An Evaluation of Teacher Implemented Trial Based Functional Analysis and Functional Based Interventions in a Mainstream Classroom.

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Abstract

Despite the documented accuracy of using Functional Analysis (FA) to design effective interventions, it is not being utilised in school settings for students with challenging and highly disruptive behaviours (Shumate & Wills, 2010). This may be due to the time constraints and complexities associated with standard FA procedures, making them difficult to complete in classrooms and requiring specialised staff. Many variations to the standard FA have been adapted to address these issues, including Trial-Based Functional Analysis (i.e., TBFA). The method uses short (1-4 min) assessment probes within typical classroom instruction to measure occurrences of behaviour under different conditions (e.g. Attention, Demand, Tangible and Ignore). Research on TBFA has shown its reliability to identify functions (Bloom et al., 2011), making it a viable option for classroom settings. Furthermore, research on TBFA methodology has been able to show behavioural skills training methods can upskill teachers to carry out TBFA and Function Based Interventions (FBI) procedures with high fidelity, particularly with students who present with disabilities (Flynn & Lo., 2016). There are, however, some areas requiring further research including generalisation of procedures to new students and using social validity measures to understand teacher's perceptions and acceptance of the procedures. There is also limited use of procedures with students who are typically developing but engage in highly disruptive or challenging behaviours in mainstream classrooms. This study aimed to expand current research and address the limitations by analysing teacher implemented TBFA and FBI procedures on disruptive or challenging behaviours with typical developing students in mainstream classrooms. Two teachers participated in behavioural skills training on TBFA and FBI methodology and

implemented the procedures across three typical developing students who presented with off-task disruptive behaviours. The results showed teachers had the ability to carry out the TBFA and FBI procedures with high level of integrity. In addition, one of the teachers could implement procedures with a high level of fidelity during generalisation measures. Results showed a reduction in disruptive off-task behaviour across all students, indicating the FBI's were effective in addressing function. Finally, social validity measures indicated teachers found the procedures easy to implement and felt they had a positive impact on student behaviours.

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Chapter 1: Introduction

More common than severe behaviours, distracting and instructionally disruptive behaviours frequently result in school-based disciplinary referrals by teachers (Sterline-Turner, Robinson & Wilczynski, 2001). These behaviours are troublesome not because they threaten the physical or psychological safety of the student or those around him/her, but because they usually occur at a high frequency and make instruction difficult. Furthermore, when disruptive behaviour is not addressed effectively and typical punitive strategies do not change behaviour, there can be a multitude of ongoing effects including increased teacher feelings of burn out (Hastings & Bham, 2003), decreased skill acquisition and learning outcomes, increased likelihood of expulsion or suspension (Gilliam & Shahar, 2006) or unnecessary referrals for special education services (Sterline-Turner, Robinson & Wilczynski, 2001).

Functional Assessment

To identify and address severe behavioural issues including aggression and self-injurious behaviours, particularly in children with disabilities or behavioural disorders such as autism spectrum disorder (ASD) or emotional behaviour disorders (EBD), the behaviour analysis field has utilised Functional Behavioural Assessment (FBA) methods. The FBA procedures have been well established in identifying functions and reinforces maintaining problem behaviours (Iwata et al., 1982/1994). An FBA refers to any formal method used to identify reinforcers maintaining problem behaviour (Iwata & Dozier, 2008) and includes three types of assessments; anecdotal or indirect measures, descriptive measures and experimental analysis in the form of a Functional Analysis (FA).

Anecdotal methods include closed and open-ended indirect assessments that use rating scales or questionnaires. They are often used as they can gather quantifiable results quickly and it's easy to present findings to those involved. The limitations with some closed-ended indirect assessments, for example; Motivation Assessment Scale (MAS; Durand and Crimmins, 1988) and Questions about Behaviour Function (QABF; Matson & Vollmer, 1995), are that they can be unreliable and without reliability there is no validity, meaning there is no way to determine whether function is correct using these instruments (Sigafoos, Kerr & Roberts, 1994). Semi-structured open-ended interviews with people who most often interact with the student can help behaviour analysts to discover common, as well as unique variables that may be evoking and maintaining problem behaviours (Hanley, 2012). Although these approaches are easy to use and are therefore most often used by practitioners (Desrochers, Hile & Williams-Moseley, 1997) when used on their own to hypothesize function, the results can be unreliable and therefore inadequate to design effective interventions.

A more descriptive analysis uses direct observations of a student to observe target behaviour in the environment in which it occurs to collect baseline data and to evaluate treatment effects (Iwata & Dozier, 2008). This method, however does not directly identify functional relations, as they record information only on events and their occurrence. It also does not show data on the functional properties of the events or the functional relationships between the events. An FA is the only method to provide this kind of information (Bijou, Peterson & Ault, 1968). When results from descriptive analysis and FA methods have been compared they often show low correspondence (Thompson & Iwata, 2007). The reasons for this could be that FA methods are able to reveal differences among social contingencies, for example, escape versus attention that maintains problem

behaviour (Lerman & Iwata, 1993; Mace & Lalli, 1991). The descriptive analysis may also have trouble detecting thin schedules of reinforcement occurring (Marion, Touchette & Sandman, 2003) and often suggest attention as a function as it is a common consequence used when problem behaviour occurs (St Peter et al., 2005).

With the limitations of both anecdotal and descriptive analysis of problem behaviour, FA has become the standard for research. In fact, trends regarding the behavioural treatment of self-injurious behaviour over a 35-year period show there was a continual increase in studies using FA methods, whereas studies only using descriptive or anecdotal methods have decreased or ceased respectively (Iwata & Dozier, 2008).

Functional Analysis

Although FA procedures do not alter the behaviour itself, they do alter the conditions surrounding the behaviour to observe when it occurs. The term 'Functional Analysis' can only be applied when there is manipulation of some environmental events and is the only method that can demonstrate a causal relationship between antecedents, reinforcement and behaviour (Asmus et al., 2002). The method serves an important purpose by using the information gathered to design meaningful interventions based on the function. The basic procedure of a standard FA involves brief (10-15min) test conditions where environmental stimuli are presented and withdrawn to observe how the stimuli affect the behaviour of the student (Iwata et al., 1982/1994). Researchers have consistently found that interventions based on the result of FA are more effective than arbitrarily selected treatments (Hanley, Iwata & McCord, 2003). However, when assessing their use in school settings, it was found that only 31.4% of studies that were reviewed implemented FA's in schools (Hanley et al., 2003).

Despite the documented accuracy of an FA in identifying functions and designing effective interventions, it is not being utilised in school settings for students with challenging behaviours (Shumate & Wills, 2010). Some possible reasons are the complexity of variables during procedures. It often requires manipulating variables which can be complicated and requires a high level of environmental predictability and control, which may not be evident in a classroom setting. This means standard FA procedures, often require students to be withdrawn into a clinic type setting for a long period of time to complete the procedures and demands several specialised staff to implement procedures, making it impractical for most schools.

Over the past 10 years, variations of FA procedures have been developed such as; modified sessions length (Mueller et al., 2011), modified conditions (Rispoli et al., 2013), variations in settings (Lang et al., 2010), change of implementer (Thomas-Sassi et al., 2013) and modification of antecedent variables (Fahmie et al., 2013). An example of researcher's adjustment of FA procedures is Brief Functional Analysis (BFA) (Northup et al., 1991) where test conditions were reduced to 5-min sessions. They demonstrated their BFA with three participants with severe disabilities. The results were significant in determining the function of the challenging behaviour by showing a reduction in aggressive behaviour when intervention based on the functions were implemented. This study was a significant step towards classroom application of FA, however, the procedures were carried out by the researchers and students were still required to be pulled out of normal class instruction to complete the procedures. To investigate if FA procedures could be carried out under normal classroom instruction, Ellis and Magee (1999) compared the results of a classroom FA to a pulled-out version. They conducted an FA out of the classroom for three students

and then completed an in-class FA for two of the students. Interventions were developed based on the FA results. All participant's inappropriate behaviours decreased indicating the classroom FA had accurately identified behaviour function of inappropriate behaviours. This was a significant step for the implementation of FA in school settings, however, the researchers still had concerns around the amount of time it takes to implement and the practicality of having the method implemented into schools.

Trial Based Functional Analysis (TBFA)

More recently researchers began to explore a variation called Trial Based Function Analysis (TBFA) where the assessment was structured into individual trials distributed across time and settings and have been able to validate its use in classroom settings (Risploli, Ninci, Neely & Zaini, 2014). The procedure exposes the individual to specific antecedent and consequences within the context of their normal routines and activities in a natural environment and the ability to use the procedure in natural environments made the assessment applicable to school settings.

Sigafoos and Saggers (1995) demonstrated the first implementation of TBFA on aggressive behaviours with two students with autism spectrum disorder (ASD) in a classroom setting. The procedure consisted of using a series of trials throughout typical classroom instruction across five days. The trials were 1-min test segments where the establishing operation and contingency for problem behaviour were present, followed by a 1-min control segment where the student had access to reinforcement continually (tangible, attention and no academic demands). All segments were terminated when problem behaviour occurred. When this procedure was implemented with two students who exhibited challenging behaviour, the procedure was successful in identifying the positive

social reinforcement (attention) as the function for both students. These results, however had some limitations including the limited number of participants and it lacked a comparison to a standard FA method, to confirm their findings. The results did warrant further examination in the use of TBFA in a naturalistic classroom setting during normal instruction.

To validate the benefits of the TBFA method Bloom et al. (2011), produced a comparison study conducting TBFA and standard FA with students with developmental disabilities, hearing impairments, and speech delays exhibiting different challenging behaviours. The study differed from previous examples by having the control segment for each trial conducted first to avoid carryover of challenging behaviour from test to control segment and only 20 short 4-min control/test embedded segments for each trial type (Attention, Tangible, Demand, and Ignore) during a school day under typical instruction. Their comparisons results showed 60% concordance with an analogue FA. With the benefits of the procedure including; reduced time for implementation, early termination of trials with fewer incidences of challenging behaviour (Lyndon, Healy, O'Reilly & Lang, 2012) and the validity of the results, there is sufficient evidence to continue to research this procedure in applied settings such as classrooms.

Teacher Implementation of TBFA

The transition of FA procedures to classroom settings has taken place relatively recently (Hanley et al., 2003). This late transition could be due to the training and expertise required to conduct these procedures (Iwata et al., 2000; Scott et al., 2005). If we are expecting teachers to properly assess and address challenging behaviour in classroom settings, they must be able to operationally define the behaviour, understand the functional relationship between behaviour and

consequence, and provide antecedents and consequences with high integrity. To extend the expertise to teachers or support staff, we need to establish that education staff have, or can gain, these prerequisite levels of expertise as they are crucial to implementing behavioural assessment procedures and designing corresponding behaviour support plans.

Recent research suggests that teachers struggle with these skills without support or training. Mortenson et al. (2008) assessed 88 teachers to identify their ability to identify the behavioural function of challenging behaviours described in three vignettes. They found they struggled to correctly identify the function of the specific behaviours and had difficulties proposing appropriate behavioural interventions. These findings highlight the need for applied behavioural analysis support training for teachers and further research to assess teacher training methods.

Currently, many variations of staff training exist including training manuals (Cipani & Schock, 2012), instructional videos (LaVigna & Willis, 2005) and in-school consultation (Renshaw, Christensen, Marchant & Anderson, 2008). Staff training on FA methods has occurred mainly in special education settings but has been assessed on a variety of research staff, practitioners, paraprofessionals and special education teachers (Rispoli et al., 2014). The results of these studies consistently show staff trained to use FA methods could implement procedures with high levels of procedural fidelity in very little time (Erbas et al., 2006; Kunnavatana et al., 2013a, b; Machalicek et al., 2009; McKenney et al., 2013; Moore et al., 2002; Wallace et al., 2003). However, although there have been over 30 years of research and technological advancement of FA with increasing application in school settings (Beavers et al., 2013), teachers' implementation of FA continues to be limited.

Function-Based Interventions (FBI)

In addition to accurately identifying the function of students' challenging behaviour, there is also a critical need to implement FBI's for students in school settings to reduce challenging behaviours (Scott & Kamps, 2007). Interventions based on FA information have been shown to be more effective in reducing challenging behaviours than arbitrarily selected interventions (Ingram et al., 2005). Furthermore, several problems can arise when interventions are selected without considering behavioural function. These could include strengthening the problem behaviour via positive or negative reinforcement or if the intervention is not functionally related to the contingencies maintaining the problem behaviour, it may not address teaching alternative behaviours that are more socially appropriate that serve the same function (Shumate & Wills, 2010).

Another function for FBI's is to validate outcomes of FA's including teacher implemented TBFA. If an FBI based on a teacher implemented TBFA is effective, then the teacher has likely identified the correct function from their results. Yet although FBI should be used as a dependent measure for correct FA implementation, a meta-analysis on FA research found that out of 19 studies, measuring FA results, only nine included follow up functionally based interventions (Lane et al., 1999).

Teacher Implementation of FBI's

To increase implementation of FBI's in mainstream school settings, staff training on FBI theories and procedures is important. Training teachers to design and implement FBI's, involves education on the theory on behaviour analysis principles used in interventions including; reinforcement, extinction, punishment and response costs procedures. Differential reinforcement is a fundamental principle leading to the development of a set of procedures used as a treatment for

problem behaviour (Cooper, Heron & Heward, 2007). It is implemented by reinforcing only the appropriate response (behaviour you want to increase) and removing current reinforcement for all other responses, called extinction. Extinction is the discontinuation of reinforcement for a previously reinforced behaviour (Cooper et al., 2007).

Some common types of differential reinforcement used in FBI's include Differential Reinforcement of Other Behaviour (DRO) and Differential Reinforcement of Alternate Behaviour (DRA). DRO/Omission Training is the delivery of reinforcement when the target behaviour has not occurred during a specific period, it provides reinforcement for the absence or omission of a target behaviour (Cooper et al., 2007). DRA delivers reinforcement for a behaviour that serves as an alternative to the disruptive behaviour that we want to reduce (Cooper et al., 2007), for example reinforcing instances of a student putting their hand up to get their teachers attention as opposed to the disruptive calling out behaviour. It is often implemented with an extinction procedure to remove current reinforcement contingencies for targeted behaviour we want to reduce for example not responding or giving any attention to instances where a student is calling out.

One of the first studies to train teachers to conduct descriptive analysis and FBI's was completed by Lalli et al. (1993). They spent time (8-hours) training teachers to select appropriate treatments from hypothesised functions. The training included observations and recording the target behaviours and practice in implementing response blocking and DRA procedures. The trainer then picked an intervention and trained teachers to individualise procedures to reduce challenging behaviours. The training involved instructions, modelled procedures, immediate performance feedback including descriptive praise and error correction. The study

revealed the teacher implemented interventions reduced problem behaviour, however, the study did not include any fidelity measures for teacher's behaviour (Flynn & Lo, 2016).

Current research on staff training of FBI has incorporated fidelity measures to show teachers can implement intervention after training with high fidelity. The high-fidelity scores, however, are highly correlated with access to coaching or performance feedback. Auld et al. (2010) trained pre-service teachers using a 1-hour workshop and individual feedback meetings following direct classroom observation to measure their ability to implement DRA procedures. The results showed that student teachers increased their number of correct DRA responses to increasing hand-raising and decreased calling out with students. A further study by Noell et al. (2005) measured teachers' implementation integrity of written treatment plans following consultation and found that performance feedback, as a follow-up procedure, successfully improved treatment integrity. Their results of the performance feedback condition were significantly higher than the consultation alone condition, indicating that performance feedback is an essential element in sustaining levels of treatment integrity.

More recently Bethune & Wood (2013) measured effects of coaching on special education teachers' implementation of FBI's with students with severe disabilities. Their results indicated a functional relationship between coaching and an increase in teacher fidelity scores for FBI implementation. There was a strong relationship between improvement in student behaviour and coaching conditions and for interventions without coaching behaviour data was inconsistent. For FA (specifically TBFA) methods to be effective when used in addressing challenging behaviour, further research on fundamental elements including performance feedback in FBI training and professional development for teachers is crucial.

Limitations in Current Research

An area of limited research is the use of FA methods with typically developing students, and more specifically, students who are displaying disruptive behaviours. Most of the current literature focuses on students with a wide range of disabilities, in particular students with developmental, emotional and behaviour disorders (Hanley et al., 2003).

Moore and Edwards (2003), however, is one of the few studies to show positive effects of FA procedures with typically developing students. They evaluated the effects of social variables and task difficulty on escape-maintained problem behaviour with four students in a typical classroom (three of them were identified as typically developing) and found an increase in engagement and decrease in problem behaviours when teachers praise and reprimands (positive and negative reinforcement) were manipulated based on individual FA results (Shumate & Wills, 2010).This study demonstrates the effectiveness of employing FA methods with typically developing children to reduce problem behaviours. More specifically, the authors explained the results from the FA made it possible for them to understand how teacher attention (i.e., in the form of reprimands and praise) influenced escape-maintained behaviour to design effective interventions to increase engagement and desirable behaviours (Moore & Edwards, 2003).

Further limitations specific to teacher implemented TBFA and FBI, is the lack of generalisation measures to assess teacher's independence with the skills (Machalicek et al., 2009; Wallace et al., 2003). Current research on teacher skill acquisition has assessed some generalisation variables, for example, training teachers to assess three different students at staggered stages of their training, demonstrating a level of generalisation (Christensen et al., 2008). Also, Poole et al. (2012) examined generalisation by demonstrating a teacher could assess

behavioural function across a whole class and Bethune & Wood (2013) demonstrated teachers could generalisation FA and FBI with fidelity to new situations with target students. However, research is still limited on the generalisation of TBFA and FBI procedures to new students.

Finally, few studies have collected data on teachers' perceptions of procedures. Social validity is a critical feature in the applied behaviour analysis field as to have an applied study, the behaviour being analysed and changed must be important to the individual (Baer, Wolf, & Risley, 1968; Wolf, 1978). For example, teachers need to feel that behavioural assessment and behaviour change procedures are efficient, easy to use and are effective in addressing students' challenging behaviour in school settings for them to implement on a consistent basis (Flynn & Lo, 2016).

To address the limited generalisation and social validity measures a recent study by Flynn & Lo (2016) included generalisation and social validity measures while studying teacher's ability to acquire skills needed to run a TBFA and FBI procedures in a classroom with students who were diagnosed with ASD or E/BD. The study aimed to determine the effects of a Behavioural Skills Training model (consisting of instructions, modelling, behavioural rehearsals, and performance feedback) on teachers' reliable implementation of TBFA and DRA procedures. They found that the teachers could run the skills proficiently during the training phase and were also able to implement the skills with a new student on their own demonstrating generalisation. Furthermore, when measuring social validity using a post-intervention acceptability and importance of effects survey they found that teachers indicated TBFA and FBI had an overall positive impact on student behaviour.

Current Research Aims

The purpose of the present research is to expand current findings and implement a training program for mainstream teachers to use TBFA and FBI methodologies in their classrooms with students who present with disruptive behaviours. The following research questions will be addressed; What effect will behavioural skills training and performance feedback on teachers' reliable implementation of TBFA and FBI procedures? What effect will teacher-designed and delivered FBI's have on typically developing students' disruptive behaviours? What will the classroom teachers' perspectives be on the importance, acceptance, and effectiveness of the TBFA procedures and the subsequently designed FBI plans? The aim of the study is for the teachers to carry out TBFA and FBI procedures with high fidelity after training and performance feedback which consequentially will reduce student's disruptive behaviours. By implementing the techniques, the hypothesis is that teachers will gain receptiveness to the process and increase their understanding of behavioural principles including functions of behaviour and reinforcement and increase the likelihood they will continue to implement them.

Chapter 2: Method

Ethical Approval

Ethical approval was obtained from the School of Psychology Research Ethics Committee, with approval number # 16:67.

Participants

Teachers.

Teachers from a mainstream primary school were approached to volunteer to participate in the study. Two female teachers agreed to participate and both were

assigned to the prep grade levels for the year. Teacher 1 was in their fifth year of teaching and had no previous experience with the functional assessment or functional behavioural intervention methods but had some experience working with children with autism and had implemented individual token economies and behaviour plans in previous years. Teacher 2 had been teaching for three years and had no experience with functional assessment and behavioural interventions theories or methods but had worked with two students with high behavioural needs in the past so had some experience with using individual token economies.

Students

Each teacher participating in the study nominated a student that presented challenging behaviours that were disrupting during normal classroom instructions at a level that needed addressing. The teachers also chose a second student who also presented with challenging behaviours to independently implement some of the skills they developed with their first student to measure generalisation of skills. For all students selected the teacher approached parents at the end of the school day and gave the information sheet and consent form to request permission for students to participate in the study. Once consent was granted the researcher gathered further information about the behaviour using the open-ended behaviour assessment questionnaire (Appendix J) and observed the students during two 30-min observation periods that were at different times of day and included an array of classroom activities including mat times, group work and independent work. If the behaviour occurred at a frequency of more than five times or lasted longer the 15-min (half of the observation time) or there was less than 1-min between each occurrence of the behaviour, then it was considered applicable for this study.

All student's information including gender, age and topography of behaviour is displayed in Table 1. Student A had no formal diagnosis of any

developmental or behavioural disorder. The student was aged 5 and enrolled in the mainstream foundation grade (prep). The student had previously been in a mainstream kinder setting, however, the kinder had recommended repeating a year before enrolling in a primary school setting. Parents opted not to repeat kinder and decided on the primary school enrolment. The challenging behaviour described by the teacher was a high level of off-task behaviour across all class activities but mainly during mat times. The off-task behaviour was operationalised as 3 consecutive seconds of students gaze not being oriented towards the teacher, whiteboard or materials (as appropriate for the task). Inappropriate sitting was also included as an off-task behaviour during mat times as it was a clear indicator that attention was not on task. This behaviour was operationalised as 3 consecutive seconds of student's legs not being in the cross-legged position.

Student B also had no formal diagnosis of any developmental or behavioural disorder. The student was aged 5 and enrolled in the mainstream foundation grade. The challenging behaviour described by the teacher was off-task disruptive behaviours including not engaging in mat times or correct work activities and singing during inappropriate times. The student's behaviour was operationalised as 3 consecutive seconds of students gaze not being oriented towards the teacher, whiteboard or materials (as appropriate for the task) and not completing correct work activity, for example, drawing pictures instead of handwriting activity. Vocalisations were also included and operationalised as any instance of singing behaviour in the classroom not relating to the work task.

Student C had no formal diagnosis of a behavioural or developmental disorder. The student was aged 5 and enrolled in Teacher 2's mainstream foundation grade (prep). The challenging behaviour was described by the teacher

Table 1.

Target Student Information Including Gender, Age Reported in Years and Topographies of Disruptive Behaviours.

Student	Gender	Age	Topographies of Disruptive Behaviour.
A	Male	5	Off- task Behaviour (Not sitting with legs crossed or orientating towards teacher or materials for more than 3s)
B	Male	5	Off-task Behaviour (Not orientating towards teacher or materials for more than 3s, engaging in non-work tasks i.e. drawing and vocalisations i.e. singing)
C	Male	5	Off-task Behaviour /Elopement (moving away from designated work area not relating to the work task)

as not staying on task and continued walking around the room. This behaviour was operationalized as elopement; getting up and moving away from the designated work area not relating to the work task.

Setting

The research was completed at a government-funded mainstream primary school in Melbourne Australia. The school has an enrolment of 150 students and has an average of 13% percent of students in each class who are eligible for extra

assistance from a general classroom aid or behavioural therapists. All observations, trials and sessions occurred at the student's school during their typical school day sessions. Students are at school Monday to Friday from 8:50 am-3:10 pm. The trial-based analysis took place in a mainstream classroom alongside their classroom peers. In the first classroom with teacher 1, there were 24 students with a teacher and an additional aid/therapist. In the second classroom with Teacher 2, there were 23 students with a teacher and no formal additional support. Both classrooms work on the Victorian Schools Prep level curriculum.

Materials

Teachers were given training packs during the initial training which included all materials they would need during the training. These training packs included general information (i.e. information sheets, contact details and research summary), a copy of the slides for TBFA and FBI training and training materials including open-ended functional assessment interview (Appendix J), A4 and A3 handouts of how to carry out TBFA conditions (Appendix D), preference assessment information and data sheets (Appendix K), TBFA Datasheets (Appendix L), Time sampling data sheets (Appendix I), steps on how to graph data using excel graphing sheet shared with teachers and FBI design templates (Appendix M). Teachers were also required to use their iPhone as a timer for TBFA conditions and FBI data collection.

Procedures

Phase 1: TBFA Training and Implementation

Teacher Training. To begin the study teachers participated in a 1-hour training session run by the researcher. The training consisted of teaching and practising correct implementation of TBFA trial types and data collection. The researcher

explained the rationale for when and why TBFAs are completed and discussed research to show their effectiveness in school settings. The rationale and evidence for identifying functions to lead to effective interventions to decrease disruptive behaviours was also discussed. The experimenter showed functional analysis conditions video examples (Brynosaurous, 2012) and demonstrated examples of TBFA trial types. To make sure all information was covered across both teachers training the researcher followed a training plan checklist adapted from Flynn & Lo (2016) study (Appendix E). The researcher then organised an initial session with each teacher to begin their TBFA data collection. The session began by the researcher reviewing each condition before the teacher implemented them. For the first two trials of each condition, the researcher gave feedback if there were any parts of the procedure the teacher had difficulty with or did not complete correctly. Once the researcher had observed each condition at least twice the teacher continued to implement the rest of the TBFA with their student independently. Prior to the initial TBFA session, each teacher had organised for a paired stimulus preference assessment to be conducted with each student. The procedures for the assessment were part of the initial training.

TBFA Experimental Design and Measurement

The TBFA phase used a multi-element design whereby children were exposed separately to different test and control conditions to see which conditions result in the highest percentage of occurrences of behaviour. In completion of all conditions, data were graphed for each student to examine the results of the TBFA. The participating teachers were the primary implementers and data collectors for the TBFA and proceeding interventions in their classrooms. During the TBFA occurrence/non- occurrence data sheets were used to measure the target disruptive behaviour (Appendix L).

TBFA Procedures

In this study, TBFA sessions ran for an average of 45-min. For Students A and B both teachers ran a 30-min and a 20-min session totalling 50-min across two days. Teacher 2 then ran one 35-min session for Student C. The trials were run on a shorter time segment; 1-min control then 3-min test. The control segment occurred at the beginning of each condition and during this, the child was not exposed to any suspected antecedents for the target behaviours. After the 1-min control, the teacher began the test segment where potential antecedents were introduced. If the target behaviours occurred during the control or test segments, the segment was discontinued because, for the purposes of this study, the researcher wanted to track occurrence versus non-occurrence within each condition, not their frequency or duration. Teachers ran at least five trials for Demand and Attention conditions and at least four trials of the Tangible and Ignore conditions. Data collected from the TBFA trials were graphed by the teacher and researcher to identify the likely function of the disruptive behaviours. You can see an example of this in Appendix N.

TBFA Conditions

Attention. During the control segment, the teacher sat with the child and a preferred activity item was always available including books, colouring activities and drawing materials. A range of preferred items was identified using a paired stimulus preference assessment before beginning any testing with each student. The teacher delivered attention (at least every 20s) throughout the segment. At the end of the control segment, the test segment began. The teacher initiated the test segment by stating that she "had to do some work" and moved away from the child. If the child engaged in the target behaviour, the teacher faced the subject and issued attention in response to the behaviour.

Demand. During the control segment, the child was seated with access to leisure or moderately preferred materials. The teacher also provided attention (at least every 20s). Target behaviour produced no consequences except for trial segment termination. At the beginning of the test segment, the teacher initiated instructional trials by moving back the preferred items and introducing a work task, using a three-step prompting sequence (vocal prompt, modelled prompt, and physical prompt) to assist the student in starting. Once the student started the teacher turned away from the student or in some cases walked 1-2-meters away. If the subject engaged in the target behaviour, the teacher terminated the segment by removing work and turning away.

Tangible. During the control segment, the teacher was seated with the child, who had access to their highly-preferred item as determined by the preference assessments completed prior to testing. Each student's choice of highly preferred item is discussed below. At the beginning of the test segment, the teacher removed any preferred items from the child's reach, but within view, and kept items out of the child's reach for 3-min. If target behaviour occurred, the teacher gave the item to the child immediately and the segment was terminated.

Ignore. Instead of a control and test segment, the ignore trials consisted of two consecutive 2-min test segments where the child was seated away from others, without leisure or task materials. Target behaviour produced no consequences and did not terminate that segment of the trial.

Procedural Fidelity

To measure the teacher's ability to carry out the trial conditions during the TBFA the teachers were scored across two sessions using a 54-step procedural fidelity checklist adapted from Flynn & Lo (2016) (Appendix G). The checklist included the list of trials types the teachers need to complete, the behaviour the teachers need to exhibit during each trial type, the antecedent and consequential behaviours the teacher needs to apply to each trial type and the responses needed when the challenging behaviour occurs. The researcher observed the first session the teacher implemented the conditions and gave performance feedback in the form of explicit praise for correct trials and verbal feedback during and after trials for every point the teacher did not implement correctly. The researcher then observed a second session after the teacher had been implementing the conditions independently and took data on the teacher's behaviour without providing any feedback. The procedural validity checklist was also used to measure the Teacher 2's ability to carry out the TBFA independently with a new student. The researcher observed Teacher 2's TBFA session and completed the checklist without giving any performance feedback.

Phase 2: Function-Based Interventions (FBI)

Teacher Training. Both teachers participated in an additional 1-hour training session to develop function-based interventions from data collected during their TBFA. The training began with a presentation of information on applied behaviour analysis principles used in designing behavioural interventions including differential reinforcement, extinction, punishment and response costs (Cooper et al., 2007). The researcher then mapped out behaviour patterns including common setting conditions, antecedent triggers, target behaviour, desired behaviours, replacement behaviours, maintaining consequences and

function using data from each of the students TBFA and general observations. Once antecedent and consequential events had been discussed teachers used the FBI template (Appendix M) to design an intervention that addressed the function, would be applicable to a classroom setting and able to be implemented by the teacher within their teaching role. The template used by the teachers covered the main points required for an FBI including the descriptions of the behaviours, common antecedents, reinforcement schedule, preferred items to use as reinforcement, data collection procedures, phases of intervention, mastery criteria and proactive replacement skills and reactive behaviour management plan. To implement the interventions the researcher worked with the teacher during the first session to demonstrate and give feedback to teachers attempts.

FBI Measurement and Experimental Design

To measure student's behaviour during FBI implementation, the teachers designed data collection methods for each student to measure occurrences and non-occurrences of behaviour, however, the researcher included more comprehensive data collection measures to use for research purposes. For all student's, the partial interval recording data collection was used to record percentage of intervals where target behaviour occurred (Appendix I). This data collection method was chosen as the target behaviour occurred over long durations within a single instance of the behaviour. The researcher observed ten sessions after FBI implementation. Within each session, at least four intervals were recorded. Each interval ran for 3-mins and recorded target behaviour occurrences (+) or non-occurrences (-) over 10s intervals. To measure changes in target behaviour the percentage of target behaviour was averaged across all intervals in each session. For FBI data analysis, a multiple baseline across participants was used. This design could determine the efficiency of the function

based intervention based on the information gained during the TBFA. For each student, a baseline condition before the intervention was in place until a steady baseline was evident.

FBI Teacher Behaviour Treatment Integrity

The ability for teachers to design and carry out FBI procedures was measured using a procedural fidelity checklist (Appendix H) scored by the researcher. The researcher analysed FBI templates (Appendix M) submitted by the teachers which recorded their FBI information and three observation sessions in the classroom to observe its implementation. The design phase was measured using a 13-point checklist including items such as able to operationalise behaviour, data collection procedures and reinforcement and extinction procedures. The implementation phase was measured using a 6-point procedural integrity scoring sheet highlighting key behaviours the teachers should be implementing with their FBI including delivers reinforcement contingent on behaviour, removes reinforcement during extinction procedures when applicable, follows reactive plan when target behaviour occurs, uses prompt hierarchy or strategies as described in the FBI design, records data correctly, moves through phases.

Interobserver agreement (IOA)

Interobserver agreement (IOA) data for student off-task behaviour during baseline and interventions was collected by an independent behavioural therapist who was trained to observe at least 35% of observation sessions for each participant. For the IOA data collection, the observer was given operational definitions of behaviour and trained to collect individual data using partial time sampling methods. The independent observer took data with the researcher but they were situated in different areas of the room with no verbal contact. The researcher would start time sampling trials by giving the independent observer a signal to

start their timer at the same time. Trials were discontinued of one of the observers had an obscured view. IOA was calculated using point by point analysis (Cooper, et al., 2007) where the number of agreements was divided by a total number of agreements and disagreements and multiplied by 100.

Generalisation

To assess the generalisation of procedures, Teacher 2 implemented TBFA and FBI procedures with a new student. Once Student B had started their intervention phase, the teacher conducted their TBFA generalisation session on Student C. They ran at least 5 trials of each of the four condition of the TBFA independently over a 1-day period. The teacher independently recorded occurrence and non-occurrence data and graphed their data to observe what conditions had the highest occurrence of the target behaviour. The teacher then met with the researcher to review the data and design an intervention to target the behaviour. For FBI generalisation, the researcher scored the teachers independently developed intervention plan and observed the implementation with the student to score on FBI fidelity checklist (Appendix H).

Social Validity

To measure the social validity of the TBFA and FBI training when the study ceased both teachers filled out a post-intervention acceptability and importance of effects survey (see Appendix F for the form; Lane & Beebe-Frankenberger, 2004). The survey included 11 closed-ended questions which required the teachers to answer using a Likert scale from 1 (strongly disagree) to 5 (strongly agree). The closed-ended questions were included to measure the acceptability, effects and importance of the TBFA and FBI training. There were also two open-ended questions asking for information on what teachers enjoyed and any changes

they would make to the TBFA and FBI training. This gave the teachers the opportunity to offer additional feedback information of how they felt about the usefulness of the training. The survey took approximately 15 min to complete.

Chapter 3: Results

Interobserver Agreement (IOA)

During FBI implementation sessions, a criterion for IOA was set at 78% meaning any intervals that recorded IOA less than this were not to be used to make decisions about student behaviour. To record IOA data an independent observer recorded partial interval data on each student's behaviour for 35% (16/45) for Student A, 36% (18/50) for Student B and 35% (17/49) for Student C across baseline and intervention sessions. IOA was calculated using point by point analysis (Cooper et al., 2007) where the number of agreements was divided by total number of agreements and disagreements and multiplied by 100. All IOA data calculations are presented in Appendix O. The results show Student A averaged 92% and ranged from 83% to100%. Student B averaged 91% and ranged from 78% to100%. Student C averaged 99% and ranged from 94% to 100%.

TBFA Procedural Validity

The procedural validity outcome measures for each teacher's behaviour using the TBFA are presented in Tables 2, 3 and 4. The results showed that after the initial training Teacher 1 implemented the TBFA methods with 88% accuracy and Teacher 2 with 70% accuracy. After feedback, both teachers increased their accuracy with Teacher 1 bringing their score up to 98% and Teacher 2 to 100%. Table 3. presents specific areas the teachers required feedback on, weaknesses in the integrity of teacher's behaviour and any failed segments. Teacher 1 required feedback during the Demand condition to remove the work and turn away immediately when target behaviour occurred. They recorded two failed segment both during attention conditions where they were interrupted by other students.

Table 2. *Scores on Procedural Validity Checklist for Teachers 1 and 2.*

Teacher	Before Feedback	After feedback	Generalization
1	88%	98%	
2	70%	100%	98%

Table 3. *Weaknesses in Integrity and Failed Segments during Initial TBFA Feedback Session for Teachers 1 and 2*

Teacher	Condition	Weaknesses in Integrity	Number of Failed Segments
1	Attention	n/a	2 (teacher interrupted by other students on both occasions)
	Demand	Teacher needed prompting to remove work before recording data.	0
	Tangible	Teacher did not immediately return activity contingent on target behaviour.	0
	Ignore	n/a	0
2	Attention	Did not move far enough away from student to remove attention Did not provide attention contingent on target behaviour	1 (peer provided attention)
	Demand	Teacher needed prompting to remove work before recording data.	1 (teacher recorded occurrence of off-task behaviour and then realised student was reading numbers for work task)
	Tangible	n/a	0
	Ignore	Teacher needed assistance setting up area for condition	0

Table 4.

Weaknesses in Integrity and Failed Segments during Generalization TBFA Sessions for Teacher 2.

Teacher	Condition	Weaknesses in integrity	Number of failed segments
2	Attention	n/a	0
	Demand	Did not remove work task immediately	0
	Tangible	n/a	0
	Ignore	n/a	0

Teacher 2 required feedback during the demand condition to remove work and turn away when target behaviour occurred. They also required assistance setting up the Ignore condition for the first trial so was not able to implement any of the items correctly. Teacher 2 recorded two failed trials overall. One was during the test segment of the attention condition where peers provided attention to target students and the second during the demand condition where the teacher ended the test segment and recorded an occurrence of target behaviour but realised student was reading numbers on the wall to help them with their work task.

Table 4. presents data on the TBFA generalisation measure and show Teacher 2 scored 98% on the procedural validity checklist when implementing TBFA procedures with a new student (Student C). Teacher 2 failed to remove work immediately during one of the observed demand segment and recorded no failed trials.

TBFA Results

TBFA were completed for all three students. The results from the TBFA were used to hypothesise the function of behaviour to use to develop the FBI. Prior to implementation of TBFA procedures teachers conducted a Paired Stimulus Preference assessment with each student. The results from the preference assessment concluded that IPad was the strongest preference for Student A and C while colouring activities were the strongest for Student B. All students moderately preferred books, blocks and dress up's. These preferences were used in the tangible condition.

Figure 1 Shows student A's TBFA results. Student A's off-task behaviour occurred in 0% of the test and control intervals in the Attention conditions, 100% of the test intervals and 0% of the control intervals in the Demand conditions, 0% of the test and control intervals in the Tangible conditions and 50% of the observed Ignore control and test conditions.

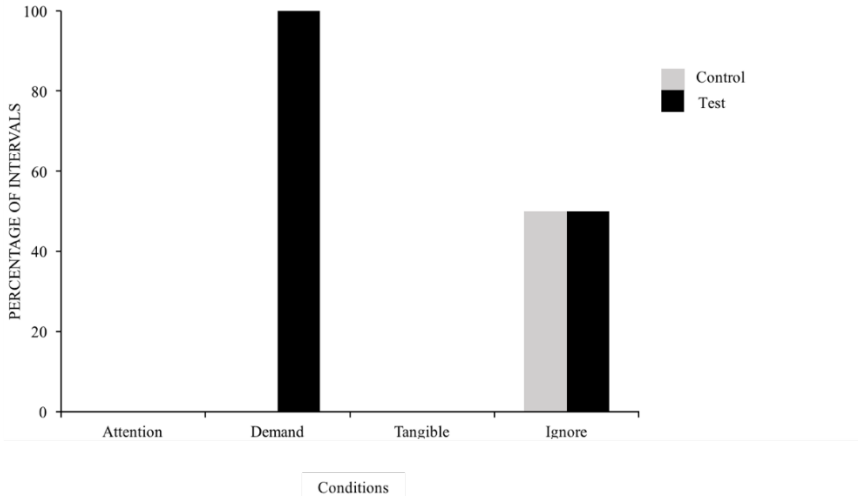

Figure 1. TBFA results for Student A's off-task behaviour in the classroom

Figure 2 Shows Student B's TBFA results. Student B's off-task behaviour occurred in 14% of the test and 0% of the control intervals in the Attention conditions, 80% of the test and 0% of the control intervals in the Demand conditions, 100% of the test and 0% of the control intervals in the Tangible conditions and 100% of the observed Ignore control and test condition.

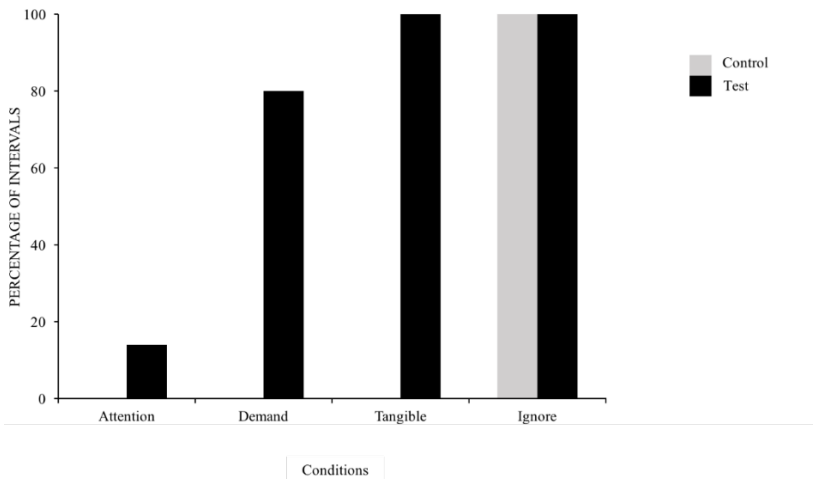

Figure 2. TBFA results for Student B's for off-task behaviour in the classroom.

Figure 3 shows Student C's TBFA results. Students C's off-task behaviour occurred in 86% of the test and 0% of the control intervals in the Attention conditions, 29% of the test and 0% of the control intervals in the Demand conditions, 29% of the test and 0% of the control intervals in the Tangible conditions and 100% of the observed Ignore control and test conditions.

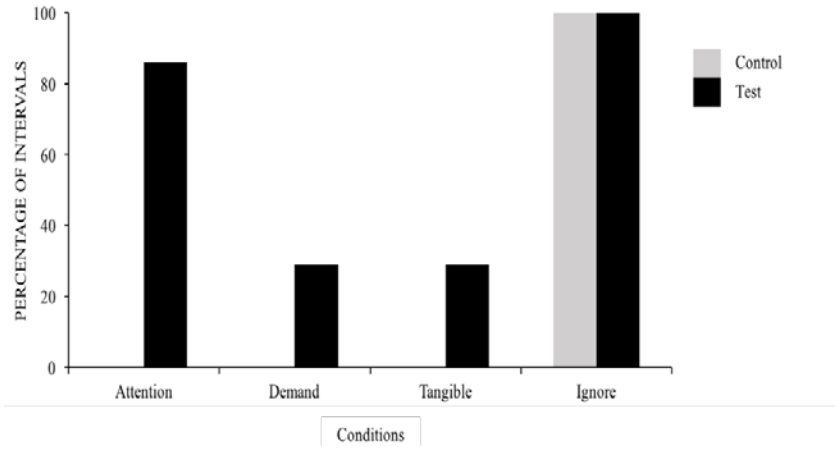

Figure 3. TBFA results for Student C for elopement behaviour in the classroom.

FBI Design

Summaries of each student target behaviour, hypothesised function and function-based interventions developed are presented in Table 5.

Student A had the highest occurrences of target behaviour in the Demand condition. Their behaviour was hypothesised to function as an escape from work demands. The intervention implemented was Differential Reinforcement of Other Behaviour (DRO)/Omission Training. The teacher delivered reinforcement when the target behaviour had not occurred during specific time periods that were systematically increased. The student was also taught a replacement skill of sitting with legs crossed when on the floor.

Student B had the highest occurrences of target behaviour in the Demand, Tangible and Ignore conditions. The behaviour was hypothesized to function as automatic as it occurred at a high rate over at least three conditions and seemed to not be affected by social reinforcement. The intervention implemented was a First/Then program where access to preferred activities was contingent on on-task behaviour during closed-ended work tasks for example first finish five maths problems and then you can colour a picture.

Student C had the highest occurrences of target behaviour in the Attention condition. The behaviour was hypothesised to function as access their teacher's attention. The intervention implemented was Differential Reinforcement of Alternate Behaviour (DRA). The teacher delivered her attention contingent on the replacement behaviour of staying in their chair and raising their hand. The being out of chair target behaviour was put on extinction by removing attention when behaviour occurred. The student was taught to stay in their seat and raise their hand to access the teacher's attention.

Table 5.

Target Student Information Including Topographies of Disruptive Behaviours, Hypothesised Function, Interventions implemented and Replacement Behaviours.

Student	Topographies of Disruptive Behaviour.	Function	Function-Based Interventions
A	Off-task (Not sitting with legs crossed or orientating towards teacher or materials for more than 3 s)	Escape from Demand.	DRO Replacement Behaviour: Sitting with legs crossed during mat time.
B	Off-task (Not orientating towards teacher or materials for more than 3s, engaging in non-work tasks i.e. drawing and vocalisations i.e. singing)	Automatic	First/Then Contingency Program.
C	Off-task elopement (getting up and moving away from designated area not relating to the work task)	Access to Attention	DRA + Extinction Replacement Behaviour: Stay in their seat and raise their hand.

Student's Behaviour

The results for challenging behaviours before and after FBI for each student are presented in Figure 4. The figures show the percentage of intervals in which target behaviour occurred across baseline and intervention conditions. The results for all three students show reduction in the percentage of intervals the student was exhibiting target behaviours.

Student A's target behaviour was off-task, operationalised as not sitting with legs crossed or orientating towards teacher or materials for more than 3s. The function of the behaviour was mediated by negative reinforcement, i.e., avoidance of work demand. Prior to intervention the teacher would intermittently give feedback about sitting properly, paying attention, and to continue his work

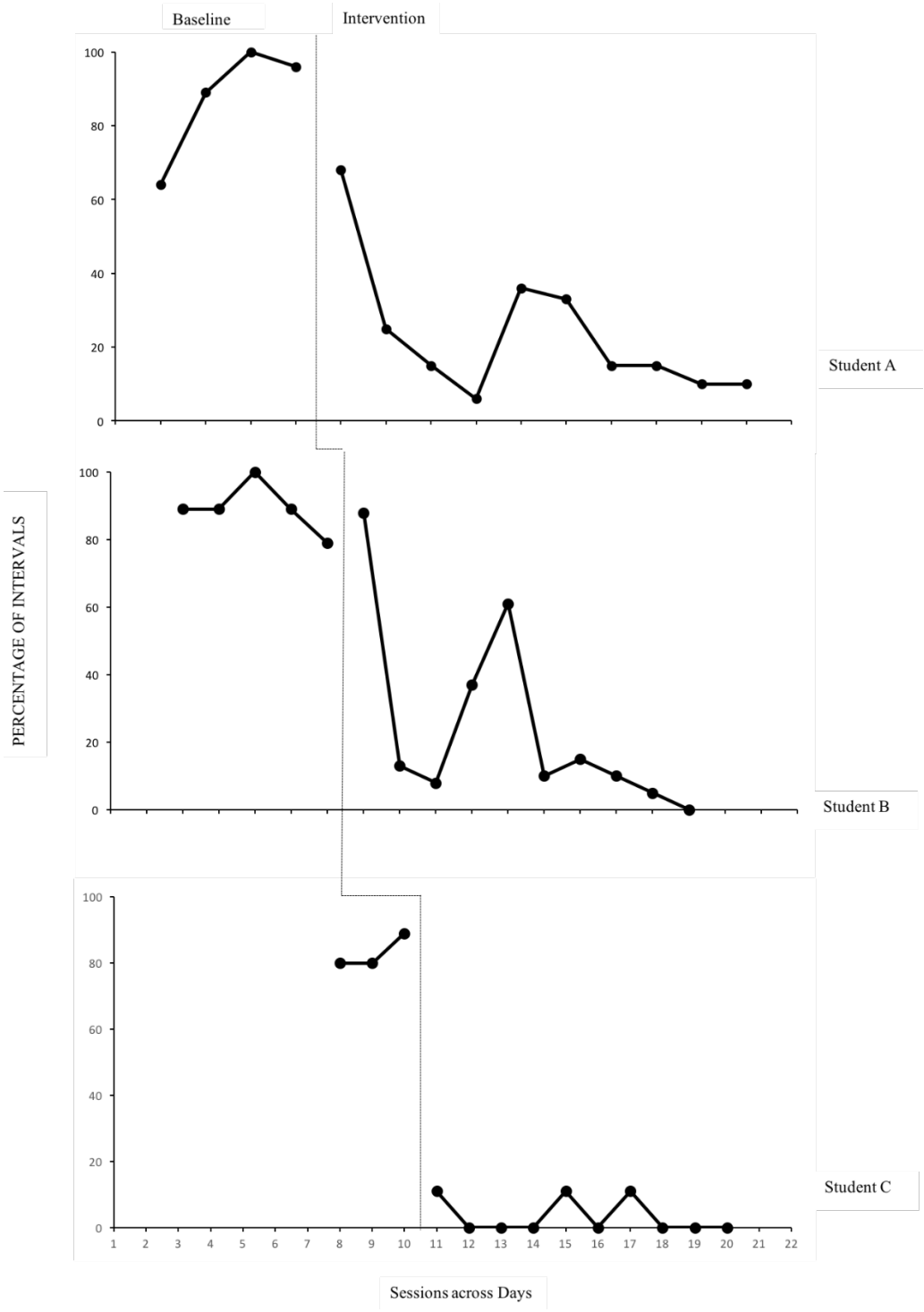

Figure 4. Percentage of intervals with off-task behaviour for Students A, B and C.

and then would ignore the student, allowing him to not engage in the work task/activities. The FBI design plan for Student A involved a DRO + replacement skill procedure during mat times. The student was provided with a reinforcer every 3-min in the absence of off-task behaviour. If off-task behaviour occurred the

timer was stopped and the student was prompted to look at teacher or materials and sit with legs crossed. When student exhibited appropriate behaviours with the prompt, the teacher waited for 20s and restarted the timer. Figure 4 shows, for Student A prior to intervention, that the percentage of intervals where off-task behaviour occurred ranged from 64% to 100% averaging 87% across four baseline sessions. After FBI, the intervals of off-task behaviour steadily decreased stating at 68% and reducing to 11% across the ten observed intervention sessions.

Student B's target behaviour was off-task, operationalised as not orientating towards teacher or materials for more than 3s, engaging in non-work tasks, i.e.. drawing and vocalisations (singing) not relating to work task. The function of the behaviour was hypothesized as automatic and not mediated by social reinforcement. Prior to intervention behaviour occurred at a high rate throughout the day regardless of activity or teachers feedback or response to behaviour. The FBI for Student B was a First/Then program, where the teacher used a visual board to show the student a close-ended task they needed to complete before having access to preferred items (including off-task behaviours i.e. drawing). Tasks were limited to short duration 5-10 min and the teacher made sure the student understood the task before sending them off to complete it. If off-task behaviour occurred the teacher gave feedback and paused the activity delaying access to reinforcement. Once student reengaged in the appropriate behaviours the teacher moved away from the student. Figure 4 shows for Student B, prior to intervention, that the percentage of intervals where behaviour occurred ranged from 79% to 100% averaging 89% across five baseline sessions. By the end of FBI observed sessions the intervals of off-task behaviour had reduced to 0% and ranged from 88% to 0% across the ten observed intervention sessions.

Student C's target behaviour was off-task, operationalised as eloping from work area for a reason not related to the work task. The TBFA data indicated the function was that behaviour was mediated by positive reinforcement in the form of teacher's attention. Prior to the intervention, the teacher would respond the student's questions, comments or requests when they had left their work area to find the teacher. The FBI design plan included DRA+ extinction procedures. The student was taught the replacement skill of waiting at their table and raising their hand to get their teachers attention. The elopement behaviour was also placed on extinction whereby the teacher would ignore any request, comment or question from the student if they were out of their chair. The teacher used gestural prompts to direct the student to their chair and pointed to visual prompts to show the student they needed to raise their hand. The schedule of differential reinforcement was set at FR 1 where the student was reinforced with praise and teacher's attention every time they raised their hand to establish the new behaviour. Figure 4 shows for Student C prior to intervention the percentage of intervals where off-task behaviour occurred ranged from 80-89% averaging 83% across three baseline sessions. After FBI, the intervals of off-task behaviour immediately reduced to 11% and ranged from 11% to 0% across the ten remaining observed intervention sessions.

FBI Procedural Fidelity

Results for teacher's procedural integrity for FBI design and implementation are presented in Table 6. Both teachers demonstrated they could implement the FBI procedures with 100% fidelity even when Teacher 2 implemented procedures with a new student. Teacher 2 required assistance with 6/13 (54%) parts of Student B's FBI design but increased the fidelity of FBI design to 92% when generalising the

skill with a new student. Both teachers required prompting to set up mastery criteria with all three students.

Table 6.

Weaknesses in Integrity during FBI design and Implementation Sessions for Teachers 1 and 2

Teacher/ Student	FBI Design	FBI Implementation	Weaknesses in Integrity for Design
1A	85%	100%	Required prompting to - Identify likely maintaining consequence - Set up mastery criteria for success.
2B	54%	100%	Required prompting to - Identify maintaining consequence - Task analyse behaviours - Select reinforcement strategy - Minimise reinforcement for undesirable behaviour strategies. - Set Mastery for success criteria -
2C	92%	100%	Required prompting to: - Set up mastery criteria for success

Social Validity

To measure teacher perceptions of the effectiveness of the training, outcomes and their receptiveness to the TBFA and FBI training, a validity questionnaire was given to each teacher. The questionnaire (see Appendix F) included 11 Likert-style questions where 5 indicated strongly agree and 1 indicated a low level of agreement. Teachers' individual responses and the average rating across both teachers for each question are presented in Table 7. After completing the interventions for at least 10 days both teachers scored highly (>4) on the usability

Table 7.

Teacher Post-Intervention Acceptability and Importance of Effects Survey.

Questions	Teacher 1	Teacher 2	Mean
1. Procedures for conducting TBFA were easy to learn.	4	4	4
2. Procedures for conducting the TBFA were easy to perform in the classroom .	3	4	3.5
3. Procedures for designing and conducting the intervention were easy to learn	4	5	4.5
4. Procedures for designing and conducting the intervention were easy to perform.	4	5	4.5
5. The intervention increased my students' appropriate behaviour.	5	5	5
6. The intervention decreased my students' disruptive behaviour.	4	5	4.5
7. My students appeared to like and respond to the intervention well.	5	5	5
8. I will use the TBFA again with my students.	4	5	4.5
9. I would recommend the TBFA to other teachers.	4	5	4.5
10. I will use the intervention again with the same students or other students.	4	5	4.5
11. I would recommend the intervention to other teachers.	4	5	4.5

of procedures in their classroom and indicated the interventions had positive effects on behaviour. Both teachers indicated that procedures for designing and conducting interventions were easy to learn and that procedures for designing and conducting interventions were easy to implement. They both also indicated that the intervention increased their students' appropriate behaviour overall, and decreased inappropriate behaviours. Further, Teachers 1 and 2 indicated that their students appeared to respond to and like the intervention overall. Overall, all teachers reported that they would use the TBFA and intervention procedures again with other students and would recommend them to other teachers. Results from all closed-ended social validity questions are shown in Table 5.

On the open-ended questions, Teacher 1 stated they enjoyed implementing the TBFA and found it interesting to discover the functional relationship behind behaviours they were observing. Teacher 2 stated They enjoyed the behaviour analysis information in the training and the training video examples of FA conditions. They also found mapping out behaviour pathways for each student beneficial.

Chapter 4: Discussion

Overview of Findings

The purpose of this study was to evaluate the effectiveness of training and performance feedback on the teacher's ability to reliably implement TBFA and FBI procedures with students in their classroom who present with disruptive behaviours. In addition, this study sought to measure the effects of the procedures on student's behaviour and discuss the applicability of teachers using these skills in an ongoing capacity.

The results of the current study indicate that two mainstream primary school teachers could implement TBFA procedures with high procedural integrity before (i.e. Above 70%) and after (i.e. Above 98%) performance feedback. The study was also able to demonstrate that one of the teachers generalised the skills from training to a new student with high procedural integrity (i.e. 98% accuracy). Furthermore, the time all three students spent off-task decreased after FBI implementation, further validating the ability of teachers to accurately identify functions of behaviour. Finally, both teachers submitted high scores on the post acceptability and outcome survey, strongly indicating they saw positive effects on student's behaviours and agreeing that procedures were easy to perform in their classroom.

TBFA Training Effects

Few studies have included teachers as the primary interventionists using FA procedures (e.g., Barretto et al., 2006; Ellingson et al., 2000; Moore et al., 2002; Wallace et al., 2004). For the ones that have, however, high levels of procedural integrity on teacher implementation of FA are reported (i.e., Barretto et al., 2006; Ellingson et al., 2000; Moore et al., 2002; Wallace et al., 2004). The current

research found using behavioural skills training with performance feedback was effective in training teachers to implement TBFA and FBI procedures with high fidelity in a short amount of time. TBFA training effects were measured by scoring teachers ability to carry out procedures with their students after training. Teachers participated in a 1-hour training session covering; TBFA descriptions, video examples of FA procedures, multiple exemplars and modelling of TBFA procedures. After training Teacher 1 demonstrated 88% accuracy and Teacher 2 70% accuracy of procedures with their students. After receiving performance feedback on the steps, they were not able to complete independently (displayed in Tables 3 and 4) both teachers increased their accuracy to 98% and 100% respectively. To further validate the teachers, acquisition of skill Teacher 2 demonstrated they could implement the TBFA with a new student with 98% accuracy indicating they had acquired the skills enough to generalise to another student.

The main difficulty both teachers had with TBFA implementation, was removing work immediately following behaviours. Both teachers did not score this point on the TBFA fidelity checklist. Furthermore, Teacher 2 was not able to demonstrate the skill during the generalisation phase. During observations of this skill, both teachers had their attention focused on the data collection and recorded their data before removing the work task, creating the delay. Teachers need to remove work immediately as the immediacy of delivering reinforcement can have large impacts on a student's responses (Neef et al., 1993). Further practice of the skill with performance feedback including explanations and rationales as to why the response is important may help reduce this problem in the future.

The results from teacher training successfully demonstrate TBFA's short assessment times under naturalistic settings, making setting aside large amounts

of time or organising supervision of other students for procedures no longer necessary. As described in previous research, standard FA's can take an average of 208-min to complete, whereas TBFA takes an average of 31.6-min to complete (LaRue et al., 2010). This study matched previously reported time frames with the TBFA's taking on average 45-min to complete. The reduced assessment times were partly due to the reduced number of trials run by each teacher. Initially, teachers set out to run ten trials of each condition, based on numbers from previous studies (Flynn & Lo., 2016) however, the researcher reduced this to at least five trials of Attention and Demand and four trials of Tangible and Ignore conditions. This decision was made based on the requirement for teachers to conduct the TBFA quickly without much disruption to their classes routines and data collected from the initial trials identified clear functions emerging during the conditions to use for FBI.

The FBI behaviour results showed that off-task behaviour reduced for all three students. This indicates teachers addressed the correct function with their interventions, confirming positive behavioural effects can still be achieved with data from a smaller number of trials of each condition. This reduction in assessment time gives teachers the ability to collect behaviour information without needing time-consuming additional measures (i.e., indirect, direct observations) or calling in extra behavioural support, enabling them to implement FBI's quicker and address behaviour sooner. Decreasing the amount of time problem behaviour occurs is also beneficial to the entire class by decreasing interruption of instruction time and freeing up the teacher to assist with all students.

Overall, the TBFA training outcomes are in line with previous studies by demonstrating that teachers who are unfamiliar with the theoretical principles of

FA were proficient in implementing procedures with a high level of accuracy in a short amount of time after training and performance feedback (e.g., Moore et al., 2002; Wallace et al., 2004) and generalised the skills to new students (Flynn & Lo, 2016).

FBI Training Effects

For studies, measuring teacher implemented FA, very few measure the teachers' ability with FBI methodology (e.g., Barretto et al., 2006; Flynn & Lo., 2016; Moore et al., 2002; Wallace et al., 2004). This study provides further evidence that it is feasible to use behaviour skills training procedures to train teachers to design and implement function-based interventions with their students. The current results show both teachers implemented their FBI with 100% accuracy after a single demonstration session with the researcher. These results further validate teacher's ability to follow written FBI plans with their students in a classroom setting with a high level of integrity (Auld et al., 2010; Noell et al., 2005.).

For FBI design, Teacher 1 designed their FBI with 85% accuracy immediately after training however, Teacher 2 required more assistance, only scoring demonstrating 54% accuracy on the fidelity checklist and requiring prompting on five parts of their design (See Table 6). This lower fidelity score could be due to the Student B's function being hypothesised as automatic reinforcement. Automatic reinforcement occurs when a person's behaviour creates a favourable outcome without the involvement of another person (Cooper et al., 2007). The lack of social contingencies effecting behaviour could make planning FBI's using social and tangible reinforcement contingencies (e.g. Differential reinforcement) more difficult. The researcher worked with the teacher on identify maintaining consequence, task analysing the behaviour, selecting appropriate

reinforcement strategy, minimising the access to automatic reinforcement for undesirable behaviour and setting mastery for success criteria to design an FBI implemented with Student B. The FBI was implemented with 100% accuracy and a reduction in target behaviour was observed indicating the intervention addressed the automatic function.

The FBI training outcomes indicate that, when the function is automatic, further training sessions involving designing FBI's may be required for teachers to design FBI's proficiently. It is, however, important to note that after the feedback, prompts and adjustments to Student B's FBI, the teacher designed an FBI for Student C with 92% accuracy demonstrating generalization of skill. Although the function was not Automatic, it does demonstrate the teachers' proficiency in designing FBI's using the differential reinforcement procedures covered in training.

Student's Behaviour Data

The Teachers in this study implemented a range of behavioural intervention methodology (DRA+ Extinction, DRO and First/Then contingency) in the classroom with high fidelity. All three student's off-task behaviour reduced over the intervention period, indicating all three FBI's implemented by the teachers, were effective in addressing the correct function. Additionally, the findings demonstrate the positive effects TBFA and FBI can have with typical students in a mainstream setting. Specifically, Student C's percentage of time engaging in off-task behaviour decreased dramatically from 89% during baseline to 11% after the first FBI session. The reason for the significant reduction in behaviour could be due to several reasons including; an increased proficiency if FBI skills for Teacher 2, or a higher ability of the student to acquire the FBI contingencies.

Studies have previously revealed that relative to children with behaviour disorders such as autism spectrum disorder, children who are developing normally display significantly higher scores on the acquisition of adaptive social skills, and less variability in adaptive skills when tested using Vineland Adaptive Behaviour Scale (Rodrigue et al.,1991). Student C had no formal diagnosis of emotional or behavioural disorders and demonstrated no indication of language or cognitive delay. These indicators may have increased the student's ability to understand the behavioural contingencies in place and quickly acquire new replacement skills that will get access to social reinforcement and to avoid them needing to engage in the off-task behaviour. These findings highlight typical developing student's abilities to understand the contingencies and acquire the replacement skills, to address to functions of maladaptive behaviours, in a short amount of time. Further emphasising the benefits of FBI in mainstream school settings.

Social Validity Findings

Both Teachers recorded high scores across all questions on the post-intervention acceptability and outcome survey. This indicates teachers found the methods user-friendly, effective in making positive behaviours changes, applicable to other students and recommendable to other staff. Anecdotal data on the teachers' view of the training procedures, reported enjoyment in the training content and interests in observing the functional relationships in observed behaviours. The overall results indicate that both teachers were accepting of procedures indicating a higher likelihood they will continue the procedures in the future. It has, however, been reported that teachers require ongoing support (longer than 1-week) to continue correct implementation of behaviour analysis methods to a high standard (Addison & Lerman, 2009; Englemann., 1988;). Further medium and long-term

checks, to observe maintenance of skills when support is removed, and assess any examples of the continued use of procedures with current or other students, could support outcomes of the social validity findings.

Implications for Practice

Overall the teacher and student's behaviour results from this study indicate that we should continue to put efforts into upskilling teachers on functional analysis techniques that can be beneficial in the classroom for students with behavioural needs. Upskilling teachers to gain pertinent knowledge of student's behaviours without the need for school psychologist or behaviour specialists mean we could diminish time that the targeted student is out of the class working with other professionals. It can also reduce disruption for the targeted student, and give teachers a feeling of autonomy within their class to manage most of the students who display these types of off-task behaviours. The reduction in assessment times means teachers will be able to implement FBI's more efficiently, addressing the problem behaviours sooner, benefiting the entire class by decreasing interruption of instructions and freeing up teachers to assist with all students. The findings also continue to support the use of TBFA and FBI procedures in mainstream school settings for typically developing students, who present with behavioural needs.

This study provided further support for the effectiveness of FBI when the function is identified by using FA (specifically, a TBFA), and thus adds to the growing research that highlights the use of FBI, reducing the use of punishment-based procedures (Pelios, Morren, Tesch, & Axelrod., 1999). Behavioural interventions that are based on the function of behaviour are more likely to be effective because they alter maintaining contingencies rather than relying on attempts to change the establishing operation (Flynn., 2012). This means teachers

using FBI are addressing behaviour more effectively in their classrooms and are more likely to see successful behaviour change.

Suggestions for Future Research

Further analysis on how to effectively and efficiently train teachers to carry out behaviour analysis procedures is an important area for future research. Understanding how each training element (e.g. the amount of each variable including theory information, in-class demonstrations, and performance feedback) effects training outcomes is required. Furthermore, understanding what individual variables (e.g. behaviour analysis knowledge, year of teaching experience, or views on behaviour analysis) affect teacher's skill acquisition during training could assist in the development of effective and efficient training methods. To also assist in developing training methods long-term maintenance data should be investigated. As previous research has shown, teachers' accurate use of behavioural interventions rapidly decreases after initial training (Addison & Lerman., 2009). Although this study showed teachers FBI implementation was high during FBI implementation further long-term data on teacher's behaviour over time should be recorded to investigate teacher's ability to continue using the skills. Finally, no procedural integrity data was collected on the experimenter's training and accurate use of performance feedback. The experimenter used a checklist to ensure that every step was conducted during training of both TBFA and FBI but as no formal protocol for conducting TBFA currently, exists. Future studies should look at designing a formalised procedure to measure trainer's ability to deliver training and accurately give performance feedback to observe any effects on teacher skill acquisition or behaviour.

Limitations

Some of the limitations working in applied settings and limitations of findings are discussed. Firstly, a possible limitation of the study was the decision to run TBFA conditions during group instructions. As discussed by Flynn and Lo (2016), running TBFA trials during group instructions could have affected the TBFA results because the establishing operation for escape was possibly present during all four test conditions. To moderate this variable, this study followed previous TBFA instructions to remove attention by not engaging in verbal exchanges during test segments for all conditions except for attention. This was in place to discriminate the attention condition from other socially-mediated (i.e., Demand, Tangible) test conditions. However, as is expected in classrooms, demands (e.g., group instruction, independent seat work, following class routines) are present throughout the school day. Consequently, in natural settings, it is difficult to execute complete control as it could be done in an experimental setting.

Previous research has also discussed the issues with simultaneous and possible competing reinforcers (e.g., teacher attention, peer attention, preferred activities) in classroom settings (Flynn & Lo., 2016). It is highly likely students exhibiting challenging behaviour may be provided with escape from academic demands, while unintentionally being provided with additional social reinforcement. The current study acknowledged multiple functions but explained to teachers to choose the most salient (i.e., received the highest percent of occurrences of challenging behaviour) to focus on for their FBI's. The outcomes illustrated that, although teachers developed FBI's to address the most prominent function, the interventions showed positive effects on reducing challenging behaviour. Nevertheless, future research should consider student behaviour may be reinforced by multiple stimuli when hypothesizing functions and designing

interventions for challenging behaviour in the classroom setting.

During TBFA implementation, limitations in the usability of TBFA procedures across all session types emerged. It became clear that certain sessions were easier implement the TBFA than others. This included inquiry (independent play) and reading sessions. The main variable that accounted for this was how on track the rest of the class were. If students were independently engaged the teacher had more ability to implement the trial based conditions without distractions or interruptions. The teachers also used team teaching methods in their curriculum where 1 teacher takes both classes. This was beneficial as it freed the other teacher to run some conditions during these times. This implementation limitation is noteworthy for further research as finding sessions that teacher can implement the procedures is crucial when discussing teacher's acceptability of TBFA procedures. If they find it difficult to implement they will not continue to use procedures independently. These findings also did not align with previous research indicating that teachers were able to apply procedures throughout normal classroom instruction (Flynn & Lo., 2016). Although the TBFA procedures could be run within some class sessions for example demand conditions were run during reading sessions and attention trials were run during mat and inquiry time, the teachers did not implement them across all sessions throughout the day.

Conducting the research in an applied setting also had its limitations during FBI data collection. Sessions were often postponed due to changes in teachers schedule for example replacement teachers covering sessions for teachers to complete other school requirements. Sessions were often able to be rescheduled within the day or the next but should be considered when conducting further research in an applied setting.

Finally, there are several limitations to consider when discussing the findings of this study. This study only used two teachers and three students. Further research with more teachers is needed to produce support (or otherwise) for TBFA and FBI training and their implementation in mainstream settings. All three students were the same age and from the same school meaning, thus we cannot generalise findings to other ages and schools. Further research across age groups and schools is needed to help validate findings and show whether results can be generalised.

Conclusions

This study aimed to examine the effects of a behavioural skills training on teacher's reliable implementation of TBFA and FBI procedures with students' disruptive behaviour in a mainstream school setting. The results have demonstrated that behavioural skills training is effective in training mainstream teachers to reliably implement TBFA and FBI procedures with their students. Specifically, it showed a reduction in students off-task behaviour when teachers implemented FBI's based on the function identified from their TBFA results. Finally, teachers felt the intervention had a positive impact on their skills and on student behaviours. They also indicated they would use and recommend the procedures in the future. Overall, the findings indicate TBFA and FBI training for mainstream teachers could be a time effective tool in the education system to upskill teachers on effective behavioural techniques and reduce the use of ineffective procedures

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Appendix A

Dear Moomba Park Primary Managing Staff

This document provides information for potential participants to give informed consent for their participation in the following research study:

"An evaluation of teacher implemented trial based functional analysis and functional based interventions in a mainstream classroom"

*(*This research study is being run to fulfil the thesis component of a Master in Applied Psychology (Behaviour Analysis) through the University of Waikato (New Zealand)).

Purpose of the research: To evaluate the effects of training for primary school teachers to implement a trial based functional analysis and differential reinforcement of alternate behaviour with their students who present with disruptive behaviour in a classroom.

Contacts: The researcher for this study is Kelsey Anderson (kelseyandersonmasters@gmail.com). The supervisor is professor Mary Foster (m.foster@waikato.ac.nz) of the University of Waikato. There will be no sponsorship associated with the funding of this project.

Withdrawal information: All participants have the right to withdraw from the study at any time without giving any reason without negative consequences. Participants can withdraw from the study at any time by contacting the researcher using the contact details above.

Teacher Participation details:

Teachers participating in the study will receive training on behavioural analysis procedures to practice in their classroom with students presenting challenging or disruptive behaviours.

The initial training will consist of a 1-2- hours of training with the study researcher (Kelsey Anderson) on functional analysis and differential reinforcement procedures. The aim of the training is to provide you with information and evidence to support you in understanding the procedures you will be carrying out in the classroom. Also within the training you will watch demonstrations of the procedures and then practice these procedures with the supervisor in role play scenarios.

After initial training teachers will select 2 students with a challenging/disruptive behaviour in your class to implement the trial based functional analysis with. After permission is sought from parents' you will implement the procedures in the classroom during normal instruction. The researcher may be present in the classroom to answer questions during implementation.

After session, you will sit down with the researcher for an additional training session on how to evaluate the data from the functional analysis and develop a differential reinforcement of alternative behaviour (DRA) with extinction (EXT) intervention. The training will include information and evidence on the DRA procedure and collaborating on an intervention for the student to reduce the challenging behaviour and increase a functional replacement skill.

You will then practice the DRA intervention with the student during normal instruction and the researcher will be available to answer any questions during intervention stages.

For the final component, an appointment time will be made to catch up with researcher after implementation of the intervention is completed to de brief and complete a final questionnaire.

Data Collection procedures:

Teachers will record data on the frequency/amount of times that the chosen target behaviour occurs during each condition and during intervention phase. This will look like a tally mark being recorded on a piece of paper that the teacher and researcher will have access to within the session. Data collection procedures will be taught and practiced during training sessions.

Confidentiality/ Anonymity and data collection storage

All participants will be given a participant number that will be entered with all measures and questionnaire documents. All data collection will be de identified, and names will not be presented on any material presented in drafts or the final document. Collected data will be stored digitally on an external drive for up to 5 years and will only be accessible by primary researcher. The school will also not be identified in the dissertation.

Consent Form for Head Teachers/School

(Please Tick in circle)

- o I confirm that I have been informed of the nature of the study and I have had the opportunity to ask questions about the research.

- o All participants have the right to withdraw from the study at any time without giving any reason without negative consequences.

- o I understand the data collected during the research and in the follow up questionnaire will be stored securely and will not be used in any other research or looked at by anyone else except for the researcher in this study.

- o I understand my responses on the questionnaire at the end of the study will be strictly confidential.

- o I understand the school name and teachers name will not be identified in the dissertation.

Name of School Representative:
From (School Name)
Date:
Signature

Appendix B

Dear Teaching Staff

This document provides information for potential participants to give informed consent for their participation in the following research study:

"An evaluation of teacher implemented trial based functional analysis and functional based interventions in a mainstream classroom"

(This research study is being run to fulfil the thesis component of a Master in Applied Psychology (Behaviour Analysis) through the University of Waikato (New Zealand)).

Purpose of the research: To evaluate the effects of training for primary school teachers to implement a trial based functional analysis and differential reinforcement of alternate behaviour with their students who present with disruptive behaviour in a classroom.

Contacts: The researcher for this study is Kelsey Anderson (kelseyandersonmasters@gmail.com). The supervisor is professor Mary Foster (m.foster@waikato.ac.nz) of the University of Waikato. There will be no sponsorship associated with the funding of this project.

Withdrawal information: All participants have the right to withdraw from the study at any time without giving any reason without negative consequences. Participants can withdraw from the study at any time by contacting the researcher using the contact details above.

Teacher Participation details:

Teachers participating in the study will receive training on behavioural analysis procedures to practice in their classroom with students presenting challenging or disruptive behaviours.

The initial training will consist of 1 to 2 hours of training with the study researcher (Kelsey Anderson) on functional analysis and differential reinforcement procedures. The aim of the training is to provide you with information and evidence to support you in understanding the procedures you will be carrying out in the classroom. Also within the training you will watch demonstrations of the procedures and then practice these procedures with the supervisor in role play scenarios.

After initial training teachers will select 2 students with a challenging/disruptive behaviour in your class to implement the trial based functional analysis with. After permission is sought from parents' you will implement the procedures in the classroom during normal instruction. The researcher may be present in the classroom to answer questions during implementation.

After session, you will sit down with the researcher for an additional training session on how to evaluate the data from the functional analysis and develop a differential reinforcement of alternative behaviour (DRA) with extinction (EXT) intervention. The training will include information and evidence on the DRA

procedure and collaborating on an intervention for the student to reduce the challenging behaviour and increase a functional replacement skill.

You will then practice the DRA intervention with the student during normal instruction and the researcher will be available to answer any questions during intervention stages.

For the final component, an appointment time will be made to catch up with researcher after implementation of the intervention is completed to de brief and complete a final questionnaire.

Data Collection procedures:

Teachers will record data on the frequency/amount of times that the chosen target behaviour occurs during each condition and during intervention phase. This will look like a tally mark being recorded on a piece of paper that the teacher and researcher will have access to within the session. Data collection procedures will be taught and practiced during training sessions.

Confidentiality/ Anonymity and data collection storage

All participants will be given a participant number that will be entered with all measures and questionnaire documents. All data collection will be de identified, and names will not be presented on any material presented in drafts or the final document. Collected data will be stored digitally on an external drive for up to 5 years and will only be accessible by primary researcher. The school will also not be identified in the dissertation.

Consent Form for Teachers

(Please Tick in circle)

- o I confirm that I have been informed of the nature of the study and I have had the opportunity to ask questions about the research.

- o All participants have the right to withdraw from the study at any time without giving any reason without negative consequences.

- o I understand the data collected during the research and in the follow up questionnaire will be stored securely and will not be used in any other research or looked at by anyone else except for the researcher in this study.

- o I understand my responses on the questionnaire at the end of the study will be strictly confidential.

- o I understand the school's name and teacher's name will not be identified in the dissertation.

Name:
From (School Name)
Date:
Signature

Appendix C

Dear Parents/Caregivers

We are requesting permission for your child to participate in a study to evaluate the implementation of behavioural skills training for mainstream teachers.

Your child's teacher will be participating in a training program to teach them to assess potential variables that are maintaining disruptive or non functional behaviours in their classroom for example calling out to get teachers attention or being non compliant to avoid a work task. The training will also include how to design a program to teach functional replacement skills to increase positive classroom behaviours for example raising their hand to get their teacher's attention or asking for help when starting a work task.

To assess the outcomes of the training we need to see if the teacher is able to use what their training and put it into practice in their classrooms. In order to do this, we are requesting permission to work with your child by observing your child's responses to their implementation of the training. Since your child normally work with a teacher participating in the extension training we would like to request permission to observe your child while they are working with their teacher. The observations and participation will occur during normal class sessions and under typical classroom instructions.

Training: Teachers will be participating in a training to learn how to identify variables that may be maintaining behaviours that could potentially be disruptive in a classroom or be affecting the student's ability to learn.

Contacts: The researcher for this study is Kelsey Anderson (kelseyandersonmasters@gmail.com). The supervisor is professor Mary Foster (m.foster@waikato.ac.nz) of the University of Waikato. There will be no sponsorship associated with the funding of this project.

Withdrawal information: All participants have the right to withdraw from the study at any time without giving any reason without negative consequences. Participants can withdraw from the study at any time by contacting the researcher using the contact details above.

Confidentiality/ Anonymity and data collection storage: All participants including students involved will be given a participant number that will be entered with all measures and questionnaire documents. All data collection will be de identified, and names will not be presented on any material presented in drafts or the final document. Collected data will be stored digitally on an external drive for up to 5 years and will only be accessible by primary researcher.

Results: You may request a copy of the results of the study when the research has been completed.

Consent form for Parents/Guardians

(Please Tick in circle)

- o I confirm that I have been informed of the nature of the study and I have had the opportunity to ask questions about the research.

- o All participants have the right to withdraw from the study at any time without giving any reason without negative consequences.

- o I understand the data collected during the research will be stored securely and will not be used in any other research or looked at by anyone else except for the researcher in this study.

- o I understand my child's name, the school name and teachers name will not be identified in the dissertation.

Name:
Relationship to student:
Signature of Parent/Guardian/Legal authority:
Date:

Appendix D

1. Attention Condition:

Purpose: to determine if the function of behaviour is to get teacher attention

Control Segment (1 minute)

- Provide attention (e.g., “Good job,” “Keep up the good work,” “How are you doing?”) to the student every 20 seconds
- Provide preferred item/activity for your student to interact with
- Do not give work/tasks to your student, or any other kind of demand.
- Do not respond to any challenging behaviour.

Test Segment (3 minutes)

- Move away from student.
- Only provide attention for the target challenging behaviour (do not provide attention for any other challenging behaviour except the target behaviour).
- If your student does not exhibit the target challenging behaviour, continue to ignore the student until the test segment is finished.

2. Demand Condition:

Purpose: to determine if the function of behaviour is to escape an aversive task (e.g., work)

Control Segment (1 minute)

- Provide attention (e.g., “Good job,” “Keep up the good work,” “How are you doing?”) to the student every 20 seconds.
- Provide preferred item/activity for your student to interact with.
- Do not give work/tasks to your student, or any other kind of demand.
- Do not respond to any challenging behaviour.

Test Segment (3 minutes)

- Tell your student to work using a three-step prompting procedure:
  - Tell – tell your student what you want him or her to do. If compliance, give brief praise. If no compliance, then:
  - Show – demonstrate what you want your student to do. If compliance, give brief praise. If no compliance, then:
  - Assist – give physical guidance (e.g., hand-under-hand) to have student complete request. Do not provide praise at this point.
- If your student demonstrates the target challenging behaviour at any time, remove work and turn away (do not talk to him or her).

3. Tangible Condition:

Purpose: to determine if the function of behaviour is to obtain a preferred item or activity

Control Segment (1 minute)

- Provide attention (e.g., “Good job,” “Keep up the good work,” “How are you doing?”) to the student every 20 seconds.
- Provide preferred item/activity for your student to interact with.
- Do not give work/tasks to your student, or any other kind of demand.
- Do not respond to any challenging behaviour.

Test Segment (3 minutes)

- Removed the preferred item/activity, but keep it in your student’s view.
- If your student exhibits the target challenging behaviour, give back the item/activity to the student without verbal exchange or other attention.

4. Ignore Condition:

Purpose: to determine if the function of behaviour is automatic reinforcement (e.g., sensory consequences)

Control/Test Segment (2 minutes)

- Have your student seated alone without access to materials, activities, or people.
- Ignore all challenging behaviour and appropriate behaviour.

Appendix E

<table>
<tr><td colspan="2">Steps for Implementing Teacher Training TBFA Procedures</td></tr>
<tr><td>Trainer (experimenter):</td><td>Teacher(s):</td></tr>
<tr><td>Phase 1: TBFA Training</td><td>Date:</td></tr>
<tr><td colspan="2">Introduction:

o Trainer greets trainees
o Trainer reviews the purpose of training session
o Trainer describes training process</td></tr>
<tr><td colspan="2">Procedure:

o The trainer defines topography of disruptive and challenging behaviours that often occur in classroom settings such as yelling/calling out, tantrums, aggression, refusal to participate.
o The trainer describes various functions of behaviours
o Trainer provides purpose for functional assessments/analysis and how the results link to effective function based interventions.
o Trainer provides information on anecdotal methods of functional assessment i.e. open ended functional assessment interview.
o Trainer provides information on Functional Analysis in applied research
o Trainer then describes Trial Based Functional Analysis and its benefits
o Trainer provides overview of the four conditions and the steps involved when implementing them in a classroom.
o The trainer shows video of Functional Analysis conditions (Attention/Demand/Tangible/Ignore).
o The trainer demonstrates Trial Based Functional Analysis in a mock classroom setting.
o Trainer describes data collection method for TBFA.
o Trainer then describes how to graph data using excel spreadsheet.
o Trainees practice graphing from pre-made data sheets.</td></tr>
<tr><td colspan="2">In class feedback:

o The trainer watches and gives feedback on each condition in the classroom: Attention/ Demand/ Tangible/ Ignore
o Trainer uses fidelity checklist to assess trainee’s progress
o
Training completion:
o Trainee scores >90% on 54-point skill checklist.</td></tr>
</table>

Phase 2 FBI Training	Date

Introduction:

- Trainer reviews the purpose of training session
- Trainer describes training process
- Trainer provides summary of Behavioural Analysis principles often used in functional based interventions (Differential Reinforcement/Extinction/Punishment/Response Costs) and their use with students who exhibit challenging behaviours in school settings.

Procedure

- Based on TBFA results, behavioural function was reviewed with the teacher.
- Trainer uses functional behavioural pathways templates to map behaviour patterns including setting conditions, antecedents, desired/replacement behaviour that meet the same function.
- Trainer instructs teacher on how to choose replacement and desired behaviours that meet the same purpose or function as the challenging behaviour
- Trainer instructs teacher on how to implement extinction procedures i.e. pausing after student exhibits challenging behaviour, using prompts and providing immediate reinforcement when appropriate response or behaviour.
- Trainer instructs teacher on how to choose reinforcement ratios
- Trainer instructs teacher on how to use preference assessment data to identify potential reinforcers to include in FBI.
- Trainer instructs teacher on how to incorporate extinction procedures when needed.
- Trainer instructs teacher on how to include reactive behaviour management plans when challenging/disruptive behaviour occurs.
- Trainer instructs teacher on including data collection methods including type of data, who will take it and when it will be collected.
- Trainer instructs teacher on how to implement mastery criteria to move through phases of an intervention or reduce reinforcement ratios.
- Answer any questions.

FBI Feedback

- Trainer uses fidelity checklist to assess teachers FBI
- The trainer gives feedback on teacher designed interventions
- FBI implemented when it covers all points on the fidelity checklist.

Reference
Flynn & Lo (2016). Teacher implementation of trial-based functional analysis and differential reinforcement of alternative behaviour for students with challenging behaviour. *Journal of Behavioral Education, 25*(1), 1-31.

Appendix F

Teacher Post-Intervention Acceptability & Outcome Survey
Date: _____

Study Number: _____

For each item, please circle the number that best tells what you think about training and implementing trial based functional analysis and differential reinforcement of alternative behaviour procedures.

Item	Strongly Disagree 1	2	Neutral 3	4	Strongly Agree 5
Procedures for conducting TBFA were easy for me to learn	1	2	3	4	5
Procedures for conducting TBFA were easy to perform in the class	1	2	3	4	5
Procedures for designing and conducting interventions were easy for me to learn	1	2	3	4	5
Procedures for designing and conducting interventions were easy to perform in the class	1	2	3	4	5
The intervention increased my student's appropriate behaviours	1	2	3	4	5
The intervention decreased my student's disruptive behaviours	1	2	3	4	5
My student appeared to like and respond to the intervention well.	1	2	3	4	5
I will use the TBFA again with my students	1	2	3	4	5
I would recommend the TBFA to other staff.	1	2	3	4	5
I will use the intervention again with the same or other students	1	2	3	4	5
I would recommend the intervention to other teachers.	1	2	3	4	5

What did you enjoy about the TBFA and Intervention training (specifically which parts of the training did you find especially useful)?

_____
_____
_____

What would you recommend could be changed or added to the TBFA and Intervention training?

_____
_____
_____

Reference

Lane & Beebe-Frankenberger (2004). *School-based interventions: The tools you need to succeed*. Boston, MA: Allyn & Bacon.

Appendix G

Date:		Teacher Code:		Student Code: Time:	Observer:				
Order		Condition	Segment	Teacher Integrity	Trial 1		Trial 2		#correct
T1	T2								
		Attention	Control	Provided Attention every 20 seconds	Y	N	Y	N	
				Provided preferred activity	Y	N	Y	N	
				No work tasks	Y	N	Y	N	
				Teacher did not respond to challenging behaviour	Y	N	Y	N	
			Test	Teacher moved away	Y	N	Y	N	
				Teacher provided attention contingent on challenging behaviour	Y	N	Y	N	
				If no challenging behaviour, teacher continued ignoring student	Y	N	Y	N	/14
		Demand	Control	Provided Attention every 20 seconds	Y	N	Y	N	
				Provided preferred activity	Y	N	Y	N	
				No work tasks	Y	N	Y	N	
				Teacher did not respond to challenging behaviour	Y	N	Y	N	
			Test	Teacher initiated work using three step prompting procedure	Y	N	Y	N	
				Teacher removed work contingent on challenging behaviour	Y	N	Y	N	
				Teacher turned away with no verbal exchange upon challenging behaviour	Y	N	Y	N	/14
		Tangible	Control	Provided Attention every 20 seconds	Y	N	Y	N	
				Provided preferred activity	Y	N	Y	N	
				No work tasks	Y	N	Y	N	
				Teacher did not respond to challenging behaviour	Y	N	Y	N	
			Test	Teacher removed preferred item/activity	Y	N	Y	N	
				Teacher kept preferred item/activity in students view	Y	N	Y	N	
				If challenging behaviour occurred teacher gave back the item/activity	Y	N	Y	N	/14
		Ignore	Test	Student is seated alone	Y	N	Y	N	
				No access to leisure or work items	Y	N	Y	N	
				Teacher ignored challenging behaviour	Y	N	Y	N	
			Test	Student is seated alone	Y	N	Y	N	
				No access to leisure or work items	Y	N	Y	N	
				Teacher ignored challenging behaviour	Y	N	Y	N	/12
Total number of steps implemented correctly = /54 %									

Flynn, S. D., & Lo, Y. Y. (2016). Teacher implementation of trial-based functional analysis and differential reinforcement of alternative behaviour for students with challenging behaviour. *Journal of Behavioral Education*, *25*(1), 1-31

Appendix H

Date: Student: Teacher: Observer:

Fidelity Check: Design of Function- Based Intervention (FBI)

Identified and operationally define behaviour(s) of concern (BOC) (observable and measurable)	Y N
Identified triggering antecedent events: gather data on settings, people, times or activities where BOC is most/least likely to occur	Y N
Identify likely maintaining consequence (select ONE most likely)	Y N

Selected appropriate antecedent strategies, to minimize the impact of triggering antecedents	Y N
Identified an appropriate replacement behaviour which is matched to the function of the behaviour	Y N
Behaviours are task analysed (broken down) into teachable steps (when applicable)	Y N
Select and define appropriate reinforcement strategies to increase appropriate behaviours.	Y N
Initial reinforcement frequency is specified	Y N
Effective reinforces are identified and the procedure for providing reinforcement contingent on target behaviours is described	Y N
Define procedures for minimizing reinforcement for undesirable behaviours (i.e. extinction)	Y N
The reactive plan details prompting strategies if needed	Y N
Specifies data collection procedures including type of data, who is responsible for data collection, and when data will be collected	Y N
States mastery criteria for success	Y N
% Correct = _____/ _____= _____%	
Notes:	

Fidelity Check: FBI Implementation

Date: Student: Teacher: Observer:

Delivers Reinforcement Contingent on behaviour	Y N
Removes reinforcement during Extinction procedures when applicable	Y N
Follows reactive plan when target behaviour occurs	Y N
Uses Prompt Hierarchy or Strategies as described in the FBI design	N
Records Data	Y N
Moves through Phases	Y N

% Correct = _____/ _____= _____%
Notes:

Reference
Flynn, S. D., & Lo, Y. Y. (2016). Teacher implementation of trial-based functional analysis and differential reinforcement of alternative behaviour for students with challenging behaviour. *Journal of Behavioral Education, 25*(1), 1-31

Appendix I

Time Sampling Data Sheet

Student number:																		
Target Behaviour:																		
Date:																		
Time started:																		
Time	:10	:20	:30	:40	:50	:60	1:10	1:20	1:30	1:40	1:50	2:00	2:10	2:20	2:30	2:40	2:50	3:00
Plus for target behaviour																		
Time started:																		
Time	:10	:20	:30	:40	:50	:60	1:10	1:20	1:30	1:40	1:50	2:00	2:10	2:20	2:30	2:40	2:50	3:00
Plus for target behaviour																		

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Appendix J

Open-Ended Functional Assessment Interview
Date of Interview: _____ Child/Client: _____
Respondent: _____

Respondent's relation to child/client: _____

Interviewer: _____

RELEVANT BACKGROUND INFORMATION

1. His/her date of birth and current age: ____-_____-_____ ____years ____months
   Male/Female
2. Describe his/her language abilities.
3. Describe his/her play skills and preferred toys or leisure activities.
4. What else does he/she prefer?

QUESTIONS TO INFORM THE DESIGN OF A FUNCTIONAL ANALYSIS

To develop objective definitions of observable problem behaviours:

5. What are the problem behaviours? What do they look like?

To determine which problem behaviour(s) will be targeted in the functional analysis:

6. What is the single-most concerning problem behaviour?
7. What are the top 3 most concerning problem behaviours? Are there other behaviours of concern?

To determine the precautions required when conducting the functional analysis:

8. Describe the range of intensities of the problem behaviours and the extent to which he/she or others may be hurt or injured from the problem behaviour.

To assist in identifying precursors to dangerous problem behaviours that may be targeted in the functional analysis instead of more dangerous problem behaviours:

9. Do the different types of problem behaviour tend to occur in bursts or clusters and/or does any type of problem behaviour typically precede another type of problem behaviour (e.g., yelling preceding hitting)?

To determine the antecedent conditions that may be incorporated into the functional analysis test conditions:

10. Under what conditions or situations are the problem behaviours most likely to occur?
11. Do the problem behaviours reliably occur during any particular activities?
12. What seems to trigger the problem behaviour?

13. Does problem behaviour occur when you break routines or interrupt activities? If so, describe.
14. Does the problem behaviour occur when it appears that he/she won't get his/her way? If so, describe the things that the child often attempts to control.

To determine the test condition(s) that should be conducted and the specific types) of consequences that may be incorporated into the test condition(s):

15. How do you and others react or respond to the problem behaviour?
16. What do you and others do to calm him/her down once he/she engaged in the problem behaviour?
17. What do you and others do to distract him/her from engaging in the problem behaviour?

In addition to the above information, to assist in developing a hunch as to why problem behaviour is occurring and to assist in determining the test condition(s) to be conducted:

18. What do you think he/she is trying to communicate with his/her problem behaviour, if anything?
19. Do you think this problem behaviour is a form of self-stimulation? If so, what gives you that impression?
20. Why do you think he/she is engaging in the problem behaviour?

Appendix K

Preference Assessment Data Sheet

Item A	
Item B	
Item C	
Item D	
Date	
Child	
Teacher	
Trial #	Selection
1	A B
2	C A
3	A D
4	B C
5	D B
6	C D
Item A	selected ____ times
Item B	selected ____ times
Item C	selected ____ times
Item D	selected ____ times

Highest Preferred Item(s):	Item ___ =
Moderately Preferred Item(s)	Item ___ =
Lowest Preferred Item(s)	Item ___ =

Reference

Chazin, K.T. & Ledford, J.R. (2016). Paired stimulus preference assessment. In *Evidence-based instructional practices for young children with autism and other disabilities.* Retrieved from http://vkc.mc.vanderbilt.edu/ebip/paired-stimulus

Appendix l

Trial Based Functional Analysis Data Sheet					
Client Name:		Circle one:	Primary / Observe		
Target Behaviour:					
Date:		Time Started:		Session Activity:	
Trial Type	Control (1 Min)	Test (3 Min)	Failed Trial	Reason for failed trial	
Attention (A)/Demand (D)/Tangible(T)/Ignore(I)	Did Target behaviour occur during control condition ? Y/N	Did target behaviour occur during test condition? Y/N	Was it a failed trial? Y/N		

Appendix M

Function- Based Intervention (FBI) Design

Date: Student: Teacher:

Description of target challenging behaviour

Common Setting events

Hypothesized Function of behaviour (Use information from open ended questionnaire in training pack or Trial based functional analysis)

Alternate replacement skills/behaviours to teach

Reinforcement Strategies used (include frequency of reinforcement and time intervals and items used as reinforcement)

Data collection procedures including type of data, who is responsible for data collection, and when data will be collected (can attach data sheet)

Phases of intervention to work through (short and long term goals)

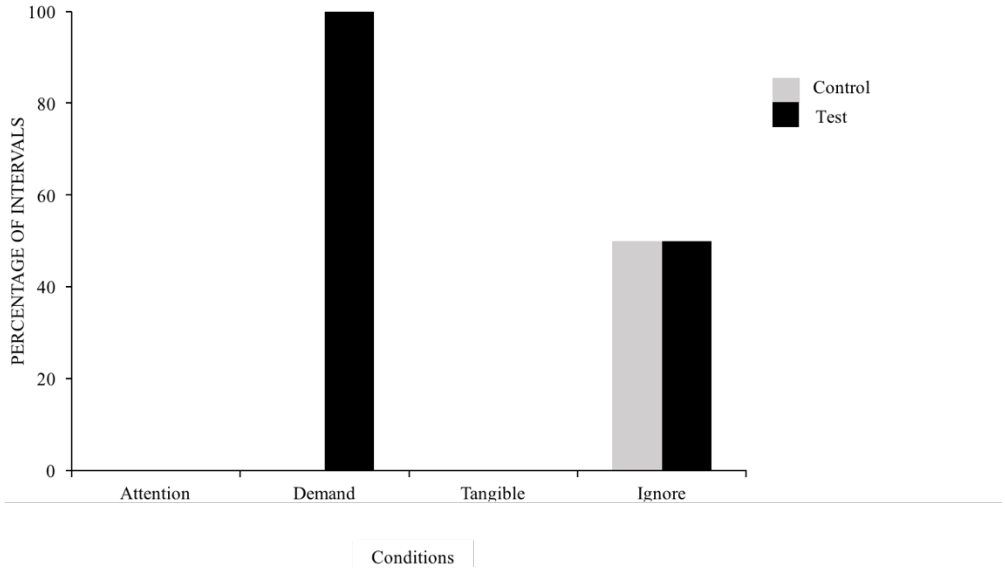
1.
2.
3.
4.
5.

Mastery Criteria to move to next phase (e.g. 3 successful intervals in a row)

Reactive Management Plan if behaviour occurs

Appendix N

Graphing Work Book (Example)		
Conditions	Control	Test
Attention	0	0
Demand	0	100
Tangible	0	0
Ignore	50	50



Appendix O

Interobserver Agreement Data

Student: A				Student: B			Student: C	C	
Interval	Agreements	Disagreements	P-P Score	Agreements	Disagreements	P-P Score	Agreements	Disagreements	P-P Score
1	18	0	100	18	0	100	17	1	94
2	16	2	89	16	2	89	18	0	100
3	15	3	83	14	4	78	18	0	100
4	18	0	100	14	4	78	18	0	100
5	18	0	100	16	2	89	18	0	100
6	15	3	83	18	0	100	18	0	100
7	16	2	89	15	3	83	18	0	100
8	16	2	89	15	3	83	18	0	100
9	15	3	83	18	0	100	18	0	100
10	18	0	100	18	0	100	17	1	94
11	16	2	89	18	0	100	18	0	100
12	18	0	100	16	2	89	18	0	100
13	16	2	89	16	2	89	18	0	100
14	15	3	83	15	3	83	17	1	94
15	16	2	89	18	0	100	18	0	100
16	18	0	100	16	2	89	18	0	100
17				16	2	89	18	0	100
18				18	0	100			
Avg.			91.625			91.05555556			98.94117647
Min			83			78			94
Max			100			100			100