuresis (APA, 2000). A primary type of enuresis occurs when the child has never achieved toilet training, while a secondary type of enuresis occurs when the child did have a period of dryness, but then returned to
having periods of incontinence. The secondary type of enuresis also is called an acquired enuresis.

Theories about the underlying causes of enuresis are numerous, and none has been conclusively proven (Heston, 1998; Schaefer, 1995). Some argue that the cause of enuresis is smaller functional bladder capacities than a normal bladder (APA, 2000; Glicklich, 1951); insufficient anti-diuretic hormone (ADH) production that helps to regulate urination (APA, 2000); psychosocial stress (APA, 2000; Heston, 1998; Schaefer, 1995); or severe developmental delays such as autism and mental retardation (Heston, 1998). Others argue that enuresis is a type of sleep disorder, and enuretic children are normally very heavy sleepers (Heston, 1998; Schaefer, 1995). A couple of studies also argue that the cause of enuresis is urinary tract infections (Heston, 1998; Schaefer, 1995), but DSM-IV-TR suggests that urinary tract infections are commonly found in children with enuresis, and they are not the cause of enuresis (APA, 2000).

Mower and Mower (1938) explained the cause of enuresis on the principles of classical conditioning (which will be discussed later) and stated that the cause of enuresis is a simply faulty learning by the child to associate the sensation of a full bladder with the response of awakening and contraction of the urethral sphincters. The Mowers argue that learning to break the infantile habit of automatic reflex voiding was a very difficult task (1938), especially for the children with developmental disabilities (Schaefer, 1995).

Ellis (1963), on the other hand, explained the cause of enuresis based on the principles of operant conditioning (which will be discussed later): When individuals with
developmental disabilities feel the sensation of a full bladder (stimulus), they urinate in their pants (response), which is positively reinforced by the feeling comfortable by relieving the distended bladder (1963). Ellis stated that unless these individuals were taught to urinate in toilet, they were more likely to repeat their urinating-in-clothes behavior.

**Early treatment packages for enuresis.**

**Historical overview.** Enuresis has been the subject of discussion for at least 3,500 years. It is interesting to see that even ancient Egyptians discussed the problem of enuresis. In the year 1550 B.C., Papyrus Ebers, an ancient Egyptian medical text, mentions the problem of enuresis (Glicklick, 1951). In 1500 B.C., doctors prescribed ground hedgehog and white hyacinthamum flowers in hoping to “cure” enuresis (Schaefer, 1995). In the year 1535 A.D., Hollis Phaer, the father of modern pediatrics, suggested the use of the stones of a hedgehog, while others recommended the viscera of pigs and urine of spayed swine to “cure” enuretic children (Schaefer, 1995). In 1544 A.D., Thomas Phaer, considered to be “the father of English Pediatrics,” made another major identifiable reference to the problem of enuresis, “Of Pyssing in the Bedde,” in his book *Boke of Children* (Glicklick, 1951).

Although the problems of enuresis must have been as prevalent then as it is today, it was not until in the early 1900s that there was interest in developing procedures to address enuresis. In 1904, Pfaundler, a German pediatrician, developed the urine alarm apparatus, commonly known as the “bell and pad,” to deal with the problem of enuresis
(Heston, 1998). In 1908, Genouville reported that the use of the bell produced good results for enuretic children (Schaefer, 1995). Although Pfaundler had initially discovered the “bell and pad” conditioning apparatus, it was Mower and Mower who popularized its therapeutic potential in 1938 (Heston, 1998; Schaefer, 1995).

*Surgical techniques.* The late ’30s through the early ’70s, there was a variety of surgical techniques proposed and attempted in hoping to “cure” enuresis (Heston, 1998; Schaefer, 1995). Some of the surgical techniques included that cauterizing the child’s urethra with silver nitrate or inserting the rubber bags into a girl’s vagina and inflating it with air to compress the bladder neck and urethra (Schaefer, 1995). According the surgical techniques proposed, the pain accompanying urination after the surgery was generally severe enough to awaken a child even out of deep sleep, and the pain did in fact become a “built-in” alarm to “cure” the problem of enuresis (Heston, 1998).

*Drugs.* Since the late 1960’s, there also have been a variety of drug treatments introduced and attempted to deal with the problem of enuresis (Heston, 1998; Meadow, 1974; Schaefer, 1995). One of the most used drugs prescribed for treating enuresis is Imipramine (Tofranil) HCL (Forsythe & Merrett, 1969). Imipramine is an anticholinergic drug, which permits the bladder to hold a greater amount of urine before the urination occurs. Other commonly used drugs are antidepressants (Schaefer, 1995). Although the drug treatments reported some initial success, the use of drugs has brought more serious side effects, causing some deaths when ingested by toddlers (Meadow, 1974), causing irritability, restlessness or lethargy in some children (Schaefer, 1973), and
blocking some nerve impulses important to body functions (Heston, 1998). In summary, the use of drugs has become ineffective and the relapse rate was relatively very high, making the drug treatments very questionable (Heston, 1998; Meadow, 1974).

Classical Conditioning

In 1904, Pavlov, a Russian psychologist, discovered a very basic form of learning while studying the digestive system of dogs in the laboratory. Pavlov strapped the dogs in a harness and put the food in their mouths. Through a tube surgically inserted into each dog’s cheek, Pavlov measured the flow of saliva upon the presentation of the food. Pavlov, however, faced the unanticipated problem. After repeated sessions, Pavlov’s dogs were conditioned (learned) to salivate even before the food was actually put in their mouth. This basic form of learning is called classical conditioning or Pavlovian conditioning.

In short, classical conditioning states that through the repeated association of an unconditioned stimulus (e.g., food) and neutral stimulus (e.g., bell sound), an organism emits a learned response (e.g., salivation) to the previously neutral stimulus. In other words, by associating the food and the bell sound, the dogs were soon “conditioned” to salivate to the bell sound alone. The following Figure 1 illustrates the process of classical conditioning:
Before learning (conditioning):

Unconditioned stimulus (US) (e.g., food) → Unconditioned response (UR) (e.g., salivation)

Neutral stimulus (NS) (e.g., bell sound) → No unconditioned response (e.g., no salivation)

During learning (conditioning):

Neutral stimulus (NS) + Unconditioned stimulus (US) → Unconditioned response (UR)

After learning (conditioning):

Conditioned stimulus (CS) (e.g., bell sound alone) → Conditioned response (CR) (e.g., salivation)

Figure 1. Process of Classical Conditioning

The Mower’s study. In 1938, the Mowers conducted a study on 30 boys with problems of enuresis, ranging in ages from 3 to 13 years, to eliminate enuresis. The Mowers stated that it was a very difficult learning experience for a child to associate the sensation of bladder fullness with the response of awakening and suggested the use of moisture-sensitive equipment to detect bed-wetting (1938). The apparatus activates a loud sound when the child wets a urine-sensitive pad which is placed under the bottom sheet in the bed. Upon being awakened by the loud noise, the child is taught to stop voiding in the bed and then go to the bathroom to complete urination in the toilet. After repeated sessions, the child will break the habit of relieving himself in bed and associate the sensation of full bladder with the need to go to the bathroom (Mower & Mower, 1938).
The Mower’s conditioning procedure was based on the principles of classical conditioning. Utilizing the principles of classical conditioning, the Mowers explained the system of moisture-sensing device: As the child begins to wet the bed, the urine-sensitive alarm system wakes the child up. The child begins to associate the sensation of a full bladder with contracting the sphincter muscle, and eventually learns to control involuntary urination by stopping the flow of urine. The following Figure 2 represents this:

**Before learning (conditioning):**

- **Unconditioned stimulus (US):** (e.g., sensation of a full bladder)
- **Unconditioned response (UR):** (e.g., urination)
- **Neutral stimulus (NS):** (e.g., alarm sound)
- **No unconditioned response:** (e.g., no urination)

**During learning (conditioning):**

- **Neutral stimulus (NS):**
- **Unconditioned stimulus (US):**
- **Unconditioned response (UR):**

**After learning (conditioning):**

- **Conditioned stimulus (CS):** (e.g., alarm sound alone)
- **Conditioned response (CR):** (e.g., stopping urination flow or urination in toilet)

*Figure 2. Application of Classical Conditioning*

Despite of its impracticality (e.g., wearing a bulky, urine-sensing device during the student’s school day, the amount of time and energy required to monitor the device) and high relapse rates, Mower and Mower’s behavioral conditioning approach using
urine-sensing apparatuses was believed to be the most efficient, successful method in treating enuresis for a long time (Heston, 1998; Saloviita, 2002; Schaefer, 1995).

**Operant Conditioning/Applied Behavior Analysis (ABA)**

In 1930, the modern behavioral psychologist B. F. Skinner invented a device called the Skinner Box to study the effects of reinforcement on the behavior of laboratory animals. A rat or pigeon was placed in the Skinner Box. Upon pressing a response bar (for rats) or pecking a key (for pigeons), a small food pellet was dropped into the box. The rat’s (or pigeon’s) behavior was called an “operant” because it operated on the environment. Skinner demonstrated that organisms learn by associating response-outcome contingencies in favor of themselves.

Operant conditioning, described by Skinner, states that the understanding of operant human behavior is explained in a four-term contingency: setting events, antecedents, behavior, and maintaining consequences (1953). A behavior is affected by (a) the setting events or establishing operations that increase the probability of the occurrence of the behavior, (b) the antecedents or the discriminative stimuli that lead directly to the occurrence of the behavior, and (c) the maintaining consequences that determine whether the behavior will occur or not (Baer, Wolf, & Risley, 1968; Bijou & Baer, 1961; Foxx 1982; Skinner, 1953). A stimulus-response-reinforcement (S-R-R) contingency paradigm is often referred to as antecedents-behavior-consequences (A-B-C) contingency (Skinner, 1953). In other words, setting events or antecedents (stimuli) set
the stage for a behavior to occur, the behavior (response) occurs, and the consequence (reinforcement) follows.

Skinner believed that although knowing the setting events or antecedents that occur prior to problem behavior is helpful for understanding why the behavior is occurring, it is not enough to fully understand the whole purpose or function of the behavior. To Skinner, it is the maintaining consequences that reinforce the problem behavior and thus become the function of the behavior. Skinner asserted that by manipulating the environmental contingencies or consequences related to a specific behavior, one can increase or decrease the likelihood of the behavior occurring again in a near future under similar or same antecedent conditions (Skinner, 1953).

In the early 1960’s, psychologists began to apply B. F. Skinner’s operant conditioning principles to individuals with disabilities. Largely based on the principles of operant conditioning, the approach became known as applied behavior analysis (ABA), and it had shown to be more effective in treating maladaptive behavior than any traditional methods used at that time (Martin & Pear, 1997). ABA is a scientific approach to examine environmental determinants of human behavior (Skinner, 1953), to solve problems of social importance (Baer, Wolf, & Risley, 1968; Bambara & Kern, 2005; Bijou & Baer, 1961; Carr et al., 2002), and to improve an individual’s life (Baer, Wolf, & Risley, 1968).

Applied behavior analysis (ABA) uses antecedents-behavior-consequences (A-B-C) contingency paradigm which was originally from Skinner’s stimulus-response-
reinforcement (S-R-R) contingency and states that the examination of the behavior and maintaining consequences relationship constitutes the core understanding of ABA. In other words, it is the maintaining consequences that reinforce the behavior and thus become the function or purpose of the behavior. ABA also asserts that by manipulating the consequences related to a specific behavior, one can increase or decrease the likelihood of the same behavior occurring again in a near future under similar or same antecedent conditions. The major components of applied behavior analysis (ABA) are reinforcement and punishment. The following sections will describe the basic components of ABA: reinforcement, punishment, extinction, and schedules of reinforcement.

**Reinforcement.** Skinner defined the term reinforcement as any stimulus that increases the probability of a previous response. In other words, reinforcement is the process of following an event with a second event/stimulus meant to make the recurrence of the previous response more likely. The second stimulus or event itself is called the reinforcer that increases the probability of a previous event/response. There are two types of reinforcement: positive and negative.

Positive reinforcement increases a behavior through the presentation of a positive stimulus. An example of a positive reinforcement includes the rat in the Skinner box who was positively reinforced with a pellet of food, contingent on pressing a bar and was more likely to repeat his pressing-bar behavior in a near future in order to obtain the food.
Other examples include smiles, high-fives, or a pat on the back for completing homework.

Negative reinforcement increases a behavior through the removal of a negative stimulus. An example of a negative reinforcement includes a student who tears paper and kicks the desk during a difficult lesson. As a consequence of his disruptive behavior, he is sent to a quiet corner. The student is more likely to repeat his disruptive behavior in a near future in order to avoid his work. Avoidance of his work is the aversive stimulus for the student and possibly serving as a maintaining consequence or the function of his problem behaviors. Skinner cautioned that negative reinforcement and punishment are not the same. While negative reinforcement increases a behavior, punishment decreases a behavior.

**Punishment.** Skinner defined a punishment as any stimulus that stops or decreases the probability of a previous response. There are two types of punishment: positive and negative. Positive punishment stops or decreases a behavior through the presentation of a negative or aversive stimulus. An example of a positive punishment includes physical restraint and spanking. Other examples of aversive stimuli may include slaps, shouts, electric shock, or water mist in the face (Lovaas, 1982). Negative punishment stops or decreases a behavior through the removal of a positive stimulus. An example of a negative punishment includes time out for hitting or taking a game boy or TV-watching privilege away for a tantrum.
Although punishment is one of the most widely used behavioral technique in changing unwanted behavior (Foxx, 1982), it can have some serious, unwanted side effects, and alternatives are strongly needed to replace the use of punishment (Sidman, 2000; Skinner, 1953). First, unwanted behavior may be temporarily suppressed, but punishment does not get rid of the unwanted behavior permanently. Second, punishment does not teach the appropriate replacement behavior of what to do to the child. It only tells the child what not to do. In competition with positive reinforcement, punishment will eventually lose its effectiveness as a coercive agent (Sidman, 2000). Third, punishment may lead to increases in aggressive behavior and emotional reactions in the punished child and thus does not work (Skinner 1953). Fourth, punishment can sometimes backfire because a stimulus thought to be aversive may, in fact, prove to be a positive reinforcer. For example, many children with mental retardation and autism usually do not have functional communication skills and thus have been reinforced that the self-injurious behavior (e.g., biting, hitting, or scratching self) is the only way of obtaining attention of adults (Sideman, 2000). In this scenario, the pain itself had become a rewarding positive reinforcer rather than a punishing agent (Sidman, 2000). In conclusion, punishment is a most unwise, undesirable, and fundamentally destructive method of controlling behavior, and the alternatives should be in place to teach the appropriate replacement behavior (Sidman, 2000; Skinner, 1953).

**Extinction.** In operant conditioning, extinction requires the removal of reinforcement that is provided contingent on a behavior (Skinner, 1969). For example,
extinction of positive reinforcement requires the removal of pleasant stimuli or reinforcers which were previously provided contingent on the target behavior. Extinction procedures involve breaking up the previously associated relationship by first identifying possible reinforcer(s) for the target behavior.

**Schedules of reinforcement (SOR).** In operant conditioning, a schedule of reinforcement (SOR) is the protocol for determining how often a behavior is reinforced. There are two types of reinforcement schedules: continuous and partial reinforcement schedule. In a schedule of continuous reinforcement, reinforcement is delivered every time the desired behavior occurs. In a schedule of partial reinforcement, reinforcement is presented only part of the time. There are also various types under the partial reinforcement schedule including fixed and variable ratio (FR and VR) as well as fixed and variable interval (FI and VI). A fixed schedule of partial reinforcement involves delivering reinforcement after a specified number of responses (FR) have been made or specified time (FI) has elapsed. For example, FR 3 means the reinforcer will be delivered after every third response, and FI 3 means the reinforcer will be delivered after every three minutes. A variable schedule of partial reinforcement involves the delivery of a reinforcer after an average number of responses (VR) or average amount of time (VR) have passed.

During the initial stage of teaching a new skill, one specific type of schedules of reinforcement (SOR) called continuous SOR will be used to each and every desired response. Once the learning has achieved a predetermined criterion (e.g., 80% accuracy),
continuous SOR will be switched to a partial SOR in which there is less than 100% contingency between the desired behavior and the reinforcement. In other words, the desired behavior or response will be reinforced only after some unpredictable number of responses (FR) or some specified time (FI). This partial SOR creates a high, steady rate of response, and the response is more resistant to extinction (Ferster & Skinner, 1957).

**Applications of operant conditioning.**

**Traditional toileting interventions.** In 1963, a behavioral model which included a combination of positive reinforcement and punishment was introduced to toilet train individuals with severe to profound disabilities (Ellis, 1963). Ellis explained the cause of enuresis based on the principles of operant conditioning: When individuals with disabilities feel the sensation of a full bladder (stimulus), they urinate in their pants (response), which is positively reinforced by the feeling comfortable by relieving the distended bladder. Ellis stated that unless these individuals were taught to urinate in toilet, they were more likely to repeat their urinating-in-clothes behavior. Ellis’ stimulus-response (S-R) reinforcement procedure introduced the individuals with severe and profound disabilities to associate the feeling of a full bladder with the need to go to the bathroom and urinate in the toilet (1963). Ellis has contributed to the evidence that individuals with the most severe and profound disabilities are even capable of learning how to discriminate. Ellis, however, included the punishment procedures and did not address self-initiated toileting skills in his study.
Based largely on the original techniques developed by Ellis, subsequent studies followed and reported some success to teach some individuals with developmental disabilities to remain continent during the day (Ando, 1977; Hundziak, Maurer, & Watson, 1965; Mahoney, Van Wagenen, & Meyerson, 1971; Van Wagenen et al., 1969). Still, self-initiated use of the toilet was not addressed (Cicero & Pfadt, 2002; Kroeger & Burnworth, 2009).

The first intensive behavioral treatment package to address self-initiated toileting skills was developed by Azrin and Foxx, known as the Rapid Toilet Training (RTT) procedure. Unlike the Mowers, Azrin and Foxx explained the traditional bell and pad approach in terms of operant conditioning principles (Azrin, Sneed, & Foxx 1973). When the child wets himself, unpleasant consequences (e.g., loud noise, awakening, parents’ scolding, etc.) are presented. In order to remove these unpleasant consequences, that is, to be negatively reinforced, the child learns to control his sphincter muscles and voids in the toilet.

In order to speed up the effectiveness of the bell and pad apparatus, Azrin and Foxx included some other components in their study such as: (a) regularly scheduled intensive toilet training, (b) increased intake of fluid to increase the frequency of urination, (c) positive reinforcement for successful voiding in toilet (e.g., edibles, verbal praise, etc.), and (d) punishment contingent on incontinence (e.g., overcorrection, full cleanliness training). The Azrin and Foxx treatment demonstrated improved outcomes for individuals who have never urinated successfully in the toilet and with a long history
of incontinence (Azrin, Bugle, & O’Brien, 1971; Azrin & Foxx, 1971; Sadler & Merkert, 1977; Smith, 1979). Since its introduction in 1971, the original Azrin and Fox treatment package created change awareness that individuals with the most severe and profound developmental disabilities could be toilet trained and provided stimulus for further research (Lancioni & Markus, 1999). Over the next several decades, the Azrin and Foxx’s Rapid Toilet Training (RTT) has brought additional advances in toilet training for individuals with a variety of developmental disabilities (Didden, Sikkema, Bosman, Duker, & Curfs, 2001; Lancioni, 1980; Sadler & Merkert, 1977).

Despite its effective success rate, the use of RTT has brought some practical concerns over amount of trainers’ time and effort required (Sadler & Merkert, 1977) and ethical concerns over the use of punishment procedures, which make it impractical for use in an educational setting (Cieror & Pfadt, 2002). Modified versions of RTT have addressed some of these practical and ethical concerns in implementation and demonstrated to be effective to train toileting skills for individuals with a variety of developmental disabilities (Cieror & Pfadt, 2002; Foxx, 1993; Didden et al., 2001; Luiselli, 1997); however, many of these studies still included the punishment components in teaching of toileting skills to individuals with disabilities (Kroeger & Burnworth, 2009).

The Lovaas’ study. In the 1970s, Lovaas and his colleagues began early behavioral interventions based on applied behavior analysis (ABA) for young children with autism at the University of California, Los Angeles. From the early Lovaas study,
behavioral interventions based on ABA principles produced some promising results (Lovaas et al., 1973). These researchers helped students with autism increase language acquisition and decrease aggression and self-stimulating behaviors. The study, however, included the negative side as well. The children in the studies were not able to generalize and maintain their treatment gains across new environment (Lovaas et al., 1973).

To counteract the negative side of and maximize treatment gains resulted from the early study, Lovaas later developed an applied behavior intervention which included all significant people in a child’s life in order to generalize learning gains to new settings (1987). The later Lovaas study included 40 young children with autism, an experimental group of 19 children and two control groups (1987). The independent variable was the number of educational training hours (at least 40 hours of one-to-one training per week vs. 10 hours or less per week). The study showed that 47% of experimental group participants scored as having IQs over 100 and performed successful first grades in the public schools. In contrast, only 2% of the control group participants gained the same performance score. The Lovaas classic study (1987) demonstrated that educating children with autism with language and social skills was an achievable goal, previously seen as impossible. The study also emphasized that the intervention must begin early and intensively, with sufficient duration (Lovaas, 1987).

Problems with the use of aversive, punishment-focused interventions.

Punishment techniques have been widely used in controlling and changing problem behaviors (Foxx, 1982; Kazdin, 1994). Although these punishment-based techniques
can have some serious, unwanted side effects (Sidman, 2000), they are abundant in the toileting literature (Cicero & Pfadt, 2002; LeBlanc et al., 2005; Saloviita, 2000), whether it is a form of verbal reprimands, physical prompts, or aversive overcorrection (Kroeger & Burnworth, 2009). The following section will describe two of the common punishments used in the literature: overcorrection and verbal reprimand.

**Overcorrection.** Overcorrection is defined as having a student engage in repetitive behaviors as a punishment for displaying an inappropriate behavior. Two common examples of overcorrection procedures include restitution and positive practice (Foxx, 1982). Restitution requires the student to overly repay, or overly restore the environment to better than its original condition (before the display of inappropriate behavior and even better condition). Positive practice requires the student to overly or excessively practice an appropriate behavior numerous times where the inappropriate behavior frequently occurs.

Foxx (1982) lists three characteristics of the overcorrection in order to ensure its effectiveness in controlling inappropriate behavior: (a) must be directly related to the inappropriate behavior, (b) implemented immediately after displaying inappropriate behavior, and (c) performed at a rapid rate. The famous Azrin and Foxx’s toileting training includes the overcorrection procedure called full cleanliness training. Full cleanliness training required the individual with developmental disabilities to excessively clean himself/herself and the environment (i.e., restitution) and repeatedly practice the appropriate behavior (i.e., positive practice) after wetting or soiling himself/herself.
Azrin & Foxx suggested that punishment such as overcorrection was a necessary component in teaching of toileting skills for individuals with severe and profound disabilities, whose histories of urinary incontinence were lengthy (Azrin & Foxx, 1971; Foxx & Azrin, 1973).

Foxx, however, recognized a few drawbacks of the overcorrection procedure: (a) may require a great deal of time and energy of the staff, which can often be a problem with limited staff in a school setting, (b) may interfere with ongoing classroom instruction, and (c) is physically intrusive (1982).

**Verbal reprimand.** Verbal reprimand is the most common punishment technique (Kazdin, 1994). Verbal reprimands take the form of saying “No” or disapproving statements. While traditional toileting interventions included more aversive punishment procedures such as restitution and positive practice, the more current toilet training interventions include “less aversive” punishment such as verbal reprimands (Kroeger & Brunworth, 2009). The famous Lovaas study also included some undesirable punishment procedures. For example, the use of punishment such as time-out, the delivery of a loud “no,” or a slap on the thigh were used throughout the study to control undesirable behaviors of the participants. Verbal reprimands can be effective if accompanied by gestures or physical grasps that add to their intensity; however, verbal reprimands can lose their efficacy over time (Kazdin, 1994). By virtue of their temporary and inconsistent effects, verbal reprimands rarely produce significant behavioral changes (Kazdin, 1994).
In summary, punishment is a most unwise, undesirable, and fundamentally destructive method of controlling behavior. These punishment-based interventions can have some serious, unwanted side effects. For example, punishment may lead to increases in aggressive behavior and emotional reactions in the punished child and thus does not work (Sidman, 2000; Skinner 1953). Alternatives are strongly needed to replace the use of punishment and to teach the appropriate replacement behavior (Sidman, 2000; Skinner, 1953). One alternative is functional communication training (FCT), which is a proactive, educative intervention approach. FCT views challenging behavior as a skill deficit in communication skills (Durand & Carr, 1992), focusing on teaching functionally alternative replacement behavior.

The following section will briefly describe an applied science of positive behavioral interventions and supports (PBIS) as the theoretical framework for functional communication training (FCT) before the discussion on FCT.

**Positive Behavioral Interventions and Supports (PBIS)**

Up until the mid 1980s, most of behavior management interventions used to address problem behaviors (e.g., physical aggression, self-injury) were highly punitive and reactive (Horner et al., 2002; Meyer & Evans, 1989). As an alternative to the penalizing and restrictive interventions, positive behavior interventions and supports (PBIS) was emerged in the late 1980s and early 1990s as a comprehensive, systems change approach that stress reliance on prevention, function-based, and self-determination (Carr et al., 2002; Edmonson & Turnbull, 2002; Sugai et al., 2000). As a
behaviorally-based systems approach, PBIS owes much of its theoretical and methodological framework to applied behavior analysis (ABA) and provides evidenced- and data-based strategies for addressing challenging behaviors (Bambara & Kern, 2005; Edmonson & Turnbull, 2002; Luchshyn et al., 2002). It should be noted that the ultimate goal of PBIS is not only to reduce problem behaviors by promoting socially appropriate behaviors but also to enhance the individual’s overall quality of life (Carr et al., 2002).

Several critical features guide the practice of positive behavioral interventions and supports (PBIS) including: prevention, social validity, and self-determination (Carr et al., 2000). First, PBIS approach is proactive and preventative. Prevention is achieved by changing the environmental conditions that contribute to problem behavior and intervening on the problem behavior when the behavior is not occurring in order to decrease the future likelihood of such behavior (Bambara & Kern, 2005; Carr et al., 2002). This proactive nature of PBIS approach differentiates itself from traditional ABA approach. Traditional behavioral interventions were reactive, crisis-driven with focus on the use of punitive and aversive procedures (Fox, Dunlap, & Buschbacher, 2000; Horner et al., 2002; Wilcox, Turnbull, & Turnbull, 2000). In traditional approaches, the consequences were altered in hope of reducing or eliminating the problem behavior, only after the problem behavior had occurred.

The proactive and preventative nature of PBIS approach has been incorporated into many policies and procedures, including the federal government. The federal law, the Individuals with Disabilities Education Act (IDEA) 2004, which outlines rights and
regulations for students with disabilities, directs teachers to make specific considerations for the use of positive strategies when designing behavior intervention plans for individual students. For example, the legislation included in IDEA provides that, during development, review, and revision of an individualized education program (IEP) for a child whose behavior impedes his or her learning or the learning of others, the IEP team must “consider, if appropriate, strategies including positive behavioral supports to address that behavior” (34 C.F.R. 3300.346 (a) (2) (i) [2004]). The current federal law promotes more strongly the use of positive behavioral interventions and supports for students with impeding behaviors than the previous ones (IDEA, 2004). In summary, PBIS discourages the use of punitive and aversive interventions which include punishment or pain (Horner et al., 2002; Wilcox, Turnbull, & Turnbull, 2000) and encourages focusing on designing function-based positive behavior supports (Dunlap, Robins, & Kern, 1994; Horner et al., 2002; Wilcox et al., 2000).

Second, PBIS approach emphasizes social validity for interventions. Social validity is a form of indirect assessment to validate the outcome of an intervention by collecting subjective evaluations of changes in the target behavior (Kazdin, 2011; Wolf, 1978). In the past, most of ABA-based behavioral interventions were conducted in clinic/university settings, and since many have been insisted that more practical interventions should be developed in the individual’s natural environment such as school, home, or community. To achieve a high level of social validity, PBIS considers many factors, including acceptance (e.g., “Is the intervention age-appropriate and acceptable to
the student and the plan implementers”), practicability (e.g., “Is the intervention feasible to implement within ongoing routines?”), significance of change (e.g., “Do the interventions make a meaningful difference in the lifestyle of the individuals with disabilities and their family members?”), and contextual fit (e.g. “Do the interventions fit the specific context/setting in which they are to be implemented? Do the interventions reflect the values of the plan implementers such as teachers and family members?”) (Albin, Lucyshyn, Horner, & Flannery, 1996; Bambara & Kern, 2005; Edmonson & Turnbull, 2002; Carr et al., 2002; Luchshyn et al., 2002; Snell & Janney, 2000; Sugai et al., 2000). When there is a good contextual fit between a support plan and the values of the student and plan implementers, the interventions are more likely to sustain (Albin et al., 1996; Bambara & Kern, 2005; Edmonson & Turnbull, 2002; Carr et al., 2002; Luchshyn et al., 2002; Snell & Janney, 2000; Sugai et al., 2000).

Third, within the PBIS framework, the students with disabilities have complete control over their behaviors and are encouraged to express their interests and needs as much as possible. Self-determination is defined as one’s pursuit of personal preferences and control without external pressure (Bambara & Kern, 2005). Self-determination is a combination of skills, knowledge, and beliefs that enable a person to engage in goal-directed, self-regulated, autonomous behavior (Mount, 2000; O’Brien & Pearpoint, 2003). In the past, educators or clinicians were the sole experts in developing behavior or educational plans for students with disabilities. During the late 1980s, the self-determination movement emerged with emphasis on incorporating the students’ own
preferences and choice into their educational plans (Mount, 2000; O’Brien, 1987; 
O’Brien & Pearpoint, 2003). The federal government now requires that students with 
disabilities should be involved in their transition planning for their post-school life and 
encourages them to express their own preferences, interests, and dreams for the future 
(IDEA, 2004).

If the student with disabilities cannot speak for themselves, educators are 
required to invite those involved in the student’s life such as family members or other 
significant others to speak on the student’s behalf. The more opportunities students have 
to pursue their preferences and choice, the greater control they have over the direction of 
their lives. The students will become more independent and adaptive in their everyday 
life situations and furthermore enhance their overall quality of life (Mount, 2000; 
O’Brien, 1987; O’Brien & Pearpoint, 2003). One of the PBIS strategy in addressing 
proactive education, social validity, and self-determination skills is functional 
communication training (FCT).

**Functional Communication Training (FCT)**

In the early 1980’s, a general strategy termed functional communication training 
(FCT) has emerged to teach alternative ways to achieve the same desired outcome as the 
problem behavior once the reasons for problem behaviors are identified. Two researchers 
had worked with children displaying aggression or self-injury and found two distinct 
reasons for these problem behaviors (Carr & Durand, 1985). The study (1985) suggested
that the problem behaviors might be a form of communication, either to obtain attention or to escape difficult tasks.

Most children with developmental disabilities are severely impaired by communication skills (APA, 2000). Research has suggested that children with autism who exhibit challenging behaviors may do so as the result of communication skill deficits (Horner et al., 2002; Koegel, Koegel, & Dunlap, 1996), and challenging behaviors may serve a communicative function (Carr & Durand, 1985). FCT provides an alternative way of expressing the child’s needs and wants in a more socially appropriate way. When individuals with developmental disabilities were taught functional communication skills that produced the same function as their challenging behavior, there was a significant decrease in the frequency and intensity of the challenging behavior and broader generalization and greater maintenance of positive effects (Carr & Durand, 1985; Durand & Carr, 1992; Koegel & Koegel, 1996).

In FCT, the use of communication devices to augment or assist a student’s ability to communicate is often utilized when the student cannot communicate his needs and wants via verbal speech, as experienced in most individuals with developmental disabilities. Under the Individuals with Disabilities Education Act (IDEA), these alternative communication systems are considered a type of “assistive technology.” As a part of IDEA (2004) assures are set forth regarding the right of every child to have an assessment regarding the need for assistive technology and encourages the use of
assistive technology into developing positive interventions for individuals with limited or no language skills.

A host of alternative communication modalities may include gestures, facial expressions, sign language, pictures or related visual symbols, computers, and voice output communication devices. The mode of communication, whether to use a picture symbol or voice output device, is of less importance. Alternative forms of communication that match the needs and strengths of the student would be the most efficient communication mode.

The process of functional communication training (FCT) involves three components: (1) identifying the function or purpose of a problem behavior through the process of a functional behavioral assessment (FBA), (2) identifying the replacement behavior through the process of a competing behavior model, and (3) teaching appropriate functional communication skills that may serve the same communicative function as the problem behavior. For example, if the function of a student’s problem behavior (e.g., aggression) has been identified primarily as a way to escape or avoid some difficult task, then the teacher might teach the student to say "finished" or even "break" when a task becomes too challenging. If the student does not have verbal skills, the teacher may initially teach the student to use nonverbal communication (e.g., a gesture or picture symbol) for “finished” or “break.” The following section will describe the process of FCT in details, beginning with the functional behavioral assessment, the competing behavior pathway model, and then teaching strategies.
**Functional Behavioral Assessment (FBA)**

Functional behavioral assessment (FBA) is a method of identifying specific variables or circumstances that trigger or maintain problem behaviors that impede a student’s ability to learn (Horner & Carr, 1997; Johnston & O’Neill, 2001; O’Neill et al., 1997; Scott et al., 2005). The state of Illinois defines functional behavioral assessment as an “assessment process for gathering information regarding the target behavior, its antecedents and consequences, controlling variables, the student's strengths, and the communicative and functional intent of the behavior, for use in developing behavioral interventions” (Ill. Admin. Code tit. 23, § 226.75, 2006).

Under the current federal law, the Individuals with Disabilities Education Act (IDEA, 2004), a FBA is a type of service that a child must be received when the child is removed for more than 10 days from his or her current educational placement due to disciplinary reasons. A child’s IEP team must conduct a manifestation determination meeting to determine if the conduct in question was caused by or had a direct and substantial relationship to the child’s disability or whether it was the direct result of the school’s failure to implement the IEP. If the behavior was found to be a manifestation of the disability, the school must conduct a functional behavioral assessment and implement or modify the child’s behavior intervention plan as necessary to address the behavior.

More specifically, IDEA 2004 requires a functional behavioral assessment:

If the conduct was determined to be a manifestation of the child’s disability, the IEP team shall—“(i) conduct a functional behavioral assessment, and implement a
behavioral intervention plan for such child, provided that the local educational agency had not conducted such assessment prior to such determination before the behavior that resulted in a change in placement [for more than 10 school days]; (ii) in the situation where a behavioral intervention plan has been developed, review the behavioral intervention plan if the child already has such a behavioral intervention plan, and modify it, as necessary, to address the behavior.” (IDEA 2004, § 615(k)(1)(F)).

In summary, the current federal law IDEA 2004 strongly promotes the use of positive behavior supports and requires the use of functional behavioral assessments when designing behavioral intervention plans for individual students with problem behaviors.

The function of the behavior is divided into three groups: (a) to obtain social attention, tangibles, or preferred activities/person, (b) to escape/avoid unpleasant tasks, activities, or person, and (c) to increase or decrease internal sensory stimulation. A problem behavior is functional in that it is impacted by the environment through desirable outcomes that are preferable to the individual engaged in problem behavior. The FBA process recognizes that challenging behaviors serve a certain function or purpose for the individual and the problem behavior has been reinforced over time (Fox, Dunlap, & Buschbacher, 2000; Horner et al., 2002). In other words, problem behaviors occur because certain environmental conditions support them. Problem behaviors are more likely to be continued unless there is a change in the consequences maintaining the challenging behaviors. In the past, it was believed that challenging behaviors occurred
because an individual had a certain disability (Bambara & Kern, 2005; O’Neill et al., 1997), and the interventions were developed without recognizing its function (Fox, Dunlap, & Buschbacher, 2000). Within the FCT and FBA framework, problem behaviors are not caused by disabilities. Diagnostic labels or categories of problem behaviors are considered to be less relevant in identifying the variables for producing and maintaining problem behaviors (Koegel, Koegel, & Dunlap, 1996). The application of functional assessment increased the match between the intervention and problem behaviors by recognizing its functions and thus brought significant changes in improving desired behaviors and decreasing problem behaviors (Fox, Dunlap, & Buschbacher, 2000; Horner & Carr, 1997).

**Process of functional behavioral assessment (FBA).** The process for conducting a FBA usually involves three different methods: indirect assessment (e.g., interview, record reviews), direct observation (e.g., scatter plot, ABC chart, and Functional Assessment Observation form), and functional analysis (O’Neill et al., 1997). The indirect assessment will include interviews with a student’s paraprofessionals and parents and a review of the student’s academic, behavioral, and psychological reports in order to collect additional information about the behaviors of interest. The data from the interviews and record reviews will generate the initial hypothesis statement about why the problem behavior is occurring. One of the interview tools is the Functional Assessment Interview (FAI) form, which was originally developed by O’Neill et al (1997) to identify possible functions of challenging behaviors and to provide descriptive
information that will be used to design a function-based positive behavior support interventions.

The direct observation method will include the use of scatter plot, antecedent-behavior-consequence (ABC) chart, and functional assessment observation (FAO) form. Direct observation of a student’s challenging behavior can be conducted using the scatter plot to identify specific time periods across the day when challenging behavior is occurring. The scatter plot is an interval recording system and usually designed with time plotted on the vertical line and the date on the horizontal line. Although the scatter plot is helpful identifying whether challenging behaviors occur at predictable time periods, it does not provide much descriptive information such as what antecedents and consequences are associated with the behavior.

Another direct observation tool is called the Antecedent-Behavior-Consequence (ABC) chart. The ABC chart can provide additional information what happens right before problem behavior (i.e., antecedents), what behavior looks like, and what happens after problem behavior (i.e., consequences). The last direct observational tool is the Functional Assessment Observation (FAO) form to identify the possible functions of challenging behaviors and to provide information that will be used to design a function-based positive behavior support intervention (O’Neill et al., 1997). The FAO form combines elements of the ABC chart and scatter plot and tracks to record target behaviors, antecedents, possible functions, and consequences.
The last assessment tool for identifying a function of the behavior is to use functional analysis. Functional analysis is a systematic manipulation of environmental determinants that maintain problem behavior thus identifying the function of the behavior. Functional analysis is to yield high levels of validity and reliability (Iwata, et al., 19914); however, it is an expensive, time consuming procedure. Many have found that functional analysis is an impractical tool for community settings because of low levels of external validity (Carr et al., 2002) or when ethical concerns arise.

In summary, the data gathered through indirect assessments (e.g., interviews and record reviews) will lead to initial hypotheses about why challenging behavior is occurring, and the data gathered through direct observations (e.g., scatter plot, ABC chart, and FAO form) and functional analysis will assist in the confirmation of the hypothesis statement and development of a function-based intervention.

**Build a behavior hypothesis statement.** Based on information obtained during the FBA process, a behavior hypothesis statement will be developed. The behavior hypothesis statement summarizes what is known about antecedents, problem behavior, and maintaining consequences and their inter-relationships. The behavior hypothesis statement also offers an important step toward developing interventions that are directly linked to the function of the student’s challenging behavior (O’Neill et al., 1997). The blank form of the behavior hypothesis statement is illustrated in Figure 3.
The behavior hypothesis statement starts with any setting events that increase the likelihood of problem behavior. For example, if a student did not receive enough attention at home for whatever reasons—maybe the family welcomed a newborn baby—the student’s likelihood of being engaged in problem behavior at school can be increased. The absence of attention at home can be a setting event for the student’s problem behavior.

Next, the behavior hypothesis statement lists antecedents that “trigger” problem behavior and usually occur immediately before a problem behavior. For example, when the student’s paraprofessional is absent, the student has difficult time transitioning from activity to activity or place to place, but on most days the student does well with verbal prompts. However, on days when this particular student did not receive enough attention at home, the absence of her regular paraprofessional may be less tolerable than usual. The absence of attention and/or the absence of her regular paraprofessional would be the antecedents that directly responsible for problem behavior (e.g., wetting the pants in order to get attention from others, shouting or screaming, throwing pencil or books, etc).
Last, the behavior hypothesis statement lists consequences or functions of problem behavior. Consequences are the events that directly follow a behavior. If problem behavior increases when the consequence is presented, then the behavior is positively reinforced. If problem behavior increases when the consequence is removed, then the behavior is negatively reinforced. When applying a consequence to the student’s problem behavior, a common mistake is to use the consequence without considering the functions of behavior. Consider the following scenario: When the student is engaged in problem behaviors (e.g., shouting, pushing desk over, or kicking), our usual response would be presenting the consequence such as quiet room/corner to the student. This may actually be reinforcing problem behavior if the function of the student’s problem behavior is escape motivated. That is, the consequences such as quiet room or corner may be increasing the likelihood of problem behavior for this particular student in a near future. The behavior hypothesis statement helps avoid the function-absent intervention mistake by summarizing relationships among setting events, antecedents, behaviors, and functions/consequences and helps develop positive behavior support interventions based on functions of problem behavior. An example of the behavior hypothesis statement whose function of the problem behavior is attention-motivated is shown in Figure 4.
Identify the replacement behavior using a competing behavior model. Once the functional behavioral assessment (FBA) and the behavior hypothesis statements are completed, a functionally equivalent replacement behavior should be identified based on a competing behavior pathway model. For example, O’Neill et al., (1997) presented a competing behavior model to guide teachers and practitioners to develop behavior intervention plans focusing on changing environments and teaching skills. The competing behavior model is the process of diagramming and developing hypotheses about problematic situations and identifying a comprehensive range of interventions to attempt to increase desired behaviors and decrease problem behaviors (O’Neill et al., 1997). Instead of waiting for the problem behavior to occur, the competing behavior model focuses on the preventive aspect by changing the environments beforehand to decrease the future likelihood of problem behaviors.

With emphasis on the proactive skill-building aspect, the competing behavior model also teaches the student how to achieve desired outcomes using functionally equivalent, yet socially appropriate behaviors instead of problem behaviors (O’Neill et
Students typically engage in challenging behaviors because they do not have appropriate social skills or they have learned that challenging behaviors are more effective means to obtain the intended outcomes (O’Neill et al., 1997). If it is determined that a student does not possess a socially appropriate repertoire of behaviors, then a new alternative skill, replacement behavior, is taught. This new alternative behavior is designed to achieve the same outcome as the challenging behavior had produced. The following Figure 5 is a blank form of the competing behavior pathway model.

**Figure 5. Competing Behavior Pathway Model—Blank Form**

Completing the competing behavior pathway model involves three steps: listing the information identified from the functional assessment summary statements, identifying a replacement behavior with the consequence that matches the same function as the problem behavior, and identifying a desirable behavior with more natural consequence. First, the competing behavior pathway model begins with listing the events
identified in the behavior hypothesis statement, including setting events, antecedents, problem behavior, and maintaining consequence. The following Figure 6 illustrates this:

![Diagram of Competing Behavior Pathway Model]

**Figure 6. Competing Behavior Pathway Model—Step One**

Next, the competing behavior pathway model requires identifying a replacement behavior and its consequence. The replacement behavior will be a substitute for a problem behavior and provide the same function/consequence. The replacement behavior is supposed to be easier for a student to perform to obtain the same consequence as the problem behavior and less disruptive to overall classroom functioning. The following Figure 7 will illustrate this:
Last, the competing behavior pathway model identifies a desired behavior and its natural consequence. The desired behavior is the behavior that is expected of most or all students in the setting. Since the student is a school-aged child, she is expected to continue with the given work/activity. The following Figure 8 will illustrate this:

*Figure 7. Competing Behavior Pathway Model—Step Two*

*Figure 8. Competing Behavior Pathway Model—Step Three*
The competing behavior pathway model emphasizes increasing the social validity and contextual fit (e.g. “Do the interventions fit the specific context/setting in which they are to be implemented? Do the interventions reflect the values of the plan implementers such as teachers and family members?”), which is one of the critical features guiding positive behavior support interventions (Bambara & Kern, 2005; Carr et al., 2000; O’Neill et al., 1997).

**Teach alternative functional communicative behavior.** Once the function of the behavior (through the FBA process) and the replacement behavior (through the competing behavior model) are identified, the next step in FCT is the actual intervention process where alternative functional behaviors are taught. FCT is often compared to differential reinforcement of alternative behavior (DRA). DRA is based on the principles of ABA and a procedure where an alternative replacement behavior is reinforced over the problem behavior. Carr and Durand (1985) define the specific type of DRA used in FCT as a differential reinforcement of communicative behaviors (DRC). The difference between DRA and FCT/DRC is that in DRA, someone else other than the student (e.g., clinicians or experimenters) has complete control over when and how to deliver the reinforcement and decide what replacement behavior should be exhibited. In FCT/DRC, however, the student is in active roles by having complete control over when the reinforcement is to be delivered because the student has to make a functionally communicative response (i.e., alternative replacement behavior) to another person in order to receive the reinforcement. FCT/DRC used as an active contingency to the
behavior makes other reactive, aversive, punishment-based techniques are obsolete (Carr & Durand, 1985; Fox et al., 2000; O’Neill et al., 1997).

A common FCT technique in teaching a new behavior is prompting. A prompt is a hint or assistance to elicit the desired response from an individual, when teaching a new behavior. Types of prompts include verbal (instructions or hints), visual (pictures or gestures), modeling (a visual demonstration), and physical prompts (hand-over-hand, partial or full physical guidance). For example, an individual is about to learn how to brush teeth independently. If the individual does not know how to brush, the given task is broken down into small, manageable steps through the process of task analysis. The individual may observe the model unscrewing the toothpaste cap and is asked to perform the same action. If the individual does not respond to the request or perform the desired response, he or she is given prompts, either verbally, physically, or a combination of different types of prompts. Once the individual completes the required action, he is positively reinforced with his identified reinforcers. Then the individual moves to the next step such as putting the toothpaste on the toothbrush, and the cycle begins again.

Another common technique used in FCT when teaching a new behavior is to reinforce a newly acquired behavior on a continuous schedule of reinforcement in order to allow a strong initial association to be formed between the alternative behavior and reinforcer. Once the student demonstrates the acquisition and fluency stages of the FCT, then the SOR will be thinned, switching to a partial SOR (e.g., FR3, where every third behavior will be reinforced). The following Figure 9 illustrates this (O’Neil et al., 1997):
Figure 9. Functional Communication-based Intervention

In summary, once the function of the problem behavior is identified through FBA, then a FCT intervention is developed, creating environments in which challenging behaviors become irrelevant, inefficient, and ineffective (Buschbacher & Fox, 2003; O’Neill et al., 1997). The FCT intervention derived from the information based on FBA can substantially reduce problem behaviors (O’Neill et al., 1997). The FCT intervention incorporates one of the critical features of PBIS such as focus on prevention and education, which means punishment should not be included. The FCT intervention also incorporates the PBIS philosophy of self-determination skills (e.g., choice making, independence). As part of improving quality of life, self-determination skills encourage the students with disabilities to express their own preference, interests, and choice for the
future (IDEA, 2004). As stated earlier, in FCT, the students have complete control over their behaviors. The greater control the student has over the direction of her life, the student will become more independent and adaptive in her everyday life situations and further enhance her overall quality of life (Mount, 2000; O’Brien, 1987; O’Brien & Pearpoint, 2003).

**Summary**

This chapter provided the reader with the process of functional communication training (FCT) in details. Some problems associated with traditional, punishment-based toileting procedures were presented. Positive behavioral interventions and supports (PBIS) approach was discussed as a theoretical framework for FCT. The process of FCT, including a functional behavioral assessment (FBA) was highlighted, focusing on the development of a proactive, educative intervention. The FCT-based intervention promotes reliance on prevention, function-based, and self-determination skills (e.g., independence, choice-making, and self-management). The FCT-based intervention also eliminates any aversive punishment components, reflecting the core principles set by the current federal special education law (i.e., IDEA 2004).

In the next chapter, the research method is discussed, including participants and setting, instrumentation, study design, intervention procedure, and data collection.
Chapter III
Method

Introduction

The effectiveness of functional communication-based behavioral interventions in reducing severe challenging behaviors (e.g., aggression, stereotypy, and self-injury) exhibited by individuals with developmental disabilities is well documented (Bambara & Kern, 2005; Carr et al., 2002; Horner et al., 2002; Sugai et al., 2000). However, far less is known about the effects of a FCT-based toileting intervention for students with developmental disabilities in a school setting. Furthermore, the currently available toileting interventions for students with disabilities include some undesirable procedures such as the use of punishment, unnatural clinic/university as opposed to more natural school/home settings, and prompt-based as opposed to communicative, self-initiated toileting skills.

The purpose of this study was to expand the current literature regarding the effectiveness of FCT and to assess the effectiveness of FCT for teaching of communicative, self-initiated toileting skills for students with developmental disabilities in a school setting. The following sections explain how this study was conducted, including the research questions and hypotheses, participants and setting selection, instrumentation, study design, intervention procedure, and data collection.
**Research questions.**

1. Could a FCT-based toileting intervention lead to increased incidence of communicative, self-initiated toileting behavior for students with developmental disabilities?

2. Could a FCT-based toileting intervention lead to decreased incidence of toileting accidents for students with developmental disabilities?

**Research hypotheses.**

1. It was hypothesized that a FCT-based toileting intervention would lead to the increase in the incidence of communicative, self-initiated toileting behavior.

2. It was hypothesized that a FCT-based toileting intervention would lead to the decrease or elimination in the incidence of toileting accidents.

**Independent variable.** A functional communication training (FCT)-based toileting intervention

**Dependent variables (target behaviors).**

1. Communicative, self-initiated toileting behavior, which was defined as any event that the student requested to use the bathroom, verbally or using a picture symbol without any prompts given, and voided in the toilet as monitored by the sound of the fluid entering the toilet.

2. Toileting accident, which was defined as a wet diaper/Pull-up or visual observation of wetness on the pants. Wetness of the pants was defined as a wet spot on the student’s pants larger than a quarter size in diameter.
**Participants**

To identify potential participants, the present study employed two of Patton’s purposive sampling strategies for participants’ inclusion criteria: convenience and criterion sampling (1990).

**Convenience sampling.** The participants were selected by convenience sampling because of their convenient accessibility and proximity to the researcher. The school is a non-profit, therapeutic day school located in an urban setting of Chicago, Illinois. The school enrolls about 70 children and 30 adults with severe and profound developmental disabilities in the same building and serves the Chicago and suburban areas. The researcher previously worked as a certified special education teacher at the school.

Before conducting the study, the researcher had consulted with the principal of the school. Since there were many variables that were hard to control (e.g., student absences and turnover rate, staff absences and turnover rate, high transfer rate among classrooms, etc.), the principal of the school suggested that the researcher use her classroom students. After the discussion with the principal, the students of this researcher were the participants of this research study and met the requirement of the convenient sampling criterion.

**Criterion sampling.** Once the participants were chosen by the convenience sampling, they also were chosen by the following criterion sampling: (a) chronological age between thirteen and nineteen with a primary diagnosis of developmental disabilities such as autism and/or mental retardation, (b) the student had two or more toileting
accidents on a daily basis, (c) the student was ambulatory, and (d) the student’s toileting problems must not have a medical cause.

The first inclusion criterion to participate in this study, the student was between eleven and eighteen years of chronological age with a primary diagnosis of developmental disability such as autism and/or mental retardation. Most of the students at this school had severe and profound developmental disabilities, with a corresponding intelligence quotient (IQ) score of 34 or below. A copy of the student’s social and behavior skills (e.g., Vineland Adaptive Behavior Scales) was reviewed to collect additional information and assess the student’s overall adaptive functional performance. The student’s academic and developmental performance (e.g., Brigance Diagnostic Inventory of Early Development, Peabody Picture Vocabulary Test) was also reviewed to collect additional information on the student’s overall academic and developmental functioning.

Some students had no verbal skills and used non-verbal communication aids such as picture symbols and/or speech generating devices. While a few students carried a Voice Output Communication Device with picture symbols representing ideas and concrete objects such as “hello” or “ball,” and others had a picture communication binder where a set of picture symbols were arranged to communicate a series of activities such as “first speech,” “then bicycle” and/or concrete objects. The participants were introduced and familiar with a standardized commercial picture symbolic system because they were used during class instructions and therapy sessions as part of their
communication. The use of picture symbols was not an out of ordinary procedure; it was part of the student’s normal daily routines.

The second and third inclusion criterion was that the student had two or more toileting accidents on a daily basis and was ambulatory. One of dependent measures in this study was to directly observe the student’s outer pants in order to document wetness. Since the pants of the ambulatory student could be easily observed as opposed to those of the students in a wheelchair, the students in their wheelchairs were excluded from this study.

The fourth inclusion criterion was that the student had no medical conditions for causing his/her toileting problems. That is, the student was cleared of any medical conditions to cause the toileting problems from her primary physician or psychiatrist.

Once the potential participants were identified by convenience and criterion sampling, the researcher sent in a copy of parental consent form (see Appendix L, Consent to Participate in Research-Parental Consent) and detailed intervention sheets (see Appendix J, Functional Communication Training Intervention) home inside the student’s communication folder that went home in the student’s book bag. The school utilized a communication folder which had two pockets inside. The pocket on the left side was for communication notes/materials from home, and the pocket on the right side was for the classroom daily notes/reports going home.

The parental consent form (see Appendix L) included: (a) purpose of the study, (b) a brief description of FCT procedure, (c) benefits of participation, (d) any potential
risks involved, (e) participant’s confidentiality, (f) their participation is completely voluntary, and (g) how to contact the primary researchers should they have any additional questions. The intervention information sheets (see Appendix J) listed detailed the FCT procedures, including the purpose of the study, two-person prompting procedure to teach communication (of the need to use the bathroom) to the students with three motor skills (i.e., pick up a picture symbol, reach her communication partner, and release the picture symbol), and how to fade out prompts to promote the student’s independence. The intervention sheets also listed how to teach self-initiation (to void in the toilet) and toileting-related sub skills (e.g., pull the pants down, sit in toilet, wash hands, etc.) using the most-to-least prompting procedure, and how to fade out prompts to facilitate the student’s independence using the delayed prompting procedure.

The parents/guardians were asked to sign the parental consent form if they would like to participate in the study, return the signed consent form to the school using a communication folder in the student’s book bag, and keep the detailed FCT information sheets for their records. The researcher then sent in a copy of the signed parental consent form home inside the student’s communication folder for the parents/guardians to keep for their own records.

For those parents who might not fluently speak English and read English, a Spanish version of a parental consent form (see Appendix M for Spanish version) was provided to the parents, along with the intervention information sheets (see Appendix K for Spanish version). Both the parental consent form and intervention sheets were
translated by a native speaker, and the translator signed a statement indicating that he had carried out the translation to the best of their ability. After considering the students’ characteristics, most of whom were diagnosed with severe and profound developmental disabilities, the student assent form was not appropriate for this student population. The assent process was not included in the study.

Prior to beginning the study, the researcher sought an approval to conduct the study from the Institutional Review Board (IRB) for Research with Human Subjects at Loyola University Chicago to protect the rights and welfare of the participants. Prior to the study, the researcher had trained two paraprofessionals who worked as the research assistants for the study. The research assistants were trained for their role in the research, took the Collaborative Institutional Training Initiative (CITI) course for proper human research subjects protections, and had their CITI training record on file with the Institutional Review Board (IRB). The research assistants helped implementing the proposed FCT intervention and collecting the data.

Before the study began, parents and administrators were given written information sheets about the project (see Appendix J, Functional Communication Training Intervention). In addition, the parents were given a parental consent form (see Appendix L, Consent to Participate in Research-Parental Consent), including the information on the confidentiality of the student. The students were not personally identified in any way and were assigned a participant number (e.g., Student A, Student
B). No individual names were used in any reports or publications resulting from this study.

Furthermore, all data sheets were kept in the researcher’s brief case throughout the day, and at the end of each day, all the collected data sheets were stored away by the researcher in locked areas (e.g., locked file cabinet at home) for the participants’ confidentiality and privacy. Only the principal researcher had an access to the collected data which were kept in a locked file cabinet. The data entered into the computer system for analysis were only viewed by the principal researcher with a password. Conscious efforts were made throughout the intervention for the confidentiality of participants to be maintained. All the data were to be destroyed one year following the conclusion of this study.

Setting

**Setting selection criterion.** The research site was selected by convenience sampling because of its convenient accessibility and proximity to the researcher (Patton, 1990). The researcher previously worked as a certified special education teacher at the school.

**Description of the school.** The school is a non-profit, therapeutic day school located in an urban setting of Chicago, Illinois. The school enrolls about 70 children and 30 adults with severe and profound developmental disabilities in the same building and serves the Chicago and suburban areas. The school operates two separate programs: Student Program and Adult Program. The Student Program serves students aged six
through twenty-one and diagnosed with severe and profound disabilities and/or autism. The Adult Program provides services to adults who have “aged out” of the Student’s Program and usually start the program on their 22\textsuperscript{nd} birthday. Some students stay in the Student Program until the day before their 22\textsuperscript{nd} birthday, then move to the Adult Program if the requirements are met (e.g., displaying no physical aggression toward others and self, having some basic self-care skills, etc.). The students enrolled in the school are referred by their local school districts (e.g., Chicago Public School, suburban school districts, etc.). Services available at the school include Music Therapy, Speech Therapy, Occupational Therapy, Physical Therapy, Social Work, Nursing, and Vision Services. This study focused on the students who enrolled in the Student Program.

**Description of the classroom.** The school has a total of nine classrooms. Each classroom enrolls about six to eight students with severe and profound developmental disabilities, a certified special education teacher, and paraprofessionals. Depending on each student’s needs, each classroom has a different number of assigned paraprofessionals. For example, if a student displays severe challenging behaviors to impede his learning and risks the safety of himself and others, a specific paraprofessional is assigned to the student to help him complete daily tasks and activities throughout the school day.

All toilet training sessions were conducted in a classroom, which the students attended from 8:45 a.m. to 2:30 p.m. (approximately 6 hours per day) and 5 days per week. The classroom is composed of a combination of cement and dry walls and a tile
floor with florescent tube light fixtures. The size of the classroom is about 20 by 20 feet, attached with a small closet about 6 by 14 feet. The classroom has eight individual desks, six chairs, and two special adaptive Rifton chairs to help students for a proper sitting posture. Typically, three individual desks are put together in the middle of the classroom to save the space and facilitate a group project. The classroom also has a small desk fixed at the corner of the classroom and a rolling chair for the teacher, and a corner window. The closet of the classroom has a safety mat, bean bags, plastic space dividers, a wooden drawer, and wooden shelves.

**Description of the bathroom.** The school has limited number of bathrooms for students, a total of six bathrooms shared by nine classrooms. Each bathroom contains one toilet, one sink, and a small changing area. The size of the bathroom is about 7 by 7 feet, and the size of the changing area is 7 by 9 feet. The bathroom is shared with an adjacent classroom. About fifteen students with various levels of developmental disabilities shared one bathroom. Due to practical concerns over the availability of the bathroom, another bathroom down the hallway was available for use during this study, and all toilet training sessions were conducted in the classroom which was located seven feet from the classroom with no obstructions for the route, except passing the changing station.

**Materials.** A picture symbol was made using Boardmaker software. The size of the picture symbol is 2 by 2 inch, the same size of other picture symbols used during class instructions and therapy sessions. On the top of the picture card, it says “bathroom”
and has a corresponding picture on the bottom. Prior to use the picture symbol in training sessions, the picture symbol was laminated for durability. The small Velcro was attached to the back of the picture symbol to keep it in the student’s picture communication binder.

During field trips or community outings, each student was required to wear the student identification (ID) card. On the front of the ID card, it has the student’s picture, the school and emergency contact information. During the field trips or community outing, the student slipped a picture of the bathroom into her ID card sleeve for communicating her bathroom needs during the trips.

**Data Collection Instrumentation**

Data were collected on the outcome (e.g., intervals of time with wet clothing), implementation fidelity, and social validity for the intervention. The instruments that were used in this study included the Functional Assessment Interview (FAI) form, the Functional Assessment Observation (FAO) form, the Competing Behavior Pathway form, toileting task analysis sheet, FCT Data Sheets, the FCT Implementation Checklist, and a social validity questionnaire. A description of each instrument follows:

**Functional assessment interview (FAI) form.** The Functional Assessment Interview (FAI) form was originally developed to identify the possible functions of challenging behaviors and provide information that will be used to develop a function-based positive behavior intervention (O’Neill et al., 1997). The original FAI form was modified to be used in this study. The FAI form (see Appendix A) asks to describe the
behaviors of concern, student’s typical daily schedule of activities, and possible functions of the behavior. The FAI form was used by the researcher during an interview with a paraprofessional.

**Functional assessment observation (FAO) form.** The Functional Assessment Observation (FAO) form was originally developed to identify the possible functions of challenging behaviors and provide information that will be used to develop a function-based positive behavior intervention (O’Neill et al., 1997). The original FAO form was modified to be used in this study. The FAO form (see Appendix B) combines the elements of the Antecedents-Behavior-Consequences (ABC) chart and scatter plot and will be used for three purposes: to identify the student’s elimination pattern, establish the student’s baseline for each target behavior, and identify the possible function of the student’s toileting behavior. The FAO form is divided into the several sections: (a) student’s name and date, (b) time intervals, (c) target behaviors, (d) predictors or antecedents, (e) perceived functions of the target behaviors, and (f) actual consequences. The FAO form was used by the paraprofessionals during baseline and intervention phase.

**Competing behavior pathway (CBP) form.** O’Neill et al. (1997) presented a Competing Behavior Pathway (CBP) model (see Appendix C) to guide teachers and practitioners to develop behavior intervention plans focusing on changing environments and teaching skills. With emphasis on the proactive skill-building aspect, the CBP model teaches the student how to achieve desired outcomes using functionally equivalent, yet socially appropriate behaviors instead of problem behaviors (O’Neill et al., 1997). CBP
model asks to identify a functionally equivalent replacement behavior, yet producing the same function as the problem behavior. If it is determined that a student does not possess a socially appropriate repertoire of behaviors, then a new alternative skill, replacement behavior, is taught. This new behavior is designed to achieve the same outcome as the challenging behavior had produced.

Completing the CBP form involves three steps: (a) listing the information identified from the FAO form, (b) identifying a functionally equivalent replacement behavior with the consequence, and (c) identifying a desirable behavior with more natural consequence. The researcher completed the Competing Behavior Pathway Model with the paraprofessionals during baseline for each participant.

**Toileting task analysis sheet.** Toileting task analysis sheet (see Appendix D, Toileting Task Analysis Sheet for Female student and Appendix E, Toileting Task Analysis Sheet for Male student) was administered during a baseline and an intervention phase. During the baseline, the toileting task analysis sheet was used to determine the current performance level of each participant’s target behaviors (dependent measures). The toileting task analysis sheet lists two target behaviors (i.e., toileting accident and communicative, self-initiated toileting behavior) and toileting-related subskills, and the sheet asks the rater to rate each statement: four points for completing the given task “independently”, three points for completing the given task with “verbal prompts,” two points with “gestural prompts,” and one point with “physical prompts.” The instrument yielded a pretest score on the target behaviors and toileting-related subskills.
The toileting task analysis sheet was also completed at the end of the intervention to yield a post-test score and to see if there is any change in behavior. The toileting task analysis sheet was used by the paraprofessionals during baseline and intervention phase.

**Functional communication training (FCT) data sheets.** FCT data sheets include two parts: teaching communication (of the need to toilet) and teaching self-initiation (for voiding in the toilet). FCT data sheet—Part I (see Appendix F) focuses on teaching communication to students by beginning with three motor responses (i.e., pick up a picture symbol, reach a communication partner, and release the picture symbol to the communication partner). FCT data sheet—Part II (see Appendix G) focuses on teaching self-initiation (for voiding in the toilet) and toileting-related subskills (e.g., enter the bathroom, pull the pants down, sit on the toilet, etc.). FCT data sheets were used by the paraprofessionals during intervention phase.

**FCT implementation checklist.** Functional Communication Training (FCT) Implementation checklist (see Appendix H) lists the major FCT procedures and was used by the researcher to calculate fidelity (a) during baseline, while providing paraprofessionals with functional communication trainings and (b) during intervention, while randomly observing the paraprofessionals.

**Social validity questionnaire.** The social validity questionnaire used in this study is a modified version from the original Treatment Evaluation Inventory-Short Form (TEI-SF) (Kelley, Heffer, Gresham, & Elliott, 1989). The modified TEI-SF instrument (see Appendix I) is a five-point Likert rating scale with nine statements regarding
treatment procedures and effectiveness. The paraprofessionals were asked to rate each statement by indicating *strongly disagree, disagree, neutral, agree, or strongly agree.* The social validity questionnaire was used by the paraprofessionals after the intervention.

**Study Design**

The present study was a multiple baseline design to evaluate the effects of the proposed FCT intervention to increase a student’s communicative, self-initiated toileting behavior and reduce or eliminate the student’s toileting accidents. A single-subject, multiple baseline design was chosen because continuous assessment of the student’s toileting behavior was necessary in order to establish the student’s elimination pattern. A multiple baseline design was also chosen because it was better suited for use in the natural environment such as school settings because it was not necessary to withdraw or reverse an effective treatment (e.g., A-B-A-B experimental designs) to demonstrate experimental control (Gast, 2010; Kazdin, 2011). A-B-A-B withdrawal and reversal designs may be ethically inappropriate when the effective treatment is withheld, and many behaviors are often functionally irreversible (Gast, 2010; Kazdin, 2011). The multiple baseline design also allows the concurrent measurement of several conditions or tiers (e.g., across individuals, settings, or situations) at the same time period.

Baseline was established concurrently for all participants. For the purpose of this study, baseline stability was defined as when three data points were in a similar proximity, not indicating a significant change in the pattern of the observed target behavior. Visual inspection of baseline data were used to confirm the baseline stability.
for each participant’s toileting behavior. Once stability in baseline was observed, the
participants were randomly assigned by the researcher. The researcher wrote each
participant’s names in a 3 by 3 piece of paper, put the names in a bag, and drew the
names to decide which participant would first receive the intervention. The random
assignment of participants to each condition allows for statistical control over threats to
internal validity that may confound results of the investigation, such as maturation or
participant characteristics that may influence treatment outcomes (Gast, 2010).

The FCT intervention was sequentially introduced to the first participant, only
after stability in baseline was demonstrated in order to minimize the risk factors for the
validity of the study. The intervention was introduced for the second participant after
there appeared to be a downward trend in the number of wetting incidences for the first
participant. For the purpose of this study, a downward trend was defined as when three
consecutive points in a downward direction regarding wetting behavior. The intervention
was introduced to the third participant after there appeared to be a downward trend in the
number of wetting incidences for the second participant, and so forth. All the participants
received the intervention. The intervention was implemented in the student’s classroom
and lasted about 10 weeks.

Procedure

**Paraprofessional data training.** Just before a baseline phase, data collection
training was provided to paraprofessionals using the Functional Assessment Observation
(FAO) form (see Appendix B), which was originally developed by O’Neill et al. (1997).
The FAO form combines the elements of the ABC chart and scatter plot and will be used to identify the student’s elimination pattern and establish the student’s baseline for each target behavior. The FAO form is divided into the several sections: (a) student’s name and date, (b) time intervals, (c) target behaviors, (d) predictors or antecedents, (e) perceived functions of the target behaviors, and (f) actual consequences.

The FAO form consists of twelve 30-min intervals on the vertical line and two operationally defined target behaviors: toileting accident and communicative, self-initiated toileting behavior. The operational definition of each behavior is as follows:

**Toileting accident (TA).** Toileting accident was defined as a wet diaper/pull-up or visual observation of a wet spot on the outside of the student’s clothing larger than a quarter size in diameter.

**Communicative, self-initiative toileting behavior (CS).** Communicative, self-initiated toileting behavior was defined as any event when the student requested to use the bathroom, verbally or using a picture symbol without any prompts given, and voided in the toilet as monitored by the sound of the fluid entering the toilet.

The paraprofessionals took a count as to whether the target behaviors (i.e., toileting accident and communicative, self-initiated toileting) occurred anytime during the specific interval with a tally mark ( / ) using a frequency recording system.

The data collection training consisted of a review of the FAO form and a practice session on how to use the form, including the operational definitions, examples, and non-examples of each target behavior; and questions and concerns the paraprofessionals
might have regarding data collection procedures. The data training consisted of one 30-to 45-minute session and was provided in the classroom after school by the researcher of this study.

During the practice session, the paraprofessionals were asked to make a tally mark (/) on the FAO form whether the target behavior occurred within the intervals on a given date. The researcher also discussed times when a behavior would not be counted to make sure that each observer’s numbers were comparable and thus to increase the interobserver reliability. For example, if the student pointed to her wet pants, it was not counted as self-initiated toileting behavior because the definition of self-initiated toileting was defined as urinating in the toilet, not on her diaper or pants. During the practice session, the researcher described hypothetical situations, and the paraprofessionals were asked to verbally state the observed condition to the researcher whether the target behavior occurred or did not occur in a given interval. When the researcher and the paraprofessionals were in an agreement three times in a row for the same given interval, then a baseline was introduced. If there was no agreement three times in a row between the researcher and the paraprofessionals during the practice session, more training sessions were scheduled until the agreement was reached.

**Baseline.** During a baseline phase, the researcher conducted interviews with paraprofessionals using the Functional Assessment Interview (FAI) form (see Appendix A). The paraprofessionals conducted direct observations using the Functional Assessment Observation (FAO) form (see Appendix B), completing the Competing
Behavior Pathway Model form (see Appendix C), and toileting task analysis sheets (see Appendices D and E). During the baseline, the paraprofessionals were instructed to engage in the daily activities with their students as they would normally do.

**Functional assessment interview (FAI) form.** Using the FAI form (see Appendix A), the researcher had an unstructured, informal interview with the students’ paraprofessionals and asked them to describe the daily routines of each student, possible reinforcers for each student, and how the student’s toileting behavior impacted the overall independent functioning. The researcher also reviewed a student’s academic, behavioral, and psychological reports in order to collect additional information about the behaviors of interest. Since the parents already expressed the concern toward their child’s self-help skills, interviewing the parents was not performed. The interviews with the paraprofessionals and record reviews by the researcher were conducted in the classroom after school.

**Functional assessment observation (FAO) form.** During the baseline, paraprofessionals were asked to complete the FAO form (see Appendix B) on a daily basis. Using the FAO form, the paraprofessionals made a direct observation on the student’s behavior to identify the student’s elimination pattern, establish the student’s baseline for the target behavior, and identify the possible function of the student’s toileting behavior by completing sections of antecedents, possible functions, and actual consequences.
Antecedents are the stimuli that directly precede problem behavior and may be related to the occurrence of toileting problems. Antecedents serve as a “trigger” or cue for a problem behavior. Examples of common antecedents include verbal demand/request, the absence of attention, difficult task, transition (place to place or activity to activity), and the presence or absence of specific person or materials (O’Neill et al., 1997).

Perceived functions of the behavior relate to the reasons behind a problem behavior. Although there are many reasons that a student may be engaged in the problem behavior, functions of the behavior usually fall into two major areas: to get/obtain something desirable (positive reinforcement) and to escape/avoid something undesirable (negative reinforcement) (Carr & Durand, 1985; Durnad & Carr, 1992: O’Neill et al., 1997).

Examples of get/obtain something desirable: positively reinforced

- Social attention (e.g., verbal praise, high-five, smiles, hugs, frowns)
- Tangible objects/activity (e.g., food, toys, money)
- Internal stimulation (e.g., visual stimulation, endorphin release)

Examples of escape/avoid something undesirable: negatively reinforced

- Social attention (e.g., verbal demand/request, corrections, specific people)
- Tasks/activities (e.g., difficult task, specific activities)
- Internal stimulation (e.g., sinus pain, hunger, itching)
Actual consequences on the FAO form refer to the actual consequences that follow problem behavior. Examples of consequences include preferred items, verbal praise, social recognition, verbal reprimand, redirection, or sent to a quiet room/corner. By providing some idea of the consistency between problem behavior and the actual consequences followed, this section provides further clues to the possible functions of problem behavior. For example, if verbal reprimand is used with problem behavior that appears to be attention motivated, then providing the student with verbal engagement, even if it is a form of verbal reprimand, may actually be reinforcing the problem behavior. The reinforcers identified during direct observations were utilized during an actual intervention phase to reinforce the production of the replacement behavior.

At the end of each day, the paraprofessionals and the researcher met in the classroom, counted the number of tally marks marked on the data sheet, and wrote the total number on the bottom of the form.

**Competing behavior pathway (CBP) form.** The researcher discussed with the paraprofessionals in completing a Competing Behavior Pathway (CBP) form (see Appendix C) to ensure the social validity of the intervention. The CBP form was used to identify a functionally equivalent replacement behavior yet producing the same function/consequence as the problem behavior and an ultimate, desired behavior producing a more natural consequence. When selecting an appropriate replacement behavior, Durand (1999) recommends the following criteria: (a) chronologically age-appropriate, (b) easily taught, understood, and portable (c) make the student more
independent, and (d) prepare the student to function in community settings. The paraprofessionals completed the CBP form with the researcher after school in the classroom.

**Toileting task analysis sheet.** During the baseline, toileting task analysis sheets (see Appendices D and E) were completed one time by the paraprofessionals to determine the current performance level of each participant’s target behaviors (dependent measures). The toileting task analysis sheet, included in Appendix D (for female students) and Appendix E (for male students), lists two target behaviors (i.e., toileting accident and communicative, self-initiated toileting behavior) and toileting-related subskills and asks the rater to rate each statement: four points for completing the given task “Independently”, three points for completing the given task with “Verbal prompts,” two points with “Gestural prompts,” and one point with “Physical prompts.” The instrument yielded a pretest score on the target behaviors and toileting-related subskills (e.g., pull the pants down, sit on toilet, flush toilet, wash hands, etc.). The toileting task analysis data sheets were completed by the paraprofessionals one time during the baseline.

**Paraprofessional functional communication training.** Since paraprofessionals were primarily involved in the FCT intervention, the paraprofessional FCT training was provided by the researcher, following the collection of baseline data and immediately before the proposed FCT intervention. The paraprofessional FCT training consisted of (a) a review of the FBA information, including the possible function of the student’s
challenging behavior, (b) an explanation regarding the rationale for replacing a challenging behavior with a socially appropriate behavior, (c) a combination of prompting (e.g., verbal and modeling) and fading out prompting instructions by the researcher on how to teach the student to use a replacement behavior in order to achieve the same function as the challenging behavior, and (d) practice sessions with the paraprofessionals, including questions or concerns that they had regarding the implementation of the proposed FCT intervention. The paraprofessional training sessions were conducted in the classroom after school and provided by the researcher of this study.

**Intervention.** The FCT intervention was introduced after the paraprofessionals reached 97% fidelity rate on the FCT Implementation Checklist during their training sessions. After visually inspecting the FAO form, the specific times of the day when the student was most likely to urinate was identified. About 5 to 10 minutes before the expected urination, functional communication training began. The student was taught to request “I want to go to the bathroom” to the student’s communicative partner by using a picture symbol or verbalizing, depending on the communication mode of each student.

If a student had verbal skills, the student was taught to say, “I want to go to the bathroom” or simply “Bathroom,” depending on the student’s communicative level. If a student had no verbal skills, then nonverbal communication mode was introduced to the student. For the purpose of this study, nonverbal communication training meant the use of a picture symbol. The Picture symbols were chosen because they are universally
recognizable without different interpretations and can be easily taught in a relatively short period of time, compared to sign language (Durand, 1999). Also, all the participants were familiar with the picture symbols because they were used during class instructions and therapy sessions as part of their communication. The use of picture symbols was not an out of ordinary procedure; it was part of the student’s normal daily routines.

When teaching communication to the students who had no verbal skills, the teaching strategies recommended by the Picture Exchange Communication System (PECS) were utilized: two-person prompting procedure in order to elicit the replacement behavior from the student with errorless learning approach and to facilitate rapid fading of prompts (Bondy & Frost, 2002). The two-person prompting procedure involves two people: the communicative partner and the physical prompter. The first staff, designated as the communicative partner, interacts with the student such as by providing the reinforcement. The second staff, designated as the physical prompter, prompts the student from behind (or next to) and does not interact with the student in any social manner and steadily fades out prompts so that the student displays the replacement behavior independently. For the purpose of this study, the student’s assigned paraprofessional was the communicative partner, and the researcher or another independent paraprofessional was the physical prompter.

The FCT intervention began by teaching student with three motor responses such as pick up, reach, and release (see Appendix F, Functional Communication Training—Part I). An example of the lesson is as follows:
1. The physical prompter (the second staff behind the student) assists the student to pick up a picture symbol of the bathroom. The physical prompter provides no verbal prompts during the lesson.

2. The communicative partner opens her hand.

3. The physical prompter assists the student to reach to the student’s communicative partner (i.e., the student’s assigned paraprofessional).

4. The communicative partner opens her hand to receive the picture symbol only after the student has reached.

5. The physical prompter assists the student to release the picture symbol into the communicative partner’s open hand.

6. The physical prompter and the communicative partner assist the student to use the bathroom.

7. The communicative partner provides the student with the previously identified reinforcer.

Using backward chaining, the physical prompter fades out the given prompts from the “back end” of the chain (see Appendix F, Functional Communication Training—Part I) to facilitate fading of prompts and promote the student’s independence. For example, once the student independently released the picture symbol into the communicative partner’s hand five times in a row, the physical prompter discontinued providing prompts and taught the student to reach toward the communicative partner’s hand. Once the student independently reached toward the communicative partner five times in a row, the
physical prompter discontinued providing prompts and taught the student to pick up the picture symbol. Once the student independently *picked up* the picture symbol five times in a row, the physical prompter discontinued providing prompts and taught the student to use three motor responses in succession. Once the student independently *picked up* the picture symbol, *reached* the communicative partner, and *released* the picture symbol five times in a row, the physical prompter completely faded out of the prompts.

If the student made an error, the back-step error correction was used (Bondy & Frost, 2002). For example, if the student dropped the picture symbol into the floor, instead of reaching to the communicative partner’s open hand, the physical prompter took the student back into the last step that the student completed correctly. That is, the physical prompter picked up the picture symbol from the floor, put it on the desk, and the lesson began again. If the student had a toileting accident anytime during the lesson, the student was simply asked to change her wet pants and instructed to continue the lesson.

The FCT intervention also included teaching student with self-initiation (to void in the toilet) and toileting-related sub skills using the most-to-least prompts and delayed prompting procedure (see Appendix G, Functional Communication Training—Part II) to facilitate errorless learning and promote the student’s independence. The toileting-related sub skills for female students are as follows:

- Enters the bathroom
- Pulls pants down
- Sits on toilet
The toileting-related sub skills for male students are as follows:

- Enters the bathroom
- Raises the toilet lid
- Pulls pants down
- Pulls pants up
- Flashes the toilet
- Washes hands
- Dries hands
- Exits the bathroom

The most-to-least prompts include full physical, partial physical (hand-over-hand), gestural (pointing), and verbal prompts. If the student independently performed the given task within three seconds, the paraprofessionals slowly faded out the use of prompts and allowed the replacement behavior under the control of the student, instead of depending on the prompts given by the paraprofessionals and others in order to promote the student’s independence. In other words, the prompt that was required early in the training process was faded out and replaced with a prompt that was less intrusive as the...
student independently performed the given task. For example, a student who required hand-over-hand physical prompt to perform the task might require a different, less intrusive prompt, such as a paraprofessional’s hand shadowing over the student’s hand, a paraprofessional’s hand floating over or pointing to the corrective task.

The schedule of reinforcer delivery faded from a continuous to partial schedule. At the beginning of the intervention, every successful response was reinforced. Once the student displayed a communicative, self-intiated toileting behavior on a regular basis, a schedule of partial reinforcement was introduced to fade out the reinforcement delivery. That is, not every replacement behavior was reinforced. If the problem was observed during implementation (e.g., increased toileting accidents), changing a schedule of reinforcement delivery was discussed with the paraprofessionals. No systematic schedule of fading out reinforcer was included in this study.

The FCT intervention was taught in the student’s classroom throughout the day. The researcher was present during the intervention phase, and the proposed intervention lasted about ten weeks. The paraprofessionals were asked to complete the Functional Assessment Observation (FAO) form (see Appendix B) on a daily basis throughout the intervention phase to monitor the student’s progress. At the end of the intervention, the paraprofessionals were asked to complete the toileting task analysis sheets for female and male students (see Appendices D and E, respectively) to yield a post-test score to compare if there was any change in behavior.
During the intervention phase, the researcher kept an informal journal book to write down any unusual observations or any comments/suggestions made to review later time. The field notes were both handwritten and typed by the researcher and stored in the researcher’s own computer with a password. Students’ names were removed from the notes and replaced with initials such as Student A, B, C, and D. The field notes were written throughout the intervention phase to reflect any issues or concerns.

The FCT intervention ceased at the end of 10th week. No punishment was used in this study. Only identified positive reinforcers (e.g., verbal praise, smile, high-fives, music, etc.) were used to teach the students appropriate communicative behavior.

**Parent training.** A written description of FCT procedures (see Appendix J, Functional Communication Training Intervention) was sent home. At any time during the intervention phase, if the parents expressed their interest in using the FCT intervention at home, the training arrangements were made between the parents and the researcher in order to generalize the student’s possible learning gains to home settings.

**Implementation Fidelity**

Implementation fidelity, also referred to as treatment fidelity, refers to the degree to which the procedures of an intervention would be implemented as intended. To emphasize the importance of treatment integrity, Gresham & Lopez (1996) states, “Treatment integrity can be used as a direct behavioral index of the treatment acceptability. If an intervention is not implemented as intended, then some aspects of that intervention might be considered unacceptable.” To assess the accuracy with which
the proposed FCT intervention would be implemented as intended, a FCT Implementation Checklist (see Appendix H) was completed by the researcher. The implementation checklist describes the major FCT procedures, from teaching communication (of the need to go to the bathroom) to self-initiation (to void in the toilet).

Evaluation of treatment fidelity was conducted during a paraprofessional FCT training and an actual FCT intervention phase using the checklist. During the paraprofessional FCT training, the researcher observed the behavior of the paraprofessionals implementing the procedures and checked off whether or not the prescribed procedures were followed. If the prescribed procedure was observed, the researcher checked off under the YES column for the occurrence of the behavior. If the prescribed procedure was not observed, then the researcher checked off under the NO column for the nonoccurrence of the behavior. The researcher compared the record of the paraprofessional’s behavior on each planned procedural variable to the plan itself and reported the percentage agreement on each procedural variable that the professional’s behavior matched the planned procedures. The formula for calculating implementation fidelity was:

\[
\text{Implementation fidelity} = \frac{\text{Number of observed behaviors}}{\text{Number of planned behaviors}} \times 100
\]

This yielded a percentage that reflected the degree to which the paraprofessionals followed prescribed procedures. The paraprofessionals reached 100% fidelity during the training sessions. During the intervention phase, the researcher randomly selected 40%
of the intervention sessions for each participant. The researcher repeated the same procedure as in the paraprofessional FCT training and calculated the treatment fidelity. The fidelity rate during the intervention was 97%.

**Social Validity**

Social validity is a form of indirect assessment to validate the outcome of an intervention by collecting subjective evaluations of changes in the target behavior (Kazdin, 2011; Wolf, 1978). Wolf (1978) recommends collecting three levels of social validity data: “social significance of goals,” “the social appropriateness of the procedures,” and “the social importance of the effects.”

A social validity questionnaire was administered to students’ paraprofessionals at the end of the study. The social validity questionnaire was given to the paraprofessionals specifically because they worked with the students on a daily basis and were in charge of reinforcing the appropriate replacement behavior after the study. The social validity questionnaire used in this study was a modified version from the original Treatment Evaluation Inventory-Short Form (TEI-SF) (Kelley, Heffer, Gresham, & Elliott, 1989). The social validity questionnaire (see Appendix I) is a five-point Likert rating scale with nine statements regarding treatment procedures and effectiveness. The paraprofessionals were asked to rate each statement by indicating strongly disagree, disagree, neutral, agree, or strongly agree. The social validity questionnaire was anonymously completed by the paraprofessionals after the intervention.
Interobserver Agreement

An interobserver agreement was defined as the degree to which two observers independently gave consistent ratings of the same target behavior (i.e., occurrence or non-occurrence). Two independent observers were the researcher and the paraprofessional, who was the primary coder. If the researcher was not immediately available (e.g., assisting another student or staff, attending a meeting, etc.), another independent paraprofessional, titled as the teacher’s assistant at school, observed and recorded the data.

Originally, it was decided that two independent observers should make at least 40% of the observations for each participant to ensure reliable and consistent measurement of variables and make sure the study’s integrity. When the study began, the school started implementing a two-person observation policy. That is, at no time the student is left alone with only one staff. When the student is being helped to change clothes by his/her assigned paraprofessional or during any therapy sessions, there should be the second observer in the visual field all time. In observation of the school policy, two observers were present all time for each participant and recorded the reliability data 100% of the time throughout the study.

Two observers made the observations at the same time but independently recorded the data using the FAO form (see Appendix B). No discussion was allowed between the two observers during the observing or recording of the data to assure independence in data recording. At the end of the day, the observers compared data.
sheets to determine agreement and disagreement. Agreement was defined as both observers recording the same data for each observed target behavior (i.e., toileting accident or communicative, self-initiated toileting behavior). For example, agreement included that both observers recorded under the same target behavior column for the same corresponding interval on the data sheet. A disagreement was defined as both observers recording under the different target behavior column for the same interval.

Interobserver agreement was calculated using a point-by-point agreement. The formula for calculating interobserver agreement was:

\[
\text{Interobserver Agreement} = \frac{\text{Agreements}}{\text{Agreements + Disagreements}} \times 100
\]

The percentage of interobserver agreement was calculated by dividing the number of agreements by the total number of agreements plus disagreements, then multiplied the quotient by 100. Interobserver agreement was assessed in the classroom for 100% of observational sessions for each participant, and the agreement was 99%.

**Data Analysis**

As data were collected, information was entered and graphed in Excel. The graph displayed visual analysis of day-to-day variation in the data set, including the frequency of toileting accidents and communicative, self-initiated toileting behavior. Data were presented in a line graph form for each participant. The y-axis, a vertical line on the left-hand side of the graph, was marked from zero (0) to twelve (12) in units of one and represented the number of occurrences of the target behavior (e.g., “frequency of toileting
accidents” and “frequency of self-initiated toileting”). The x-axis, a horizontal line on the bottom of the graph, was marked from one (1) to fourthy-seven (47) in units of one and represented the days of observation (e.g., “Days”), indicating that data were plotted on a daily basis.

During the baseline, all data points were entered, and within-phase patterns (e.g., level, trend, and variability) were used to visually analyze the data points to initially determine what steps needed. In single-case experimental strategies, the simple phase change consists of establishment of the stability, level, and trend within the series of data points acrsoo time taken under similar conditions (Barlow, Hayes, & Nelson, 1984). For the purpose of this study, the phase change line (i.e., a dashed line running vertically) was used to designate the condition when changed from baseline to intervention phase. If the stability, level, or trend shown in the baseline phase changes when the intervention is implemented, then the intervention may be responsible for producing an effect increases (Barlow et al., 1984; Kazdin, 2011). Between-phase patterns such as immediacy of effect and overlap also were used to visually inspect data between baseline and intervention phases to determine if there was any significant change in behavior. Also, the Change Point Test was considered to determine if and when a significant changed occurred in the slope of the student’s data (Siegel & Castellan, 1988).

**Summary**

This chapter discussed the research design and data collection methodology used in this study. The present study employed the use of a multiple baseline design to
evaluate the effects of FCT intervention on the self-initiated toileting behavior for the students with developmental disabilities in a school setting. Participants were selected according to the convenience and criteria sampling. Data collection procedures included functional behavior assessment (FBA) using the FAI form, the FAO form, the Competing Behavior Pathway form, and FCT data sheets to collect baseline and intervention data on each participant. Additional instruments used were toileting task analysis sheets, FCT implementation checklist, and a social validity questionnaire to collect treatment fidelity and social validity data. Collected data were analyzed by visually inspecting the graphically presented results.

In the next chapter, the results of each instrument used in the study will be presented, including each participant’s target behavior change (dependent measures).
Chapter IV

Results

Introduction

The purpose of this study was to expand the current literature regarding the effectiveness of Functional Communication Training (FCT) and to assess the effectiveness of FCT for teaching of communicative, self-initiated toileting skills for students with developmental disabilities in a school setting. The current study did not include any punishment components, which was considered as a necessary component in teaching of self-initiated toileting skills to individuals with developmental disabilities (Azrin & Foxx, 1971). Furthermore, the current study was conducted in a more natural setting such as school, rather than intensive inpatient clinic or university settings, allowing the student to carry out her day-to-day routines. Also, the current study was based on teaching of independent, self-initiated toileting skills, rather than prompted or scheduled toileting skills.

This chapter will inform the reader of the outcomes of the study in three sections. The first section begins with the research questions and associated hypotheses to be answered and discusses the description of the participants, including the participants’ demographic information and functional, developmental level assessed by the popular psycho-educational tests. The second section shares the results of each instrument used in the study, including the Functional Assessment Interview (FAI) form, the
Functional Assessment Observation (FAO) form, the Competing Behavior Pathway Model form, and the toileting task analysis sheet. Each instrument details each participant’s problem behavior, possible function of the problem behavior, and an alternative, replacement behavior. Further, this second section discusses social validity assessment and interobserver agreement. Finally, the third section discusses each participant’s target behavior changes (i.e., the frequency of toileting accidents and of communicative, self-initiated toileting behavior).

Research questions.

1. Could a FCT-based toileting intervention lead to increased incidence of communicative, self-initiated toileting behavior for students with developmental disabilities?

2. Could a FCT-based toileting intervention lead to decreased incidence of toileting accidents for students with developmental disabilities?

Research hypotheses.

1. It was hypothesized that a FCT-based toileting intervention would lead to the increase in the incidence of communicative, self-initiated toileting behavior.

2. It was hypothesized that a FCT-based toileting intervention would lead to the decrease or elimination in the incidence of toileting accidents.

Independent variable. A functional communication training (FCT)-based toileting intervention as described in chapter 3.
Dependent variables (target behaviors).

1. Communicative, self-initiated toileting behavior, which was defined as any event that the student requested to use the bathroom, verbally or using a picture symbol, without any prompts given, and voided in the toilet as monitored by the sound of the fluid entering the toilet.

2. Toileting accident, which was defined as a wet diaper/Pull-up or visual observation of wetness on the pants. Wetness of the pants was defined as a wet spot on the student’s pants larger than a quarter size in diameter.

Description of the Participants

Of the six original participants who initially met the criteria, two participants did not meet the second criterion sampling (i.e., the student had two or more toileting accidents per day). A total of four participants (one male and three females) were included in the present study. Their mean age was 15.5 years (range = 13-17 years). Each of the participants was ambulatory, and all participants wore diapers/Pull-ups and had two or more toileting accidents per day. None of the participants had ever gone to the bathroom independently and without prompting. Three of the participants were on medication for physical aggression and/or hyperactivity. All the participants were diagnosed by an independent psychiatrist as having developmental disabilities such as autism and/or mental retardation.

The participants did not have verbal skills and used non-verbal communication aids such as picture symbols and/or speech generating devices. While a few students carried a Voice Output Communication Device with picture symbols representing ideas
and concrete objects such as “hello” or “ball,” others had a picture communication binder where a set of picture symbols were arranged to communicate a series of activities such as “first work,” “then bicycle” or concrete objects. The participants had been introduced and were familiar with a standardized commercial picture symbolic system used during class instructions and therapy sessions as part of their communication.

In order to protect the student’s confidentiality, the participant was assigned a participant number (e.g., Student A, Student B, etc.) or a made-up name (e.g., “Mike,” “Mandy,” etc.). In a subsequent discussion hereafter, the participant number or the fictitious name was used. Table 1 illustrates a summary of the demographic information for each participant including sex, age, primary diagnostic label, and communication mode.

Table 1

*Participant Demographic Information*

<table>
<thead>
<tr>
<th>Student</th>
<th>Sex</th>
<th>Age</th>
<th>Primary Diagnosis</th>
<th>Communication Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>F</td>
<td>17</td>
<td>Down Syndrome</td>
<td>Non-verbal</td>
</tr>
<tr>
<td>B</td>
<td>M</td>
<td>13</td>
<td>Autism</td>
<td>Non-verbal</td>
</tr>
<tr>
<td>C</td>
<td>F</td>
<td>16</td>
<td>Autism</td>
<td>Non-verbal</td>
</tr>
<tr>
<td>D</td>
<td>F</td>
<td>16</td>
<td>Autism</td>
<td>Non-verbal</td>
</tr>
</tbody>
</table>

A copy of the student’s social and behavior skills (e.g., Vineland Adaptive Behavior Scales) were reviewed to collect additional information and assess the student’s
overall adaptive functional performance. The student’s academic and developmental performance (e.g., Brigance Diagnostic Inventory of Early Development, Peabody Picture Vocabulary Test) were reviewed to collect additional information on the student’s overall developmental functioning. Each testing measure reviewed is discussed below.

The Vineland Adaptive Behavior Scales, Second Edition (2005) measures the individual’s typical performance of adaptive behaviors from birth to adulthood. Adaptive behaviors are those day-to-day activities necessary for individuals to get along with others and take care of themselves. The Vineland-II covers adaptive behaviors in four different domains: Communication, Daily Living Skills, Socialization, and Motor Skills. The Vineland also produces a composite score summarizing the individual’s performance across all of these domains. The Vineland-II is usually completed by someone who is familiar with that individual, such as a parent, caregiver, or teacher. The reviewed Vineland-II in this study was completed by a parent, a teacher or a paraprofessional.

The Brigance Inventory of Early Development II (2004) is an assessment tool to evaluate and monitor present levels of academic achievement and functional performance, and identify children with developmental delays. The Brigance IED II measures the developmental ages of birth to 7 years and progress in areas of pre-ambulatory motor, gross motor, fine motor, self-help, speech and language, general knowledge and comprehension, social and emotional, readiness, basic reading, manuscript writing, and basic math skills.
The Peabody Picture Vocabulary Test, Fourth Edition (2007) is an individual intelligence test, measuring an individual’s receptive vocabulary achievement and verbal ability in standard American English vocabulary from 2 to over 90 years old. The PPVT-IV can be used to estimate the child’s scholastic aptitude, identify language disorders, and assess verbal intelligence. Another test designed to foster development in communication is the Nonspeech Test (1988). The Nonspeech Test is a standardized test of receptive and expressive language abilities for children who are nonspeaking. It is targeted from birth to 4 years and designed to foster development in communication. The following Table 2 summarizes each participant’s developmental level from each test measures.
Table 2

*Each Participant’s Developmental Level*

<table>
<thead>
<tr>
<th>Student</th>
<th>Mandy</th>
<th>Mike</th>
<th>Terri</th>
<th>Amanda</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>17</td>
<td>13</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>% Rank</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Age Eq. (yrs.mth)</td>
<td>1.3</td>
<td>2.10</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Adapt. Level</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>% Rank</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Age Eq. (yrs.mth)</td>
<td>2.9</td>
<td>2.11</td>
<td>1.7</td>
<td>1.9</td>
</tr>
<tr>
<td>Adapt. Level</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>% Rank</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Age Eq. (yrs.mth)</td>
<td>1.3</td>
<td>1.2</td>
<td>0.7</td>
<td>1.0</td>
</tr>
<tr>
<td>Adapt. Level</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>% Rank</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Age Eq. (yrs.mth)</td>
<td>3.7</td>
<td>3.8</td>
<td>2.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Adapt. Level</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>% Rank</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Age Eq. (yrs.mth)</td>
<td>1.9</td>
<td>2.2</td>
<td>1.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Adapt. Level</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Receptive Vocabulary Age Eq. (yrs. month)</td>
<td>&lt;2.0</td>
<td>&lt;2.0</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Receptive Language Age Eq. (months)</td>
<td>30-33</td>
<td>28-30</td>
<td>7-10</td>
<td>18-21</td>
</tr>
<tr>
<td>Expressive Language Age Eq. (months)</td>
<td>25-28</td>
<td>18-21</td>
<td>9-11</td>
<td>18-21</td>
</tr>
</tbody>
</table>
Results of the Instruments

**Functional assessment interview (FAI) form.** Paraprofessionals were interviewed and asked to describe the target behaviors of concern, including the topography and frequency. The paraprofessionals reported that all participants wore diapers or Pull-ups and had two or more toileting accidents per day. None of the participants had ever gone to the bathroom independently and without prompting. The primary problem behavior for all participants was identified as having two or more toileting accidents on a daily basis. Please refer to Table 3 for the details of each student’s problem behavior, including the frequency of toileting accidents. The paraprofessionals also shared their concerns that the students lost significant instructional time and learning opportunities by constantly going to the bathroom to change pants.

**Functional assessment observation (FAO) form.** Paraprofessionals were asked to complete the FAO form during baseline and intervention phases. During initial data collection trainings on the use of the FAO form, the researcher described hypothetical situations, and the paraprofessionals were asked to verbally state if the target behavior had occurred or not. Once the researcher and the paraprofessionals were in an agreement three times in a row for the given scenario/interval, then a baseline was introduced. Two separate data trainings were provided, and 100% agreement was reached.

During the baseline, the FAO form was used to identify each student’s elimination pattern (e.g., time of the day she is more likely to wet pants), establish the baseline for each target behavior (i.e., the frequency of daily toileting accidents and of communicative, self-initiated toileting behavior), and help to identify the possible
function of each student’s toileting behavior. The paraprofessionals observed each student every 30-minute interval per a 5.5 hour school day for three to five days or until baseline stability was established (i.e., three data points were in a similar proximity, not indicating a significant change in the pattern of the observed toileting accidents). Please refer to Table 3 for a summary of the possible functions of each student’s toileting behavior. Also, the paraprofessionals completed the FAO forms during an intervention phase to document the frequency of communicative, self-initiated toileting behavior, in addition to the frequency of toileting accidents.

**Competing behavior pathway (CBP) form.** Paraprofessionals were asked to complete the CBP form during a baseline. The completed CBP form was used to design an individualized plan based on the function of each student’s toileting behavior and to replace a problem behavior with a functionally equivalent alternative behavior, yet producing the same function as the problem behavior. Table 3 summarizes these results:
Table 3

Each Participant’s Possible Function of Problem Behavior and Alternative, Replacement

Behavior

<table>
<thead>
<tr>
<th>Student</th>
<th>Problem Behavior (from the Functional Assessment Interview)</th>
<th>Possible Function (from the Functional Assessment Observation)</th>
<th>Alternative, replacement Behavior (from the Competing Behavior Pathway Model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Wetting pants and diapers five or more times on a daily basis</td>
<td>A combination of attention-seeking and skill deficit</td>
<td>The student will request to use the bathroom by handing in a picture symbol to the staff.</td>
</tr>
<tr>
<td>B</td>
<td>Wetting pants and Pull-ups ten or more times on a daily basis</td>
<td>A combination of social attention and escape</td>
<td>The student will request to use the bathroom by pointing to a picture of bathroom on the student’s communication device or handing in the picture symbol to the staff.</td>
</tr>
<tr>
<td>C</td>
<td>Wetting pants and diapers two or more times on a daily basis</td>
<td>Skill deficit</td>
<td>The student will request to use the bathroom by handing in a picture symbol to the staff.</td>
</tr>
<tr>
<td>D</td>
<td>Wetting pants and Pull-ups two or more times on a daily basis</td>
<td>Skill deficit</td>
<td>The student will request to use the bathroom by handing in a picture symbol to the staff.</td>
</tr>
</tbody>
</table>

Toileting task analysis sheet. Paraprofessionals were asked to complete a toileting task analysis sheet one time during a baseline and an intervention phase. The task analysis sheet was used to produce a pre- and post-test score on the performance level of each student’s toileting behaviors and compare the scores before and after the intervention. The following table summarizes each participant’s pre- and post-test scores on communicative, self-initiated toileting behavior and toileting-related subskills (e.g., pulling pants up, sitting in the toilet, flushing, washing hands, drying hands, etc.). As shown in Table 4, all the participants increased their toileting-related subskills.
Each Participant’s Pre- and Post-Test Score on the Toileting Task Analysis Sheet

<table>
<thead>
<tr>
<th>Student</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>29</td>
<td>40</td>
</tr>
<tr>
<td>B</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td>C</td>
<td>18</td>
<td>29</td>
</tr>
<tr>
<td>D</td>
<td>11</td>
<td>20</td>
</tr>
</tbody>
</table>

Functional communication training implementation checklist. During the baseline when the researcher trained the paraprofessionals with the procedures of functional communication training, the FCT implementation checklist was used to calculate fidelity. The implementation fidelity was assessed during the training sessions with the paraprofessionals, one paraprofessional role-playing as a student and rotating the role. The percentage of implementation fidelity was calculated by the number of observed behaviors divided by the number of planned behaviors and multiplied by 100. This formula produced a percentage that reflected the degree to which the paraprofessionals followed prescribed procedures. The implementation fidelity was 100% during the training sessions.

During an intervention phase, the FCT implementation checklist also was used to calculate the degree to which the FCT procedures were implemented by the paraprofessionals as intended. The researcher randomly selected 40% of the intervention
sessions for each participant. The researcher repeated the same procedure as in the paraprofessional FCT training and calculated the treatment fidelity. The fidelity rate during the intervention was 97%.

**Social validity assessment.** On the last day the intervention was completed, each paraprofessional was given a copy of a social validity questionnaire, which was modified from the original *Treatment Evaluation Inventory-Short Form* (TEI-SF) (Kelley et al., 1989) to rate the acceptability of the intervention procedures. The social validity questionnaire is a five-point Likert rating scale with nine statements regarding treatment procedures and effectiveness (see Table 5). The paraprofessionals were asked to rate each statement by indicating *strongly disagree, disagree, neutral, agree, or strongly agree* and return the completed form to the primary research assistant. Three paraprofessionals anonymously completed the social validity questionnaire. Overall, all the paraprofessionals provided positive ratings from “Agree” to “Strongly Agree” on the acceptability of the procedure. For quality control, the question #6 was phrased as follows: “I believe the student will experience discomfort during the treatment.” Two out of three responses were “Strongly Disagree,” and the remaining response was “Disagree.” Table 5 details all of the paraprofessionals’ responses to TEI-SF items.
Table 5

Paraprofessional Responses to a Modified Social Validity Questionnaire, the Treatment Evaluation Inventory—Short Form (TEI-SF)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response 1</th>
<th>Response 2</th>
<th>Response 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>I find the treatment to be an acceptable way of dealing with the student’s toileting behavior.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>I would be willing to use this procedure if I had to change the student’s toileting behavior.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>I believe that it would be acceptable to use this treatment without the student’s consent.</td>
<td>Strongly agree</td>
<td>Strongly agree</td>
<td>Neutral</td>
</tr>
<tr>
<td>I like the procedures used in this treatment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>I believe this treatment is likely to be effective.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>I believe the student will experience discomfort during the treatment.</td>
<td>Strongly disagree</td>
<td>Strongly disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>I believe this treatment is likely to result in permanent improvement.</td>
<td>Agree</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>I believe it would be acceptable to use this treatment with individuals who cannot choose treatments for themselves.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Overall, I have a positive reaction to this treatment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

Note: Possible responses included strongly disagree, disagree, neutral, agree, or strongly agree.

Interobserver agreement. For the purpose of this study, interobserver agreement was defined as the degree to which two independent observers gave consistent ratings of the same target behavior whether it occurred or not at a given time. Paraprofessionals served as primary observers. If a second observer (i.e., the researcher) was not immediately available (e.g., assisting another student or staff, attending a meeting), another independent paraprofessional observed and recorded the occurrence of target behaviors. The percentage of interobserver agreement was calculated by dividing the number of agreements by the total number of agreements plus disagreements, then multiplied by the quotient 100.
Originally, it was decided that two independent observers make at least 40% of the observations for each participant to ensure reliable and consistent measurement of variables and make sure the study’s integrity. When the study began, the school began implementing a two-person observation policy school wide. That is, at no time the student is left alone with only one staff. For example, when the student is being helped to change clothes by a paraprofessional or during any therapy sessions, there should be the second observer in the visual field all time.

In observation of the school policy, two observers were present all time for each participant and recorded the reliability data 100% of the time throughout the study. The percentage interobserver agreement was 99%.

**Target Behavior Changes**

The current study was a multiple baseline design across four participants in which the baseline lengths were staggered as follows: 6, 16, 30, and 40 days. The two dependent measures were the frequency of daily toileting accidents (i.e., wetting pants or diapers/Pull-ups) and of communicative, self-initiated toileting behavior (i.e., requesting to use the bathroom using a picture symbol and urinating in the toilet). All four participants were introduced to a baseline and an intervention phase. Once baseline stability was established by visually inspecting each participant’s baseline data; that is, when three data points were in a similar proximity, the intervention was introduced.

The participants were randomly assigned to an intervention starting point. Each participant’s name was written on a piece of paper, put the name pieces in a shoe box, and the researcher and one primary research assistant drew the name one at a time. The
random assignment of participants allows for statistical control over threats to internal validity that may confound results of the study such as participant characteristics (Gast, 2010). When there appeared to be a downward trend in the number of toileting accidents for the first participant, then the intervention was introduced to the second participant, the third participant, and fourth. A downward trend was defined as when three consecutive points in a downward direction regarding toileting accidents. The intervention was implemented in the student's classroom and lasted about 10 weeks. Figure 10 shows the within- and across- comparisons for the frequency of daily toileting accidents and communicative, self-initiated toileting behavior for each participant.
Figure 10. A Multiple Baseline Design within- and across-Participants Comparisons for Toileting Accidents and Self-initiated Toileting Behaviors
The top panel of the Figure 10 illustrates that during baseline, Mandy’s frequency of toileting accidents ranged from six to seven times per 5.5 hour observation period, and no communicative, self-initiated toileting behavior to use the bathroom was made. The top panel depicts a stable data path across six data points. Since Mandy’s data had stable level and trend, on day 7, the toileting training intervention was introduced to the first participant “Mandy.” Mandy immediately responded to the intervention, urinating in the toilet on day 8, and decreased her toileting accidents to an average of twice a day. Mandy consistently initiated independent toileting on a daily basis.

There were episodes of toileting accidents and no display of communicative, self-initiation toward the last trimester. The staff decided to provide more visual prompts in order to build a stronger connection between urination-in-toilet behavior and her positive reinforcers such as social attention from the staff. Mandy sometimes refused to go to the bathroom when she already had a toileting accident on her pants. She was embarrassed by other male staff present in the classroom. In order to help Mandy change her wet pants, the male staff were asked to briefly leave the classroom or look at a different direction other than toward Mandy’s. Although one or two toileting accidents were still observed, the frequency of communicative, self-initiated toileting behavior began outnumbering the frequency of toileting accidents, starting day 39. Despite the lack of additional toileting training at home, Mandy continued demonstrating communicative, self-initiation to use the bathroom.
The second panel of the Figure 10 shows that Mike’s frequency of daily toileting accidents ranged from eight to ten times per 5.5 hour observation period, depicting a stable data path across sixteen data points. Although Mike demonstrated somewhat self-initiated toileting behavior before the intervention (e.g., pointing to his private area and indicating his already wet pants), the frequency of his daily toileting accidents was high. When the first participant displayed a downward trend in the number of toileting accidents (i.e., three consecutive data points in a downward direction) on day 17, the toileting training intervention was introduced to the second participant “Mike.” Mike’s urinating in the toilet was frequently observed, and the frequency of daily toileting accident decreased. Mike seemed to respond to social attention from the staff (e.g., enthusiastic verbal praise, smile, pat on the shoulder, etc.). Although the toileting accidents were still observed, Mike continuously demonstrated communicative, self-initiated toileting behavior.

The third panel of the Figure 10 illustrates that the third participant Terri’s frequency of daily toileting accidents ranged from two to four times during a 5.5 hour observation period, displaying stable data path. When the second participant Mike displayed a downward trend for toileting accidents (i.e., three consecutive data points in a downward direction) on day 31, the toilet training intervention was introduced to the third participant Terri. On a couple of occasions, Terri was observed urinating in the toilet while changing her wet pants. Although Terri demonstrated some subtoileting skills (e.g., pulling pants down, pulling pants up), she did not demonstrate any communicative,
self-initiated toileting behavior during an intervention phase, displaying no change in data.

The bottom panel of the Figure 10 shows that the last participant Amanda’s frequency of daily toileting accidents ranged from two to three times per a 5.5 hour observation period, displaying stable data path. When the third participant displayed a downward trend regarding toileting accidents behavior, the toileting training intervention began on day 41. Although Amanda was observed urinating in the toilet on a couple of occasions while changing her wet pants, no communicative, self-initiated toileting behavior to use the bathroom was observed during both baseline or intervention phases.

Also, the Figure 10 demonstrates the across-participant comparisons. For example, when the intervention was introduced to the first participant (“Mandy”), causing a relatively clear change in level and trend, the second participant (“Mike”), the third participant (“Terri”), and the fourth participant (“Amanda”) were still in baseline. When the intervention was introduced to Mike, causing a change in level, the third participant (“Terri”) and the fourth participant (“Amanda”) were still in baseline. When the intervention was introduced to the third participant Terri, the last participant Amanda was still in baseline.

In the next chapter, the discussion, implications, and limitations of the study are discussed, along with the directions for future research.
Chapter V
Discussion

The following sections describe and discuss the study results as they pertain to the original research questions. It begins with the summary of the study followed by a review of the findings from the analysis of data. The discussion, implications and limitations of the study are discussed, along with the directions for future research.

Summary of the Study

The purpose of this study was to determine the effectiveness of functional communication training-based toileting intervention for teaching of communicative, self-initiated toileting skills for students with developmental disabilities in a school setting. The currently available toileting interventions for students with disabilities included some undesirable procedures such as the use of punishment, unnatural clinic/university settings as opposed to more natural school/home settings, and prompt-based as opposed to self-initiated toileting skills.

The current study addressed these issues and examined the self-initiated toileting behavior that functional communication training (FCT) has on students with developmental disabilities in a school setting. The current study did not include any punishment components, which was considered as a necessary component in teaching of self-initiated toileting skills to individuals with developmental disabilities (Azrin & Foxx, 1970).
1971). Furthermore, the current study was conducted in a more natural setting such as in the student’s classroom, allowing the student to carry out her day-to-day routines, rather than intensive inpatient clinic or university settings. The current study did not use specialized equipment such as urine-sensing apparatus and edible reinforcers often found in traditional toileting treatments (Post & Kirkpatrick, 2004) because it was unnatural for the student to wear the kind of heavy urine-sensing device and impractical to provide food to the student as a positive reinforce in a school setting. Also, the current study was based on teaching independent, self-initiated toileting skills, rather than prompted or scheduled toileting skills.

Potential participants were selected by both convenience and criterion sampling. First, the potential participants were selected by convenience sampling because of their convenient accessibility and proximity to the researcher. Once the potential participants were chosen by the convenience sampling, then the participants were chosen by the following criterion sampling: (a) chronological age between thirteen and nineteen with a primary diagnosis of developmental disabilities such as autism and/or cognitive disabilities, (b) the student had two or more toileting accidents on a daily basis, (c) the student was ambulatory, and (d) the student’s toileting problems must not have a medical cause.

Of the six original participants who initially met the criteria, two participants did not meet the second criterion sampling (i.e., the student had two or more toileting accidents per day). A total of four participants (one male and three females) were included in the present study. Their mean age was 15.5 years (range = 13-17 years).
Each of the participants was ambulatory, and all participants wore diapers/Pull-ups and had two or more toileting accidents per day. None of the participants had ever gone to the bathroom independently and without prompting. Three of the participants were on medication for physical aggression and/or hyperactivity. All the participants were diagnosed by an independent psychiatrist as having developmental disabilities such as autism and/or mental retardation (see Table 1).

Each participant’s overall developmental and functional performance level was reviewed from different psycho-educational tests (e.g., the Vineland Adaptive Behavior Scales, the Peabody Picture Vocabulary Test, and the Nonspeech Test) to collect additional information and assess the student’s overall adaptive functional performance.

The research questions and associated research hypotheses were as follows:

**Research questions.**

1. Could a FCT-based toileting intervention lead to increased incidence of communicative, self-initiated toileting behavior for students with developmental disabilities?
2. Could a FCT-based toileting intervention lead to decreased incidence of toileting accidents for students with developmental disabilities?

**Research hypotheses.**

1. It was hypothesized that a FCT-based toileting intervention would lead to the increase in the incidence of communicative, self-initiated toileting behavior.
2. It was hypothesized that a FCT-based toileting intervention would lead to the decrease or elimination in the incidence of toileting accidents.

Using the Functional Assessment Interview form, the Functional Assessment Observation form, and the Competing Behavior Pathway model form, the problem behavior, the possible function of the problem behavior, and an alternative, replacement behavior for each participant were defined (see Table 3). The toileting task analysis sheet was used to produce a pre- and post-test score on the performance level of each student’s communicative, self-initiated toileting behavior and toileting-related subskills (e.g., pulling pants up, sitting in the toilet, flushing, washing hands, drying hands, etc.) and compare the scores before and after the intervention. Overall, all the participants increased their toileting-related subskills (see Table 4). Using the modified Treatment Evaluation Inventory—Short Form (TEI-SF), social validity was assessed to measure paraprofessionals’ perceptions on the acceptability of the intervention (see Table 5).

Two target behaviors (i.e., communicative, self-initiated toileting behavior and toileting accidents) were observed during the study. The findings of the study indicated that two of the participants made a progress toward increasing in the incidence of communicative, self-initiated toileting behavior and decreasing in the incidence of toileting accidents, which seemed to confirm the original research hypotheses.

Discussion

The preliminary results of this study indicated that the present toilet training intervention was effective in teaching of communicative, self-initiated toileting behavior
in a school setting for some students with developmental disabilities (mean age =15.5 years and range = 13-17 years). The literature on toileting reported that punishment procedures such as positive practice and restitutuoin and positive practices separately, a combination of these two could be an effective treatment (Foxx and Azrin, 1972). Overcorrection procedures have been ineffective in some cases, and they may not be appropriate educational practices in a school setting (Cicero & Pfadt, 2002) and are often considered too intrusive for establishing independent toileting by caretakers (Dalrymple & Ruble, 1992). The preliminary results of this study appear to indicate that training could be effective without the punishment components for some students with developmental disabilities.

Two of the participants who responded better to the current FCT intervention seemed to have higher skill levels on their adaptive behaviors such as communication, daily living skills, and socialization (see Table 2, Each Participant’s Developmental Level). Students with lower cognitive functioning and no verbal communication skills may require more training time to achieve independent, self-initiated toileting behavior (Dalrymple & Ruble, 1992), and the amount of support required also may need to be increased for individuals with more severe developmental and multiple disabilities (Dalrymple & Ruble, 1992; Scisson, Van Hasselt, & Hersen, 1987). For example, individuals who lacked verbal communication skills took about 2.7 years to become
independent, compared to 1 year for children with verbal communication skills. The study also found that individuals with both autism and severe to profound developmental disabilities took about 3 years of training to become independent, compared to 1.2 years for individuals with autism but without developmental disability. Given the fact that the toileting difficulties for individuals with non-verbal communication skills, autism, and/or developmental disabilities, the preliminary results of this study seemed to be promising in teaching of independent toileting skills to individuals with developmental disabilities.

Similar to the study (Dalrymple & Ruble, 1992), the other two participants who did not respond to the current intervention may have required more training time, given their lower cognitive functioning with non-verbal communication skills. In traditional, high-intensity, punishment-based toilet training procedures (e.g., positive practice and restitutinal overcorrection), it took an average of four days for participants to learn independent toileting skills (Azrin & Fox, 1971); however, no other researchers were able to replicate the rapid rate of independent toileting skill acquisition using the original Azrin & Foxx procedure (Smith & Smith, 1987). The data reported in the present study show much slower rates of skill acquisition. Even into the day 39 training, the first participant did not meet full continence: One or two toileting accidents were still observed during the observation period. Another possible explanation for this outcome is that the current study was conducted in the student’s normal school setting, not in the clinic setting where extraneous variables were more under control.
It seemed to be that the effects of the intervention without punishment might take longer than the intervention with punishment. While the intervention with punishment may get quicker results in the setting originally the intervention took place, the generalization and maintenance of the effects may be a problem due to the lack of the presence of the punisher in other settings. The overcorrection punishment procedure also has serious side effects: (a) may require a great deal of time and energy of the staff, which can often be a problem with limited staff in a school setting, (b) may interfere with ongoing classroom instruction, and (c) is physically intrusive (Foxx, 1982).

The present study did not include any unnatural components such as having the child involuntarily drink unlimited fluids, which was seen in the original Azrin & Foxx (1971) study and many of its modified studies. Having the student involuntarily drink fluids without the doctor’s script was viewed unethical and impractical at a school setting. Rather, the present study reflected a student’s “natural” elimination pattern from the functional behavioral assessment and used that information in setting up a “teaching moment” individualized plan. Also, the current study did not use specialized equipment such as urine-sensing apparatus and edible reinforcers often found in traditional toileting treatments because it was unnatural for the student to wear the kind of heavy, often bulky urine-sensing device and impractical to provide food to the student as a positive reinforcer. The current study demonstrated that social and non-consumable reinforcers could be as effective as edible reinforcers, as long as they were developed based on each student’s function of behavior.
The role of function when making the new, replacement behaviors played an important role in increasing their communicative, self-initiated toileting behavior and decreasing their toileting accidents. By identifying the function of problem behavior and teaching a socially appropriate replacement behavior that has the same function as the problem behavior, the current study provided an alternative way of expressing their needs and wants appropriately to the students who had no/limited language skills. By focusing on the function of each student’s toileting behavior to replace a problem behavior with a functionally equivalent alternative behavior, yet producing the same function as the problem behavior, the results of this study appeared to correspond with previous FCT literature: When individuals with autism were taught functional communication skills that produced the same function as their challenging behavior, there was a significant decrease in the frequency and intensity of the challenging behavior and broader generalization and greater maintenance of positive effects (Carr & Durand, 1985; Durand & Carr, 1992; Koegel & Koegel, 1996).

It appeared that when the function of a problem behavior was attention-motivated, individuals with mental retardation (e.g., Down Syndrome) responded better to social attention. This seemed to be the case for the first participant of this study. The individuals with cognitive disabilities responded well to social attention such as enthusiastic verbal praise and high-fives. Some individuals with autism, on the other hand, did not respond well to such social attention as enthusiastic verbal praise, gentle pat on the shoulder, or high-fives. That is because as part of their diagnostic criteria,
individuals with autism may lack significant social interaction skills (e.g., aloof, prefer to be alone, flat affect), and many display differential responses to sensory stimuli (e.g., excessive fearfulness in response to obviously harmless objects, oversensitivity to sounds or being touched, or fascination with certain stimuli) (APA, 2000). Knowing the function of each participant’s problem behavior played an integral role in designing an individualized intervention for the participants with autism in this study. For example, if the function was socially-motivated, staff attention and verbal praise were minimally kept (e.g., “good job for peeing in the toilet.”). No physical attention such as gentle pat on the shoulder or high-fives was given to the students with autism if they had oversensitivity to being touched. Toileting training individuals with mental retardation appeared to be quicker than individuals with autism because the individuals with cognitive disabilities responded better to natural positive reinforcers such as verbal praise and smiles.

The present study included teaching of communication skills in providing students with developmental disabilities with some kind of communication tool. Although the goal of the original Azrin & Foxx (1971) was to establish self-initiated toileting for individuals with severe and profound mental disabilities, the original study did not include teaching communication skills in a systematic way. It was once regarded that since incontinence was an inevitable consequence of mental disabilities, these individuals were unable to be toilet trained (Hyams, McCoull, Smith, & Tyrer, 1992), and if they were initially toilet-trained, it was very hard for individuals with severe
developmental disabilities to maintain their self-initiated toileting behavior (Hyams et al., 1992).

Other researchers have found that a larger number of the trainees failed to maintain self-initiated toileting skills and eventually became dependent upon the caregiver’s prompts (Hyams et al., 1992). Frequent toileting prompts may remove the opportunity for the child to experience the sensation of a full bladder and subsequently request to use the bathroom. In order to sustain self-initiations for using the toilet, frequent toileting prompts should be faded from toilet training intervention (LeBlanc et al., 2005). The present study included a PECS-suggested communication strategy, gradually eliminating any prompts given, especially verbal prompts, since the verbal prompts are the hardest to fade among all the prompts in teaching a new skill set (Bondy & Frost, 2002). The present study included teaching of communication (of the need to go to the bathroom) and self-initiation (to urinate in the toilet) inherent to maintenance of toileting success (Kroeger & Burnworth, 2009), and the preliminary results of the present study seem to support that two of the participants responded to the sensation of a full bladder, communicated to her communicative partner with the need to go, and relieved a full bladder in the toilet.

Although a couple of participants seemed to require more time in increasing their communicative, self-initiated toileting behavior, all of the participants demonstrated significant growth on their toileting-related subskills (see Table 4).
toileting skills into small manageable steps was helpful in learning each participant’s skill level to determine where she needed more assistance than other areas.

During this study, paraprofessionals played an integral role in implementing the treatment. The principal of the school was moving toward applying positive behavioral interventions and supports (PBIS) principles school wide. The principal was in support of PBIS approach and supported the current study. With this strong administrator’s support on site, the paraprofessionals may have been more eager to learn these new concepts and principles supporting the PBIS approach. Also, during this study, the researcher had a high ratio of staff to student support, with four participants and six staff to implement the treatment. If more assistance was needed, there was four other staff available in the classroom. This may not be more typical of environments that support students with low incidence disabilities. One of the reasons the training of the paraprofessional appeared to be effective may have been a result of the administrator’s support from the beginning, which may have increased the staff’s level of buy-in and their commitment in implementing the treatment.

The results of the present study indicated that two of four participants increased in their overall communicative, self-initiated toileting behavior and decreased in their daily toileting accidents. These results are noticeable because paraprofessionals were actual implementers of the intervention, not the researcher or behavioral specialists who were typical intervention implementers in the past. Social validity data indicated that the paraprofessionals, who seemed to be the typical intervention agents in a natural school
context, found the treatment very much acceptable in a school setting (see Table 5, Paraprofessional responses to a modified social validity questionnaire, the *Treatment Evaluation Inventory—Short Form* (TEI-SF)). The present toilet training intervention was more acceptable by both school personnel and parents/caregivers due to the proactive, preventative, educative teaching philosophy the present intervention is based on and due to the absence of any punishment components.

**Qualitative Field Observations**

Throughout the study, the researcher kept an informal journal notebook to write down any unusual observations or any comments and suggestions made. It must be noted that there were the improvements which were not necessarily expected, and therefore cannot be objectively measured. These qualitative field notes shared some observations otherwise unnoticed in a quantitative manner. For example, the student named Mandy began generalizing her toileting skills not only to her assigned paraprofessional but to other people in the classroom. From the functional behavioral assessments information, one of Mandy’s positive reinforcers included enthusiastic verbal praise and smiles. Mandy responded to the staff’s social attention so much that she communicated to other staff in the classroom, indicating that she wanted to go to the bathroom. On a few occasions, Mandy did not urinate in the toilet, but the staff still provided Mandy with verbal praise and smile upon independently demonstrating other toilet-related subskills such as flushing the toilet, pulling her pants up, washing her hands, etc. Mandy’s pre-test score on the toileting task analysis sheet was 29, and after the
intervention, her post-test score was 40, indicating that she completed many toilet-related subskills without prompts given.

On day 21, Mandy was introduced to regular underwear. Mandy has indicated that she did not like any changes in her daily routines so the staff were concerned about her tantrums for refusing to wear the underwear. Mandy tolerated the presence of the underwear. Mandy began consistently asking to use the bathroom and often generalized the toileting behavior to different bathrooms in the school and to different school staff. During the informal follow-up, the paraprofessionals stated that they would like to carry the procedure even after the study, and Mandy would eventually display complete independent toileting skills, if given more time to the intervention.

The student named Mike was introduced to wearing regular underwear. Mike wore diapers throughout the day. Mike would wet the diapers, and if he was not given a new diaper right away, he would throw tantrums, crying and hitting. Also, Mike refused to wear underwear in the past. Mike was first introduced to a thick liner attached to underwear. Mike did not refuse wearing the underwear with the liner attached inside. The staff gradually faded out the liner and introduced underwear only. When Mike urinated in the toilet, he’d receive social attention (e.g., verbal praise and smile) from the staff, which were two of his positive reinforcers identified through the functional behavioral assessment.

Before the intervention, the student was taken to the bathroom every time he wet the pants. The staff taught the student to “hold” until a short lesson was finished. Mike’s
pre-test score on the toileting task analysis sheet indicated 28 and after the intervention, his post-test score read 38. Two of the toileting subskills for Mike were to lift the toilet lid before urinating and to urinate while he was standing rather than climbing up in the toilet seat. The student’s paraprofessional stated that the treatment seemed very acceptable, including the student’s communication needs in mind. During the informal follow-up, the paraprofessional reported that Mike made significant progress, moving from wearing diapers/Pull-ups to actually wearing underwear throughout the day, increasing a communication of the need to use the bathroom and a self-initiation to urinate in the toilet.

The student named Terri had many unexpected changes. The student’s regularly assigned paraprofessional, who built rapport with the student, unexpectedly quit at the beginning of the study. The student had unexpected medical problems such as very sensitive stomach and dental issues. It had been problematic to teach the student while other medical and physical needs were not properly addressed. Although Terri displayed a downward trend regarding her toileting accidents on day 40, it may have been due to her medical conditions (e.g., Terri refused to eat and drink and threw up), not due to the intervention effects. Toward the end of the study, the student was absent to attend appointments with her physician. Although the student did not display any communicative, self-initiated toileting behavior during the study, the toileting task analysis sheet indicated that the student increase some toileting-related subskills from a score of 18 to 29.
The student named Amanda did not display any communicative, self-initiated toileting behavior during the study either; however, Amanda increased her some toileting-related subskills from a score of 11 to 20. About a week and half later, the researcher informally followed up with the paraprofessionals. The paraprofessional reported that as Amanda walked into the classroom, she took a picture symbol, went to the bathroom, and urinated in the toilet. The paraprofessional stated that it made her feel really good when the student was beginning to ask about going to the bathroom.

It was observed by the researcher that some of the paraprofessionals who were not participating in the study were teaching the study participants who were not ready yet. It was also observed that those non-participatory paraprofessionals taught their assigned students who were not participating in the study with communication and other teaching strategies they have been observing in the classroom.

Paraprofessionals were asked of any challenges during the study. The paraprofessionals reported the unavailability of the bathroom right away. During this study, about 15 students shared one bathroom. When the student requested to use the bathroom, if the bathroom was not immediately available, then the student was taken to another bathroom across the hallway such as in the library, another classroom, computer lab, etc. Those bathrooms could be full as well, especially in the morning. The paraprofessionals reported that by the time they found the available bathroom, the student already had an accident on the pants.
Another main concern brought up by the paraprofessionals was to collaborate with parents on the FCT intervention in the future. The students may learn the necessary skill at school; however, if the skill was not reinforced at home, it would be all over again teaching the same skill the next day when the student returned to school. The paraprofessionals reported that it was a frustrating experience.

A couple of paraprofessional reported some benefits from implementing the intervention. For example, fewer diapers/Pull-ups and pants were used, saving the family some financial cost. The student often went home in the same pants as she originally came in. The intervention may have helped decrease any medical-related problems arising from skin irritation and urinary tract infections that may result from wearing wet diapers and Pull-ups for an extended period of time. In addition, the students generalized her toileting skill. For example, the student asked going to the bathroom when they were playing outside or in another side of the school building. Independent toileting skills may have improved the students’ and their family’s overall quality of life.

**Implications**

The results of the present study have a couple of implications. First, additional training time may be necessary in order to teach some students who have lower cognitive functioning and nonverbal communication skills. In the traditional, punishment-based toilet training, it was recommend intensive 8-hour training per day in order to teach individuals with severe to profound developmental disabilities of independent toileting skills (Azrin & Foxx, 1971). While individuals with autism but without other
developmental disability took about 1.2 years of toilet training to achieve daytime bladder control, it required about 3 years of training for individuals with both autism and severe to profound developmental disability (Dalrymple & Ruble, 1992). The amount of training time required also may need to be increased for individuals with more severe developmental and multiple disabilities (Dalrymple & Ruble, 1992; Scisson et al., 1987). The present toilet training intervention was only implemented with lower intensity hours (approximately 5 hours) during the participants’ school day, allowing the student’s day-to-day routines to be carried out.

Second, for some students, it may be helpful to set smaller short-term goals based on their pre-toileting skills, with the long-term goal of independence. Complete independent, self-initiating, toileting behavior involves a complex chain of behaviors requiring many subskills, from communicating the need to go to the bathroom, entering the bathroom, pulling pants down, eliminating in the appropriate location (e.g., in the toilet bowl, not on the bathroom floor), drying hands, and to exiting the bathroom. Teaching each of these skills using backward chaining, rather than working on the entire chain at once, may work better, especially for some students with lower cognitive functioning.

In chaining, each response in the chain is followed by an event or stimulus that reinforces that response while simultaneously serving as a discriminative stimulus for the next response (Foxx, 1982). Backward chaining, one form of chaining, is defined as breaking down the steps of task using a task analysis process and teaching the steps
backwards from the goal. For example, the student completes the final step while the adult finishes the rest of the steps. This backward chaining provides the student a sense of success with every learning trial. Once the student completes each step successfully, the adult gradually fades away and the student is given the next step, with the goal of the student complete the task with success.

**Limitations**

There are a couple of limitations to this study. First, due to practical reasons, participants were not selected on the basis of statistical sampling. The participants were selected by both convenience sampling (i.e., convenient access by the researcher) and criteria sampling. Although the participants were randomly assigned to the intervention, the random participant sampling might have increased a casual relationship. Second, the study was conducted for about ten weeks. Increasing the length of the intervention phase may have the researcher better determine the overall effectiveness of FCT-based toileting intervention. Although the study included an informal follow-up based on anecdotal information, a longer intervention period may have allowed the researcher to include the formal follow-up phase to see if the intervention effects continued over time and generalized to other settings. Third, not all schools settings have a sufficient staff to student ratio present in this study (i.e., six staff and four students all time). Such lack of staff resources might not be able to provide immediate assistance to the student in need, which could delay the establishment of a functional relationship between a behavior and a consequence.
The interventions in this study appeared to be more effective for students with performance-deficits related to toileting. For example, the students who knew how to perform specific behaviors related to toileting but chose not to perform in order to obtain something (e.g., tangible objects, social attention, or sensory input) or to escape from given tasks/demands or sensory overload appeared to be more responsive to treatment. The students for whom lack of independent toileting was based on a possible skill deficit did not appear to respond as quickly to the intervention. However, one student who had skill-deficits (Student C) seemed to respond to a task analysis-based intervention that included some prompting. In the future, research that includes students with skill deficits should perhaps include direct teaching of specific tasks using backward chaining related to toileting skills. With backward chaining, the student would be given errorless learning opportunities to increase the likelihood of success.

**Directions for Future Research**

A need for future research to collaborate with parents on the FCT intervention is identified. There is much research supporting between parent participation and the increased, positive effects of the intervention (Luchshyn et al., 2002). Future studies should focus on developing some training sessions across settings (e.g., school, home) in order to help the families replicate the study with ease, build consistence and increase generalization and maintenance of learned toileting skills. Perhaps, building in family involvement and participation from the beginning of the intervention and designing an effective way of sharing data across settings.
Also, the use of FCT toileting intervention to students with developmental disabilities in regular education school setting needs further exploration. Given the restraints of staff and time, will the FCT intervention produce the same positive effects as in a therapeutic school? Until there is an increase in the understanding of what is required to support students with significant disabilities in general education, students with developmental disabilities in a regular school settings may be those with higher cognitive functioning and verbal communication skills. Future studies may explore the relationship between the participant’s cognitive functioning and the degree of increasing independent, self-initiating toileting behavior.

Another need for further exploration should focus on modifying teaching techniques based on the subcategories in the population of individuals with developmental disabilities. Do individuals with autism require more training time than individuals with mental retardation because of their lack of social interaction skills? What kind of social attention can be provided to individuals with autism when the function of their problem behavior is socially motivated? For example, the individuals with autism are very sensitive such stimuli as noise or touch. Are there different sets of social attention for the individuals with autism, other than natural, social reinforcers such as verbal praise, pat, or high-fives? In addition, the future research may focus on the FCT intervention without punishment components with individuals with other developmental disabilities. These issues need further investigation.
Conclusion

In summary, the present study provides some evidence for the effectiveness of functional communication training-based toilet training intervention for some students with developmental disabilities in a school setting. Two of the four participants made significant progress toward their communicative, self-initiated toileting behavior and decreased their daily toileting accidents, and all the participants increased their toileting-related subskills. (e.g., pulling pants up, sitting in the toilet, flushing, washing hands, etc.). Despite the current intervention was based on low intensity behavioral procedures without punishment components and conducted in a school setting, the outcome of the study seems to be promising. The current study provided the school staff with the positive support and behavioral strategies that can be used with other students in a school. The outcomes of the present study will extend the current functional communication training (FCT) and positive behavioral interventions and supports (PBIS) literature by showing that the current FCT-based intervention resulted in a significant behavior change in teenagers with developmental disabilities in a school setting (Horner et al., 2002; Sugai et al., 2000).
APPENDIX A

FUNCTIONAL ASSESSMENT INTERVIEW (FAI) FORM
Appendix A. Functional Assessment Interview (FAI) Form*

NOTE: This form is used by the researcher when interviewing the paraprofessionals regarding the student’s toileting behavior.

Person of concern: ______________________ Age _______________ Sex:  M  F
Date of interview ______________________ Interviewer ______________________
Respondent ________________________________

A. Describe the behaviors.

For the behaviors of concern, define the topography (how it is performed), frequency (how often it occurs per day), duration (how long it lasts when it occurs), and intensity (how damaging or destructive the behaviors are when they occur).

Behavior ________________________________________________________________
_______________________________________________________________________
Topography ______________________________________________________________
_______________________________________________________________________
Frequency ______________________________________________________________
_______________________________________________________________________
Duration _________________________________________________________________
_______________________________________________________________________
Intensity _________________________________________________________________

B. Briefly list the student’s typical daily schedule of activities. (Check the boxes by those activities the person enjoys and those activities most associated with problems.)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
<th>Enjoys?</th>
<th>Problems?</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:00 p.m.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C. Identify the consequences or outcomes of the problem behaviors that may be maintaining them (i.e., the functions they serve for the person in particular situations).

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Particular situations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What exactly does her or she get?

What exactly does she or he avoid?

---

*Adapted from O’Neill et al., (1997)*
APPENDIX B

FUNCTIONAL ASSESSMENT OBSERVATION (FAO) FORM
**Appendix B. Functional Assessment Observation (FAO) Form**

**Note:** This form is used by paraprofessionals when observing the student’s toileting behavior during baseline and intervention phase.

Student Name: ___________________________  Observer Name: ______________________  Date: __________________

Target behaviors operationally defined:
1. **Toileting accident (TA):** A wet diaper/pull-up or visual observation of a wet spot on the outside of the student’s clothing larger than a quarter size in diameter.
2. **Communicative, self-initiated toileting behavior (CS):** Any event when the student requests to use the bathroom, verbally or using a picture symbol, without any prompts given, and voids in the toilet.

**Direction:** Observe the student’s toileting behavior for each interval period, indicate the occurrence of each target behavior with a tally mark ( / ) and total them at the bottom of the table. Also, during baseline, fill out Antecedents, Perceived Functions, and Actual Consequences sections.

<table>
<thead>
<tr>
<th>Time</th>
<th>Target Behaviors</th>
<th>Antecedents</th>
<th>Perceived Functions</th>
<th>Actual Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Toileting accident (TA)</td>
<td>Self-initiated (CS)</td>
<td>Being left alone (no attention)</td>
<td>Demand/ Request</td>
</tr>
<tr>
<td>8:30-</td>
<td></td>
<td></td>
<td>Social Attention</td>
<td>Desired item/ activity</td>
</tr>
<tr>
<td>9:00-</td>
<td></td>
<td></td>
<td></td>
<td>Demand/ Request</td>
</tr>
<tr>
<td>9:30-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:00-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:30-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:00-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:30-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:00-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:00-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Adapted from O’Neill et al., (1997)
APPENDIX C

COMPETING BEHAVIOR PATHWAY MODEL
Appendix C. Competing Behavior Pathway Model*

Note: This form will be used by the researcher with the paraprofessionals while designing a function-based, FCT intervention.

Student Name: _________________________  Date: __________________________

* Adapted from O'Neill et al. (1997)
APPENDIX D

TOILEITNG TASK ANALYSYSI SHEET

(FOR FEMALE STUDENT)
Appendix D. Toileting Task Analysis Sheet (for Female Student)

Note: This form is used by paraprofessionals one time during baseline and one time after the intervention.

Student: _____________________  Observer: _____________________  Date: ____________

Target behaviors operationally defined:

1. **Toileting accident (TA):** A wet diaper/pull-up or visual observation of a wet spot on the outside of the student’s clothing larger than a quarter size in diameter.

2. **Communicative, self-initiated toileting behavior (CS):** Any event when the student requests to use the bathroom, verbally or using a picture symbol, without any prompts given, and voids in the toilet.

**Direction:** Observe the student’s toileting behaviors, circle the prompts required to complete each behavior, and total its corresponding scores at the bottom of the table.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Prompt Used*</th>
<th>Score**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The student has a toileting accident (TA) on a daily basis.</td>
<td>TA</td>
<td>N/A</td>
</tr>
<tr>
<td>2. The student displays communicative, self-initiated toileting behavior (CS).</td>
<td>N/A</td>
<td>I</td>
</tr>
<tr>
<td>3. The student enters the bathroom.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>4. The student pulls the pants down.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>5. The student sits on toilet.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>6. The student urinates in the toilet.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>7. The student pulls the pants up.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>8. The student flushes the toilet.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>9. The student washes the hands.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>10. The student dries the hands.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>11. The student exits the bathroom.</td>
<td>P</td>
<td>G</td>
</tr>
</tbody>
</table>

**TOTAL SCORE:**

*Prompt Key: TA = Toileting Accident; N/A = Not Applicable; P = Physical; G = Gestural; V = Verbal; I = Independent

Score Key: TA = 0; N/A = 0; P = 1; G = 2; V = 3; I = 4
APPENDIX E
TOILETING TASK ANALYSIS SHEET
(FOR MALE STUDENT)
Appendix E. Toileting Task Analysis Sheet (for Male Student)

Note: This form is used by paraprofessionals one time during baseline and one time after the intervention.

Student: ______________________  Observer: _____________________  Date: __________

Target behaviors operationally defined:

1. **Toileting accident (TA):** A wet diaper/pull-up or visual observation of a wet spot on the outside of the student’s clothing larger than a quarter size in diameter.

2. **Communicative, self-initiated toileting behavior (CS):** Any event when the student requests to use the bathroom, verbally or using a picture symbol, without any prompts given, and voids in the toilet.

**Direction:** Observe the student’s toileting behaviors, circle the prompts required to complete each behavior, and total its corresponding score at the bottom of the table.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Prompt Used*</th>
<th>Score**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The student has a toileting accident (TA) on a daily basis.</td>
<td>TA</td>
<td>N/A</td>
</tr>
<tr>
<td>2. The student displays communicative, self-initiated toileting behavior (CS).</td>
<td>N/A</td>
<td>I</td>
</tr>
<tr>
<td>3. The student enters the bathroom.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>4. The student raises the toilet lid.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>5. The student pulls the pants down.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>6. The student urinates in the toilet.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>7. The student pulls the pants up.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>8. The student flushes the toilet.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>9. The student washes the hands.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>10. The student dries the hands.</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>11. The student exits the bathroom.</td>
<td>P</td>
<td>G</td>
</tr>
</tbody>
</table>

**TOTAL SCORE:**

* **Prompt Key:** TA = Toileting Accident;  N/A = Not Applicable;  P = Physical;  G = Gestural;  V = Verbal;  I = Independent

**Score Key:** TA = 0;  N/A = 0;  P = 1;  G = 2;  V = 3;  I = 4
APPENDIX F
FUNCTIONAL COMMUNICATION TRAINING—PART I
**Appendix F. Functional Communication Training-Part I**

**NOTE:** This script is used by paraprofessionals during intervention phase to teach communication.

<table>
<thead>
<tr>
<th>Individual Observed: __________________</th>
<th>Observer: __________________</th>
<th>Date: __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student: ____________________________</td>
<td>Start Time: _______________</td>
<td>End Time: ________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching Communication</strong></td>
<td>Using the two-person Prompting Procedure*</td>
</tr>
<tr>
<td>1</td>
<td>The physical prompter assists the student to <strong>pick up</strong> a picture symbol of the bathroom. The physical prompter provides no verbal prompts during the lesson.</td>
</tr>
<tr>
<td>2</td>
<td>The communicative partner <strong>opens</strong> her hand.</td>
</tr>
<tr>
<td>3</td>
<td>The physical prompter assists the student to <strong>reach</strong> to the student’s communicative partner.</td>
</tr>
<tr>
<td>4</td>
<td>The communicative partner opens her hand to receive the picture symbol only after the student has reached.</td>
</tr>
<tr>
<td>5</td>
<td>The physical prompter assists the student to <strong>release</strong> the picture symbol into the communicative partner’s <strong>open</strong> hand.</td>
</tr>
<tr>
<td>6</td>
<td>The physical prompter and the communicative partner assist the student to use the bathroom.</td>
</tr>
<tr>
<td>7</td>
<td>The communicative partner provides the student with identified reinforcer.</td>
</tr>
</tbody>
</table>

**Fading out Prompts**

**Decision Rule:** The student independently demonstrates the given task (i.e., pick up, reach, and release) **five times in a row**, the procedure for fading out physical prompts is introduced.

<table>
<thead>
<tr>
<th>Step</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>The student independently releases the picture symbol into the communicative partner’s hand <strong>five times in a row</strong>. The physical prompter discontinues providing prompts.</td>
</tr>
<tr>
<td>9</td>
<td>The student independently <strong>reaches to the communicative partner</strong> five times in a row. The physical prompter discontinues providing prompts.</td>
</tr>
<tr>
<td>10</td>
<td>The student independently <strong>picks up the picture symbol</strong> five times in a row. The physical prompter discontinues providing prompts.</td>
</tr>
<tr>
<td>11</td>
<td>The student independently picks up the picture symbol, reaches to the communicative partner, and releases the picture into the communicative partner’s hand <strong>five times in a row</strong>. The physical prompter completely fades out.</td>
</tr>
</tbody>
</table>

* Adapted from Bondy & Frost (2002)
Appendix G. Functional Communication Training—Part II

NOTE: This script is used by paraprofessionals during intervention phase to teach self-initiation.

Individual Observed: ___________________     Observer: _______________     Date: ________
Student: _____________________________     Start Time: ____________     End Time: ____________

<table>
<thead>
<tr>
<th>Step</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching Self-initiation</strong></td>
<td></td>
</tr>
<tr>
<td>Using the Most-to-Least Prompting Procedure</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td><strong>The student enters the bathroom.</strong> If the student does not perform the task within 3 seconds, provide a full physical prompt (e.g., full guidance).</td>
</tr>
<tr>
<td>2</td>
<td><strong>The student pulls the pants down.</strong> If the student does not perform the task within 3 seconds, provide a full physical prompt.</td>
</tr>
<tr>
<td>3</td>
<td><strong>The student sits on the toilet.</strong> If the student does not perform the task within 3 seconds, provide a full physical prompt.</td>
</tr>
<tr>
<td>4</td>
<td><strong>The student urinates in the toilet.</strong></td>
</tr>
<tr>
<td>5</td>
<td><strong>The student flushes the toilet.</strong> If the student does not perform the task within 3 seconds, provide a full physical prompt.</td>
</tr>
<tr>
<td>6</td>
<td><strong>The student washes hands.</strong> If the student does not perform the task within 3 seconds, provide a full physical prompt.</td>
</tr>
<tr>
<td>7</td>
<td><strong>The student dries hands.</strong> If the student does not perform the task within 3 seconds, provide a full physical prompt.</td>
</tr>
<tr>
<td>8</td>
<td><strong>The student exits the bathroom.</strong> If the student does not perform the task within 3 seconds, provide a full physical prompt.</td>
</tr>
<tr>
<td>9</td>
<td>The staff immediately provides the identified reinforcer to the student for displaying the replacement behavior.</td>
</tr>
</tbody>
</table>

| **Fading out Prompts** |
| **Decision Rule:** If the student independently performs the given task within 3 seconds, the procedure for fading out prompts is introduced. |
| 10 | Present a task to the student. If the student independently performs the given task within 3 seconds, discontinue a full physical prompt, and move to the next. |
| 11 | Present a task to the student. If the student independently performs the given task within 3 seconds, discontinue a partial physical prompt, and move to the next. |
| 12 | Present a task to the student. If the student independently performs the given task within 3 seconds, discontinue a gestural prompt, and move to the next. |
| 13 | Present a task to the student. If the student independently performs the given task within 3 seconds, discontinue a verbal prompt, and move to the next. |
| 14 | No prompt needed because each step/task signals the next step/task. |
APPENDIX H

FUNCTIONAL COMMUNICATION TRAINING (FCT)

IMPLEMENTATION CHECKLIST
Appendix H. Functional Communication Training (FCT) Implementation Checklist

**NOTE:** This script is used by the researcher to calculate fidelity during baseline while training paraprofessionals with functional communication trainings and during the intervention while randomly observing the paraprofessionals.

Individual Observed: ___________________ Observer: _______________ Date: __________

Student: ____________________ Start Time: ______________ End Time: __________

**Direction:** While observing the individual, please record whether the following procedures occurred or not and total the frequency at the bottom of the table. If the step is not applicable, record under NA column and do not include in the calculation of fidelity.

<table>
<thead>
<tr>
<th>Step</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Teaching Communication, Part I</strong> Using the two-person Prompting Procedure**</td>
</tr>
<tr>
<td>1</td>
<td>The physical prompter assists the student to <strong>pick up</strong> a picture symbol of the bathroom. The physical prompter provides no verbal prompts during the lesson.</td>
</tr>
<tr>
<td>2</td>
<td>The communicative partner <strong>opens</strong> her hand.</td>
</tr>
<tr>
<td>3</td>
<td>The physical prompter assists the student to <strong>reach</strong> to the student’s communicative partner.</td>
</tr>
<tr>
<td>4</td>
<td>The communicative partner opens her hand to receive the picture symbol only after the student has reached.</td>
</tr>
<tr>
<td>5</td>
<td>The physical prompter assists the student to <strong>release</strong> the picture symbol into the communicative partner’s <strong>open</strong> hand.</td>
</tr>
<tr>
<td>6</td>
<td>The physical prompter and the communicative partner assist the student to use the bathroom.</td>
</tr>
<tr>
<td>7</td>
<td>The communicative partner provides the student with identified reinforcer.</td>
</tr>
<tr>
<td></td>
<td><em>(Steps 1 through 7) SubTotal:</em></td>
</tr>
</tbody>
</table>

|      | **Fading out Prompts** |
|      | *Decision Rule:* The student independently demonstrates the given task (i.e., pick up, reach, and release) five times in a row, the procedure for fading out physical prompts is introduced. |
| 8    | The student independently **releases** the picture symbol into the communicative partner’s hand five times in a row. The physical prompter discontinues providing prompts. |
| 9    | The student independently **reaches to the communicative partner** five times in a row. The physical prompter discontinues providing prompts. |
| 10   | The student independently **picks up the picture symbol** five times in a row. The physical prompter discontinues providing prompts. |
| 11   | The student independently picks up the picture symbol, reaches to the communicative partner, and releases the picture into the communicative partner’s hand five times in a row. The physical prompter completely fades out. |
|      | *(Steps 8 through 11) SubTotal:* |

**Total Number of Yes / 11 = __________ % Total FCT, Part I Fidelity**
### Teaching Self-initiation, Part II
Using the Most-to-Least Prompting Procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Checklist</th>
<th>SCORE*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>YES</td>
</tr>
</tbody>
</table>

#### 1. The student enters the bathroom. If the student does not perform the task within 3 seconds, provide a full physical prompt (e.g., full guidance).

#### 2. The student pulls the pants down. If the student does not perform the task within 3 seconds, provide a full physical prompt.

#### 3. The student sits on the toilet. If the student does not perform the task within 3 seconds, provide a full physical prompt.

#### 4. The student urinates in the toilet.

#### 5. The student flushes the toilet. If the student does not perform the task within 3 seconds, provide a full physical prompt.

#### 6. The student washes hands. If the student does not perform the task within 3 seconds, provide a full physical prompt.

#### 7. The student dries hands. If the student does not perform the task within 3 seconds, provide a full physical prompt.

#### 8. The student exits the bathroom. If the student does not perform the task within 3 seconds, provide a full physical prompt.

#### 9. The staff immediately provides the identified reinforcer to the student for displaying the replacement behavior.

(Steps 1 through 9) SubTotal:

#### Fading out Prompts (steps 1 through 8)

**Decision Rule:** If the student independently performs the given task within 3 seconds, the procedure for fading out prompts is introduced.

<table>
<thead>
<tr>
<th>Step</th>
<th>Checklist</th>
<th>SCORE*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>YES</td>
</tr>
</tbody>
</table>

#### 10. Present a task to the student. If the student independently performs the given task within 3 seconds, discontinue a full physical prompt, and move to the next.

#### 11. Present a task to the student. If the student independently performs the given task within 3 seconds, discontinue a partial physical prompt, and move to the next.

#### 12. Present a task to the student. If the student independently performs the given task within 3 seconds, discontinue a gestural prompt, and move to the next.

#### 13. Present a task to the student. If the student independently performs the given task within 3 seconds, discontinue a verbal prompt, and move to the next.

#### 14. No prompt needed because each step/task signals the next step/task.

(Steps 10 through 14) SubTotal:

**Total Number of Yes / 14 = ____ % Total FCT, Part II  Fidelity**

*Score Key: YES = Occurred; NO = Not Occurred; NA = Not Applicable

**Adapted from Bondy & Frost (2002)**
APPENDIX I

SOCIAL VALIDITY QUESTIONNAIRE
Appendix I. Social Validity Questionnaire*

NOTE: This form is used by the paraprofessionals after the FCT intervention.

Name (optional): _______________________________    Date: ______________

Direction: Please circle the number which best describes your agreement or disagreement with each statement.

1 = strongly disagree    2 = disagree    3 = neutral    4 = agree    5 = strongly agree

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I find the treatment to be an acceptable way of dealing with the student’s toileting behavior.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I would be willing to use this procedure if I had to change the student’s toileting behavior.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I believe that it would be acceptable to use this treatment without the student’s consent.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I like the procedures used in this treatment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I believe this treatment is likely to be effective.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I believe the student will experience discomfort during the treatment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I believe this treatment is likely to result in permanent improvement.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I believe it would be acceptable to use this treatment with individuals who cannot choose treatments for themselves.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Overall, I have a positive reaction to this treatment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

* Adapted from the Treatment Evaluation Inventory-Short Form (Kelley, Heffer, Gresham, & Elliott, 1989)
APPENDIX J

FUNCTIONAL COMMUNICATION TRAINING INTERVENTION

(ENGLISH VERSION)
Appendix J. FUNCTIONAL COMMUNICATION TRAINING INTERVENTION

Title: Effects of Functional Communication Training (FCT) on the Communicative, Self-initiated Toileting Behavior for Students with Developmental Disabilities in a School Setting

Purpose: The purpose of this study is to assess the effectiveness of functional communication training (FCT) for teaching of communicative, self-initiated toileting skills to students with developmental disabilities (e.g., autism, cognitive disability) on the incidence of

- Increasing socially appropriate behaviors (i.e., communicative, self-initiated toileting behaviors) and
- Decreasing or eliminating toileting accidents (e.g., wetting pants, diapers, or Pull-Ups) during the student’s daily routines in a school setting.

Functional Communication Training Procedure:

After observing the student’s elimination pattern, the specific times of the day when the student is most likely to urinate will be identified. About 5 to 10 minutes before the expected urination, functional communication training will begin using the teaching strategies recommended by the Picture Exchange Communication System (PECS) (Bondy & Frost, 2002). For example, the student will be taught to perform the replacement behavior such as “I want to go to the bathroom” to the student’s communicative partner using two-person prompting procedure in order to elicit the replacement behavior from the student with errorless learning approach and to facilitate rapid fading of prompts (Bondy & Frost, 2002). The two-person prompting procedure involves two people: the communicative partner and the physical prompter. The first staff, designated as the communicative partner, will interact with the student such as by providing the reinforcement. The second staff, designated as the physical prompter, prompts the student from behind (or next to) and does not interact with the student in any social manner and will steadily fades out prompts so that the student displays the replacement behavior independently. For the purpose of this study, the student’s assigned paraprofessional will be the communicative partner, and the researcher or another independent paraprofessional will be the physical prompter.

The student will be taught with three motor responses such as pick up, reach, and release (see Appendix F, Functional Communication Intervention—Part I). An example of the lesson is as follows:

1. The physical prompter (the second staff behind the student) assists the student to pick up a picture symbol of the bathroom. The physical prompter provides no verbal prompts during the lesson.

2. The communicative partner opens her hand.
3. The physical prompter assists the student to *reach* to the student’s communicative partner (i.e., the student’s assigned paraprofessional).

4. The communicative partner opens her hand to receive the picture symbol only after the student has reached.

5. The physical prompter assists the student to *release* the picture symbol into the communicative partner’s open hand.

6. The physical prompter and the communicative partner assist the student to use the bathroom.

7. The communicative partner provides the student with the previously identified reinforcer.

Using backward chaining, the physical prompter will fade out prompts from the “back end” of the chain (see Appendix F, Functional Communication Intervention—Part I). Once the student independently *releases* the picture symbol into the communicative partner’s hand five times in a row, the physical prompter will discontinue providing prompts and teach the student to reach toward the communicative partner’s hand. Once the student independently *reaches* toward the communicative partner five times in a row, the physical prompter will discontinue providing prompts and teach the student to pick up the picture symbol. Once the student independently *picks up* the picture symbol five times in a row, the physical prompter will discontinue providing prompts and teach the student to use three motor responses in succession. Once the student independently *picks up* the picture symbol, *reaches* the communicative partner, and *releases* the picture symbol five times in a row, the physical prompter will completely fade out of the prompts.

If the student makes an error, the back-step error correction will be used (Bondy & Frost, 2002). For example, if the student drops the picture symbol into the floor, instead of reaching to the communicative partner’s open hand, the physical prompter will take the student back into the last step that the student completed correctly. That is, the physical prompter will pick up the picture symbol from the floor, put it on the desk, and the lesson will begin again. If the student has a toileting accident anytime during the lesson, the student is simply asked to change her wet pants and instructed to continue the lesson.

Once the student independently approach his communicative partner (i.e., pick up the picture symbol and reach to the communicative partner) and deliver a message (i.e., release the picture symbol into the communicative partner’s open hand), the student will be taught with the toileting and toileting-related behaviors (e.g., pull down pants, sit in toilet, wash hands, etc.) using the most-to-least prompts and delayed prompting procedure (see Appendix G, Functional Communication Intervention—Part II).
If the student independently performs the given task within three seconds, the paraprofessionals will slowly fade out the use of prompts and allow the replacement behavior under the control of the student, instead of depending on the prompts given by the paraprofessionals and others (see Appendix G). In other words, the prompt that is required early in the training process will be faded out and replaced with a prompt that is less intrusive as the student independently performs the given task. For example, a student who requires hand-over-hand physical prompt to perform the task may require a different, less intrusive prompt, such as a paraprofessional’s hand shadowing over the student’s hand, a paraprofessional’s hand floating over or pointing to the corrective task.

The schedule of reinforcer delivery will be faded from a continuous to partial schedule. At the beginning of the intervention, every successful response is reinforced. Once the student displays a communicative, self-initiated toileting behavior on a regular basis, a schedule of partial reinforcement is introduced to fade out the reinforcement delivery. That is, not every replacement behavior is reinforced. If the problem is observed during implementation (e.g., increased toileting accidents), changing a schedule of reinforcement delivery will be discussed with the family or paraprofessionals.

The FCT intervention will be taught in the classroom throughout the day. The researcher will be present during the intervention phase, and the proposed intervention will last about ten weeks. The FCT intervention will cease at the end of 10th week. No punishment will be used in this study. Only identified positive reinforcers (e.g., verbal praise, smile, high-fives, music, etc.) will be used to teach the students of appropriate communicative behavior.
APPENDIX K

FUNCTIONAL COMMUNICATION TRAINING INTERVENTION

(SPANISH VERSION)
Apendice K. Intervención funcional Formación Comunicación

El aumento de comportamientos socialmente apropiados (es decir, de comunicación, por iniciativa propia conducta de ir al baño) y
Disminución 0 eliminación de los accidentes de ir al baño (por ejemplo, Mojar los pantalones, panales 0 pull-ups) durante las rutinas diarias de los estudiantes en la escuela.

Comunicación funcional procedimiento de entrenamiento:

Después de observar el patrón de los estudiantes de eliminación, los momentos concretos del día, cuando el estudiante tiene mas probabilidades de orinar se identificaran. De 5 a 10 minutos antes la expectativa de orinar, entrenamiento en comunicación funcional se iniciara. Al estudiante se le enseña a "Quiero ir al baño" al socia comunicativa de los estudiantes mediante el uso de un pictograma 0 verbalizar, dependiendo del modo de comunicación de cada alumno.

Si un alumno tiene las habilidades verbales, al estudiante se le enseña a decir: "Quiero ir al baño" 0 simplemente "bano", según el nivel comunicativo del alumno. Si un estudiante no tiene las habilidades verbales, el uso de un pictograma se introducini al alumno.

La intervención consistirá FCT de las instrucciones de ayuda (por ejemplo, el modelo adverb, señalando, mano sobre mano, actuar.), Seguido por el sistema de refuerzo positivo (por ejemplo, la alabanza verbal, la sonrisa, la música, alta de cinco años). La intervención se iniciara por la enseñanza de los estudiantes con tres respuestas motoras, tales como recoger, alcanzar, y la liberación (la comunicación funcional de Capacitación-parte 1), con dos personas, provo cando procedimiento para facilitar el aprendizaje rápido y promover la independencia del estudiante. Un ejemplo de la lección es la siguiente:

1. El apuntador física (el personal de segundo por detrás del estudiante) ayuda al estudiante a tomar un pictograma del cuarto de baño. El apuntador física no proporciona verbales durante la lección.
2. El socio de comunicación se abre la mano.
3. El apuntador física ayuda al estudiante para llegar a socio comunicativa de los estudiantes (es decir, el estudiante asignado asistente de maestro).
4. El socio de comunicación abre la mano para recibir el símbolo de imagen sólo después de que el estudiante ha alcanzado.
5. El apuntador física ayuda al estudiante a liberar el simbol0 de imagen en la mano abierta el socia comunicativo.
6. El apuntador físico y el socio de comunicación ayudar al estudiante a usar el baño.
7. El receptor comunicativo pro vea al estudiante con el reforzador previamente identificados.

La intervención FCT también incluyan la enseñanza de los estudiantes con la iniciación de oficio del 9 al vado en el baño) y baño habilidades relacionadas con la mayoría de a 10
menos las indicaciones y provocando retraso en el procedimiento (funcionales Comunicación Formación-Parte II) para promover la la independencia del estudiante. Las habilidades relacionadas con el subir al baño para estudiantes de sexo femenino son las siguientes:

Entrar en el cuarto de baño
Saca los pantalones abajo
Se sienta en el inodoro
Tira de los pantalones
Vada el inodoro
Se lava las manos
Se seca las manos
Existe el baño

Las habilidades relacionadas con el subir al baño de los alumnos varones son los siguientes:

Entrar en el cuarto de baño
Plantea la tapa del inodoro
Saca los pantalones abajo
Tira de los pantalones
Vada el inodoro
Se lava las manos
Se seca las manos
Sale del baño

El de mayor a menor, solicita incluir pleno desarrollo físico, físico parcial) de mano sobre mano), gestual (señalando), verbales. Si el estudiante realiza de forma independiente la tarea encomendada a tres segundos, el asistente de maestro poco a poco se desvanecerá el uso de indicadores y permitir la conducta de reemplazo bajo el control del estudiante, en lugar de en función de las indicaciones dadas por el asistente de maestro y los otros para promover la la independencia del estudiante. En otras palabras, los mensajes que se requiere al inicio del proceso de formación se desvaneció y se reemplaza con un mensaje que es menos intrusivo que el estudiante de manera independiente lleva a cabo la tarea encomendada. Por ejemplo, un estudiante que requiere de mano sobre mano las ayudas físicas para realizar la tarea puede requerir un diferente, menos intrusiva del sistema, tales como la mano de un asistente de maestro o sombras sobre la mano del estudiante, la mano de un asistente de maestro esta flotando por encima 0 que apunta a la tarea correctiva.

La intervención de FCT se impartirán en el aula durante todo el día. La investigación estará presente durante todo el estudio y la propuesta de intervención tendrá una duración de diez semanas. La intervención cesará cuando FCT cero accidentes ir al baño se observen durante tres días consecutivos 0 al final de la 10 a semana, lo que ocurra primero. No hay pena será utilizada en este estudio. Unicamente se han identificado los reforzadores positivos (por ejemplo, la alabanza verbal, la sonrisa, el cinco de alto, la música, etc). Sera utilizado para enseñar a los estudiantes de la conducta comunicativa apropiada.
**Funcional de Comunicación Formación-Parte 1**

Nota: Este script es usado por para-profesional en la fase de intervención.

Individuo observado: ____________ Observadores: ____________ Fecha: ________

Estudiante: ____________ Inicio de Time: ____________ final: ____________

Lista de verificación de paso

La enseñanza de la comunicación
Usando las dos personas * Preguntar Procedimiento

1 El apuntador física ayuda al estudiante a tomar un pictograma del cuarto de baño. El apuntador física no proporciona verbales durante la lección.

2 El receptor comunicativo abre la mano.

3 El apuntador física ayuda a que el estudiante alcance al compañero de comunicación del estudiante.

4 El receptor comunicativo abre la mano para recibir el símbolo de imagen sólo después de que el estudiante ha alcanzado.

5 El apuntador física ayuda al estudiante a liberar la imagen símbolo de la mano abierta en el socio comunicativo.

6 El apuntador físico y el socio de comunicación ayudar al estudiante a usar el baño.

7 El receptor comunicativo proporciona al estudiante refuerzo identificados. Desapareciendo indicaciones
Regla de decisión: el estudiante demuestra la independencia se da (es decir, recoger, alcanzar, y la liberación) cinco veces seguidas, el procedimiento para el desvanecimiento de las ayudas físicas

8 El estudiante independiente liberar el pictograma en la mano del partner de comunicación de cinco veces en una fila. El apuntador interrumpe física proporcionando instrucciones.

9 El estudiante independiente llega a la pareja de comunicación de cinco veces seguidas. El apuntador proporcionar ayudas físicas.

10 El estudiante independiente recoger la imagen símbolo de cinco veces seguidas. El apuntador interrumpe física proporciona instrucciones.

11 El estudiante independiente recoge el símbolo de imagen, llega a la pareja de comunicación y comunicados de la imagen en la mano del partner de comunicación de cinco veces en una fila. El apuntador física se desvanece por completo.
Comunicación Formación funcional-Parte II

Nota: Este script es usado por para-profesional en la fase de intervención.

Individuo observado: __________ Fecha: ____________ Observador: __________
Estudiante: ______________ Hora de inicio: __________ final Time: __________

Lista de verificación de paso
Autoaprendizaje de iniciación
Por el procedimiento mas-al menos-Preguntar

1 El alumno entrar en el cuarto de baño. Si el estudiante no realiza la tarea en 3 segundos, dar un examen físico completo indicaciones (por ejemplo, orientación, completa).

2 El alumno saca los pantalones abajo. Si el estudiante no realiza la tarea en 3 segundos, dar un examen físico completo indicaciones.

3 El alumno se sienta en el inodoro. Si el estudiante no realiza la tarea en 3 segundos, proporcionan un estímulo físico completo.

4 El alumno orina en el inodoro. Si el estudiante no realiza la tarea en 3 segundos, proporcionan un estímulo físico completo.

5 El estudiante vuelca la taza del baño. Si el estudiante no realiza la tarea en 3 segundos, proporcionan un estímulo físico completo.

6 El estudiante se lava las manos. Si el estudiante no realiza la tarea en 3 segundos, proporcionan un estímulo físico completo.

7 La salida del estudiante del cuarto de baño. Si el estudiante no realiza la tarea en 3 segundos, proporcionan un estímulo físico completo.

8 La salida del estudiante del cuarto de baño. Si el estudiante no realiza la tarea en 3 segundos, proporcionan un estímulo físico completo.

9 El personal proporciona inmediatamente el refuerzo identificó al estudiante para la visualización de la conducta de reemplazo.

Desapareciendo Solicita
Regla de decisión: si el estudiante lleva a cabo de forma independiente la tarea encomendada a menos de 3 segundos, el procedimiento para el desvanecimiento de instrucciones se introduce.

10 Presentación de un trabajo para el estudiante. Si el estudiante lleva a cabo de forma independiente la tarea encomendada a menos de 3 segundos, dejar un mensaje físico completo, y pasar a la siguiente.

11 Presentación de un trabajo para el estudiante. Si el estudiante lleva a cabo de forma independiente la tarea encomendada a menos de 3 segundos, suspender un examen físico parcial, y pasar a la siguiente.

12 Presentación de un trabajo para el estudiante. Si el estudiante lleva a cabo de forma independiente la tarea encomendada a menos de 3 segundos, dejar un gestual, y pasar a la siguiente.

13 Presentación de un trabajo para el estudiante. Si el estudiante lleva a cabo de forma independiente la tarea encomendada a menos de 3 segundos, dejar una verbal, y pasar a la siguiente.

14 No aparece ningún mensaje sea necesario, ya que cada paso de la señal / tarea el siguiente paso / tarea.
APPENDIX L

CONSENT TO PARTICIPATE IN RESEARCH

PARENTAL CONSENT

(ENGLISH VERSION)
Appendix L. CONSENT TO PARTICIPATE IN RESEARCH (Parental Consent)

**Project Title:** Effects of Functional Communication Training (FCT) on the Communicative, Self-initiated Toileting Behavior for Students with Developmental Disabilities in a School Setting

**Researcher(s):** Jinnie Kim  
**Faculty Sponsor:** Dr. Hank Bohanon

**Introduction:**  
You are being asked to give permission for your child to take part in a research study being conducted by Jinnie Kim for a doctoral dissertation under the supervision of Dr. Hank Bohanon in the Department of Education at Loyola University of Chicago.

Your child is being asked to participate because your child’s previous classroom teacher or the paraprofessional, or the family had expressed the opinion that your child’s poor self-care skills might benefit from participating in this study. In order to participate in this study, the following criteria will be used:

(a) The student is between eleven and eighteen years old of chronological age with a primary diagnosis of developmental disabilities (e.g., autism, cognitive disability).
(b) The student has two or more toileting accidents on a daily basis.
(c) The student is ambulatory.
(d) The student’s toileting problems must not have a medical cause.

The approximate number of participants in the study is between four and seven.

Please read this form carefully and ask any questions you may have before deciding whether to allow your child to participate in the study.

**Purpose:**  
The purpose of this study is to assess the effects of functional communication training (FCT) for teaching of communicative, self-initiated toileting skills to students with developmental disabilities (e.g., autism, cognitive disability) on the incidence of

- Increasing socially appropriate behaviors (i.e., communicative, self-initiated toileting behaviors)
- Decreasing or eliminating toileting accidents (e.g., wetting pants, diapers, or Pull-Ups) during the student’s daily routines in a school setting.

**Procedures:**  
If you agree to allow your child to be in the study, he/she will be asked to participate in a functional communication training program. Your child will be taught how to request, “I want to go to the bathroom,” by using a picture symbol or verbalizing, depending on the communication mode of each student. The program will consist of prompting instructions, followed by positive reinforcement system (e.g., verbal praise, smile, music, high-fives). Prompting instructions (e.g., verbal, gesture, modeling, or hand-over-hand) initially will be used to teach communicative toileting behavior. Once the student demonstrates how to request for a bathroom, prompts will faded out to promote the student’s independence. No punishment will be used in this study.

**Risks/Benefits:**  
There are no foreseeable risks involved in participating in this research beyond those experienced in everyday life. Students may be embarrassed if paraprofessionals are recording incidents when the students wet their pants. To minimize this possibility, the paraprofessionals will be recording the incidents when the students are not watching (e.g., recording the incidents in a classroom closet).

The anticipated benefits to society and the larger community outweigh the risks. The results of this research could potentially benefit other teenagers in the school setting because of the increased understanding of the effectiveness of functional communication training for the specific population. The results from this study also will be used to inform
school staff (e.g., teachers, therapists, paraprofessionals, administrators) about the efficacy of their current instructional strategies.

Also, the anticipated benefits to participation for you and your family may include:

- Your child may have increased self-esteem and/or self-management skills (e.g., choice-making, independence).
- Your child may have a repertoire of more socially appropriate behaviors (e.g., going to the bathroom while in public, rather than wetting pants).
- Your child and your family may have increased quality of life.
- Your family may have decreased financial cost and psychological stress level (e.g., less pants to wash and dry, less diapers/Pull-Ups to buy).

Confidentiality:
Your child or your family will not be personally identified in any way. Your child will be assigned a participant number (e.g., Student A, Student B). No individual names will be used in any reports or publications resulting from this study. Only the principal researcher will have an access to the collected data which will be kept in a locked file cabinet. The data entered into the computer system for analysis will only be viewed by the principal researcher with a password. Conscious efforts will be made throughout the intervention for the confidentiality of participants to be maintained. While other staff will be aware that your child is participating in the study, the researcher will attempt to maintain confidentiality. All the data will be destroyed one year following the conclusion of this study.

Voluntary Participation:
Participation in this study is voluntary. If you do not want your child to be in this study, he/she does not have to participate. Even if you decide to allow your child to participate, he/she is free to withdraw from participation at any time without penalty. Your decision to participate or not will have no effect on the current relationship with the researcher (i.e., student-teacher).

Contacts and Questions:
If you have questions about this research study, please feel free to contact the researcher Jinnie Kim at 773-286-6226, ext. 106 and/or jkim@newhorizoncenter.org or the faculty sponsor Dr. Hank Bohanon at 312-915-7099 or dbohanon@luc.edu

If you have questions about your child’s rights as a research participant, you may contact the Loyola’s Office of Research Services at (773) 508-2689.

Statement of Consent:
Your signature below indicates that you have read the information provided above, have had an opportunity to ask questions, and agree to allow your child to participate in this research study. You will be given a copy of this form to keep for your records.

Parent’s/Guardian’s Signature ___________________________ Date ___________________________

Researcher’s Signature ___________________________ Date ___________________________
APPENDIX M

CONSENT TO PARTICIPATE IN RESEARCH

PARENTAL CONSENT

(SPANISH VERSION)
Apendice M. CONSENTIMIENTO PARA PARTICIPAR EN LA INVESTIGACION
(Consentimiento de los Padres)

Titulo del proyecto: Efectos del entrenamiento de comunicacion funcional (FTC) en la comunicacion, por iniciativa propia conducta de ir al bane para estudiantes con discapacidades de desarrollo en el ambito escolar

Investigadora (s): Kim Jinnie
Patrocinador Facultad: Dr. Hank Bohanon

Introduccion:
Se le pide autorizacion para que su hijo a participar en un estudio de investigacion llevado a cabo por Jinnie kim para una tesis doctoral bajo la supervision del Dr. Hank Bohanon en el departamento de Educacion de la Universidad Loyola de Chicago.

Su hijo esta siendo invitado a participar, porque el maestro de su nino en el aula 0 auxiliar de la anterior, 0 de la familia habia expresado la opinion de que su hijo deficiente autocuidado podrian beneficiarse de participar en este estudio. Con el fin de participar en este estudio, los criterios se utilizanln los siguientes:
(A) El estudiante tiene entre once y diecisiete anos de edad cronologica con un diagnostico primario de discapacidades del desarrollo (por ejemplo, autismo, discapacidad cognitiva).
(B) El estudiante tiene dos 0 mas accidentes de ir al bane a diario.
(C) El estudiante es ambulatorio.
(D) problemas para ir al bafio del estudiante no debe tener una causa medica.

El numero aproximado de participantes en este estudio es entre cuatro y siete. Por favor, lea atentamente este formulario y haga cualquier pregunta que pueda tener antes de decidir si se debe permitir a su hijo a participar en este estudio.

Proposito:
El proposito de este estudio es evaluar los efectos del entrenamiento de comunicacion funcional (FCT) para la ensenanza de la comunicacion, por iniciativa propia capacidad de ir al bane a los estudiantes con discapacidades del desarrollo (por ejemplo, autismo, discapacidad cognitiva) sobre la incidencia de
El aumento de las conductas socialmente apropiadas (es decir, de comunicacion, por iniciativa propia conducta de ir al bafio)
Disminucion o eliminacion de los accidentes de ir al bane (por ejemplo, pantalones de humectacion, panales, 0 tira-up) durante la rutin a diaria del estudiante en una escuela

Procedimientos:
Si esta de acuerdo para permitir a su hijo a participar en el estudio, el/ ella se le pedid.

Riesgos / beneficios:
No hay riesgos previsibles involucrados en la participaci6n en esta investigaci6n mas alla de los experimentados en la vida cotidiana. Los estudiantes pueden sentirse avergonzados si-profesionales estan registrando incidentes en los que los estudiantes mojado los pantalones. Para minimizar esta posibilidad, el asistente de maestro a grabar los incidentes, cuando los estudiantes no estan viendo (por ejemplo, el registro de los incidentes en un armario en el aula).

Los beneficios anticipados para la sociedad y la comunidad en general superan los
riesgos. Los resultados de esta investigación podrían beneficiar a otros adolescentes en el ámbito escolar debido a la mayor comprensión de la efectividad del entrenamiento de comunicación funcional para la población específica. Los resultados de este estudio también se utilizarán para informar a staff (e.g. escuela, maestros, terapeutas, administradores-profesional), acerca de la eficacia de sus estrategias de enseñanza actual.

Además, los beneficios esperados de participar para que usted y su familia pueden incluir:
- Su hijo puede tener una mayor autoestima y/o habilidades de autocontrol (por ejemplo, la elección de decisiones, la independencia).
- Su hijo puede aumentar un repertorio de conductas socialmente apropiadas (por ejemplo, ir al baño, mientras que en público, en lugar de pantalones mojados)
- Su hijo y su familia pueden tener mayor calidad de vida.
- Su familia puede haber disminuido el costo financiero y el nivel de estrés psicológico (por ejemplo, menos los pantalones para lavar y secar, menos pañales/pull-ups para comprar).

Confidencial:
- Su hijo o su familia no serán identificados de ninguna manera. Su hijo se le asignará un número de participante (por ejemplo, los estudiantes A, los students B). Ninguno de los nombres individuales se utilizarán en los informes 0 publicaciones resultantes de este estudio. Sólo el investigador principal tendrá acceso a los datos recogidos, que se mantendrán en un archivador cerrado. Los datos introducidos en el sistema informático para el análisis solo estarán al alcance de la investigación principal con una contraseña.
- Esfuerzos conscientes se harán a través de la intervención de la confidencialidad de los participantes para que se mantenga. Mientras que el resto del personal será consciente de que su hijo está participando en el estudio, la investigación trata de mantener la confidencialidad. Todos los datos serán destruidos un año después de la conclusión de este estudio.

Participación voluntaria:
- La participación en este estudio es voluntaria. Si usted no quiere que su hijo participe en este estudio, él/ella no tiene que participar. Incluso si decide permitir que su hijo participe, él/ella es libre de retirar su participación en cualquier momento sin penalización. Su decisión de participar o no va a ningún efecto sobre la relación actual con el investigador (es decir, estudiantes y maestros).

Contactos y Preguntas:
- Si tiene alguna pregunta sobre el derecho de su hijo como un participante en la investigación anterior, ha tenido una oportunidad de hacer preguntas, y de acuerdo en permitir que su hijo participe en este estudio de investigación. Se le entregará una copia de este formulario para mantener en sus archivos.

Firma de Padre / Tutor __________________________ Fecha __________________________

Firma del Investigador __________________________ Fecha __________________________
APPENDIX N

CONSENT TO PARTICIPATE IN RESEARCH

(PARAPROFESSIONAL CONSENT)
Appendix N. INFORMED CONSENT TO PARTICIPATE IN RESEARCH

The Loyola University at Chicago

Project Title: Effects of Functional Communication Training (FCT) on the Communicative, Self-initiated Toileting Behavior for Students with Developmental Disabilities in a School Setting

Researcher(s): Jinnie Kim
Faculty Sponsor: Dr. Hank Bohanon

Introduction:
You are being asked to give consent to take part in a research study being conducted by Jinnie Kim for a doctoral dissertation under the supervision of Dr. Hank Bohanon in the Department of Education at Loyola University of Chicago.

Please read this form carefully and ask any questions you may have before deciding whether to participate in the study.

What is the purpose of this study?
The purpose of this study is to assess the effects of functional communication training (FCT) for teaching of communicative, self-initiated toileting skills to students with developmental disabilities (e.g., autism, cognitive disability) on the incidence of
- Increasing socially appropriate behaviors (i.e., communicative, self-initiated toileting behaviors)
- Decreasing or eliminating toileting accidents (e.g., wetting pants, diapers, or Pull-Ups) during the student’s daily routines in a school setting.

Your student is being asked to participate because the student’s previous classroom teacher or the paraprofessional or the parents had expressed the opinion that the student’s poor self-care skills might benefit from participating in this study. In order to participate in this study, the following criteria will be used:
(a) The student is between eleven and eighteen years old of chronological age with a primary diagnosis of developmental disabilities (e.g., autism, cognitive disability).
(b) The student has two or more toileting accidents on a daily basis.
(c) The student is ambulatory.
(d) The student’s toileting problems must not have a medical cause.

The approximate number of participants in the study is between four and seven.

What will be done if you take part in this research study?
If you agree to participate in this research study, you will be asked to participate in a functional communication training program. The student will be taught how to request, “I want to go to the bathroom,” by using a picture symbol or verbalizing, depending on the communication mode of each student. The program will consist of prompting instructions, followed by positive reinforcement system (e.g., verbal praise, smile, music, high-fives). Prompting instructions (e.g., verbal, gesture, modeling, or hand-over-hand) initially will be used to teach communicative toileting behavior to the students. Once the student demonstrates how to request for a bathroom, prompts will faded out to promote the student’s independence. No punishment will be used in this study.

The Project Duration is: 10 weeks

What are the possible risks and benefits?
There are no foreseeable risks involved in participating in this research beyond those experienced in everyday life. Students may be embarrassed if paraprofessionals are recording incidents when the students wet their pants. To minimize this possibility, the paraprofessionals will be recording the incidents when the students are not watching (e.g., recording the incidents in a classroom closet).

The anticipated benefits to society and larger community outweigh the risks. The results of this research could potentially benefit other teenagers in the school setting because of the increased understanding of the effectiveness of
functional communication training for the specific population. The results from this study also will be used to inform school staff (e.g., teachers, therapists, paraprofessionals, administrators) about the efficacy of their current instructional strategies.

Also, the anticipated benefits to participation may include:

- The student may have increased self-esteem and/or self-management skills (e.g., choice-making, independence).
- The student may have a repertoire of more socially appropriate behaviors (e.g., going to the bathroom while in public, rather than wetting pants).
- The student and his/her family may have increased quality of life.
- The family may have decreased financial cost and psychological stress level (e.g., less pants to wash and dry, less diapers/Pull-Ups to buy).

If you choose to take part in this study, will it cost you anything? No

Will you receive compensation for your participation in this study? No

Confidentiality:
Participants will not be personally identified in any way. Each student will be assigned a participant number (e.g., Student A, Student B). No individual names will be used in any reports or publications resulting from this study. Only the principal researcher will have an access to the collected data which will be kept in a locked file cabinet. The data entered into the computer system for analysis will only be viewed by the principal researcher with a password. Conscious efforts will be made throughout the intervention for the confidentiality of participants to be maintained. All the data will be destroyed one year following the conclusion of this study.

Voluntary Participation:
Participation in this study is voluntary. Even if you decide to participate now and decide not to participate later, you are free to withdraw from participation at any time without penalty. Your decision to participate or not will have no effect on the current relationship with the researcher.

Contacts and Questions:
If you have questions about this research study, please feel free to contact the researcher Jinnie Kim at 773-286-6226, ext. 106 and/or jkim@newhorizoncenter.org or the faculty sponsor Dr. Hank Bohanon at 312-915-7099 or hbohanon@luc.edu

If you have questions about your rights as a research participant, you may contact the Loyola’s Office of Research Services at (773) 508-2689.

Statement of Consent:
Your signature below indicates that you have read the information provided above, have had an opportunity to ask questions, and agree to participate in this research study. You will be given a copy of this form to keep for your records.

_______________________________  __________________________
Participant’s Signature              Date

_______________________________  __________________________
Researcher’s Signature              Date
Appendix O. Definition of Key Terms

Relevant key terms used within this study are briefly defined to clarify their meaning to the reader.

**Antecedents.** Events that lead directly to the occurrence of the behavior. Also called the discriminative stimuli.

**A-B-C contingency.** In operant conditioning, the understanding of operant human behavior is explained in a three-term contingency: antecedent, behavior, and consequence. Antecedents (A) set the stage for a behavior to occur, the behavior (B) occurs, and the consequence (C) follows. Also, called a stimulus-response-reinforcement (S-R-R) contingency.

**Applied behavior analysis (ABA).** A scientific approach established in the 1960s to examine environmental determinants of human behavior, to solve problems of social importance, and to improve an individual’s life. Largely based on the principles of operant conditioning established by the modern behavioral psychologist B. F. Skinner, ABA states that it is the maintaining consequences that reinforce the behavior.

**Autism.** Autism is a developmental disability significantly affecting communication and social interaction, generally evident before the age three, that adversely affects a child’s educational performance (IDEA 2004); A severe, neuro-biologically based pervasive developmental disorder characterized by varying degrees of impairment in several areas of development: (a) communication, (b) social interaction, and (c) stereotyped behaviors (APA, 2000). Autism typically appears during the first three years of life and lasts throughout an individual’s lifetime long.

**Classical conditioning.** A type of learning that through the repeated association of an unconditioned stimulus (US) and neutral stimulus (NS), an organism emits a conditioned response (CR) to the previously neutral stimulus (NS). Also called Pavlovian conditioning.

**Competing behavior model.** The process of diagramming and developing hypotheses about the problem behavior; identifying a replacement behavior with the consequence that matches the same function as the problem behavior; and identifying a desirable behavior with more natural consequence.
Consequences. Events that determine whether the behavior will occur or not under the similar/same conditions in a near future.

Developmental disability. A diverse group of severe, life-long conditions that is attributable to a mental or physical impairment, or both, originating before the age of 22. Individuals with developmental disabilities are affected with major areas of their life such as communication, self-help, socialization, mobility, and overall quality of life and usually last the individual’s lifetime long. Individuals with developmental disabilities also display a wide range of behavioral problems such as aggression, stereotypy, and self-injury. Examples of developmental disabilities include cognitive disability, autism, cerebral palsy, and seizure disorder.

Differential reinforcement of alternative behaviors (DRA). Based on the principles of ABA, DRA is a procedure where an alternative replacement behavior is reinforced over the problem behavior. In DRA, someone else other than the student (e.g., clinicians or experimenters) has complete control over when and how to deliver the reinforcement and decide what replacement behavior should be exhibited.

Differential reinforcement of communicative behaviors (DRC). The specific type of differential reinforcement of alternative behaviors (DRA) used in functional communication training (FCT). In FCT/DRC, the student is in active roles by having complete control over when the reinforcement is to be delivered because the student has to make a functionally communicative response (i.e., alternative replacement behavior) to another person in order to receive the reinforcement.

DSM-IV-TR. The text revision of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders, a manual published by the American Psychiatric Association in 2000 for use in diagnosing mental disorders.

Extinction. The elimination of a learned response by removal of the unconditioned stimulus (in classical conditioning) or reinforcement (in operant conditioning).

Enuresis. Repeated voiding of urine into bed or clothes, whether involuntary or intentional that occurs twice per week for at least 3 consecutive months, after the age of five years, when bladder control is normally achieved, and not due to either a drug side effect or a medical condition.
Functional behavioral assessment (FBA). A process of identifying specific variables or circumstances that trigger or maintain problem behaviors that impede a student’s ability to learn. The process of conducting FBA often involves three different methods: indirect assessment (e.g., interview, record reviews), direct observation (e.g., scatter plot, ABC chart, and Functional Assessment Observation form), and functional analysis. Also called functional assessment.

Functional communication training (FCT). A general strategy of identifying the function of a problem behavior and teaching alternative ways to achieve the same desired outcome as the problem behavior.

Implementation fidelity. The degree to which intervention is implemented as originally intended. Also called procedural fidelity, treatment fidelity or treatment integrity.

Individuals with Disabilities Education Act of 2004 (IDEA, 2004). A federal law ensuring appropriate services to children with disabilities throughout the nation. IDEA governs how states and public agencies provide early intervention, special education and related services to children and youth with disabilities.

Intelligence quotient (IQ). According to the American Association of Mental Retardation (AAMR), intelligence refers to a general mental capability. It involves the ability to reason, solve problems, and think abstractly. IQ is reported as a numerical value, with 100 representing average intelligence.

Interobserver agreement. A measure used to assess the degree to which different observers/raters give consistent measurement of the same target behavior.

Mental retardation (MR). Mental retardation means significantly subaverage general intellectual functioning, existing concurrently with deficits in adaptive behavior and manifested during the development period, that adversely affects a child’s educational performance (IDEA 2004); A developmental disability to identify individuals with (a) significantly subaverage general intellectual functioning (IQ), usually an IQ score of 70 or below, (b) accompanied by significant limitations in
functional adaptive skills, and (c) the onset before the ages of 18 (APA, 2000). Also called intellectual or cognitive disability.

**Negative punishment.** Negative punishment stops or decreases a behavior through the removal of a positive stimulus. Examples of a negative punishment include time out for hitting or taking a game boy or TV-watching privilege away for a tantrum.

**Negative reinforcement.** Negative reinforcement increases a behavior through the removal of a negative stimulus. An example of a negative reinforcement includes removing unpreferred tasks/activities upon screaming or taking an aspirin for a headache.

**Operant conditioning.** A type of learning in which behavioral change occurs as a function of the consequences of the behavior. An organism learns to behave certain ways in order to produce desirable outcomes.

**Overcorrection.** A form of punishment in which an individual is excessively engaged in repetitive behaviors for displaying an inappropriate behavior. Examples of overcorrection procedure include restitution and positive practice.

**Pervasive developmental disorder (PDD).** Pervasive developmental disorder (PDD), also known as autism spectrum disorder, is any one of a group of developmental disabilities marked by severe impairments in communication, social interaction, and stereotyped behavior. Pervasive developmental disorders include autism, Asperger syndrome, Rett syndrome, childhood disintegrative disorder, and pervasive developmental disorder-not otherwise specified (PDD-NOS). Manifestation of these pervasive disorders is typically apparent before the age of three.

**Positive behavioral interventions and supports (PBIS).** A comprehensive, systems change approach that emerged in the late 1980s and early 1990. PBIS focuses on reliance on prevention, function-based, data-based decision making, and self-determination skills (e.g., choice making, self-management, independence).
Positive punishment. Positive punishment stops or decreases a behavior through the presentation of a negative or aversive stimulus. Examples of a positive punishment include physical restraint and spanking for hitting.

Positive practice. A procedure where an individual overly practices an appropriate behavior numerous times where the inappropriate behavior frequently occurs. For example, if the individual wets her pants in the living room, she excessively practices going to the bathroom over and over.

Positive reinforcement. Positive reinforcement increases a behavior through the presentation of a positive stimulus. Examples of a positive reinforcement include smiles, high-fives, or a pat on the back for completing homework.

Prompts. A prompt is a cue or assistance to elicit the desired response from an individual, when teaching a new behavior. Types of prompts include verbal (instructions or hints), visual (pictures or gestures), modeling (a visual demonstration), and physical prompts (hand-over-hand, partial or complete physical guidance).

Punishment. Any stimulus that decreases the probability of a previous response through the presentation of a negative stimulus (positive punisher) or the removal of a positive stimulus (negative punisher).

Rapid toilet training (RTT). Toileting training method developed by Azrin and Foxx in 1973. RTT treatment included regularly scheduled intensive toilet training, increased intake of fluid to increase the frequency of urination, positive reinforcement for successful voiding in toilet (e.g., edibles, verbal praise, etc.), and punishment contingent on incontinence (e.g., overcorrection, full cleanliness training).

Reinforcement. Any stimulus that increases the probability of a previous response through the presentation of a positive stimulus (positive reinforcer) or the removal of a negative stimulus (negative reinforcer).

Restitution overcorrection. Restitution requires an individual to overly repay, or overly restore the environment to better than its original condition (before the display of inappropriate behavior and even better condition). For example, if an individual wets herself while sitting down on the couch in the living
room, she is required to excessively clean herself and to restore the living room to better than its original condition.

**Self-determination.** Self-determination is defined as one’s pursuit of personal preferences and control without external pressure. It is a combination of skills, knowledge, and beliefs that enable a person to engage in goal-directed, self-regulated, autonomous behavior. Examples of self-determination include choice making, independence, and self-management.

**Setting events.** Events that increase the probability of the occurrence of the behavior. Also, called establishing operations (EO).

**Social validity.** Social validity is a form of indirect assessment to validate the outcome of an intervention by collecting subjective evaluations of changes in the target behavior. Examples of social validity include the acceptance (“Is the intervention age-appropriate and acceptable to the student and the plan implementers?”) and practicability (“Is the intervention feasible to implement within ongoing routines?”).
REFERENCE LIST


VITA

Jinnie Kim graduated from Purdue University with a Master of Science in Education in 2001. She earned a Master of Education in Special Education with a type 10 Special Teaching Certificate from Loyola University Chicago in 2006. She has been pursuing toward her doctoral degree in Curriculum, Instruction, and Education Psychology program.

Jinnie Kim has worked in the field of education for over 10 years. She began her career as an educator of students with special needs. She has worked as a psychology instructor in community colleges and a special education teacher at a therapeutic day school for students with developmental disabilities. She has been actively advocating the rights of individuals with developmental disabilities by participating in community sponsored activities and programs.
The Dissertation submitted by Jinnie Kim has been read and approved by the following committee:

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