

Aspect PRT Pilot Final Report

aspect
practice



An independent outcome study of a Pivotal Response Training (PRT) intervention for children with autism

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¹The assistance of Helen Skeat in compiling data, and of Carmel Jean Seymour and Gauri Sharma in scoring some of the DVDs is gratefully acknowledged.

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Executive Summary

Pivotal Response Training (PRT) is a behaviourist-based approach whose proponents maintain that the development of skills in crucial (pivotal) areas can have wide-ranging positive effects on a broad range of other behaviours displayed by people with autism.

PRT has strong empirical support, and so Aspect decided to conduct a pilot study in two classrooms in 2010, following staff training in the approach in 2009. An independent evaluation was conducted in 2010, in which baseline measures were taken before PRT was implemented in terms 2, 3, and 4. The results of that evaluation are presented in this report.

The main purpose of the current study is to examine:

- the fidelity of the PRT intervention (that is, whether the practice of PRT is adhered to. Processes and documentation will also be discussed.)
- the effectiveness of the PRT intervention (particularly in terms of student outcomes)
- the social validity (acceptability) of PRT

It is anticipated that clarification of these three above issues will help to inform Aspect's decisions about future directions.

In relation to the first purpose, **program fidelity** is important, as it demonstrates whether staff are implementing PRT properly. If program fidelity is low, then student outcomes cannot be attributed to "real" PRT. In this evaluation, fidelity was measured by examining staff actions against the following criteria:

- Instructions are clear, appropriate to the task, uninterrupted, and the child is attending.
- Multiple cues are presented if appropriate for the child's developmental level.
- The child is given a significant role in choosing the stimulus item(s).
- Rewards are immediate, contingent, uninterrupted, and effective.
- Direct reinforcers are used the majority of the time.
- Rewards are contingent on response attempts (even if incorrect).

The evaluation found that **high program fidelity** was demonstrated in the teacher diaries, staff focus group and teacher questionnaires. The available DVD data showed it was being implemented properly by both schools by the end of the year. Unexpectedly, the DVDs and teacher observations also showed at least some staff were already implementing PRT correctly in the baseline, even before the trial was scheduled to begin. Moreover the teacher questionnaires suggested that both schools were using PRT-based practices right from the outset.

In relation to the second purpose, the study measured **student outcomes** primarily by the children's progress in the five pivotal areas of:

- motivation
- responsivity to multiple cues
- self management
- self initiations, and
- empathy.

The DVD content showed that the students were responding well in two pivotal areas (*responsivity to multiple cues*; and *motivation* as measured by highly engaged on-task behaviour). This conclusion was corroborated by other data. Three formerly untestable students were able to be examined on verbal standardised tests by the end of the year, suggesting greater engagement. In addition, the teacher focus groups, teacher diaries and parent teleconference

documented increases in the children's motivation for communication and their use of multiple cues.

Diaries and staff focus groups and parent teleconferences and questionnaires indicated improved *self management*, although the children's increasing independence led to some challenges.

Responses were mixed about the pivotal area of *self initiations*. DVDs indicated the children were not frequent initiators, but staff focus groups and parent teleconferences and teacher observations suggested some improvement in this skill.

Empathy was low in the DVDs but the parent teleconference suggested there were improvements in this area. One of the teachers mentioned she was not working on empathy. This is not unexpected, since empathy is the least well developed pivotal area by PRT practitioners and theorists.

Overall, there was converging evidence that the students were making good progress in the pivotal areas of motivation and responsivity to multiple cues and making some progress in self management and initiations. Empathy was not a prime focus of teachers, although parents reported a little development in this area.

In relation to student outcomes, the Aspect parent data compared favourably to a larger sample of parent responses taken from a study with younger children in Portland, Oregon. The Aspect parents noted improvements in the children's use of language or other means to communicate, and in their engagement in imaginative or pretend play.

Finally, in relation to the third purpose, it was found that PRT had **high social validity** for parents and teachers. They worked well together, valued and enjoyed the approach, and attributed much of the children's progress to PRT, and so would be amenable to continuing this approach. High acceptance of PRT was evident in the teacher diaries, staff focus groups, parent teleconference and parent questionnaires.

Interpretation


The evaluation was designed around a simple pre-post framework. Student outcomes were measured early in 2010, then PRT was begun and student outcomes were measured again later in the year or early in 2011. In this study the outcomes for students were predominantly positive.

Fidelity was measured, using the logic that if staff were not implementing PRT properly (i.e. low fidelity), then student outcomes could not be attributed to PRT. In fact it was found that staff implemented PRT acceptably (high fidelity) throughout the year, including during the baseline period before the PRT trial began. These results meant that only a conservative conclusion can be drawn. That is, the results are consistent with the interpretation that PRT is associated with some of the positive student outcomes. However other factors, such as child maturation, and staff and parent expectations, could not be excluded as possible contributors to the results. The conclusion is that PRT implementation is consistent with positive student outcomes, but this cannot be proven in the current evaluation.

Aside from some procedural issues, such as preventing overdependence on reward, there were few troublesome aspects from the PRT implementation. With its affirming focus on motivation and focus on generalisation of pivotal skills, PRT appears to be a low risk intervention.

Top level recommendations were:

- It is feasible to adopt PRT. (This is supported by program fidelity and social validity data, and positive responses from stakeholders.)

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- PRT implementation was coexistent with positive student outcomes, which suggests that PRT should (continue to be) incorporated into Aspect's Comprehensive Educational program, especially as it complements other approaches such as TEACCH (Treatment and Education of Autistic and related Communication-handicapped Children).
 - Parents should continue to be involved in the PRT program
 - During implementation of PRT, documentation should be consistent across classrooms.
 - The children's progress and the teaching staffs' dedication under the current evaluation should be celebrated.
 - This report should provide the foundation for a joint publication between Aspect and the University of Canberra

Overall it appears that PRT is a promising approach that is congruent with Aspect's Comprehensive Educational Program. Further, more specific recommendations can be found at Section 11.7

PART I. INTRODUCTION

1.0 Background to the evaluation

1.1 Introduction

In keeping with its emphasis on evidence-based practice, Autism Spectrum Australia (Aspect) has piloted and evaluated a number of promising programs in special schools, satellite classes, early intervention services and other facilities that deliver its Comprehensive Educational Approach. The current report continues that tradition and describes a trial of Pivotal Response Training (PRT, also referred to as Pivotal Response Treatment or Pivotal Response Therapy) that was begun in Aspect classrooms in 2010. Aspect sought an impartial assessment of the outcomes and approached the University of Canberra for an independent evaluation.

The main purpose of the evaluation is to examine:

- the fidelity of the PRT intervention (that is, whether the practice of PRT is adhered to)
- the effectiveness of the PRT intervention (including its processes and documentation),
- the social validity (acceptability) of PRT and thereby inform Aspect's decisions about future directions.

PRT is a behaviourist-based approach whose proponents maintain that the development of skills in crucial (pivotal) areas can have wide-ranging positive effects on a broad range of other behaviours displayed by people with autism. Aspect decided to trial PRT in four of its classrooms, two of which were selected to participate in the evaluation. The program was implemented in Terms 2, 3 and 4 in 2010, with follow up data collected in Term 2, 2011. The current evaluation investigates the outcomes for these Aspect students, their teachers and parents of a train-the-trainer model where teachers received instruction in PRT at their workplace and were then supported to implement the approach in their classrooms. Parents were also given information by Aspect staff, to support the parents to implement the approach at home.

It should be noted that the teachers in both schools were trained in PRT in 2009 and first implemented it in that year. To determine the effect of PRT on the students, it was agreed that the teachers would take baseline measures in the first part of 2010 with their new intake of students, and would then begin to implement PRT in the latter half of that year.

It is intended that this report constitutes the basis for at least one joint conference presentation and at least one joint academic publication between the University of Canberra and Aspect. A poster presentation entitled Implementing Pivotal Response Treatment with students with autism: Insights from an independent outcome study by Chris Kilham (UC) and Debra Costley (Aspect) was displayed at the Asia Pacific Autism Conference in Perth in September 2011.

There are some parallels with an earlier evaluation of a TEACCH intervention in Aspect schools and so comparisons will be made with this earlier study when appropriate. However it should be noted that the schools, teachers and parents were not matched in the two studies. There are wide individual differences between individuals on the autism spectrum (Volkmar, Lord, Bailey, Schultz, & Klin, 2004), and any comparisons between the two studies must be made judiciously.

To provide a framework for the evaluation, the report begins with an overview of PRT. The overview will form a reference point for determining the fidelity of Aspect's PRT implementation. That is, the overview will help to guide a judgement as to whether the program is delivered by Aspect in accordance with key PRT principles and practices.

1.2 What is PRT?

People with Autism Spectrum Disorders (ASDs) experience lifelong challenges in processing information and understanding the world they live in. A number of approaches have been proposed to assist affected individuals, including Pivotal Response Treatment (PRT).

PRT is described by leading proponents as “a comprehensive service delivery model that uses both a developmental approach and applied behaviour analysis (ABA) procedures. PRT aims to provide opportunities for learning within the context of the child’s natural environment” (Koegel & Koegel, 2006). It is implemented in natural settings in order to foster a normalised developmental trajectory and facilitate inclusion. PRT also practices high family involvement, and incorporates the procedures into everyday routines at home and school. It is believed that providing PRT early in the child’s life will produce the best results (Koegel & Koegel, 2006).

A defining feature of PRT is its focus on “pivotal” areas or responses that are alleged to underlie large collateral changes in other areas of functioning. Thus, PRT addresses generalisation, a skill which has consistently been found to pose difficulties for people on the autism spectrum. Because the intervention is designed to produce widespread improvement in other areas, PRT is more efficient than Discrete Trial Training which gives priority to isolated individual behaviours and typically requires intensive and expensive training of about 40 hours a week.

Five pivotal areas have been identified. The two primary areas are motivation, and responsivity to multiple cues. Emerging pivotal areas include self-management, self-initiation, and empathy. The conceptual basis for designating these five areas as pivotal is outlined below.

(i) Motivation needs to be addressed with diagnosed children because their communication difficulties frequently entail that they don’t understand the intentions of their teachers and caregivers. Therefore they may not comprehend the relationships between making a response (such as saying “apple”), and a reinforcer (receiving the apple). To promote motivation and avoid undesirable side effects such as learned helplessness, PRT proponents advocate that teachers and caregivers should:

- ensure the child is attending
- provide clear, appropriate, and uninterrupted opportunities to respond
- intersperse already-learned (maintenance) tasks with to-be-learned (acquisition) tasks, to provide opportunities for success and thereby keep up behavioral momentum
- provide opportunities for the child to make choices
- take turns with the child
- give immediate reinforcement as soon as the child responds or attempts to respond
- utilise direct (natural) reinforcement, meaning that the rewards are tied to the task itself. For example it is better to reward a child with a favourite DVD for saying the word “DVD” than rewarding them with a piece of chocolate which is unrelated to the verbalisation.

Other recommendations to increase motivation include using preferred materials and desired activities, and following the child’s lead. Often these procedures are incorporated into discrete trials to highlight for the child a tight link between antecedent and consequence.

(ii) Responsivity to multiple cues is considered pivotal because individuals with autism may display “stimulus overselectivity” and focus only on a limited number of features about objects or actions. Because affected students tend to attend to small details, they fail to recognise similarities across situations or apply existing skills in new, albeit relevant situations. In other words, they fail to generalise their existing skills. An example of this inability to

use prior learning in new contexts would be the child who can tie the shoelaces of his² blue sneakers but does not lace up his new red shoes because he responds to the blue footwear colour and fails to see the similarity between the two pairs of shoes. PRT is thought to be especially suitable for people with autism because it does not focus on these individual targeted behaviours. Instead, implementation occurs in several contexts.

Accordingly, a key feature of best practice is that teachers and caregivers should:

- present multiple cues, if appropriate for the child's developmental level. This means that the child is exposed to two or more units within the environment.

For example, asking a child to get their red T-shirt encourages them to focus on both the colour and the garment, since fetching a blue T-shirt or a red jumper would not be an appropriate response.

(iii) Good self management increases the length of time children with autism are socially engaged with their peers and lessens their risk of social isolation and loneliness. By being more engaged socially, children learn further social skills that decrease the need for adult vigilance and lead to independence. Conversely, poor self management can isolate the child and leave them further behind. Thus, both good and poor self management form self-perpetuating cycles, mediated through the learning opportunities that they afford.

To improve self management, it is recommended that practitioners should teach children with ASD to:

- become aware of their inappropriate behaviors
- collect data on those behaviours
- reinforce themselves or request rewards from others.

(iv) Self initiations are regarded as important because they allow children to find out their misconceptions. Accordingly, it is recommended that practitioners should:

- teach children to use a pivotal word, such as "Look" "Help" "What's that?" to actively engage others and gain knowledge. This teaching strategy is preferred over the practice of trying to teach labels for everything.

(v) Empathy is the least developed of pivotal areas. Preliminary research suggests that empathic responses help to smooth the way for relationship development, which is implicated in a broad range of skills (Koegel, Talebi, Koegel, & Carter, 2006). However, although social characteristics such as empathy are increasingly part of autism research, there are relatively few studies that provide practical guidelines for linking empathy to the PRT framework and procedures.

1.3 What is the research basis for PRT?

Autism Spectrum Disorders (ASDs) are lifelong disorders characterised by deficits in social interaction and communication and restricted, repetitive and stereotyped patterns of behaviour, interests and activities (Volkmar, Paul, Klin, & Cohen, 2005). ASDs are now believed to affect one in 160 Australian children between 6 and 12 years (MacDermott, Williams, Ridley, Glasson & Wray, 2007). More recent figures in the United States suggest rates of 1 in 110 (CDC, 2009). We know ASD is associated with a greater risk of mental health issues, school dropout and social alienation (Brereton, Tonge, & Einfeld, 2006). These concerns have seen a large and confusing increase in the number of intervention options available (Francis, 2005). In an attempt to limit the damaging effects of "Autism's false prophets" (Offit, 2008), there have recently been more urgent calls for evidence-based practice, defined loosely as high quality peer-reviewed research in scientific journals.

² The ratio of males to females with autism is about 4:1. For simplicity, this paper uses masculine pronouns when referring to children with autism, in order to mirror the gender of the study's participants, who were 100% male.

It is generally accepted that PRT is one of a limited number of autism interventions that has adequate empirical support (Skokut, Robinson, Openden, & Jimerson, 2008). In the last decade, at least nine studies of PRT published in peer reviewed journals reported positive results (Baker-Ericzen, Stahmer & Burns, 2007; Gillett & LeBlanc, 2007; Harper, Symon & Frea, 2008; Jones et al, 2006; Koegel, Carter & Koegel, 2003; Koegel, Symon & Koegel, 2002; Kuhn et al, 2008; Stahmer & Schreibman, 2006; Vismara & Lyons 2007). Only one study (Sherer & Schreibman, 2005) produced mixed results, with only three children in this particular study responding positively, and another three remaining unchanged.

Recent large scale reviews of evidence-based practices also support the effectiveness of PRT. The approach was nominated as one of 11 “Established Treatments” by the National Autism Center in 2009. That is, it was considered to be effective for individuals on the autism spectrum, a conclusion supported by 14 well controlled studies undertaken between 1987 and 2008. The National Autism Center’s report is consistent with an earlier analysis by Simpson (2005) who examined 250 articles about autism interventions and found only four with strong evidence, one of these being PRT. In another review, PRT was deemed sufficiently versatile to use at home, in clinical settings, in an inclusive classroom, and in the community. Of the ten state-of-the-art autism treatments identified by the National Research Council of the National Academy of Sciences, it is the only one identified for use in all four of these settings (National Research Council, 2001).

There is consensus that PRT increases communication, interpersonal, and play skills when applied to children with autism aged between 3 and 9 years (Gillett & LeBlanc, 2007; Harper, Symon & Frea, 2008; Koegel, Carter & Koegel 2003). This conclusion is given added weight by a large study of 158 families of children with autism conducted by Baker-Ericzen, Stahmer, and Burns (2007). All children showed significant improvements on adaptive functioning on the Vineland Adaptive Behaviour Scales (Sparrow, Balla, & Cicchetti, 1984). Children younger than 3 years showed the least impairment at the beginning of the intervention and the most improvement at the end.

The most consistently researched pivotal areas are those of motivation and responsivity to multiple cues. Evidence suggests that interventions that strengthen links between social communicative responses and direct positive consequences will help to increase motivation (Koegel, Carter, & Koegel, 2003; Koegel & Koegel, 1995). In addition, once children learn to respond to multiple cues, they can generalise their classroom learning to a range of other situations (Koegel & Koegel, 2006). Self initiation as a pivotal area is also supported by evidence, as it has been found that teaching children to initiate questions improves vocabulary and helps children to access knowledge outside of a specific teaching context (Koegel, Camarata, Valdez-Menchaca, & Koegel, 1998).

The literature also supports that PRT can be learnt relatively quickly. As little as 25 hours of parent training can provide an ‘immediate and cost effective intervention’ (Coolican, Smith & Bryson, 2010). Neurotypical classmates can also be taught to implement the procedure (Pierce & Schreibman, 1997). Thus, PRT is particularly attractive not simply because of its efficiency (since addressing pivotal areas facilitates learning in other areas), or its demonstrated evidence base, but also because of its ease of learning.

The research underpinning PRT is impressive. However even the most clearly validated, empirically supported research will not translate into common practice unless its procedures and underlying values are acceptable to the broader community. It is encouraging to note that PRT is considered to have high social validity (King & Valdovinos, 2009). In other words its procedures are acceptable to educators and families, which means that they are relatively likely to use PRT if it is recommended as an approach.

With its strong research basis, it may well be asked “Why should Aspect evaluate an established treatment?” Recently attention has turned to optimising training in, and dissemination of, PRT (Bryson, Koegel, Koegel, Openden, Smith & Nefdt, 2007). It should be noted firstly, that much of the training and support for PRT has been clinic-based and/or uses university students, or has taken place in the United States. Less attention has been paid to the

processes necessary to implement PRT faithfully in individual classrooms or on a school-wide basis, particularly in Australia. Secondly, it should be acknowledged that classroom outcomes are less well researched than clinical effects. There are challenges in attempting to “prove” the efficacy of professional development for teachers, and this also applies to teacher training in PRT.

Once its own PRT program has been evaluated Aspect would be in a better position to consider whether different options should be pursued. For example, self directed learning programs may prove beneficial for parents (Nefdt, Koegel, Singer, & Gerber) but such decisions are more properly informed when evidence is available concerning the usefulness and effectiveness of PRT in the Australian context. Thus the current small-scale study was undertaken, designed to examine the practice of PRT, and the effectiveness of PRT. The data could then inform decisions such as the advisability of implementing PRT on a larger scale at Aspect, to examine training requirements, and to suggest areas for further research.

1.4 Design of the evaluation

The evaluation employed a simple A-B design, where the progress of a small group of children was compared before and after the PRT intervention. There is no control group. It is generally accepted that there are large individual differences between children on the autism spectrum (Volkmar, Lord, Bailey, Schultz, & Klin, 2004), and so finding a control group of children who are matched on age, background, ability and so on is extremely difficult. Instead, much autism research is designed so the each student acts as their own control, and this was the approach taken in the current study.

In a simple A-B design, there is always the question of whether any observable progress is simply due to the passage of time. Incorporating normed, standardised tests into the current analysis helps overcome this interpretative difficulty because these standardised tests provide scores where the child’s performance is compared to all other children of his age level. All these other children would be expected to develop over time too, so we can examine variations in a child’s ability relative to other children as they all grow older together. If there are changes in the child’s relative standing (for example moving from the bottom 20 % in communication to the middle ability range), then to explain their accelerated development we would look for changes in the child’s environment during that time period – such as the PRT intervention.

In this study, four standardised tests were employed:

- Childhood Autism Rating Scale, Second edition (CARS-2)
- Stanford-Binet Intelligence Scales, Fifth edition (SB-5)
- Evaluation of Language Fundamentals, Fourth edition (CELF-4)
- Vineland Adaptive Behaviour Scale, Second edition (Vineland-II).

In turn, the design of the evaluation is integral to the type of analyses undertaken. Most quantitative analysis of child outcomes relies on large numbers of data points. One way to obtain lots of data is to use many participants, but clearly this was not possible in the current study. The alternative when the number of participants is small, is to take many repeated measures on targeted variables within individuals which might include requesting, attending, and so on. Repeated measures during a baseline period allow a performance trajectory to be identified. For simplicity, this is often represented graphically as a line of best fit between two points. If, following treatment, the child’s development starts to accelerate beyond the original trajectory (the line on the graph becomes steeper), this is good support for the effectiveness of the intervention, even in the absence of a control group.

This was a small scale study with only 11 participants so if quantitative analysis were to be undertaken it would be advantageous to institute repeated measures. In the current study the majority of child outcome measures were not

repeated but were completed on a “one-off” basis. For example, the four standardised assessments were conducted once at baseline and once at follow up; and the DVDs were only taken once (or at most twice) at baseline and Terms 3 and 4. Accordingly, an attempt was made to incorporate repeated measures into the design, using teacher observations of specified behaviours (data on at least one positive behaviour, one undesirable behaviour and one difficult situation was specified at baseline and during the intervention).

Every evaluation design is tempered by practicalities. Assessments should not only be exemplary, they should also be feasible. Data collection would test the teachers’ capacities because it was superimposed on top of a workload that was already expanded in virtue of the recent adoption of PRT. Embracing any new approach involves extra planning and preparation time because of the requirement to replace superseded routines and resources. Therefore, the planned evaluation procedures included the use of a psychologist, skilled in PRT and assessment, who would assist in the data collection process, including the repeated measures tool.

Triangulation, or the cross verification of data from multiple sources, is one way to strengthen small scale studies. Each source of data has its strengths and limitations which taken together, can provide converging evidence of student outcomes. One form of triangulation used in the current evaluation is the use of complementary quantitative and qualitative data. Generally, quantitative data is more efficient and objective but may miss some of the subtle differences found in qualitative data which help to contextualise more complex behaviours found in autism. The previous paragraphs are concerned with quantitative data since they discuss comparisons of test scores, behaviour frequencies and other numerical data. In contrast the study’s qualitative data are categorical and can be scrutinised to isolate major themes. These data deal with types of thinking and behaviour – such as degree of program involvement or extent of agreement with the PRT philosophy. Teacher diaries, focus groups, teleconferences, interview data, open ended questionnaires and documents are all examples of the qualitative instruments used in the current evaluation.

Assessment methods were also triangulated through the inclusion of direct and indirect measures. The main direct (observation-based) measures used samples of actual student behaviours and comprise the DVDs and the teacher observations. These were based on actual student performance so provide strong evidence about outcomes. However the direct measures were unable to capture the perceptions, feelings and attitudes of participants so the study also incorporated indirect measures from teachers and parents including focus groups, teleconferences, questionnaires, and diaries.

The design was also strengthened by the incorporation of reliability safeguards. PRT outcomes were measured in several ways including DVD analysis where DVDs were scored for the presence or absence of certain behaviours. This can be a tedious and error-prone process thus it is important to establish that the scoring is accurate. Accordingly, the target behaviours were first defined and a segment of videos was scored by two researchers. The results were compared and behaviours defined more tightly until an acceptable level of consistency was obtained. This protocol ensures that the results can be replicated.

When participants’ subjective impressions contribute to the data, the issue of bias must be addressed. To minimise the possibility that the results would be unduly coloured by individual expectations, a cross section of participants was invited to provide data. Participants included children, teachers, assistants, therapists, and parents /carers. One way to achieve a balanced perspective on specific issues is to amalgamate the input of all these individuals and then to extract common themes. This process was followed in the evaluation to minimise bias.

The final critical design feature is program fidelity, which is a measure of the quality of implementation. Poor implementation will often diminish the impact of the program. If unrecognised it can result in people wrongly dismissing a promising practice because they attribute poor results to the program when the fault may lie with their

own practice. The current evaluation therefore included measures to ensure that the teachers were implementing PRT faithfully, as it was meant to be implemented. The prime measures of program fidelity were videotapes and teacher diaries.

To summarise: To increase the robustness of the A-B (pre-post) design, the following features were integrated into the evaluation:

- Baseline measures, before PRT is implemented. (The child is his own control.)
- Normed and standardised measurements (CARS, Stanford-Binet-5, Vineland and CELF)
- Repeated measures during baseline and intervention
- Triangulation. (For example, quantitative and qualitative data.)
- Direct and indirect measures
- Inter-rater reliability, to ensure that DVD codes are consistently applied
- Bias minimisation, through measures such as independent scoring of observed behaviour.
- Treatment fidelity measures (enhanced by mentoring and assessed by DVDs, diaries, and observations).

Within this design framework, answers were sought to three major questions:

- Treatment fidelity: Is PRT being implemented as intended? (Is it feasible?)
- Student outcomes: What are the student outcomes in general and in the 5 pivotal areas?
- Social validity: What is the social acceptability and usefulness of PRT?

Table 1.4.1 overleaf summarises the evaluation questions and the primary evaluation tools that are used to address them.

Table 1.4.1 Evaluation overview: questions and tools

Evaluation Questions	Primary Evaluation Tool
Is PRT being implemented as intended? (Is it feasible?) 1. Are instructions clear, appropriate, and uninterrupted and does the teacher have the child's attention? 2. Are maintenance tasks interspersed frequently? 3. Are multiple cues present? 4. Is the child given a sufficient role in choosing the stimulus? 5. Are rewards immediate, contingent, uninterrupted and effective? 6. Are direct reinforcers used? 7. Are rewards contingent on response attempts?	<ul style="list-style-type: none"> • DVDs • Teacher diaries • Staff focus group • Staff questionnaire • Parent questionnaire
What are the student outcomes in general? What are the student outcomes in the 5 pivotal areas? 1. Is the child motivated /engaged? 2. Is the child responsive to multiple cues? 3. Does the child self-manage his behaviour? 4. Does the child initiate requests? 5. Is the child empathic?	<ul style="list-style-type: none"> • Standardised tests (CARS, SB-5, CELF, Vineland) • DVDs • Teacher diaries • Staff focus group • Parent teleconference/discussion • Staff questionnaires • Parent questionnaires • Teacher 5x3 observations
What is the social validity /usefulness of PRT, for teachers and parents?	<ul style="list-style-type: none"> • Teacher diaries • Staff focus group • Parent teleconference • Staff questionnaire • Parent Questionnaire

PART II. METHOD

2.0 Context

2.1 Setting and participants

Two schools, designated as School 1 and School 2, participated in the PRT pilot intervention. Two classes in each school trialled PRT, and it was arranged that one class in each school (called Class 1 and Class 2 from Schools 1 and 2 respectively) would collect data for the evaluation. Both classes contained children of similar ages: between five and seven years at the beginning of the intervention, which is appropriate for PRT. There was one teacher in each class, and one or two teaching assistants. Most of the adult data concerned the teachers, although the assistants' input is also acknowledged.

Class 1 had six students and Class 2, five. The children in Class 1 tended to have a milder autism diagnosis and higher measured general ability and language than their peers in Class 2. Class 1 had been set up into a work area, a floor area and a play area. The classroom contained cupboards (which were locked, to encourage requesting). Children were provided with individual timetables and individual schedules. At the time of PRT research, the children were verbal, with assistance from visuals, and they were toileting independently.

Class 2 contained two learning spaces: one for work and meals; and another for group and playtime. The classroom contained a Smart board and cupboard to access toys. The children communicated in a variety of ways along a continuum ranging from real object to words. Accordingly, prompts included real objects, verbal prompts, and visual prompts. The children's functional skills were developing, with some children toileting independently and others non-independently.

The children are described briefly before turning to the timeline of the evaluation.

(i) School 1

The children in Class 1 School 1 were given the pseudonyms C-1, C-2, C-3, C-4, C-5, and C-6. A brief snapshot of these children at the outset of the intervention is provided below.

C-1 turned six during 2010. He lived with his mum, dad, his older brother and twin brother. All three children had a communication delay. C-1's family spoke both Punjabi and English at home. When tested, C-1 scored 'extremely low' in the Bayley cognitive subtest. He could follow one-part routine instructions but needed to use a visual prompt to make choices. C-1 could sit and attend during sessions such as 'morning circle' and could spell his name as well as common objects. C-1 enjoyed lining up and stacking objects and became upset when disturbed. He was very quiet and preferred solitary play to interacting with his siblings. He was motivated by a range of activities including drawing, reading, writing, puzzles and coloured shapes. In accordance with current diagnostic criteria for autism (DSM-IV), this child's CARS2-ST ratings at the beginning of the PRT intervention indicated that he fell within the mild to moderate range of ASD.

C-2 was six years old at the beginning of 2010. He was verbal and was able to make requests for objects by using sentences; to answer and ask 'wh' questions; and to follow two-step directions independently. He was reading at a level three reader. He enjoyed playing with two or three boys at a time and played with scooters, a train set, cubby house and imaginary games. He could cope well with change if he was forewarned and could state his emotions. In accordance with current diagnostic criteria for autism (DSM-IV), this child's CARS2-ST ratings at the beginning of the PRT intervention showed many age appropriate ratings and minimal indicators of ASD.

C-3 was five at the beginning of 2010 and turned six in July. He lived at home with his parents and older and younger siblings. He had a moderate developmental delay and intellectual disability. He could copy a drawing one step at a time, but used his trunk to stabilise himself, and had poor hand-eye coordination. C-3 used his hands to eat food. He was motivated by gross motor activities. In accordance with current diagnostic criteria for autism (DSM-IV), this child's CARS2-ST ratings at the beginning of the PRT intervention indicated that he fell within the mild to moderate range of ASD.

C-4, an only child, was six years old during his PRT schooling. C-4 was verbal and could follow two part questions, identify major body parts and listen to story books for up to 20 minutes. He could also identify familiar people by name. He had a poor awareness of safety and was more compliant in familiar environments. C-4 displayed repetitive behaviour; for example he fiddled his fingers and rolled cars repetitively. He was affectionate, had preferred friends and was interactive. He was motivated by dressing up dolls, pretend play, Disney movies, cars and trucks. In accordance with current diagnostic criteria for autism (DSM-IV), C-4's CARS2-ST ratings at the beginning of the PRT intervention indicated that he fell within the mild to moderate range of ASD.

C-5 was five years old during his PRT schooling. He lived with his parents and two younger siblings. He had difficulty with auditory processing and did not respond to his name or follow directions. C-5 had difficulty when too much information was on a page or computer screen. He had difficulty waiting and found it hard to sit at the table during mealtimes. He sometimes 'hit out' for periods of up to an hour. C-5 participated in imaginary play with his brother, and was motivated by swings, trampoline, rough play and Thomas the Tank engine. In accordance with current diagnostic criteria for autism (DSM-IV), C-5's CARS2-ST ratings at the beginning of the PRT intervention showed minimal indicators of ASD.

C-6 was six years old at the beginning of 2010, and lived with his Mum, Dad and younger brother. He could use one-to-two word sentences, and understood yes/no and some names of favourite foods. It was difficult to understand C-6's speech, and he had difficulty following instructions. He had repetitive and restricted play with cars and in the night garden figurines, but would occasionally imitate play noises from a model and recognised the 'sad' emotion of his younger brother. C-6 flapped and jumped when he was excited. He was motivated by tickling games and cars. In accordance with current diagnostic criteria for autism (DSM-IV), C-6's CARS2-ST ratings at the beginning of the PRT intervention indicated that he fell within the mild to moderate range of ASD.

(ii) School 2

The children in Class 2 School 2 were given the pseudonyms C-7, C-8, C-9, C-10, and C-11. A brief sketch of these children at the outset of the intervention is provided below.

C-7 turned six in March 2010. He could request toys, music and activities, using either single words or a full "I want ..." sentence. He could answer "who" questions when pointing to photos or peers and staff and likewise "what" questions when pointing to familiar objects or pictures in a book. C-7 responded when he heard the names of preferred objects and people. He actively participated in most school activities with enjoyment. He enjoyed sensory play activities, including shaving cream, mud, bark and water play. In accordance with current diagnostic criteria for autism (DSM-IV), this child's CARS2-ST ratings at the beginning of the PRT intervention indicated that he fell within the moderate to severe range of ASD.

C-8 turned five in August 2010. C-8 responded to one-part routines with gestural cues, when staff were in close proximity and when visual supports were used - for example: "[C-8] ... classroom". He responded to his own name in structured situations and would look towards staff when they said his name. He was motivated by songs with actions during structured music sessions and enjoyed sensory play activities such as sand, dry pasta, bark and water play. In

accordance with current diagnostic criteria for autism (DSM-IV), C-8's CARS2-ST ratings at the beginning of the PRT intervention indicated that he fell within the mild to moderate range of ASD.

C-9 turned six in the middle of 2010. C-9 was non-verbal and used a photo-based communication folder to communicate his wants. He was able to understand a sequence of events - for example that his preferred activity was going to occur following something else. He could maintain eye contact for short periods of time when high preference items were shown. He could locate his bag out of a group of up to six bags. He had a very limited diet, and his favourite food was KFC popcorn chicken. In accordance with current diagnostic criteria for autism (DSM-IV), C-9's CARS2-ST ratings at the beginning of the PRT intervention indicated that he fell within the severe range of ASD.

C-10 turned six in April 2010. He would look toward staff who called his name during structured situations. C-10 could answer "what do you want" questions when presented with real objects and was able to match to sample, using items such as a photograph of himself. C-10 enjoyed tickles and expressed pleasure with smiles and giggles. He enjoyed making constructions out of various objects. In accordance with current diagnostic criteria for autism (DSM-IV), C-10's CARS2-ST ratings at the beginning of the PRT intervention indicated that he fell within the severe range of ASD.

C-11 turned seven at the beginning of 2010. C-11 would request activities using either single words or a full "I want..." sentence (often with prompts). He would also respond when he heard the name of preferred objects. He was able to recognise numbers from 1-20. He found it difficult to wait for things he liked and when he was anxious, his hands, arms and legs became rigid and he flapped his fingers. He was motivated by real objects such as model animals. In accordance with current diagnostic criteria for autism (DSM-IV), this child's CARS2-ST ratings at the beginning of the PRT intervention indicated that he fell within the mild to moderate range of ASD.

2.2 The intervention

(i) Training phase

In 2009 a clinician was appointed as PRT mentor and undertook the training provided by the Koegel Autism Center, which is a centre of excellence for PRT located in the University of California, Santa Barbara. The mentor subsequently began training the Aspect staff in the approach whereupon they began implementing it in the same year. It was intended that the mentor would further reinforce the procedures, oversee the implementation of PRT, and assist with data collection to evaluate the approach in 2010. However in early 2010 this person accepted a new role in Aspect which meant that she was unable to provide input into the PRT pilot.

Nevertheless, the pilot proceeded, with support for the two classes in each school provided by the school coordinators, supplemented by regular meetings with a manager in the organisation.

(ii) Implementation phase

Once ethics approval was obtained, the pilot baseline period was completed at the beginning of Term 2, 2010. The intervention proper took place later in Term 2 and continued in Terms 3 and 4, 2010. Data was collected in Terms 2, 3 and 4 in 2010 and follow up standardised testing was conducted a year later in Terms 1 and 2, 2011. A twelve month interval was allowed between pre and post tests on the standardised instruments in order to minimise contamination by practice effects.

2.3 Measuring instruments

Data was gathered using the following measuring instruments:

(i) Standardised assessments

(a) *Childhood Autism Rating Scale, Second edition (CARS-2)* (Schopler, Van Bourgondien, Wellman, & Love, 2010). The CARS is a 15 item test that helps to identify children with autism and determine the severity of their symptoms using ratings obtained by directly observing individuals and rating their behaviour on a four point scale. The final diagnosis is also informed by a Caregiver Questionnaire.

(b) *Stanford-Binet Intelligence Scales, fifth edition (SB-5)* (Roid, 2003). This is an individually administered assessment of intelligence and cognitive abilities. It has 10 subtests which make up verbal and non-verbal domains (Roid, 2003). Nonverbal subtests require minimal receptive language and mostly call for nonverbal responses (such as pointing, moving puzzle pieces, and so on). The verbal subtests require facility with words and printed material.

(c) *Clinical Evaluation of Language Fundamentals, Fourth Edition (CELF-4)* (Semel, Wiig & Secord, 2003). The CELF-4 is an individually administered test that helps to identify, diagnose and evaluate language and communication disorders in students aged 5-21 years old. It has 16 subtests, a pragmatic profile and an observational rating scale.

(d) *Vineland Adaptive Behaviour Scale, Second Edition (Vineland-II)* (Sparrow, Balla, & Cicchetti, & Balla, 2005). The scales of the Vineland II are organised in three domains: Communication, Daily Living, and Socialisation. The Scale measures everyday living skills such as talking and getting dressed and helps to support the diagnosis of intellectual and developmental disabilities.

(ii) DVDs

Three times during 2010 (once at baseline, once in Term 3 and once in Term 4) staff were asked to videotape their pupils for approximately 15 minutes and gather footage of the students interacting with staff, peers, and learning materials and activities.

(iii) Teacher diaries

Throughout the year the teachers were asked to keep a diary about significant interactions in the classroom.

(iv) Staff focus group

At the end of the intervention, staff who were associated with the PRT intervention were invited to attend a face-to-face focus group.

(v) Staff questionnaires

Staff completed the following questionnaires before and after the intervention:

- Teacher self assessment
- Specific elements of the PRT approach
- Autism treatment philosophy.

(vi) Parent interview /teleconference

Face-to-face parent feedback was solicited either via parent-teacher interview notes (School 1) and/or through participation in a teleconference (Schools 1 and 2), scheduled at their convenience.

(vii) Parent questionnaires

Parents were invited to complete the following questionnaires:

- Changes in child skills, behaviours, or characteristics
- Involvement in the school program.

(viii) Teacher Observations

Teachers were asked to complete a set of observations of the children in their classroom in terms 2, 3 and 4, comprising at least one positive behaviour, one undesirable behaviour and one difficult situation.

PART III. RESULTS

Introduction

As the participant description (Section 2.1) reveals, there are large differences between children in terms of abilities, interests, and autism severity. In most cases therefore it is not appropriate to amalgamate the children's results and conduct statistical analyses that test for group effects because these overall figures could obscure important differences between the children that could inform future intervention decisions.

When the sample is divided into more homogenous groups of Class 1 and Class 2, the sample size is too small to expect any difference over time to be significant. Therefore most of the analysis of child outcomes is analysed qualitatively rather than in terms of statistical significance. Graphs are frequently used to illustrate overall consistencies (or otherwise) in the results but the data are subjected to quantitative analysis only on the rare occasions where this is warranted or where standardised assessments provide statistics (such as standard deviations) to facilitate interpretation of within-participant differences.

3.0 Standardised assessments

3.1 Overview

Norm referenced standardised tests were administered once before PRT was begun, and once a year later. Because these selected tests are norm referenced, it is possible to compare children's results with other children of their own age and background. If these comparisons are made at two different occasions and a child's standing relative to their peers changes over time, this suggests that factors other than maturation may be implicated. This is because all the comparison children are also getting older, so we would expect the child to stay "in step". When a child's rate of development on normed tests increases after an intervention is begun, this provides good preliminary evidence that the intervention is a promising one and deserves further investigation.

The following four standardised tests were administered by qualified allied health clinicians before the intervention, and at a one year follow-up:

- I. Stanford-Binet Intelligence Scales, fifth edition (SB-5).
- II. Childhood Autism Rating Scale, Second edition (CARS-2) (Schopler, Van Bourgondien, Wellman, & Love, 2010).
- III. Clinical Evaluation of Language Fundamentals, Fourth Edition (CELF-4) (Semel, Wiig & Secord, 2003).
- IV. Vineland Adaptive Behaviour Scale, Second Edition (Vineland-II) (Sparrow, Balla, & Cicchetti, & Balla, 2005).

Strictly speaking, the rationale for administering intelligence tests is that they are measures of a child's potential, and so should not be affected by external events such as Pivotal Response Training. However, intelligence is inferred from behaviour, and sometimes the child has capacities that are not revealed in testing because he lacks motivation or selectively attends to the wrong stimulus. Both these factors are addressed in PRT so it is conceivable that PRT may facilitate the expression of capacities that formerly lay dormant and lead to a rise in measured intelligence over time.

3.2 Stanford-Binet Intelligence Scales, Fifth Edition (SB-5)

The Stanford-Binet Intelligence Scales, Fifth Edition (SB-5), is a standardised test that helps to measure intellectual development in children and adults aged from two years to over 85. It is individually administered, which is important for children with autism whose capacities can be underestimated because of their communication difficulties. One of its uses is to inform special education placements, by helping to diagnose a variety of

developmental disabilities and exceptionalities. The SB-5 covers five factors of cognitive ability:

- Fluid Reasoning
- Knowledge
- Quantitative Reasoning
- Visual-Spatial Processing
- Working Memory

Cutting across these factors are the verbal and non verbal domains. Each domain is comprised of five subsets each of which has a mean of 10, a standard deviation of three, and a range of 1-19. A standard deviation allows for measurement errors, so a score of (say) 10 on the SB-5 could in principle lie between 7 and 13. When determining whether a change has really occurred, or whether different scores merely reflect minor tester variations, the standard deviation needs to be taken into account.

The Stanford-Binet yields three Intelligence Quotient (IQ) scales. The Non-verbal IQ and the Verbal IQ are obtained independently and together they comprise the Full Scale IQ. These three scales all have a mean (average) of 100 and a standard deviation of 15.

Figures 3.2.1 and 3.2.2 display the results of testing, at two times, the children in Schools 1 and 2. The pre tests were scheduled for March-April 2010 before the PRT was commenced, and the post test was administered approximately one year later. Non verbal IQ, Verbal IQ and Full scale IQ scores were obtained for all children in School 1, but not all children in School 2 responded to the assessor in all subtests. It is not possible to calculate IQ scores when more than three subtests have scores of zero, so some children in School 2 do not have scores entered against their names in the figures below.

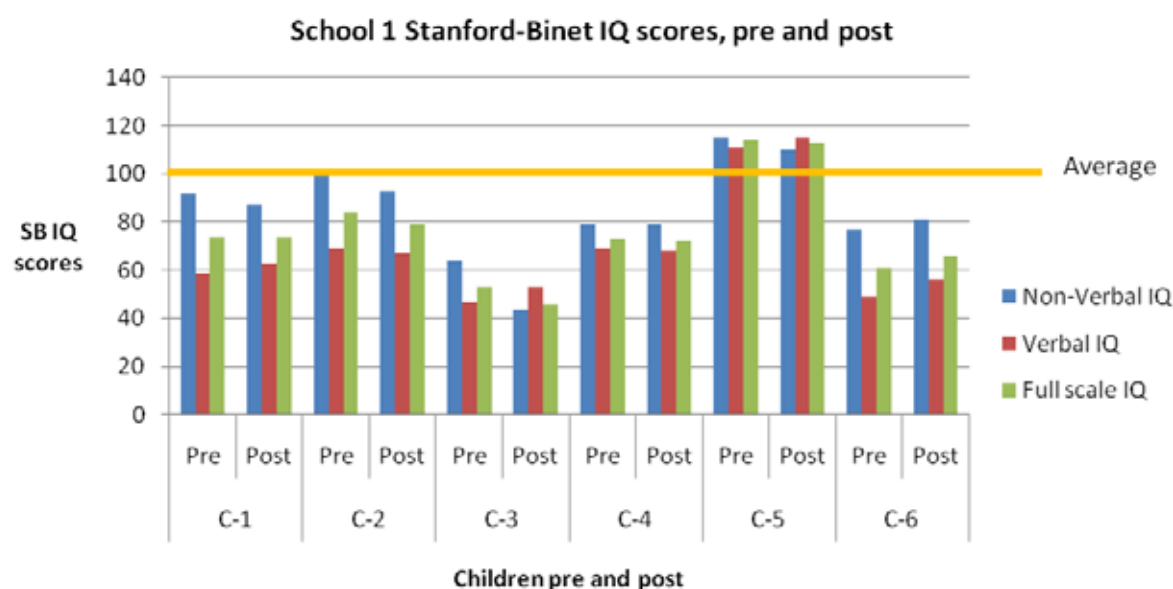


Figure 3.2.1
Stanford-Binet scores, School 1

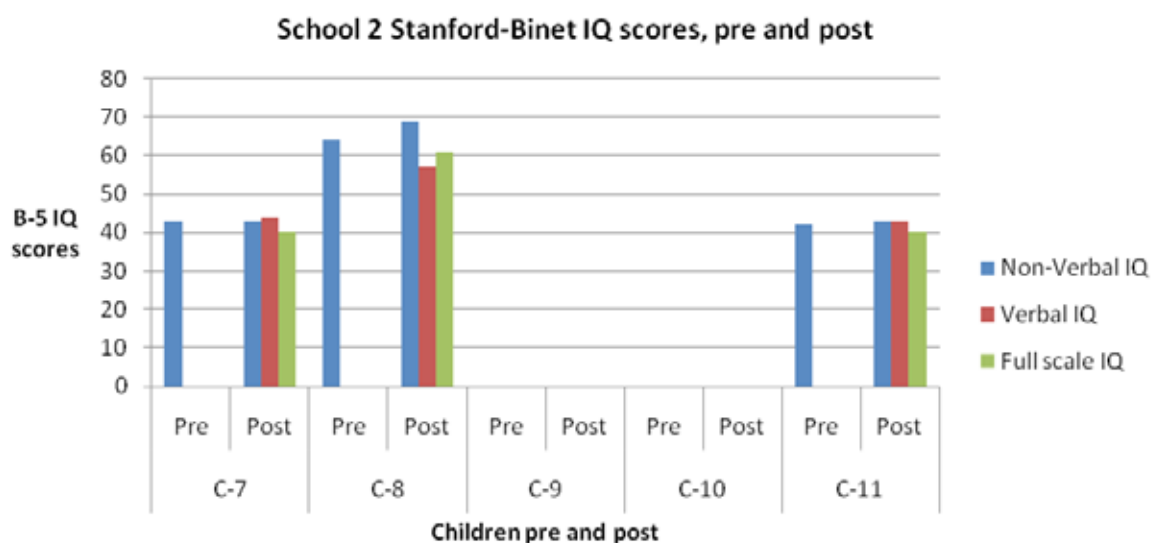


Figure 3.2.2
Stanford-Binet scores, School 2

(i) IQ Scales

Figure 3.2.1 and Figure 3.2.2 indicate that overall the children's scores remained relatively stable although there was a little movement within School 1. Child C-2's non verbal IQ and full scale IQ scores moved slightly lower at post-test although they still remained within the same ability band (average and borderline respectively). Child C-3's non verbal IQ score moved from mildly delayed in the pre test to moderately delayed in the post test although the actual difference in scores was less than one standard deviation. The IQ scores of children in School 2 remained stable when they could be tested.

Further inspection of Figure 3.2.1 and Figure 3.2.2 reveals that the two classes differ markedly. In School 2, some of the IQ scores could not be calculated (as indicated by the gaps in Figure 3.2.2), usually because the children did not attend or respond to items in the subtest. In fact no verbal scores could be calculated at pre-test, hence it was not possible to determine verbal changes over time. In contrast, all the children in School 1 were able to be tested on verbal and non-verbal items during both the pre and post sessions and their IQ scores were higher than those of Class 2.

(ii) Subtest scores

Children with autism often have an uneven ability profile (Schopler, Lansing, Reichler, & Marcus, 2005) and it was possible that the three IQ scores (verbal, non-verbal and full-scale) concealed changes at a more granular level in the subtests.

Therefore an examination of all the subtests before and after the intervention was conducted to detect any significant changes in the underlying factors. Significant changes were defined as a change of 6 scaled score points, allowing for error of measurement on the pre and post tests. With ten subtests and 11 children, and eliminating non-assessable responses, it was theoretically possible that there could have been 75 significant changes (60 for School 1 on verbal and non-verbal subtests and 15 for School 2 on non-verbal subtests). Scores for these subtests are depicted in Tables 3.2.1, 3.2.2, and 3.2.3, in which changes in a positive direction are bolded, and statistically significant positive and negative changes are highlighted. The tables reveal no consistent trend. 22 changes

are positive; 22 are negative, and 31 stayed the same. Of these, the analysis revealed only three relatively weak statistically significant changes, in no consistent direction. These changes are highlighted in Tables 3.2.2 and 3.2.3, below.

Table 3.2.1 School 1: Stanford-Binet verbal subtests scaled scores

Question	C-1		C-2		C-3		C-4		C-5		C-6	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Fluid reasoning	1	6	1	1	1	1	2	5	15	13	1	5
Knowledge	7	4	4	4	4	4	4	2	10	11	4	1
Quantitative reasoning	8	7	1	1	1	1	7	7	11	12	3	7
Visual-spatial	1	1	1	1	1	1	8	9	7	12	1	1
Working memory	1	3	1	1	1	1	5	2	16	14	1	1

Table 3.2.2 School 1: Stanford-Binet nonverbal subtests scaled scores

Question	C-1		C-2		C-3		C-4		C-5		C-6	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Fluid reasoning	14	13	14	11	4	4	5	8	18	14	11	10
Knowledge	7	6	7	6	4	4	9	7	10	11	5	7
Quantitative reasoning	6	6	6	9	1	1	8	7	11	12	1	7
Visual-spatial	11	8	11	11	12	12	4	5	15	8	13	10
Working memory	6	7	6	8	1	1	8	7	8	13	2	1

Table 3.2.3 School 2: Stanford-Binet nonverbal subtests scaled scores

Question	C-1		C-2		C-3		C-4		C-5		C-6	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Fluid reasoning	1	1	3	10	n/a	n/a	n/a	n/a	1	1	11	10
Knowledge	1	1	1	2	n/a	n/a	n/a	n/a	1	1	5	7
Quantitative reasoning	1	1	1	1	n/a	n/a	n/a	n/a	1	1	1	7
Visual-spatial	1	1	12	12	n/a	n/a	n/a	n/a	1	2	13	10
Working memory	2	1	5	1	n/a	n/a	n/a	n/a	1	1	2	1

As revealed in the highlighted cells in Tables 3.2.2 and 3.2.3, the non verbal subtest scores of two children in School 1 and one in School 2 changed significantly over time. However only two of these reflected improved scores:

- C-6's scores on quantitative reasoning improved significantly (Table 3.2.2)
- C-5's scores on visual-spatial subtest decreased significantly (Table 3.2.2)
- C-8's scores on fluid reasoning improved significantly (Table 3.2.3).

The finding that the scores in School 2 were relatively low should not blind us to the fact that three children - more than half the class - were no longer "untestable" at post-test. Children C-7; C-8, and C-11 moved from "untestable" to

“testable” on all of the five subtests of the verbal reasoning domain. This is a major achievement, and is underpinned by increased ability and/or motivation to attend, engage in a task and attempt a response.

Tables 3.2.1 - 3.2.3 also point to the large individual differences both within and between children.

3.3 Childhood Autism Rating Scale, Second edition (CARS-2)

The CARS-2 is used to diagnose autism. It was individually administered to the 11 children in Schools 1 and 2 by qualified clinicians at the beginning of the intervention in 2010 and approximately one year later. The CARS T-scores of all the students were graphed in order to show changes over time. These are depicted in Figures 3.3.1 and 3.3.2, which also portray the cut-off points for a determination of three categories of “minimal autism”; “mild-moderate autism,” and “severe autism”.

Inspection of Figure 3.3.1 reveals that one child (C-6) moved from mild-moderate to minimal classification, and no child moved to a more severe diagnostic category. Overall however, there were no great changes nor consistent results over time for School 1. In that school, the children’s CARS scores either increased, decreased or stayed the same, but the changes were too small to be significant.

Results for School 2 were more complex. The pre assessments were completed with the assistance of the child’s teacher/co-ordinator in 2010, but the post assessments in 2011 were completed with different raters, because the students by that time had changed classes. This had a confounding effect on the CARS scores, and may have introduced differences where in fact there were none. For example, it can be seen in Figure 3.3.2 that Child C-7 and C-10 moved from “mild-moderate autism” to severe autism” over the course of the study, and C-11 moved from “minimal” to “mild-moderate”. These were not in the hoped-for direction, and they may have been an artefact of different scoring personnel.

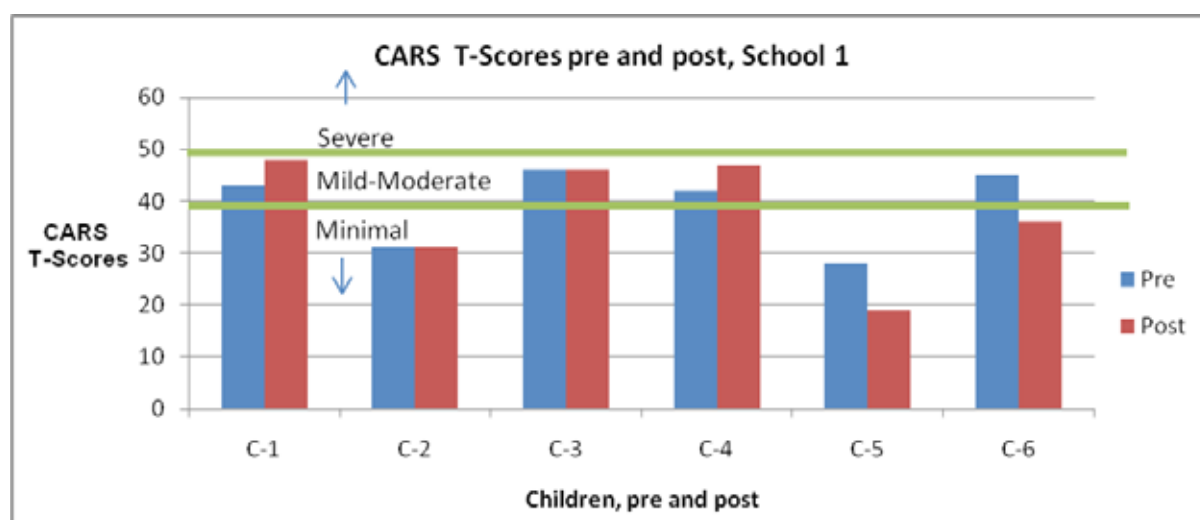


Figure 3.3.1
CARS T-Scores, School 1

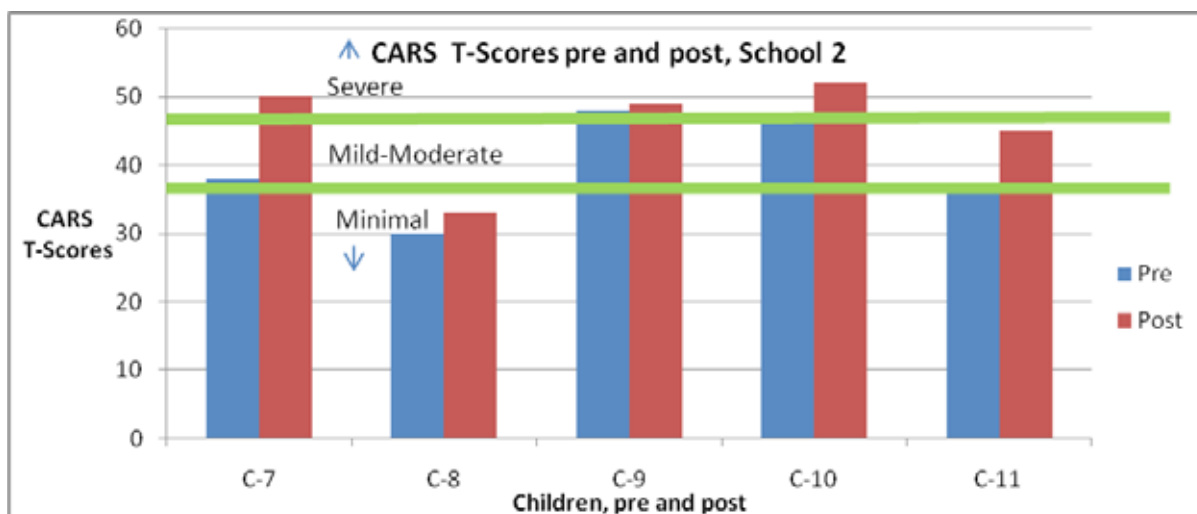


Figure 3.3.2
CARS T-Scores, School 2

3.4 The Clinical Evaluation of Language Fundamentals - 4 (CELF-4)

The Clinical Evaluation of Language Fundamentals - 4 (CELF-4) is used to assess children's ability to understand (receptive language) and use (expressive language) verbal speech with minimal visual support. As noted in the children's clinical reports, it should be remembered that functionally, this assessment can only be used as a guide for intervention. This is because the CELF-4 does not take into account the communication variables of people with autism and it has been standardised to the development of typically developing children.

The current study used three measures as indicators of progress. All of these have a mean of 100 and a standard deviation of 15 and consist of:

(i) Core language score

The core language score indicates the presence or absence of language disorder.

(ii) Receptive Language Index

The receptive language index is a measure of listening and auditory comprehension.

(iii) Expressive Language Index

The expressive language index is a measure of a child's ability to communicate a meaningful oral message.

The above three indices are derived from a child's performance within six subtests that describe the nature of the child's language. These subtests are:

- Concepts and following directions
- Word structure
- Recalling sentences
- Formulating sentences
- Word classes
- Sentence structures

The test results for children in Schools 1 and 2 are presented in Figure 3.4.1 and Figure 3.4.2 respectively. Individual differences in outcomes are again apparent, and scores neither increased nor decreased consistently. No change in either a positive or negative direction was greater than 15 points, as would be required for a confident judgement that children differed in their performance on the pre and post tests.

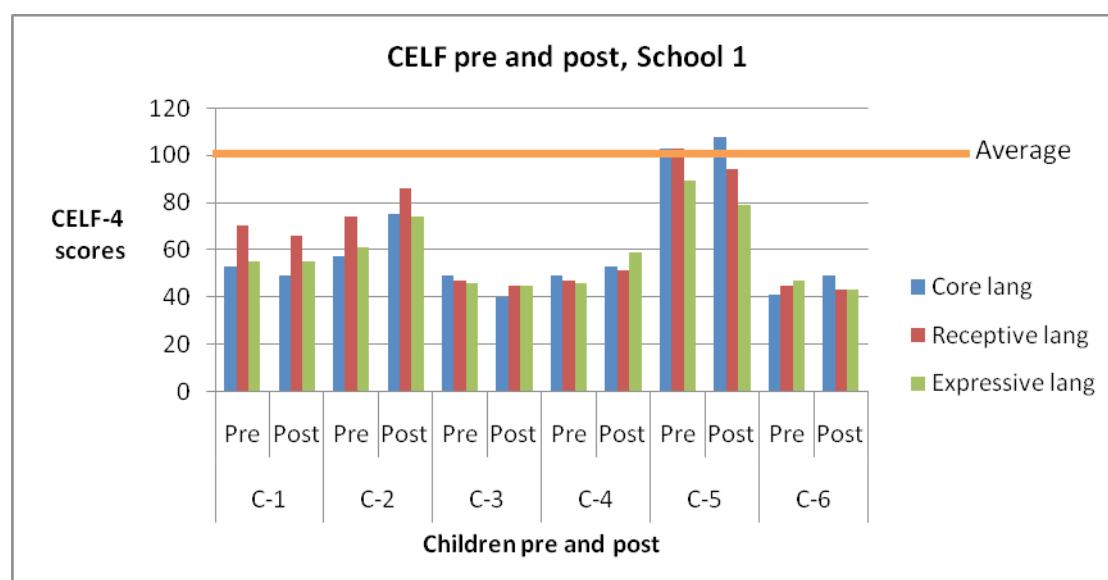


Figure 3.4.1
CELf scores, School 1

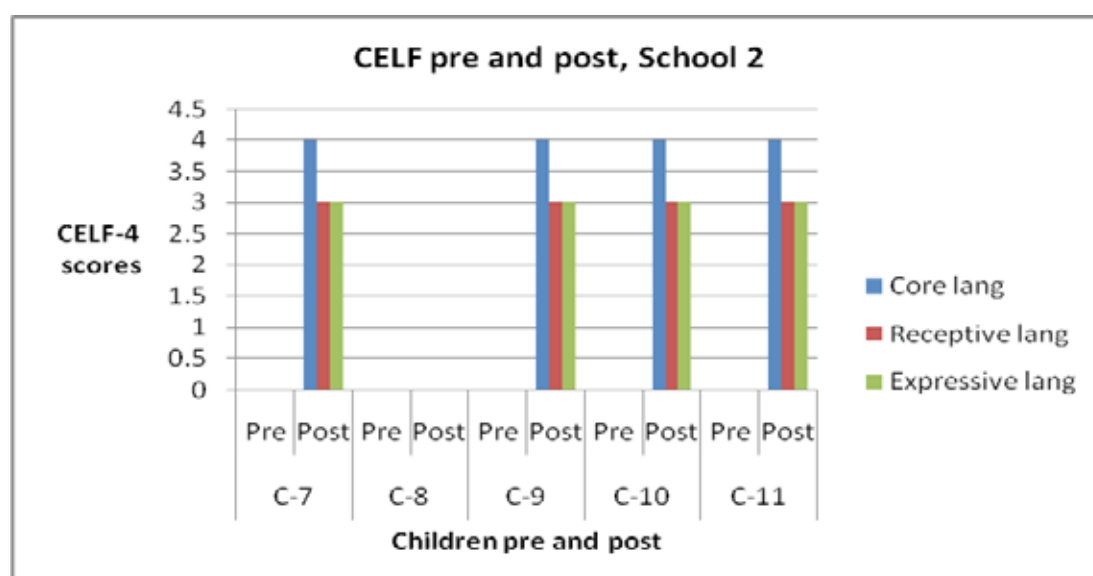


Figure 3.4.2
CELf scores, School 2

Perhaps more than any of the other tests, the CELF-4 highlights the difference between the children in the two schools, and the importance of individualised assessment. In School 2, all five children presented with a severe receptive and expressive language disorder. However the CELF results are not reflective of functional language ability (i.e., the ability to use language in everyday life), and the low CELF scores should not be considered predictive

of children's behaviour when given appropriate support. Like the Stanford-Binet, the encouraging feature of the CELF assessment in School 2 is that four of the five children moved from "non-assessable" to "assessable". Although strictly speaking there are no pre test scores for comparison, the fact that these children moved from a point of no response at pre-test to one of interacting with the assessor at post-test, is extremely encouraging.

3.5 Vineland Adaptive Behavior Scales, Second edition (Vineland-II)

The Vineland-II helps to measure personal and social skills needed for everyday living. Scores can be expressed as adaptive behaviour composites with a mean of 100 and standard deviation of 15.

The Vineland-II was the final of the four standardised test to be administered. Scores over 2010 and 2011 were available only from School 2. Results for the Vineland adaptive behaviour composite score are depicted in 3.5.1, where it can be seen that there was no significant change over time for any of the students in School 2. Four of the students remained in the "low" adaptive functioning category, and one, C-8, remained in the moderate category over time.

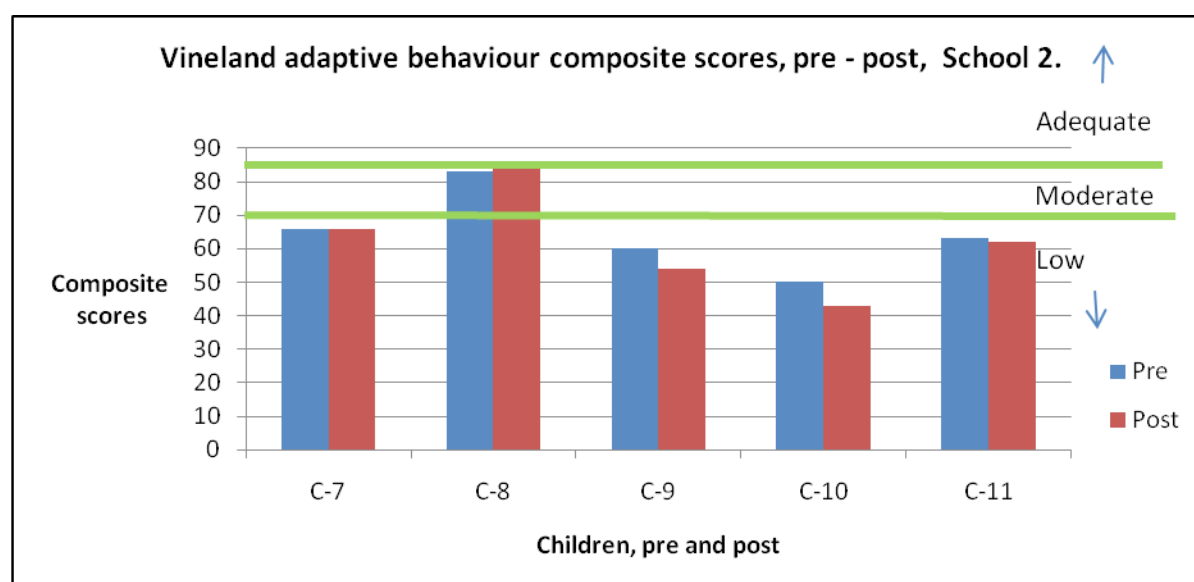


Figure 3.5.1
Vineland scores, School 2

3.6 Summary and discussion of standardised test results

- Scores on the Stanford-Binet-5; CARS-2; and CELF-4 were obtained for students in Schools 1 and 2, and Vineland-II results were also available for School 2.
- Overall a profile was revealed where students in School 1 had higher measured abilities than School 2 across all tests, and this was accompanied by a less severe autism diagnosis in School 1.
- Another salient feature, irrespective of school, is the consistently better performance of almost every child on the non-verbal domain compared to the verbal domain. Higher non verbal scores were evident at both the beginning and end of the intervention. This is not unusual for young children with autism, and the gap is expected to narrow over time (Mayes & Calhoun, 2003).
- With one exception, no consistent variations over time could be identified in the Stanford-Binet test results. Neither the non-verbal IQ, the verbal IQ, the Full score IQ or the subtest scores changed in a consistent way between 2010 and 2011. The major exception concerned the fact that more children in School 2 were more responsive and assessable at the end of the intervention than at the beginning.

- v. There was no strong evidence of substantial change in the CARS scores. Three of five children in Class 2 moved to a more severe autism classification, which was unexpected. However interpretation of the CARS in Class 2 was complicated by the finding that different people were involved in the pre and post testing, so this is a confounding factor.
- vi. No consistent changes in language ability as measured by the CELF could be detected in either School 1 or School 2.
- vii. The Vineland-II was administered in School 2 only, and no significant change over time was detected for any of these students.
- viii. Pivotal Response Training is used to teach language and academic abilities among other skills, so an increase in the current study of test scores in the verbal domain of the SB-5 from pre to post would be consistent with the underlying rationale of PRT. No consistent changes in verbal ability were evident in School 1. However if the increased verbal testability in 2011 of the School 2 children is taken as a guide, then there is soft evidence that PRT may be implicated.
- ix. The standardised assessments at the beginning of the intervention underline the challenges faced by teachers when implementing any new intervention. They also highlight the differences in ability level between the children in the two schools. These differences need to be taken into account when considering the responses of the children to the PRT intervention.

4.0 DVD Analysis

4.1 Purpose of the DVD analysis

There were three main purposes of the DVD analyses, and they focused on children, teachers, and scorers respectively. The first purpose reflected the *raison d'être* of the pilot and was designed to shed light on child outcomes: whether, and if so how, the children changed over time relative to baseline measures (that is, any DVDs taken before PRT was implemented). Thus, the analysis is concerned with “what” “when” and “how” of child outcomes. Typical questions include: “Is the child engaged?” “When is the child more responsive?” and “Does the child request objects or help?”

The second purpose of the DVD analysis was to determine to what extent the staff were implementing PRT “by the book”. This would enable a judgement of program fidelity. This allows us to make a determination as to the “why” about child outcomes. It is tempting to assume that any changes over the year must be attributable to PRT, but this cannot be done unless we can show that the staff are actually implementing PRT properly. If staff are not adhering to PRT then it would be misleading to attribute child changes to the techniques and procedures of PRT. In this study, program fidelity was ascertained by checking factors such as whether the instructions and reinforcement were correctly administered by the teacher, and whether the child was given sufficient motivators including the choice of objects and activities.

The third purpose of the DVD analysis was to ensure that the DVDs were being scored consistently. Typically, this is ascertained by having two people score a portion of the DVDs, then comparing them to see whether the results overlap to an acceptable degree.

The three purposes suggest a logical ordering of the analysis. First, we need to show the scoring is reliable, otherwise there is little point in using the scoring to assess program fidelity or child outcomes. Second, once we have established scoring reliability, we need to determine that the teachers are implementing PRT properly, otherwise it makes no sense to attribute child outcomes to PRT. It is only when we have analysed reliability and program fidelity that we are in a position to examine child outcomes. Therefore, in this evaluation, inter-rater reliability is analysed first, program fidelity second, and student outcomes are examined last of all.

4.2 Submission of DVDs

Schools 1 and 2 were asked to submit disks of 15 minutes duration taken before and after the intervention. Each school submitted three DVDs that were suitable for analysis. School 1 provided two disks taken in term 3, and one disk taken in term 4. The disks ran from about 12 - 18 minutes. Unfortunately School 1 did not submit a baseline DVD. This means it is not possible to conclude that any changes in either the teacher's behaviour or the child's behaviour on the DVDs can be attributed to PRT. Nevertheless, the DVDs can be analysed to:

- Provide a snapshot at two points in time of the two classes, to illustrate dynamics such as engagement, prompting, social interaction, and child requesting.
- Determine program fidelity - that is, whether the teachers were actually implementing PRT as intended. If the DVDs reveal high fidelity, then this is consistent with the interpretation that PRT is associated with changes in other pre and post measures, particularly standardised scores on the CARS, Vineland, SB5 and CELF-4.

School 2 provided four clips for analysis. Three clips were taken during the baseline period and one clip was taken in Term 3. One of the baseline clips provided a clear example of a teaching approach that was based on Structured Teaching (commonly called TEACCH) and entirely different to PRT. This particular clip showed no teacher-child interactions so there were no opportunities to demonstrate critical child behaviours or to assess the teacher's interactions at the outset of the pilot. This clip was therefore noted but not subjected to detailed scrutiny. Of the three remaining DVDs (called D, E, and F) disk D ran for approximately 15 minutes, disk E contained approximately four minutes of relevant interaction, and disk F, which was scratched, was analysable for approximately eight minutes.

4.3 DVD analysis: Reliability check

Scoring DVDs is difficult. The DVDs in this study were scored by research assistants who were not familiar with the children. The process requires detailed attention to behaviours which in the case of children with autism can often be weak and easily overlooked, such as a faint request for help that is directed to no one in particular. It is easy for assessors to "drift" and find they are applying slightly different scoring criteria to indicate the presence or absence of behaviours by the time they come to the end of a stack of DVDs. During this process it was important to establish that the target responses were specified tightly, so that similar results would be obtained if the DVDs were scored on different occasions or by different coders.

Consequently, in order to increase the consistency between DVD raters, the DVD analysis began by deciding upon the variables of interest and then defining these to reduce ambiguity. For example "Child displays on-task engagement" was defined as "child on task at one minute probes". All the disks were scored according to the number of predetermined teacher or child responses that occurred during one minute intervals.

The DVD scorers discussed the criteria and resolved areas of uncertainty before a reliability check was undertaken, using Disk A. During this process all the disk - approximately 20% of the total footage - was scored by two people. In line with conventional research protocols, specified categories were scored independently by the research assistant and the writer, and then compared. When inconsistencies were noted, definitions of categories were tightened and the DVDs rescored until an acceptable level of consistency was obtained using the reliability formula:

(Number of agreements) divided by (Number of agreements plus disagreements) multiplied by 100 in order to convert the score to a percentage.

On the given criteria the inter-rater reliability scores ranged from 100% (for criteria such as: "Child displays on-task engagement"; use of physical prompts", "child makes social bid""child requests help") to the lowest rate of 83% (for

the criterion “Adult encourages child independence using verbal prompts”). The research standard for inter-rater reliability is one third of observations being scored by two researchers with at least 80% inter observer agreement (Cunningham 2011). Our reliability results were therefore considered acceptable, and so the remaining videos were scored and the data was made available for the next step in the analysis: the fidelity check.

4.4 DVD analysis: Fidelity check

(i) Fidelity categories

As shown in Table 4.4.1, Koegel, Schreffirnan, Good, Cerniglia, Murphy, and Koegel (1989) devised a seven category Fidelity of Implementation scoring system for PRT.

Table 4.4.1 Fidelity of Implementation scoring system, Koegel et al (1989)

1.	Instructions are clear, appropriate to the task, uninterrupted, and the child is attending to the therapist or task.
2.	Maintenance tasks are interspersed frequently.
3.	Multiple cues are presented if appropriate for the child's developmental level.
4.	The child is given a significant role in choosing the stimulus item(s).
5.	Rewards are immediate, contingent, uninterrupted, and effective.
6.	Direct reinforcers are used the majority of the time.
7.	Rewards are contingent on response attempts (not simply 100% correct responses).

The Koegel et al (1989) system has subsequently been used in whole or in part by most major PRT fidelity studies. The current evaluation also adopted the system used by Koegel et al (1989), but instituted one exception: Category 2 was not scored because the researchers did not know the children well enough to judge which tasks were already mastered, nor therefore, which tasks could be categorised as ‘maintenance’.

The current evaluation further clarified selected parts of these categories as follows:

Category 1 (i) Instructions clear was scored as occurring if the instruction was brief and to the point, using simple, concrete language.

Category 1 (ii) Instructions appropriate to task was scored as occurring if the instruction was relevant to the child's behaviour at the time.

Category 1 (iii) Instructions uninterrupted was scored as occurring if the teacher delivered the instruction in one piece, without having to break off to attend to other activities.

Category 1 (iv) Instructions given when child is attending to teacher/task was scored as occurring if:

- The teacher ensured the child looked at the teacher when being instructed or spoken to and /or
- The teacher ensured the child ceased irrelevant behavior/activity when instructed or spoken to.

Category 2 Maintenance task interspersed frequently. A maintenance task is one that the child has already mastered. As noted above, this category was not scored because no information was available as to which tasks could be considered maintenance. Choice-making, where a child is given a choice of engaging in one of several tasks which have all been previously mastered, is a common means of incorporating maintenance tasks. Nevertheless, choice

making was not treated as a maintenance task, but was scored as occurring in Category 4, Child given sufficient role in choosing stimulus.

Category 3 Multiple cues present: was scored as occurring if:

- a. The teacher used a multiple cue in an instruction/question or opportunity to respond. For example “Bring the yellow car”: the child had to respond to the colour attribute and the vehicle attribute (bringing the yellow truck or the blue car would be incorrect) and/or
- b. The teacher used multiple cue when referring to concrete objects and/or
- c. The teacher used two different objects but same verb, e.g. “roll car”, then “roll ball” then “throw ball”.

Note: A statement made by teacher with multiple descriptors, with no opportunity for a response from the child was not treated as a multiple cue. For example, if the teacher said “Monday the second is finished” once a child had marked off the day on the calendar, then this was not scored.

Category 4 Child given sufficient role in choosing stimulus: was scored as occurring even when the choice was a closed one, with a limited number of options.

Category 5 (i) Reward must be immediate was scored as occurring even when the reward was delayed but the child has been informed immediately of getting it, by his teacher. For example: The teacher asked the child to choose his free play activity, whereupon the child chose to play outside. The teacher said “Good boy (for making a choice), you can go out as soon as [relief teacher] comes to the room.”

Category 5 (ii) Reward must be contingent was scored as occurring when reinforcements were only given for correct behaviours or attempts.

Category 5 (iii) Reward must be uninterrupted was scored when there was no disruption to the provision of the reward.

Category 5(iv) Reward must be effective: was scored as occurring if:

- a. The child demonstrated excitement at having received the reward, e.g. by clapping hands, jumping up and down, smiling and/or
- b. The child continued with the activity that was being rewarded.

Category 6 Direct reinforcers used: was scored as occurring if the reward was an object or activity directly pertaining to the task. For example, the teacher might be encouraging the child to verbalise. If the child said “ball” they would be rewarded with a ball rather than (say) a jelly bean. In this case the direct reinforcer for responding appropriately to the instruction is the ball.

Direct reinforcement was scored in two different ways. In the initial analysis praise was not scored as a direct reinforcer. The children were young and at the beginning stages of being exposed to PRT. Therefore the analysis assumed that they were acquiring skills rather than practicing skills previously learnt, and that consequently they were more dependent on primary reinforcers (based on need) rather than secondary reinforcers such as praise which are originally neutral but have become reinforcing through association with another reinforcer.

A supplementary analysis which counted praise as a direct reinforcer was undertaken to allow for the possibility that the children’s skill level was more advanced, in which case it would be appropriate for the teachers to employ

praise to maintain (but not teach) the skill. When praise is used with people with autism, it is accepted practice to use specific praise (e.g. “good talking”) as opposed to more vague praise (“good”) which does not explicitly tell the children what they were doing well. An additional analysis of the use of specific vs generic praise was therefore undertaken.

Category 7 Reward must be contingent on response attempts was scored for reasonable attempts to respond even if the response was not completely correct.

(ii) Fidelity Guidelines

Each of the disks was scored according to the following guidelines.

Guideline 1.

For the purpose of this study the categories have been scored relative to opportunity. This was done because in this study different settings were filmed early and late in the PRT pilot. We know that some situations are more likely to evoke certain behaviours than others and this could potentially skew the results. For example, when the teacher and children are in the middle of singing a song, there are few opportunities for teachers to be simultaneously giving instructions. In contrast, if the teacher were sitting 1:1 with a child and introducing them to a new task, there would be more opportunities to instruct, and more opportunities to score “clear instruction”, “appropriate instruction” and so on. It would not be fair to say the teacher failed to give clear instructions during the song, because the teacher was singing, not instructing.

Therefore, analysis-by-opportunity protocols were designed in order to accommodate the varying opportunities for responding across DVDs taken early and late in the intervention. These protocols entailed the videos were scored as indicated in Table 4.4.2:

Table 4.4.2 Opportunity scoring

Score	Definition
-	No opportunity to fulfill category /video off. (For example no reward is given because child did not attempt to respond appropriately.)
1	Opportunity, and communication partner fulfills category requirement
0	Opportunity, and communication partner does not fulfill category requirement. (For example, child responds appropriately but teacher does not give reward.)

Guideline 2

When analysing the results, behaviours are scored as opportunity percentages wherever possible. These percentages were determined by calculating the total number of times the category was fulfilled (total “1” scores), and comparing these with the number of opportunities (total “1” + “0” scores), and multiplying by 100.

(Category 3, i.e. Multiple cues present, is an exception to this rule, being scored only when present in an interaction. This was because it was not known which categories the children were familiar with, so it was impossible to determine a missed opportunity.)

Guideline 3

In relation to group settings, teacher instructions have not been scored if it is not possible to determine to whom the instruction is directed, nor therefore, which child should be attending. However teacher questions about choice have been scored, such as “Who would like to choose the next song?”

Guideline 4

Verbal and non-verbal interactions were scored, since the focus was on communication, not simply speech.

(iii) Fidelity analysis, both schools

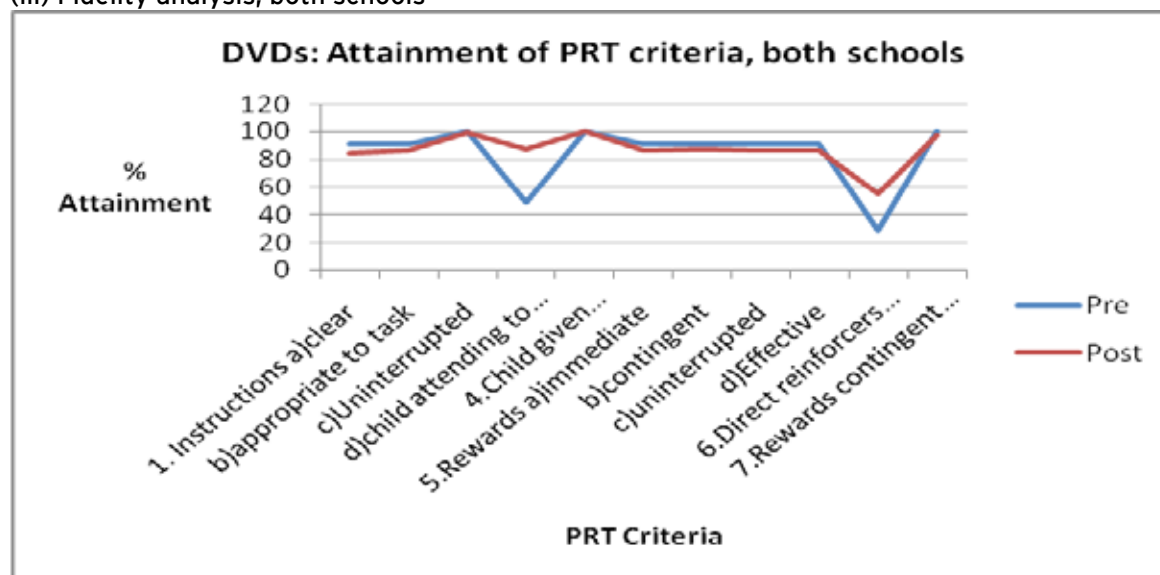


Figure 4.4.1
PRT Fidelity, both school DVDs

Figure 4.4.1 depicts the amalgamated fidelity results for both schools, before and after the implementation of PRT. The data are expressed as percentages, therefore category 3 (multiple cues present, which were scored as totals, not percentages relative to opportunity) does not appear. As mentioned earlier, maintenance tasks (category 2) could not be scored.

A criterion of correct implementation in 80% of occasions is usually taken as an acceptable level of mastery (see Suhrheinrich, Stahmer, & Schreibman, 2007). The most striking aspect of Figure 4.4.1 is that the schools were already implementing PRT to a satisfactory (80%) degree on most criteria during the baseline before PRT was officially implemented. As discussed later in this report, this has implications for the interpretation of other data. In the repeated measures data, for example, different trajectories on the baseline and implementation phase would therefore not be expected.

(iv) Fidelity analysis, School 1

Three disks were submitted by School 1. There was no baseline disk. Instead, all three disks were taken after the PRT intervention began.

Disk A (T3post) was recorded in Term 3 2010 during morning circle time. Children and staff were filmed using a Smart board to facilitate introductions, discussions of days of the week and the weather, and choices of songs and activities.

Disk B (T3post) was recorded in Term 3 2010 during outside play, when the children were playing on trampolines, climbing frames, bridges, and slides.

Disk C (T4post) was recorded in Term 4 2010 during a Smart board session when the children participated in songs

and games involving addition and subtraction. This was followed by a session when the children chose various free time activities.

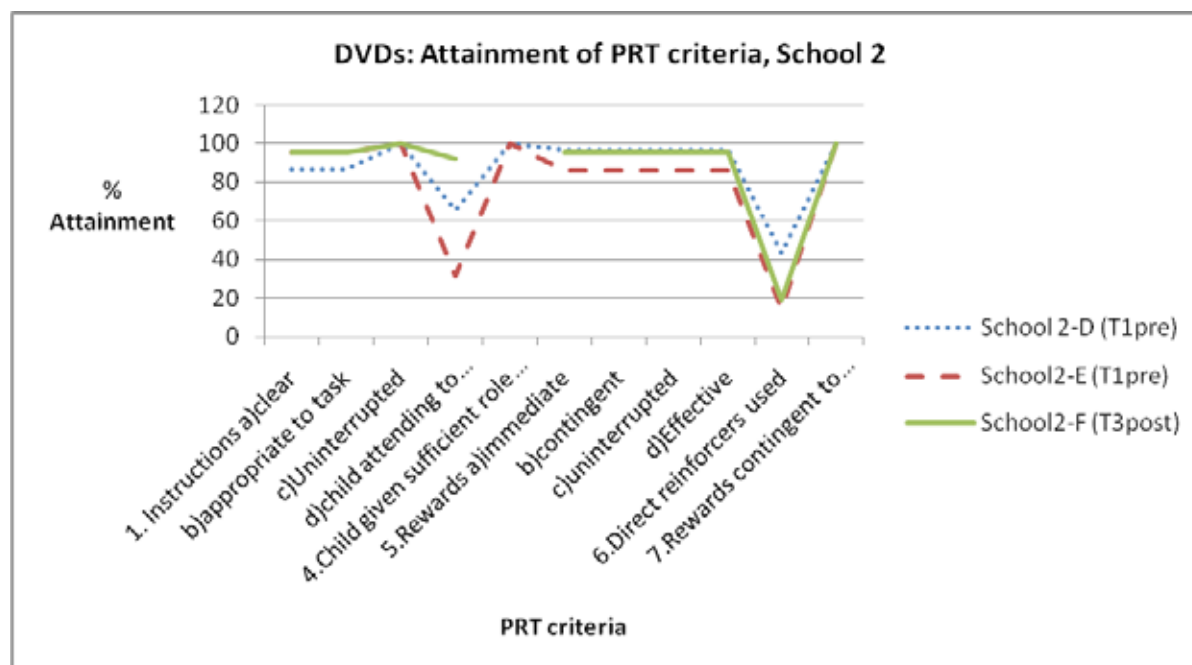


Figure 4.4.3
PRT Fidelity, School 2 DVDs

Figure 4.4.3 shows that the most noticeable differences between the pre PRT intervention DVDs (D and E) and the post PRT intervention DVD (F) was in the way the teacher ensured that the child was attending to the task during instruction. In line with expectations the child was more attentive, in disk F. Pre-post differences however are small and are very similar to the differences between the School 1 DVDs which were all taken post intervention.

No percentages were recorded for Disk F for the criterion “Child given sufficient role in choosing stimulus” because the nature of the tasks dictated that no opportunities were available for the child to do this.

Somewhat unexpectedly, the post-PRT implementation DVD failed to reach the requisite 80% criterion for the use of direct reinforcers. This was surprising because the children in School 2 as a group were more severely affected by autism and their verbal and social abilities were relatively underdeveloped compared to School 1. In these circumstances it would be reasonable to expect that there would be a relatively high reliance on direct, concrete reinforcers.

To investigate possible reasons for the trough for both schools in direct reinforcement, two subsidiary analyses were conducted. The first of these examined the role of context, and the second, the use of praise.

(vi) Supplementary analysis 1: context

DVD scoring is extremely sensitive to context. To demonstrate this feature, a subsidiary analysis was conducted on Disk F, the final DVD of School 2, which contained nine vignettes. (The final vignette was not scored because the disk was damaged.) This is depicted in Figure 4.4.4.

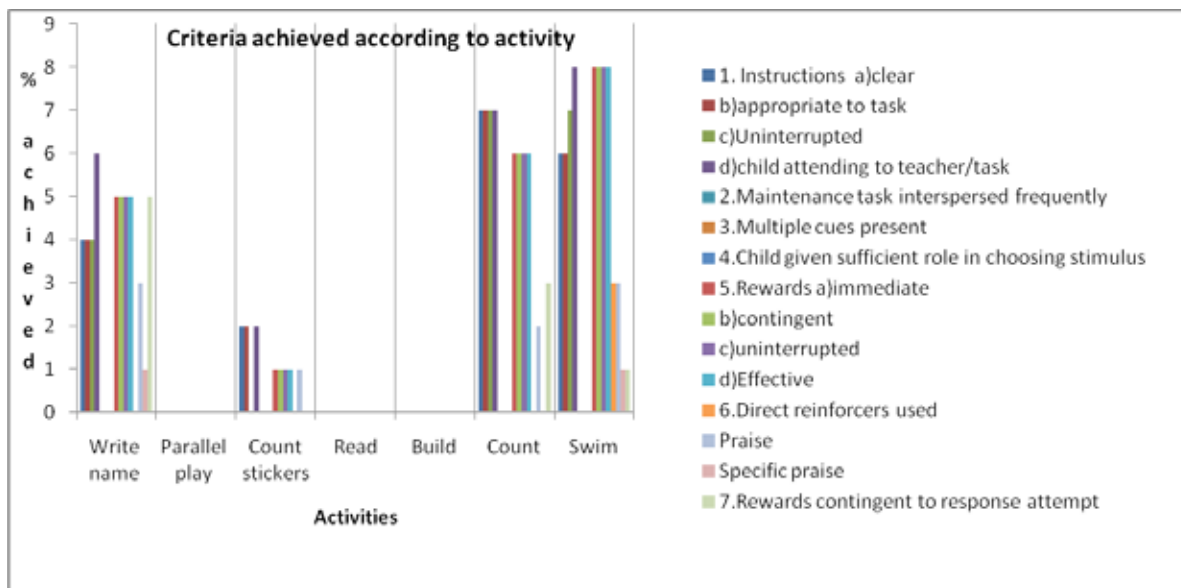


Figure 4.4.4
Sensitivity to context, School 2, Disk F (T3post)

It is clear from Figure 4.4.4 that attainment of PRT criteria was strongly dependent on the context. For example, the DVD contained three scenarios where no criteria were achieved: “Parallel play” (where three boys were playing together) “Read” (where boys were sitting on a blanket turning pages of pamphlets) and “Build” where two of the boys played with giant rubber blocks. In all cases no adult was present to instruct or reinforce, so program fidelity could not be scored. This illustrates that interactivity (upon which judgements of fidelity depend) are influenced by context. Judgements of fidelity therefore need to take context into account.

(vii) Subsidiary analysis 2: Direct reinforcement and praise

Direct (“natural”) reinforcement results directly from the appropriate behaviour. For example, a child who behaves appropriately in a group is more likely to be invited by his peers to join the group next time. Similarly, learning to say the word “apple” is most logically rewarded with an apple rather than (say) a jelly bean. Thus, praise is not strictly speaking a direct reinforcer unless the child specifically requests social attention - which is rare for children with autism. For this reason, praise was initially not scored as a direct reinforcer in this study.

However, through being paired with natural reinforcers, praise sometimes gains its own reinforcing properties. Moreover, praise is often more convenient and can be more quickly delivered than some natural reinforcers. Therefore it would be appropriate to pair praise with natural reinforcers, so that it could become rewarding in its own right. As children become more accomplished at various tasks, PRT proponents suggest that direct reinforcement is gradually scheduled with less frequency, using praise as an intermediate step. This is more convenient and approximates real life. No adult, for example, would expect to be rewarded with an apple every time they uttered the word “apple”.

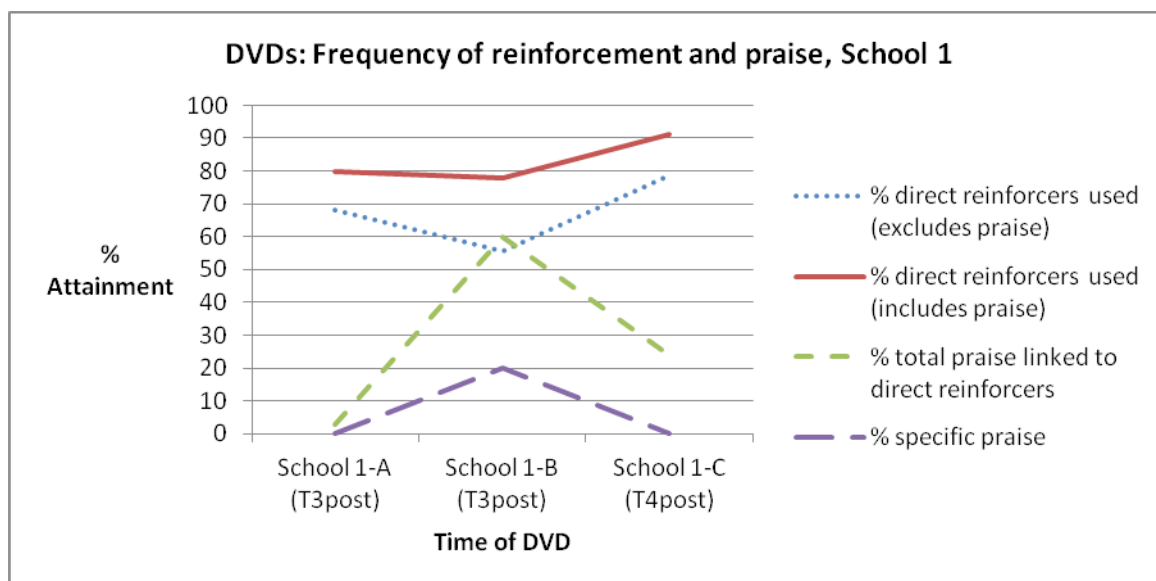


Figure 4.4.5
Reinforcement and praise, School 1

To help this process, the recommended kind of praise for young children with disability is specific praise. For example “Good listening” “Good throwing” “Good drawing” lets the child know what they are doing well, whereas “Good” or “well done” does not.

To determine how the teachers used praise, further analyses were made, as depicted in Figures 4.4.5 (School 1) and 4.4.6 (School 2).

Figure 4.4.5 shows the results for School 1. As expected the conservative estimation of direct reinforcement (dotted blue line) increases when praise is included in the calculation (unbroken red line). All the post PRT disks A, B, and C are above the 80% criterion once praise is included in the definition of direct reinforcement.

Figure 4.4.5 also reveals that the percentage of specific praise (the purple line with long dashes) is relatively low, never exceeding 20%. This is contrary to expectations. Generally it is recommended that students be given specific praise, so they know why they are being praised (Chalk & Bizo, 2004). Research shows that increases in specific praise are linked to increased student on-task behaviour and compliance (Fullerton, Conroy, & Correa, 2009 Austin & Soeda, 2008).

Finally, Figure 4.4.5 shows that the degree to which teachers link praise to direct reinforcement (shown by the green line with short dashes) is quite erratic. Praise is used along with direct reinforcement from a minimum of 3% of possible occasions (disk A) up to a maximum of 60% of occasions (disk B). This suggests that the teachers are working to promote praise as positive, although they do not consistently do this.

A similar situation is depicted in Figure 4.4.6 for School 2 when the definition of direct reinforcement is expanded to include praise. As expected under this definition, the teachers pass the fidelity criterion for direct reinforcement, just like School 1. It can be seen that the frequency of direct reinforcement increases dramatically to above 80% (unbroken red line) when praise is included in the calculation.

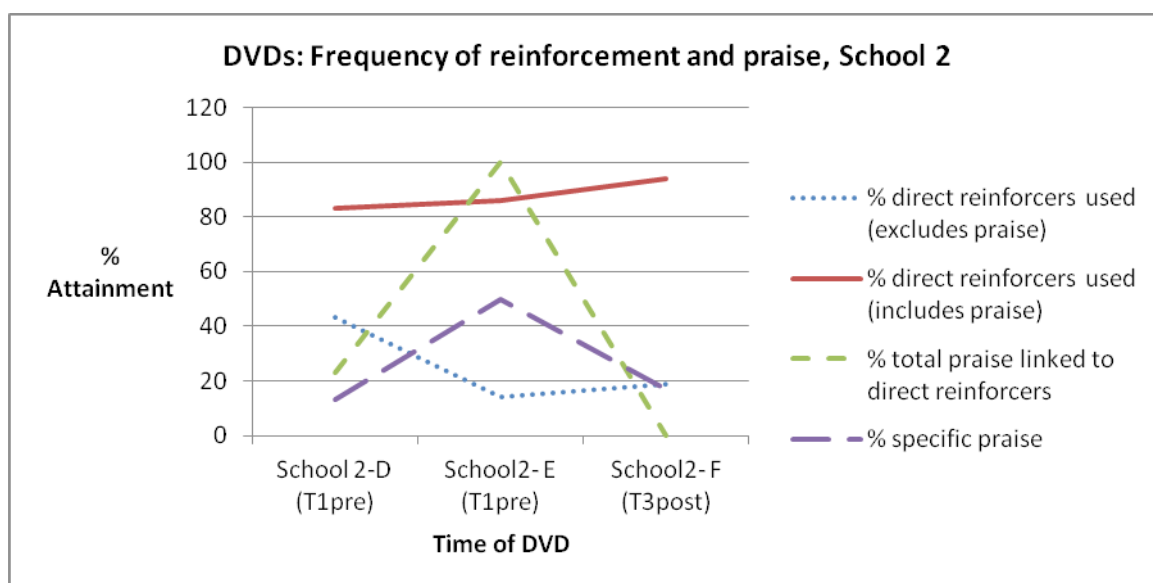


Figure 4.4.6
Reinforcement and praise, School 2

Secondly, specific praise is slightly higher than School 1, reaching a maximum of 40% but this is still relatively low for children with autism.

Finally, School 2 does not consistently link praise to direct reinforcers (this varies from zero to 100%, as indicated by the green line with short dashes). This inconsistency is surprising, given the fact that students with autism do not automatically respond to social rewards like praise. Instead, teachers need to pair praise with stronger rewards, so that praise becomes rewarding through association.

(viii) Subsidiary analysis 3: Multiple cues

Finally, a supplementary analysis was conducted to determine whether the teachers used multiple cues. Table 4.4.3 depicts the results.

Table 4.4.3 reveals that multiple cues were used by both schools when the opportunity arose. However it is not possible to conclude whether the use of multiple cues increased when PRT was begun because no school produced appropriate data for both the pre and post intervention periods. Data is only available for the post intervention period for School 1, as no DVDs were filmed in Terms 1 and 2. Data is available only for the pre intervention period in DVD-D for School 2, because the activities that were filmed in Term 3 (e.g. reading alone, parallel play) did not afford opportunities for the teacher to implement multiple cues. All that can be concluded is that School 1 used multiple cues sparingly in the post intervention period, and School 2 used them sparingly in the pre intervention period. More precisely, the analysis revealed that the teachers presented multiple cues at a low rate, averaging less than once every five minutes for School 1, and less than once in every eight minutes for School 2.

Table 4.4.3 Presentation of multiple cues, Schools 1 and 2

	School 1			School 2		
	DVD-A (T3post)	DVD-B (T3post)	DVD-C (T4post)	DVD-D (T1pre)	DVD-E (T1pre)	DVD-F (T3post)
Frequency of multiple cues	4	3	1	3	No opportunity	No opportunity

4.5 Summary of program fidelity findings

The findings are presented as “first level”, in the boxed level overleaf, and “second level”. First level findings have been bolded to indicate their significance in terms of how the DVD data and all the remaining data in the evaluation can be interpreted.

First level findings:

- i. **DVDs were scored reliably, so a fidelity analysis could be undertaken.**

School 1 provided three “post PRT” DVDs of classroom interactions in Terms 3 and 4.

School 1 attained reached 80% on all DVD fidelity criteria. Therefore we can say the School 1 implemented PRT properly in Terms 3 and 4. However, because we cannot assess their PRT-related behaviour in the baseline, it is not possible to assess whether the staff changed their behaviour between the baseline and the PRT intervention phases. The strongest conclusion that can be made is that changes in the children’s behaviour are consistent with the application of PRT, but we cannot make the stronger claim that PRT caused any changes in the children’s behaviour.

- ii. **School 2 provided two “pre PRT intervention” DVDs in Term 1 and one “Post PRT intervention” in Term 3.**

School 2 attained reached 80% on all DVD fidelity criteria post intervention.

Even before the intervention, however, both of School 2’s DVDs scored above 80% on all criteria except child attention. Therefore, there was no change from “no PRT” to “ PRT” that could be linked to any changes in the children’s behaviour. Again, the strongest conclusion that can be made is that changes in the children’s behaviour are consistent with the application of PRT, but we cannot make the stronger claim that PRT caused any changes in the child’s behaviour.

- iii. **An analysis of the same class in seven different settings showed large differences in fidelity for each setting. This indicated that attaining the PRT criteria was highly dependent on context.**

Second level, more detailed findings

- i. School 1 provided three “post PRT” DVDs of classroom interactions in Term3 (DVDs A and B) and Term 4(DVD-C).
- ii. School 2 provided two “pre PRT intervention” DVDs in Term 1 (DVDs D and E) and one “Post PRT intervention” DVD (DVD F) in Term 3.
- iii. The absence of a baseline measure for School 1 meant that the effect of the PRT intervention could only be discerned for School 2. However it was still possible to determine whether both schools implemented the PRT

program faithfully during the year.

- iv. An interrater reliability analysis indicated that DVD scoring was completed with greater than 80% consistently, so a fidelity analysis could be legitimately undertaken.
- v. Data regarding fidelity was available on six of seven conventional PRT measures. (It was not possible to score whether the teachers used maintenance tasks, because which tasks the teachers had previously taught were not known.) The PRT measures were:
 - vi. Instructions are clear, appropriate to the task, uninterrupted, and the child is attending to the therapist or task.
 - vii. Multiple cues are presented if appropriate for the child's developmental level.
 - viii. The child is given a significant role in choosing the stimulus item(s).
 - ix. Rewards are immediate, contingent, uninterrupted, and effective.
 - x. Direct reinforcers are used the majority of the time.
 - xi. Rewards are contingent on response attempts (not simply 100% correct responses).
 - xii. Wherever possible, fidelity data were scored as percentages, relative to opportunity. This was done to minimise skewing the data simply on account of the particular setting. (Some situations were more likely to evoke certain adult and child behaviours than other situations, so direct comparisons could be misleading).
 - xiii. It was expected that School 1 should achieve at least 80% success because the three DVDs were all post intervention. The standard was achieved on all criteria, as long as the criterion called "providing direct reinforcement" (ie reinforcement that is a natural consequence of behaviour) was leniently defined to include praise.
 - xiv. It was also expected that DVD-F (post intervention) of School 2 would attain the 80% success rate. This standard was achieved on all criteria, as long as the criterion called "providing direct reinforcement" was leniently defined to include praise.
 - xv. How much School 2's level of program fidelity was due to the PRT training was unclear. Even before the intervention, the DVDs D and E scored above 80% on all criteria except child attention.
 - xvi. Two definitions of "direct reinforcement" were used. One definition allowed praise to be counted as direct reinforcement, and the other more conservative definition did not. The two definitions were necessary because the use of direct reinforcement varies with the skill level of the child. Early in training, direct reinforcement should be implemented for every reasonable attempt. When the skill is mastered, direct reinforcement can be gradually reduced and /or replaced with praise or other convenient rewards (Visimara, 2009).
 - xvii. When direct reinforcement was scored conservatively (i.e. excluding praise), both schools failed to reach 80% criterion. When praise was included in the definition of direct reinforcement, teachers in both schools reached 80% criterion.
 - xviii. Whether the teachers used direct reinforcement appropriately must remain an open verdict, because data

was not available regarding the teachers' intention for each interaction (i.e. whether the teacher was intending to develop the skill or simply maintain it).

- xix. An analysis of the same class in seven different settings showed large differences in fidelity for each setting. This indicated that attaining the PRT criteria was highly dependent on context, and underlined the importance of using data from multiple sources (DVDs, standardised tests, focus groups etc) to gain a comprehensive picture of the process and outcomes of implementing PRT.
- xx. The frequency of specific praise was relatively low for both schools. Specific praise is commonly recommended for children with disabilities and this advice is thought to extend to children with autism, although this has been less widely researched in the autism literature (Stevens, Sidener, Reeve, & Sidener, 2011).
- xxi. Multiple cues were used sparingly by School 1 after the intervention and by School 2 before the intervention. Because neither school produced DVDs which filmed the use of multiple cues both before and after the intervention, the effect of the PRT training on the use of multiple cues could not be determined.
- xxii. Because the inter-rater reliability measures were above 80%, and because both schools reached criterion on all five scorable measures when praise was included in the definition of direct reinforcement, it is legitimate to consider the student outcome data.

4.6 DVD analysis: Student outcomes

(i) The 5 major questions

The third major DVD analysis was concerned with an examination of student outcomes: How did the students respond when PRT was implemented?

As outlined in section 1.2 (What is PRT?) there are 5 pivotal areas:

- Motivation - includes avoiding learned helplessness
- Responsivity to multiple cues - helps to avoid stimulus overselectivity
- Self initiations - includes asking for help
- Empathy - helps to facilitate the development of social relations
- Self management - increases the time spent interacting with peers, because the child is made self aware of inappropriate behaviours

The first four of the five pivotal areas lent themselves to DVD analysis: motivation, responsivity to multiple cues, self initiations, and empathy. The remaining area (self management) was primarily assessed using the parent teleconferences and teacher focus groups and diaries. This is because self management was difficult to codify on the DVD without a more detailed knowledge of each individual child.

To provide a framework for the DVD analysis, the four pivotal areas were linked to a series of five research questions and corresponding measurement strategies, as depicted in Table 4.6.1.

Table 4.6.1 Framework for DVD analysis

School 1		
Pivotal Area	Research Question	Measurement Strategy
Motivation	Was the child engaged?	Average % of children on task at one minute probes
	Was the child independent?	Average rate of teacher prompts per minute. (The fewer the teacher prompts, the greater the child independence.)
Responsivity to multiple cues	Did the child respond selectively to information?	% of child correct responses to teacher's multiple cues
Self initiations	Did the child request objects or help?	Average rate of child requests per minute
Empathy	Did the child initiate social interactions?	Average rate of child-child interactions and child-adult interactions per minute

Table 4.6.2 (below) provides an overview of the five student outcomes for schools 1 and 2.

(ii) Scoring guidelines

The DVDs are of varying lengths so it would not be legitimate to compare total scores of child characteristics before and after the PRT implementation, because the longer disks would have inflated measures. Instead they needed to be converted to a "common currency". Accordingly, four of the behaviour categories (engagement, independence, social interaction and requesting) have been tallied and then converted to average frequency per minute. The fifth child behaviour (responsivity to multiple cues) was dependent on the teacher providing the multiple cues, so was scored relative to opportunity, using the formula:

- Number of correct child responses divided by number of presentations of teacher multiple cues.

In addition, when analysing the child outcome data, each interaction between teacher and child has been scored separately.

Table 4.6.2 Comparative Table, School 1 and School 2: Student outcomes

DVD Element	A (15 mins)		B (13 mins)		C (15 mins)		D (15 mins)		E (3m40s)		F (8m10s)	
	Total	Av per min	Total	Av per min	Total	Av per min	Total	Av per min	Total	Av per min	Total	Av per min
1. Child displays on-task engagement. (Average = % of children attending per minute) ie child/client on task at one minute probes												
2. Adult encourages child independence using prompts.(Average = rate per minute)												
P - physical (eg hand over hand)	6	0.40	0	0	1	0.07	5	0.33	0	0	5	0.61
Vb - verbal	14	0.93	3	0.23	12	0.80	21	1.40	9	2.45	12	1.47
G - gestural (eg point)	7	0.47	0	0	11	0.73	14	0.93	8	2.18	5	0.61
V - visual (eg teacher models how to trace a letter)	0	0	0	0	3	0.20	5	0.33	2	0.54	0	0
TOTAL PROMPTS	27	1.80	3	0.23	27	1.80	45	3.0	19	5.18	22	2.69
3. Social (ie. non task) interaction I - initiate R - respond												
Child-I ... Child R	0	0	2	0.15	0	0	0	0	0	0	0	0
Child I ...No Child R	0	0	1	0.08	0	0	0	0	0	0	0	0
Child I ...Teacher R	1	.07	0	0	3	0.20	0	0	0	0	0	0
Child I ... No Teacher R	0	0	1	0.08	2	0.13	0	0	0	0	0	0
Teacher I ... Child R	0	0	1	0.08	0	0	0	0	0	0	0	0
TOTAL SOCIAL	1	.07	5	0.38	5	0.33	0	0	0	0	0	0
4. Child requests objects or help.												
VO=Verbal request object	0	0	2	0.15	1	0.07	3	0.20	0	0	1	0.12
VA= Verbal request activity	8	0.53	2	0.15	16	1.07	2	0.13	0	0	0	0
VH-Verbal request help	0	0	0	0	1	0.07	0	0	0	0	0	0
PO=physical request object	0	0	1	0.08	0	0	1	0.07	3	0.82	0	0
PA=Physical request activity	2	0.13	0	0	6	0.40	1	0.07	0	0	0	0
PH=Physical request help	0	0	1	0.08	1	0.07	0	0	0	0	0	0
TOTAL REQUESTS	10	0.67	6	0.46	25	1.67	7	0.47	3	0.82	1	0.12
	Total	Oport	Total	Oport	Total	Oport	Total	Oport	Total	Oport	Total	Oport
5. Responsivity to multiple cues	4/4	100%	3/3	100%	1/1	100%	3/3	100%	N/A	N/A	N/A	N/A

(iii) Student outcomes

The first pivotal area to be investigated is motivation. Figure 4.6.1 (below) depicts student engagement, amalgamated for each school, and reveals the average percentage of children who were engaged at one minute probes. Figure 4.6.1 shows that the level of student engagement was high, above 80%, for the three post intervention DVDs of School 1. This is encouraging, but we cannot tell if the high engagement was due to the PRT, because there are no DVDs of the children's behaviour before PRT was implemented in School 1.

Figure 4.6.1 also shows School 2 achieved engagement scores of 100% for the post intervention DVD-F in Term 3. The same high to moderately-high engagement levels was also achieved in the baseline films (DVD-E and DVD-D respectively). This is consistent with the high PRT fidelity noted in the baseline period. However, because there is no period during the year when PRT was not implemented (as summarised in the previous fidelity analysis in Section 4.5) it is not possible to attribute the relatively high engagement of School 2 unambiguously to the PRT intervention either.

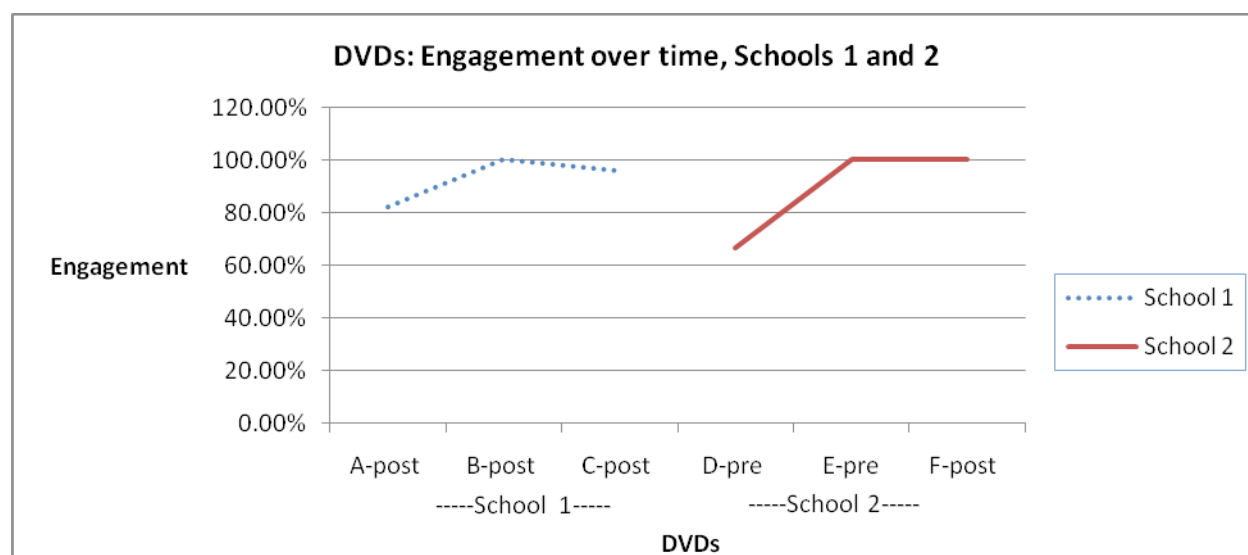


Figure 4.6.1
Student engagement, Schools 1 and 2

The pivotal area of motivation was also analysed by measuring child independence, which was defined as being inversely linked to the number of teacher prompts: the more times the teacher had to prompt the child, the less independent the child was presumed to be. Figure 4.6.2 depicts individual behaviour, expressed as average rate per minute, for independence, interaction and requesting. The dotted line shows the average number of times per minute the teacher prompted individual children. It can be seen that within each school there were no clear cut results. Teachers filmed different tasks in different DVDs so it was not possible to look for changes in the level of prompting in the same task over time. No conclusion can be made about the influence of PRT on independence for School 1 (because there were no baseline videos), and there is no suggestion that independence changed after implementation of PRT for School 2.

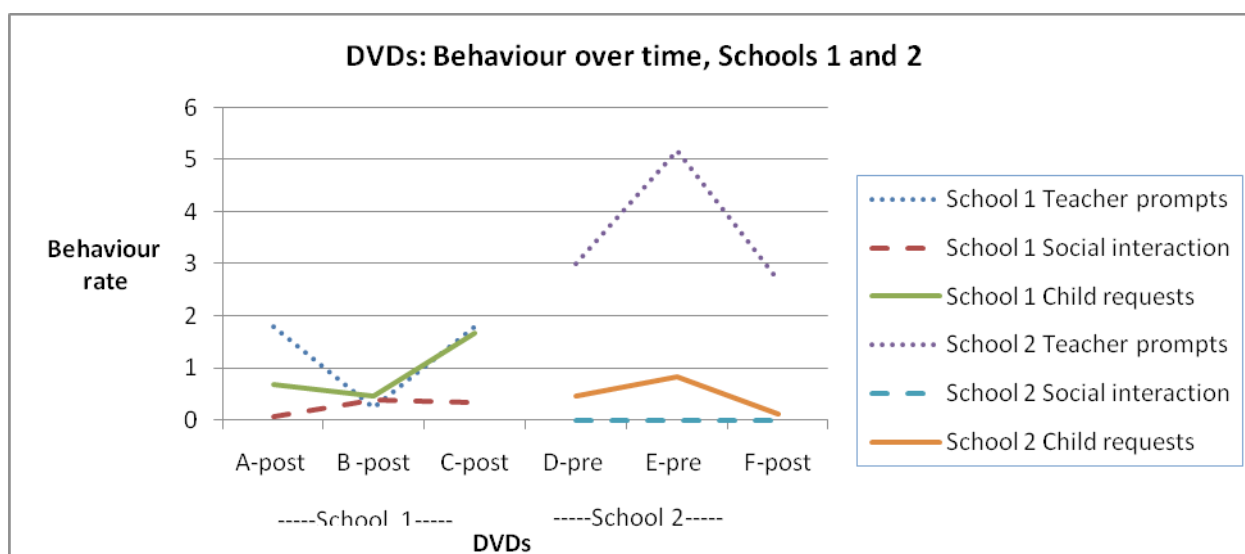


Figure 4.6.2
Prompts, interaction and requesting, Schools 1 and 2

The pivotal area of self initiations is also depicted in Figure 4.6.2, where the average rate of child requests per minute is represented by the unbroken line. Requests remain low over time for both schools especially when the teacher was not close by. Requests for help (as opposed to objects) were uniformly low for both schools with only one observed for School 1 and none for School 2.

In relation to the pivotal area of empathy, the average rate of child-initiated social interactions is also represented in Figure 4.6.2. The dashed lines show the average number of social (non-task) interactions that the children initiated with other children or teachers. Children socialised more in the teachers' presence. In keeping with general characteristics of autism, social initiations remain low for School 1 (never more than one every two minutes) and not observed, for School 2.

Finally, the pivotal area of responsivity to multiple cues (a measure of stimulus over-selectivity) was examined. Results are shown in Table 4.6.3.

Table 4.6.3 Child responses to teachers multiple cues, Schools 1 and 2

	School 1			School 2		
	DVD-A (T3post)	DVD-B (T3post)	DVD-C (T4post)	DVD-D (T1pre)	DVD-E (T1pre)	DVD-F (T3post)
Response to multiple cues	4/4	3/3	1/1	3/3	No opportunity	No opportunity
% correct responses to multiple cues	100%	100%	100%	100%	N/A	N/A

Children in School 1 consistently achieved 100% on all three post-intervention DVDs. A perfect score was also achieved by students in School 2 in the pre -intervention disk D. Disks E and F returned no student results because the teachers did not present multiple cues. This pattern of results suggests that the students were responding well to the teachers' presentation of multiple cues, and were ready for further opportunities in this area.

When the four pivotal areas are taken together, the results are highly context dependent, as was evident in the fidelity analysis. Disk DVD-F, with its seven different settings, again shows this clearly. For example, the children were most likely to make requests when in the presence of an adult but not a child, and the amount of teacher prompting was high in teaching contexts and low in play and leisure contexts.

Some general comparisons were made across the two schools. There was more prompting (that is, less independence) in School 2 than in School 1. This was probably a reflection of the lower general ability of students in School 2, as indicated in their lower Stanford-Binet scores. The students in School 2 also displayed minimal social interaction on the three DVDs, whereas the children in School 1 were slightly more sociable and made more total requests. School 1 made at least twice as many verbal requests as opposed to physical ones whereas School 2 relied relatively more on physical means of communication. The difference between the schools was echoed in the CARS scores, where as a group, the children in School 2 were diagnosed with more severe forms of autism than the School 1 students.

4.7 Summary of student outcome findings

The right hand column of Table 4.7.1 shows the student outcomes against the research questions supplied at the beginning of Section 4.6, when the framework for analysing the student outcome data was outlined.

Table 4.7.1 Student Outcomes against pivotal areas

Pivotal Area	Research Question	Measurement Strategy	Student Outcome
Motivation	Was the child engaged?	Average % of children on task at one minute probes	School 1 - high engagement post
	School 2 - high engagement pre and post	Average rate of teacher prompts per minute. (The fewer the teacher prompts, the greater the child independence.)	
Responsivity to multiple cues	Did the child respond selectively to information?	% of child correct responses to teacher's multiple cues	School 1 100% correct School 2 100% correct
Self initiations	Did the child request objects or help?	Average rate of child requests per minute	Only about one request per minute (School 1) and less than one request per minute (School 2)
Empathy	Did the child initiate social interactions?	Average rate of child-child interactions and child-adult interactions per minute	Less than one per minute (School 1) and minimal interactions (School 2)

- i. Student outcomes can be described (as illustrated in Table 4.7.1), but they cannot be attributed unambiguously to PRT, for either school. The reasons are linked to fidelity data for both schools:
 - School 1 produced three DVDs with no baseline. Fidelity in the three DVDs was fairly constant, so there was no

- change in PRT fidelity with which to link any changes in the students' behaviour over the year.
- School 2 produced two baseline DVDs and one post intervention DVD. Because of the unexpectedly high fidelity at baseline which left little room for fidelity improvement later in the year, there was no change in PRT fidelity with which to link any changes in the students' behaviour over the year for this school either.
- ii. In relation to the pivotal area of motivation, students in both schools showed relatively high levels of engagement, in line with the relatively high levels of PRT fidelity mentioned in 4. This is weak evidence consistent with the interpretation that PRT facilitated engagement over the year, but this cannot be proven with the current data.
 - iii. No relation between PRT and child independence (measured by the number of teacher prompts) could be ascertained. Child independence was context dependent, with teachers prompting more in instructional settings than play / leisure ones.
 - iv. Children were highly responsive to multiple cues, which suggests they could be extended in this area.
 - v. In relation to self initiations, children's requesting remained at a fairly low level. The majority of requests were made when staff were present. No association with PRT could be ascertained.
 - vi. In relation to empathy, the children's rarely interacted socially, unless the teacher was present. No link with PRT could be ascertained.
 - vii. School 1 students tended to be more independent than those in School 2, in line with the higher abilities and less severe autism of the former group as measured by the Stanford-Binet-5 and CARS-2.

5.0 Teacher Diaries

Teachers kept diaries in Terms 2, 3 and 4 of 2010. In the diary, they were asked to make entries on a weekly or fortnightly basis that responded to the question: What occurred in class/ at work this week /today that was significant for me? The guidelines were:

- Describe what actually happened
- Write down your thoughts and feelings and actions.
- Suggest a possible explanation or analysis.

Teachers' diaries were examined to:

- Discover more about the teaching context, particularly its challenges.
- Examine fidelity.
- Determine student outcomes.
- Determine social validity (whether the PRT intervention was acceptable to the teachers)

5.1 Context: General challenges

Both teachers documented a number of general challenges that impacted on the smooth running of the classroom. Teacher 2 noted during the baseline period that students from another school had to transfer to School 2 while asbestos was being removed from their classrooms. This entailed that Class 2 had to relocate and to share the

playground with the visiting students, prompting the teacher diary entry that both staff and children are feeling the strain of the changes to the environment and routines.

There were also several staff /carer changes. Relief teachers and aides came and went while other staff were ill or on leave. In addition, some children needed ongoing sensory support, especially during times such as when their second teeth were coming through. Finally, essential equipment sometimes malfunctioned and was away for repairs - such as the laptop for the (highly motivating) interactive whiteboard.

5.2 Context: Challenges of PRT implementation

Teachers mentioned that sometimes the children became upset when they could not receive their reward straight away. At other times it was difficult to find suitable rewards. As one teacher wrote: Cannot figure out a motivator. Tried LOTS of different ways. In such cases, the teachers had to replace intrinsic (direct) reinforcement with "do this get (unrelated) reward" strategies. Sometimes, time demands were such that the teachers were not able to individualise materials as much as they would have liked - such as creating a worksheet for each child's book.

Parent responses were reported as variable. One diary entry read Only 2 parents have watched PRT videos so far whereas another described how successful a PRT father's meeting was, and how interested these parents were in using motivators to encourage participation, communication and social play.

5.3 Fidelity

The diaries were examined to see whether teachers mentioned strategies and issues that were relevant to PRT. This would help to determine whether the student outcomes could legitimately be attributed to the PRT intervention.

Over the three terms the teachers made many pertinent references to PRT practices and principles. Both teachers described numerous instances where they addressed the pivotal area of **motivation** and actively tried to **make their lessons enjoyable**. They made frequent reference to the interactive whiteboard, using high preference activities. They used edible motivators in mathematics activities, and highly motivating food and activities for Picture Exchange Communication System (PECS) activities. Fine motor tasks and play doh work sheets were devised to appeal to the children's interests. Morning circle adjustments were made so that the first and last activities were highly motivating for the children, whilst retaining flexibility through changing the order of the activities. There were numerous instances of individual adjustments for children - such as ensuring a child who was interested in Shrek had his own Shrek toothbrush and shampoo; and adjusting meal times so that another child could have half his preferred Kentucky Fried Chicken item at both morning tea, and the remainder at lunch.

As recommended by PRT practitioners, teachers also incorporated **choice** in songs with the interactive whiteboard. Sessions of PRT playtime were also instituted, where children requested what they wanted to play, and the staff followed their lead. Choosing real objects (food) in morning circle was a regular event. One teacher wrote: Our first week of the shopping program. The children all attended and followed the previously viewed schedule exceptionally well. All of the children were able to find and purchase an item without the behaviours that we were pre-warned about from families. The activity had moments of choice, which motivated the children to become involved in the experience.

Teachers also mentioned that they introduced **turn taking** tasks with peers, and used priming (rehearsal) to help students prepare for activities such as the end of year school concert and transition to a new school at the end of the year. There were many instances where direct reinforcement was embedded in everyday activities, such as having the students ask for paint material before they could receive the material. Teachers were also careful to use prompts as necessary to ensure a high rate of success.

There were some motivational PRT strategies, such as **balancing maintenance and acquisition tasks**, which were not explicitly discussed. However that is not to say that these PRT strategies were not appreciated by the teachers. As one teacher wrote: I need to remember to intersperse maintenance and acquisition tasks more.

In relation to the second pivotal area - **responsivity to multiple cues** - the children's capacity to respond appropriately was used as an explicit measure of success. It was also clear that this pivotal area was discussed with parents/carers.

The teachers actively sought to help their students with the third pivotal area of **self-regulation** of their behaviours. A boy who snatched toys at pack-up time was successfully helped to use the replacement behaviour of "asking children if they need help packing away". Similarly, "flapping when excited" was replaced with "saying 'I am excited' and giving a high 5". Other self managing strategies made more direct use of rewards. To address the inappropriate mimicking of some repetitive behaviours of classmates, one child was provided with a visual reward chart about appropriate behaviours.

Self initiations, the fourth pivotal area, was also of concern to teachers. To increase the success rate, the use of sentence strips and key terms were both mentioned as useful strategies.

All the above strategies are directly tied to PRT. It was also noted that these experienced teachers called on strategies that are not integral to PRT, to achieve their goals. For example, teachers mentioned how they used a visual social story of the Remembrance Day Ceremony to assist their students to learn about the associated procedure and expectations. They also mentioned how their students worked through their individual timetables, with prompts to put pictures in the finished box. A third prominent strategy used by both teachers was structuring and restructuring their teaching to make the desired responses more probable. For example they used sentence strips and key words, to make successful requesting and the associated direct reinforcement more likely. They described how a token economy worked better when it was visually restructured to clarify when the child could ask for a reward, and they remarked how a song choice board helped structure choice-making.

The incorporation of strategies such as social scripts and structured teaching are not fundamental to PRT. However it did not appear that the teachers were confused about what did, and did not, constitute PRT. Rather, they were using social scripts and structured teaching as a means to an end - to enhance the child's progress in pivotal areas such as motivation and initiations.

Everything considered, the teachers' diaries provided documentation that they practised and understood the fundamental building blocks of PRT. This provides further support that they carried out PRT as it was intended. That is, the teachers' diaries provide evidence of program fidelity. Thus, it would not be contradictory to say that the student outcomes discussed in the next section could be attributed to PRT, although other possibilities cannot be ruled out at this stage.

5.4 Student outcomes

The most obvious student outcome was an increase in the children's motivation for, and use of, communication. One teacher wrote: The spontaneous and independent use of their expressive skills has been most impressive! Another diary entry was: Students have ALL achieved their goal of requesting independently and they also use multiple cues while requesting ...Children are requesting full sentences and answering and asking some "sh" questions.

Improved child self management also featured strongly in the diary entries. For example: The end of year concert was a great success and all the students performed wonderfully and look fantastic! ... [PRT has significantly

decreased the frequency of unwanted behaviour ... All the [school] visits have been successful and it really shows the students are ready for a new challenge.

Students were more on task at the end of the year: [Child] has struggled consistently in the past, to sit for table work. With these fine motor tasks, he was seen to sit and attend and complete a three step sequence of activities and smile, discussing the motivating pictures on the pages.

The teachers' positive impression of PRT seemed to be shared by the parents/carers: The parents' feedback was that they felt that PRT had been helpful to them in different ways throughout the year, and was easy enough for them to feel that they could incorporate the strategies into their daily lives.

5.5 Summary of teacher diary findings

- i. Overall, the teachers' diaries supported a positive assessment of basic program fidelity. The teachers had considerable success and were also were coming to grips with some difficulties, such as over-dependence on reward.
- ii.
- iii. However there was no discussion of more sophisticated PRT practices such as schedules of reinforcement. (To be fair, one of the teachers employed a token economy to circumvent the need to supply primary reinforcers, such as food, after every correct attempt. Nevertheless the teacher gave the impression that this was part of a commonsense approach rather than a systematic PRT process that was linked to rescheduling the frequency of rewards).
- iv.
- v. The conclusion that PRT was being implemented faithfully is consistent with, but does not prove, the interpretation that some of the positive child outcomes were attributable to PRT. Since the observations were taken over time, it is unclear to what extent the changes would have occurred, simply because the children were growing older and maturing.
- vi.
- vii. The teachers' diaries suggest that the teachers enjoyed using PRT and that the approach had high social validity for them.

6.0 Staff Focus Group

In Term 1, 2011, a focus group was conducted with the staff who were involved with the PRT implementation, either as teachers, teaching assistants, allied health staff, or coordinators. Notes were taken of the meeting and these were sent to the focus groups members for checking.

6.1 Content analysis

- i. Teachers were eager to begin the PRT trial. The **biggest changes** in their own behaviour noted by the school staff were:
 - The incorporation of intrinsic motivation according to the children's preferences, so the impetus for the behaviour came from the children rather than the staff. The students were highly interested in technology and so the combination of an interactive whiteboard with PRT was very effective. Other motivators included singing, transport, and using the children's interests in maths and counting. Teachers also described how they "designed

out” activities that did not appeal to the child (such as sitting on a chair) and replaced them with functionally equivalent but motivating activities.

- The incorporation of five strategies that are consistent with, but not necessarily unique to, PRT
 - » Priming (rehearsing /warning a child ahead of time about an event)
 - » Routines
 - » Visuals
 - » Structure
 - » Choice

ii. The teachers nominated the following three areas as the “**most significant child change**”:

- Greater use of language,
- Decrease in undesirable behaviours, attributed to language improvement and the use of motivators
- Skill development, which has gone from acquisition to maintenance.

Other child changes were also noticed:

- More references to multiple cues (e.g. “big red plane”)
- More initiations, comments and requests
- Greater independence (fewer teacher prompts)
- More amenable to starting work
- Fewer tantrums once children were able to use words to get what they wanted
- Improved self regulation (for example, snatching other children’s belongings was replaced by verbal requests)
- Increased ability to cope with change as language improved
- Happier demeanour and improved socialisation

Staff indicated that PRT did not suit all children, and that at least one boy may have needed more stimulation. Staff also remarked that when children entered a non-PRT class in 2011, some of the previous skills were not maintained.

Staff commented that parents who started early and followed through with the PRT program felt more empowered. They also felt that involving the fathers was important, and that introducing them to practical task such as making a photo album, helped to strengthen the home PRT program.

iii. **Negative features** mentioned by the staff included:

- Increased teacher workload, even though extra preparation time was provided. The activities that contributed to the workload included:
 - » Collecting research data
 - » Involving parents
- Helping the students to understand that they did not always get what they wanted. This proved to be a challenge for several teachers.

iv. The staff made the following recommendations:

- Be consistent.
- To implement anything, follow the simpler the better rule.
- Embed the PRT goals into what staff are already doing. For example the goals in an IEP Action Plan can incorporate specific PRT outcomes.
- To use their PRT training to qualify for the Certificate, teachers need things explained briefly. Too much information is overpowering.

6.2 Summary of staff focus group findings

- i. Teachers began implementing PRT wholeheartedly and interactions about PRT between home and school were positive, helpful and constructive.
- ii. All the focus groups consistently pointed to the following encouraging student outcomes from the PRT implementation:
 - Communication and use of language
 - Motivation
 - Improved self management. This was attributed mainly to motivators. Whether the child was actively involved in monitoring their own behaviour was unclear
 - Independence
 - Greater cooperation
 - More mature play and socialisation
 - Skill development
- iii. Features in their own practice that parents and teachers mainly focused on were:
 - Using rewards effectively
 - Incorporating the child's interest when teaching new skills
- iv. When teachers were asked to nominate the greatest changes in their own practice, teachers mentioned PRT methods but also mentioned strategies that were not unique to PRT. These strategies included utilisation of:
 - Priming
 - Routines
 - Visuals
 - Structure
 - Choice
- v. The following negative features were noted:
 - Dealing with child expectations of receiving a reward 100% of the time
 - Loss of progress when children transfer to non-PRT classrooms
 - Indiscriminate imitation
 - Increased time demands, when implementing
- vi. Teachers and family members made the following suggestions:
 - Incorporate the PRT into the children's Individual Education Plan, and embed the PRT goals into what staff and parents are already doing. For example the goals in an IEP Action Plan can incorporate specific PRT outcomes.
 - Schedule PRT training for parents as early as practicable.
 - Provide training for the relevant satellite staff the children are transitioning to.
 - Provide face to face training rather than e-learning.
 - Be consistent.
 - When implementing strategies, aim for simplicity.
 - Provide concise information and explanations for teachers who wish to use their PRT training to qualify for the Certificate.

7.0 Parent teleconference /discussion

The following section outlines the results of two telephone focus groups held with parent/carers from School 1 and School 2 in May and June 2011 respectively. Two of the parent/carers were interviewed separately as they were unable to attend the teleconferences. Notes were taken of the teleconferences and these summaries were sent to the members for checking. In the current report, the comments from both schools are amalgamated.

7.1 Teleconference content analysis

The overall assessment of PRT by parents was encouraging. Most parents reported positive changes in their child which they attributed mainly to PRT. Some parents acknowledged that it was difficult to identify whether PRT was responsible for all the changes they noticed. In the words of one parent: "The program has worked well as he has matured. Both things - PRT and maturity - have worked together". Notwithstanding, it was clear that PRT had given the parents an approach which they could follow which was consistent with the school's approach, and which on the whole they felt had led to significant constructive changes for their children.

i. Positive Child outcomes

In relation to communication and use of language, the following changes were noted:

- Improved comprehension of language, verbal and non-verbal. This included children whose families used English as a second language.
- Increased initiation in using language
- Increased attention ("He looks at my eyes and will listen and will try to talk back to me and I will listen")
- Increased number of steps that could be followed ("Now he's moved from following 2 step requests to 4-5 sequence of events")
- Increased ability to follow directions, including instructions with multiple cues
- Increased "openness" ("He used to be more focused on a small number of things - he shut out other things. Now he lets a lot more in. He notices and reacts to a lot more. It started with his noticing when people mentioned his name during a conversation.")

In relation to behaviour, the following changes were mentioned:

- Less frustration. ("Now all I have to do is talk to him and if he doesn't understand he will say 'what?'")
- Improved anger management. ("He doesn't seem so angry or as frustrated as before. He points to what he wants, he uses pictures and he tries to say it too.")
- Improved ability to wait. (This was partly due to improved comprehension of words such as "not today" and "tomorrow")
- Greater independence. (For example, children had begun to fetch food for themselves.)
- More relaxed with other people. (One child who previously only wanted to play alone in his room became more sociable; and another child who could not remain in a classroom with ten other children was subsequently able to watch a movie with 200 other students.)
- Increased cooperation ("He will follow directions now, though he still requires some clarification. When he was younger even getting him to sit down was difficult")
- More mature play. (For example, progression from solitary play to parallel play.)
- Increased imitation - of both desirable and undesirable behaviour.
- Greater empathy. ("In the past five months his emotions have kicked in and he has started to feel for others").

It should be noted that parents were not clear as to their child's involvement in self management and whether the

children participated in activities such as star charts or whether these were controlled by the parents.

ii. Interaction with the school

In addition to the formal training sessions, most of the parent/carers had regular contact with the teachers via a communication book and casual meetings, and the teachers provided suggestions and materials which parent/carers could use at home. The parents particularly valued any problem-solving conducted with the teachers.

When discussing home-school interactions, four consistent themes emerged:

- Interaction with the school was seen as positive and constructive, with no problems in the home-school relationship reported.
- The school reinforced skills the parents wished to focus on, and vice versa. One parent described how the family goal of increasing her son's social interactions on the weekend was promoted by the school setting a family outing as part of his homework. This meant that socialising could not only be rewarded immediately by the family when it occurred, but also later by the school, when the child reported about his activities during news time.
- Ample written information was provided by the school.
- Some of the PRT was incorporated into the children's Individual Education Plan, and this functioned as a helpful reminder of what priorities to focus upon.

iii. Suggestions for improvement

Most parents were satisfied with the program, but when asked, volunteered the following suggestions for improvement.

- Provide parent training at the earliest possible opportunity, before the child starts school.
- Invite at least one knowledgeable parent at the initial meeting run by school, so the new parents could have program meetings with someone who had done it before and who had a home perspective.
- Schedule face to face meetings with teachers (rather than internet discussion).
- Provide more information about how to physically carry out PRT.
- Provide more training for the relevant satellite class when the child transitioned from the Aspect school.

iv. Implementing PRT at home

The majority of parent/carers in the teleconference had attended most of the training provided by the school and were applying PRT at home. Parents described different applications of PRT. For example PRT helped everyone in one family engage cooperatively in activities, such as having meals together.

The parents adhered to PRT to varying degrees:

- Two parent/carers expressed that it was not always possible to implement PRT. In the words of one respondent: "It's hard to be consistent - you have to pick your time" and that although the rewards were greater, "PRT could be hard work at times".
- At least one parent would have liked someone to come into the home and assist with PRT. Another parent mentioned that she enlisted the help of a tutor to help her to implement PRT, but this option was not available to all parents due to financial considerations.
- Several parents mentioned the impact of PRT on other members of the family. In particular, they found that

managing the PRT rewards in the family context was complicated because siblings were not rewarded for similar behaviours. As one parent said: "Because of the two other children we did not follow PRT 100%". Another said "What holds me back are the other children. I have three altogether so I get tired. There are lots of jobs to do."

- Another parent, who had tried several approaches including Applied Behaviour Analysis, said she found the latter easier to implement because it focused on one behaviour at a time whereas PRT did not.

When considering their own implementation of PRT, most parent/carers reported that PRT in the home was generally successful. "Before he wasn't motivated. Now we are using rewards more effectively." The parents generally agreed that the following strategies were particularly useful and effective. (Note that the last six strategies have broad acceptance and are not unique to PRT.)

- Encourage responses with direct reinforcement.
- Encourage children to use their words in order to get the reward they want. (For example a child who was fascinated by car seats had to request permission to go to the car and adjust the seats to his desired specific angle.)
- Incorporate the child's interest when trying to teach him new skills. One parent described how she initially used rewards when tasks were completed, then found it was more effective to incorporate the child's interests in the activity per se. For example, counting cars (highly reinforcing - no extra reward needed) versus previously counting tally marks (not reinforcing - required extra reward such as computer time).
- Use a schedule of activities.
- Analyse routines into individual steps, and ensure each step is made explicit and understood.
- Talk to children with the assistance of visuals, rather than giving in to tantrums.
- Provide "down time" from PRT intervention when the child is fatigued, when coming home from school.
- Maintain a consistent approach.

Parents also discussed some of the practical challenges they encountered when implementing PRT. Two recurring issues were:

- How to wean children away from highly preferred rewards (such as chocolate).
- How to use rewards more effectively, especially when motivating the children to use words. When a child verbalised the word "car", for instance, the parents understood the importance of encouraging speech with direct reinforcement - that is, providing the actual item requested (toy car), rather than an extraneous item such as a jelly bean. On the other hand, this posed difficulties in circumstances when providing a direct reinforcer was not appropriate. A typical challenging situation comprised knowing how to respond when a child said "I want biscuit" just before dinner (because giving him the natural reinforcer - the biscuit - would ruin his dinner).

v. Negatives

When asked directly about negatives aspects of PRT, parents identified very few downsides to the intervention. Nevertheless they recognised the progress could be a double-edged sword. As one parent commented, increased understanding and responsiveness to the environment brought its own problems. Her son was beginning to appreciate what he could not do, which sometimes frustrated him. Another parent volunteered that her son had 'developed an attitude ... [and was] ... more stubborn'.

Perceived shortcomings of PRT included:

- "There always has to be a reward." Difficulty in the use of rewards became more pronounced as children become more able in the use of language. This was reported by a number of parents. For example, "if he requests to

go to K-Mart then he thinks we have to go if he makes the request" "He will throw himself on the ground if he doesn't get a reward. He will ask and ask for it. If he is nagging I might give in and give it to him". Parents seemed to be short on strategies to deal with this: 'I just have to walk away' One other parent mentioned she had to have some favourite foods ready "just in case" (the fact that these might not constitute direct reinforcement was not acknowledged).

- Loss of progress once children were no longer attending a PRT class. "[Child] was more independent during the course of PRT. Now he is with a different teacher. In the past 2-3 months he has taken a step back - or is this just a natural ebb and flow?
- Problems in generalisation: "He will sit and do work at school but he won't sit at the table at home to eat dinner where the PRT is not used".
- Inappropriate imitation. One parent said her child had begun copying the behaviours of others in the class, and this included flapping, stimming and other "autistic" behaviours. Whether this is directly attributable to PRT is contestable.
- The perception of PRT as "imposed" and "contrived". One parent said every so often she would dispense with the PRT framework because she liked to see if her son would participate without such a formal education process.

7.2 Parent follow-up discussions

The following section outlines the results of 'parent follow up discussions' held between the parent/carers of six students and teachers from School 1 in September 2010. The discussions were held individually. The data differs from that gathered at the teleconferences with parents/carers in several ways.

The parent discussions represent opportunistic data which was not designed to capture parents' overall experience of PRT. There is no record of the questions discussed, and the data presented below should not be taken to represent the number of children or parents who experienced each of topics. The discussions took place around September 2010 (about three quarters of the way through PRT) whereas the telephone focus group was held in May 2011. The discussions were with teachers, rather than an independent evaluator. Nevertheless the data gives some insight into the parents' experience of PRT and changes they observed in their child. It is considered as supplementary, indirect evidence which could be used to triangulate the data.

It was difficult to gauge overall impressions of PRT, but several positive changes were mentioned, mainly around language and behaviour. A number of parents experienced barriers to watching the PRT resources provided to them. Negative aspects were not discussed.

i. Positives

Communication and use of language:

- improved comprehension
- increased initiation in using language
- talking more
- improved use of 'wh' questions

Behavioural changes:

- Less repetitive behaviour (one child)
- Less physical management of anger (one child)
- More able to follow routine (one child)

ii. Implementing PRT at home

- Use of rewards/motivations was mentioned in two of the discussions. One parent said that they were now able to decrease the rewards and her son still continued to do the work.
- Successful use of a schedule of activities was also mentioned (one child).
- Four of the parents mentioned barriers to watching the DVD/CD resources about PRT provided to them. These included language, time, and technical problems with the DVD itself.
- Difficulty in implementing PRT because the father was away (one parent).

7.3 Summary of parent teleconferences /discussion findings

- i. Opinions expressed in parent teleconferences and parent-teacher discussions were broadly consistent.
- ii. In general, parents made favourable observations about PRT and their relationship with the school. They believed it should be begun early with suitable children and should be applied in relevant satellite classrooms for children transitioning from Aspect schools which implemented PRT.
- iii. Parents considered the child outcomes were positive, consisting primarily of developments in language and behaviour. Some advances brought their own challenges, such as the provision of appropriate role models for children with blossoming imitation skills.
- iv. Between them, parents canvassed all the five pivotal areas (motivation, responsivity to multiple cues, self management, self initiations, and empathy) which suggests that the school provided a broad overview of major concepts.
- v. Parents also incorporated other strategies which are not unique to PRT, such as the use of visual schedules.
- vi. Discussion of PRT implementation in the home centred around motivation (particularly the use of reinforcement, and building on pre-existing skills and interests).
- vii. The overall impression was that PRT had high social validity for the parents. They were comfortable with its procedures and were pleased with the outcomes obtained for their children as a result of the implementation of PRT at school.
- viii. However individual parents needed ongoing assistance to apply PRT consistently in their own homes, particularly in certain circumstances such as preventing child over-dependence on rewards.

8.0 Staff self evaluation

8.1 Introduction

Staff at the two schools filled out three self evaluation questionnaires during the baseline period (Term 2, 2010) and the end of 2010. The three questionnaires are reproduced in Appendices A, B, and C and are entitled:

- Teacher Self Assessment questionnaire
- Specific Elements of the PRT approach in classrooms questionnaire"

- Autism Treatment Philosophy questionnaire

The Teacher Self Assessment questionnaire consisted of 13 questions on a 5 point scale which tapped the teachers' knowledge and understanding about the specific learning needs of students with ASD, and of Pivotal Response Treatment. Teachers also rated their confidence in their skills, family relationships and assessment practices.

The Specific Elements of PRT questionnaire consisted of 11 items about PRT practices which were scored by the teachers as either "in place" "partially in place" or "not in place". Items assessed practices such as generalisation, record keeping, and embedding training in everyday activities.

The Autism Treatment Philosophy questionnaire contained a list of 22 questions that were designed to probe the teachers' attitudes to underlying teaching principles, according to a 6 point scale, from 1 (strongly disagree) to 6 (strongly agree). A philosophical commitment to PRT is assumed to link to program fidelity because the philosophy would provide the teacher with a framework specifying what goals to set, how to achieve them, and why it was important to do so. To tease out whether the teachers' commitment to PRT was strengthened over time, the questionnaire included items that typified PRT to varying degrees. An item such as The learning characteristics of children with autism make it necessary for them to have specialised education services epitomises PRT less closely than the statement Perhaps the most powerful tool I have as a teacher of students with autism is to pair positive consequences with desirable behaviour.

Responses to these three staff self-evaluation forms are discussed below.

8.2 results of teacher self assessment questionnaire

It was possible that different teachers might have varying levels of familiarity with PRT at the outset, or they might vary in their interpretation of "deep knowledge" and "confidence". Therefore, scoring was based on the degree of change from pre- to post- test, rather than absolute levels of self assessment. Each stepwise change was given one point. For example the change from "Not sure" to "Agree" was counted as one positive point, and the change from "Not sure to Strongly Agree" was given two points. Movements in the opposite direction were scored negatively.

Questionnaires from School 2 were incomplete, missing six items from the self assessment questionnaire. It was not appropriate therefore to conduct statistical analyses of any changes, though broad trends were noted.

The degree of change for both teachers was in a positive direction, as shown in Table 8.2.1. That is, teachers were more likely to agree that they implemented the various generic elements of the program by the end of the intervention period than at the beginning. The degree of change was, however, relatively small.

Table 8.2.1 Change in Teacher self assessment

Teacher	Teacher Self assessment (5 point scale)
T-1	+7 (out of possible 65 from 13 Q)
T-2	+0.5 (out of possible 35 from 7 Q)

The teachers completed the self assessment questionnaire after they had already completed some PRT training. Most of the questions were about knowledge and self confidence. The relatively small change in the questionnaire is consistent with the relatively small change in fidelity measures over time, and may reflect the fact that teachers had acquired knowledge about PRT before the baseline was taken. Out of the five pivotal areas, both teachers stated that they were focusing least on empathy. This was not surprising: empathy is the least well researched area in PRT,

and there are relatively few guidelines for teaching it. In addition, teachers felt that they did not change in their understanding and use of assessment during the PRT implementation period.

8.3 results of specific elements of PRT questionnaire

The same scoring logic as in the above paragraph was applied to the Specific Elements of PRT Questionnaire. Each stepwise change was allocated one point, with positive change indicated by moving in the direction of “Not in place” to “Partially in Place” to “In Place”. The results are shown in Table 8.3.1 below.

Table 8.3.1 Change in Specific elements of the PRT approach in classrooms

Teacher	Specific elements of the PRT approach in classrooms (3 point scale)
T-1	+1/(out of possible 36 from 12 Q)
T-2	+4/ (out of possible 33 from 11Q)

Both teachers were more likely to agree that they had more elements of PRT in place at the end of the year, although the changes were small. Record keeping was not a strong point. One response was missing from teacher 2 for the questionnaire.

8.4 results of autism treatment philosophy questionnaire

The Autism Treatment Philosophy questionnaire contained a series of 22 questions which teachers rated on a 6 point scale from 1 (Strongly Disagree) to 6 (Strongly agree). At the beginning of the intervention, T-1's responses showed she already had a high tendency to agree with most of the statements, and her overall agreement with the questionnaire items averaged 4.86. By the end of the intervention this had risen to 5.14, showing a higher level of commitment. T-2's agreement at pre-test was even higher at pre-test, averaging averaged 5.5 which rose to 5.6 at the end of intervention.

In line with PRT, T-1 and/or T-2 agreed more strongly with the following statements at the end of the year:

- *I would very rarely teach a cognitive skill to a child without that child showing some interest or partial ability in it (T-1).*
- *It is important to plan for generalisation and independence of skills (T-2).*
- *Principles of learning, like reinforcement, shaping, and chaining, are key aspects to the way I approach teaching (T-2).*
- *I structure the environment to stimulate my students' use of spontaneous communication (T2).*
- *To track the development of my students' emerging skills, I evaluate their performance early in the school year and then later on (T-1).*
- *I find that my students with autism learn the best when their strengths and interests are emphasised and their deficits are accepted and minimised. (T-1).*
- *I try to find the communicative intent of a student's misbehaviour (T-1).*

Teacher-1 also showed decreased agreement with the statement: The learning characteristics of children with autism make it necessary for them to have specialised education services. This change signified stronger adherence to inclusion, and thereby also to PRT because it is implemented in natural environments.

There was also stronger agreement with items that are part of general good practice but are not intrinsically linked to PRT. For example, one teacher's rating of the following statement moved from “agree” to “strongly agree” at post-test: The use of schedules can help children make transitions (T-1).

Overall this pattern of results was consistent with a commitment to the philosophical underpinnings of PRT that became marginally more pronounced over the year, although this did not reach statistical significance.

8.5 Summary of staff self-evaluation findings

- i. *The Teacher Self Assessment* questionnaire results revealed that teachers were more likely to agree that they implemented the various generic elements of the program by the end of the intervention period than at the beginning. This change was as expected, but relatively small. There was little change in the teachers' assessment practices over the school year.
- ii. *The Specific Elements of the PRT approach in classrooms* questionnaire results showed that both teachers were more likely to agree that they had more elements of PRT in place at the end of the year, although the changes were not statistically significant.
- iii. *The Autism Treatment Philosophy* questionnaire results showed relatively little change in the teachers' commitment to the philosophical underpinnings of PRT over the year.

9.0 Parent questionnaires

9.1 Parent questionnaire: Changes in child skills, behaviour or characteristics

Parents completed two questionnaires that were based on the "Autism Spectrum Disorders outcomes study and training project" conducted by Portland State University and the Oregon Department of Education http://www.autismstudy.pdx.edu/pdf/autism_outcome_study.pdf

The first questionnaire, called the Changes in skills, behaviour or characteristics questionnaire, gave parents the opportunity to provide information about changes they had (or had not) observed in their children. In the second questionnaire, entitled Involvement level in school program, parents provided feedback on their interaction and relationship with the school. These questionnaires are reproduced in Appendices D and E respectively.

Figure 9.1.1 shows the responses of six parents from School 1 on the 12 items in the Changes in skills, behaviour or characteristics questionnaire. Responses were positive overall, with parents agreeing that their child's behaviour had increased in a desirable direction on 42 (62%) out of a possible 68 responses (some parents did not answer all questions). One item - "Using language or other means to communicate" - showed the strongest improvement, with parents unanimously agreeing that their child had improved over the year. Parents also unanimously agreed that their child showed "Engagement in imaginative or pretend play", although one third of parents failed to answer this item. On 25 (37%) out of the 68 responses parents thought their child had stayed the same. "Staying the same" was the most likely response for the items "Playing with toys in ways that are appropriate to his/her age" and "Appropriate behaviour".

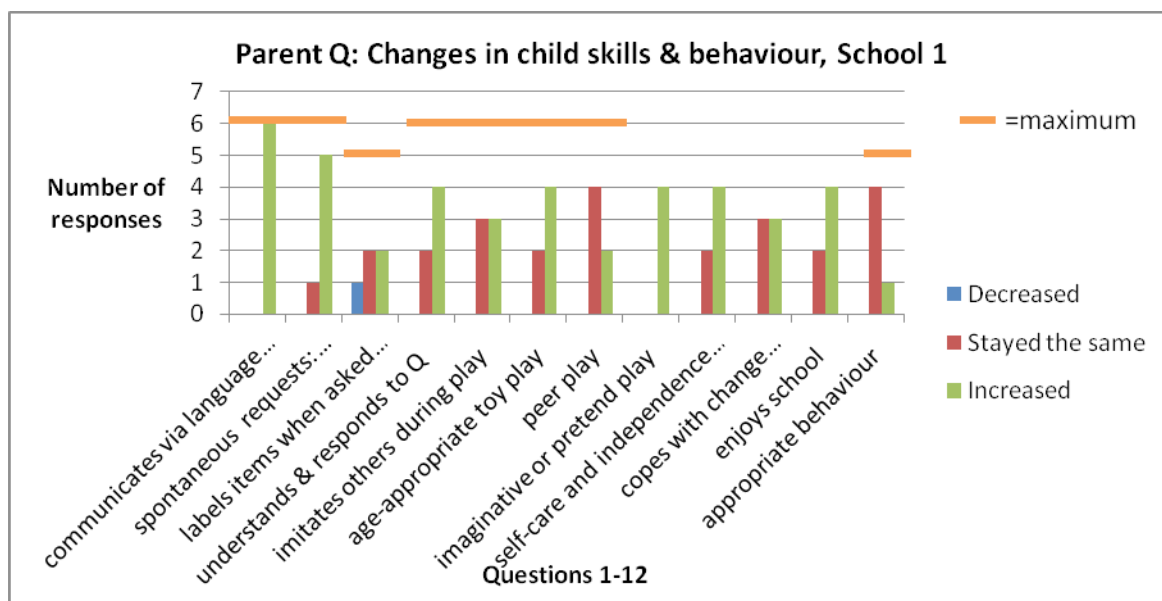


Figure 9.1.1
Parent perception of child changes, School 1

There was only one item ("Labeling items and pictures in response to questions") when one parent considered their child's behaviour had regressed over the year. This amounted to only 1% of all responses.

The final item on the questionnaire was open ended, when parents were invited to describe any other changes that had noticed in their child during the past school year. Parents responded that:

When he's happy, sad, angry, excited he flaps his hands, jumps and taps his head with hands. We want to help him to stop doing this.

- [Child] has improved in using language to communicate.
- Anxiety levels have decreased.
- Adjusts better to spontaneous circumstances (although letting him know first still helps).
- Growing in confidence doing independent tasks.
- Understanding ownership (school, home).
- Increase in writing, reading, attention, pronunciation.

Figure 9.1.2 shows the corresponding responses of four parents in School 2 to the Changes in skills, behaviour or characteristics questionnaire. Responses were even more positive, with 81% of responses (39 out of 48) indicating a positive change, and 19% (19 out of 48) indicating that the child had neither progressed nor regressed. Parents unanimously agreed that their child had increased in:

- Using language or other means to communicate
- Understanding and responding to directions
- Self-care and independence in areas such as eating, dressing, and toileting
- Coping with change or transitions

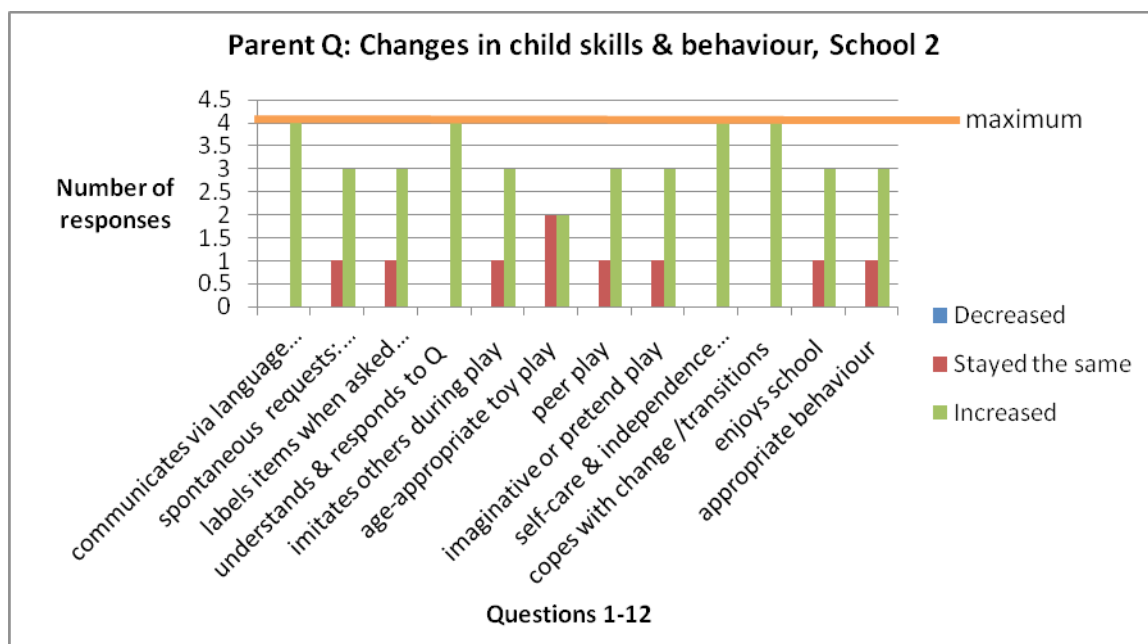


Figure 9.1.2
Parent perception of child changes, School 2

The item nominated by most parents (50%) as “staying the same” was “Playing with toys in ways that are appropriate to his/her age”.

In response to the open ended item, parents in School 2 commented that:

- *[Child] is a lot more cooperative and calmer eg doctors, shopping, out and about. He interacts with foster family a lot more. Mimics younger daughter and if she is eating something he wants it too. Can put on sox, shoes, pants and tops himself. Lots more expressive eg goes to fridge, gets out cordial bottle and puts next to his cup. eg goes to fridge and points to choc chip biscuits.*
- *Our son has made huge improvements in many areas this year.*

Items in the “Changes in Skills” questionnaire were derived from the Autism Spectrum Disorders Outcome Study and Training Project that was conducted in Oregon by Portland State University and the Oregon Department of Education. The Portland study was conducted between 1998 and 2003, with younger children (aged three or four years at baseline). Teachers and parents attended training workshops throughout Oregon which included four major topics: pivotal response training, discrete trial training, functional routines, and data collection strategies. The results for Aspect and the Portland study are compared overleaf in Table 9.1.1. Note that **the Portland researchers found that greater gains were made by the younger students, so the results of the present Aspect study (where children’s ages ranged from five to seven years) would be expected to be less pronounced. Taking the age disparity into account, the Aspect results hold up well when compared with the Portland study.**

Table 9.1.1 Parent responses, Aspect and Portland studies

Parent Questionnaire Changes In Skills, Behaviours Or Characteristics						
Skill or Behavior	Decreased		Stayed same		Increased	
	Aspect	Port-land	Aspect	Port-land	Aspect	Port-land
Using language or other means to communicate	0%	4%	0%	7%	100%	89%
Using spontaneous communication to request foods, toys, or activities Labelling items and pictures in response to questions	0%	4%	20%	7%	80%	89%
Understanding and responding to directions	11%	0%	33%	33%	55%	67%
Imitation of other children and adults during play	0%	0%	20%	4%	80%	96%
	0%	0%	40%	33%	60%	67%
Playing with toys in ways that are appropriate to his/her age	0%	4%	40%	29%	60%	67%
Play with other children	0%	0%	50%	44%	50%	56%
Engagement in imaginative or pretend play	0%	0%	12%	41%	88%	59%
Self-care and independence in areas such as eating, dressing, and toileting	0%	0%	20%	30%	80%	70%
Coping with change or transitions	0%	NA	30%	NA	70%	NA
Enjoyment of school	0%	NA	30%	NA	70%	NA
Appropriate behaviour	0%	4%	55%	31%	44%	65%

9.2 Parent Questionnaire: Involvement in School Program

Parents were invited to complete a questionnaire about their involvement in PRT and their child's schooling. The questionnaire contained eight items, including the following six closed questions where parents ranked their responses on a 10 point scale from 1 (not at all) to 10 (extremely):

1. Please rate your level of involvement with your child's overall school program.
2. Please rate your level of involvement with your child's PRT school program.
3. Please rate how satisfied you are with your involvement with your child's overall school program.
4. Please rate how satisfied you are with your involvement with your child's PRT school program.
5. Please rate your level of knowledge about PRT.
6. Please rate how interested you are in implementing PRT at home.

i. School 1

All six parents from School 1 responded to the questionnaire. Ratings for the six individual scales are depicted in Figure 9.2.1.

As shown in Figure 9.2.1, responses differed markedly between School 1 parents, with one parent consistently rating lower than other respondents. Nevertheless, twenty five of the responses (69%) were rated six or higher (higher scores represented greater involvement). There were two (6%) ratings of 2, one (3%) rating of 4, eight (22%) ratings of 5, four (11%) ratings of 6, nine (25%) ratings of 7, and 4 (11%) ratings of 8, 9 and 10.

Parents were invited to provide additional comments, and three responded:

- *We are very happy with the program. It reflects the way we parent our child.*
- *We noticed a huge increase in [Child's] vocabulary and it continues to grow. Very happy. Thank you.*
- *In his homework please give us some tasks in regard to PRT*

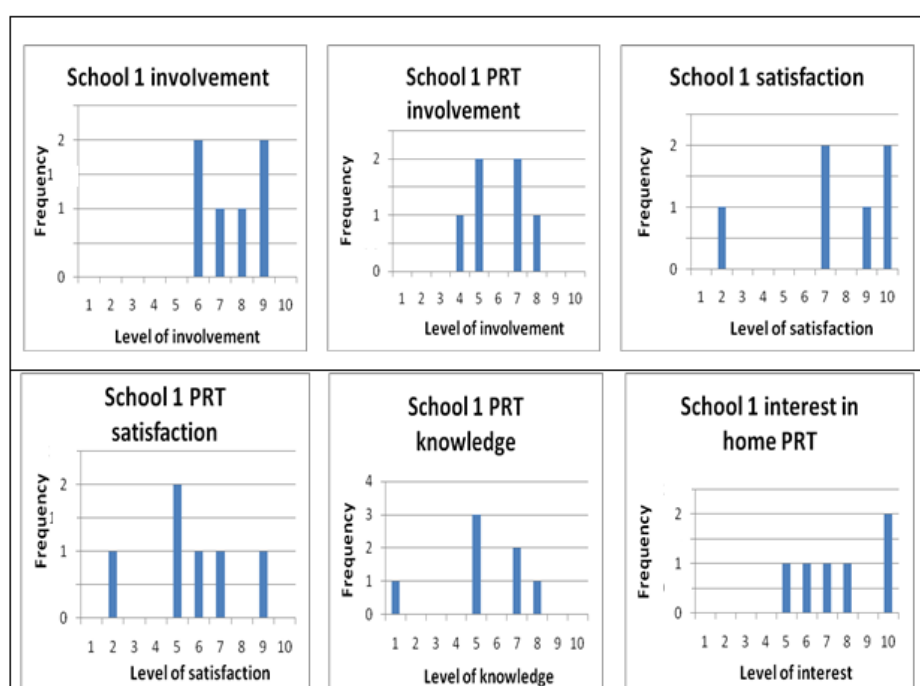


Figure 9.2.1
Parent Involvement, School 1

Parents were invited to provide additional comments, and three responded:

We are very happy with the program. It reflects the way we parent our child.

We noticed a huge increase in [Child's] vocabulary and it continues to grow. Very happy. Thank you.

In his homework please give us some tasks in regard to PRT

ii. School 2

All five parents/carers from School 2 responded to the questionnaire. Taken overall, their ratings were favourable, with all items rated six or higher. Three responses (10% of the total) produced a rating of 6, two responses (7% of the total) produced a rating of 7, eight responses (27%) produced a rating of 8, six responses (20% of the total) produced a rating of 9, and eleven responses (37% of the total) produced a rating of 10. These responses are depicted in Figure 9.2.2.

Two parents offered additional comments:

- *I am happy with [child's] progress*
- *We found PRT to be really useful. It just makes sense! We would recommend it to other families.*

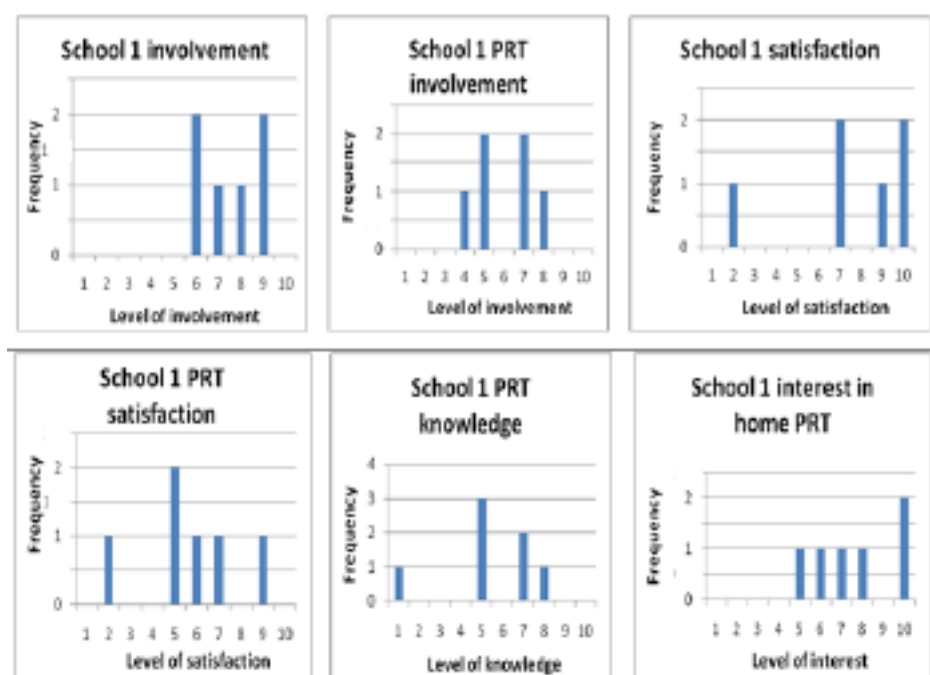


Figure 9.2.2
Parent Involvement, School 2

Finally, parents in both schools were asked whether their child was receiving any additional treatments. Six of the 11 parents responded to this question, mostly from School 1, and revealed that as many as five additional treatments were being used by one family. The following therapies were listed:

- Speech therapy (4 parents)
- Physiotherapy (2 parents)
- Occupational therapy (3 parents)
- Pegasus (1 parent)
- Meds
- Endep 2.5 a day
- Weekly therapy (unspecified)

These results attest to both the investment of time and financial resources that parents make for their children. They also point to the complexity of interpreting child outcomes during the year, when each child averages more than two concurrent interventions in addition to PRT.

9.3 Summary of parent questionnaire findings

- On the Changes in skills, behaviour or characteristics questionnaire: Parents agreed that their child's behaviour had increased in a desirable direction on 62% of responses (School 1 parents) and 81% of responses (School 2 parents).
- Communication by language or other means was the area that showed the strongest improvement.
- Aspect achieved comparable results with the Portland Autism Spectrum Disorders Outcome Study. This is encouraging because the Aspect students were older and hence less likely to make gains.

- iv. On the Involvement level in school program: 69% of parents in School 1 and 100% of parents in School 2 rated their involvement as six or higher up to a maximum of ten (higher scores represented greater involvement).
- v. There was a high rate of additional treatments used by the respondents.

10.0 5X3 teacher observations

Finally the schools were asked to complete a set of observations for each child concerning positive behaviours, undesirable behaviours, and difficult situations (such as transitions) on five separate occasions at both the beginning and end of the PRT implementation. For brevity, these were called “5x3 observations”, and they averaged about ten minutes. These observations were completed by School 2 and provided a snapshot of the children’s development over time, and documented the staff’s responses to challenges that were not captured in the DVD. Hence they complemented the DVDs and provided another perspective on program fidelity and child outcomes.

10.1 Analysis of 5x3 teacher observations

The difficult behaviours covered a range of challenges. These included:

- Leaving the vicinity when asked to share toys
- Reluctance to follow the morning program or transition from playground to classroom
- Inappropriate play or initiation of play
- Inability to focus when physically separated from favourite soft toy
- Inappropriate physical contact with peers, especially when waiting
- Refusing to wear shoes outside, after taking them off in the sandpit
- Refusing to continue a morning walk when coming across an item of interest
- Eating plants in the playground (pica)

When confronted with these difficult behaviours, staff intervened by using favourite toys as motivators and models. For example a preferred toy was used to lead a child through an obstacle course. They also provided choices (such as wearing shoes or playing in the sandpit); and they modelled turn-taking. Reinforcement was used frequently. This was either direct (e.g. reminding children of available preferred activities once they transitioned to the classroom) or indirect reinforcement (e.g. offering a soft toy if a child behaved appropriately). In the case of pica, staff offered various preferred replacement behaviours and locations, including structured play using a visual timetable of activities. All these actions are recommended by PRT proponents, which support the interpretation that program fidelity was achieved.

Behaviours that were less closely tied to PRT include ineffective prompts “after the event”. For example, children who were unsuccessfully redirected or prompted to behave appropriately may have been reinforced for attention-seeking behaviour. More details are required to make a determination about prompting however.

The second set of 5x3 interactions focussed on positive child behaviours, which were similarly varied. Behaviours included:

- Verbally requesting items and actions
- Colouring in
- Independently exploring the playground and its equipment
- Creatively constructing with blocks
- Completing table tasks with minimal prompts
- Following a visual sequence of activities

Staff used PRT-compatible strategies to encourage and extend these positive behaviours. They frequently provided direct reinforcement (e.g. a toy puppy was given to the child who verbalised “I want puppy”). In addition, sentence strips and key phrases such as “I want ... ” were given to encourage appropriate verbalisations. Staff also extended sequences of activities by placing the most preferred activity at the end of the sequence. Finally, staff promoted generalisation by having children practice activities in different locations and with different people, and they encouraged the children’s independence by providing only minimal prompts as necessary.

The third set of 5x3 observations were concerned with undesirable child behaviours. These included:

- Screaming in protest following staff requests or cessation of favourite activities
- Insisting on being first in line
- Interacting inappropriately with community members (for example, touching and yelling)
- Seeking deep pressure via hitting or squeezing when transitioning
- “Drawing” on surfaces with their tongue
- Throwing food when they had finished eating
- Tearing up books
- Flicking through visuals on a staff person’s key ring

Staff dealt with these behaviours using selected PRT strategies. To address screaming for example, the children were rewarded by seeing the next desirable activity once the staff request was complied with. Staff also restructured screaming situations by providing the child with a one minute warning that their favourite activity was about to end, followed by a physical prompt to leave for a brief period. On their return the child was given a visual to wait and count to ten before requesting their favourite activity. In the case of transitions, the staff incorporated motivating replacement behaviours that were incompatible with hitting, such as cuddling a sensory toy. To promote appropriate book behaviours they redirected or offered child proof (laminated) books that could not be torn up. Finally, when children insisted on being the first in line, they were provided with a waiting chair and staff called the children one at a time to provide the child with opportunities to be rewarded for “good waiting”.

Not all staff actions were clearly linked to PRT. The child who was “drawing” with his tongue only seemed to do this when chalk was unavailable. However staff seemed unaware of this and missed the opportunity to provide chalk to encourage appropriate drawing behaviours that could be rewarded. At other times staff provided redirection, but as this occurred after the event this extra attention may have inadvertently rewarded the undesirable behaviours. The notes were brief, and further documentation is required to interpret how the staff responded to the idiosyncratic “drawing” activities.

Although it was originally intended that the 5x3 observations would be used to compare the children’s progress during baseline and implementation periods, this analysis was not pursued for the following reasons:

- i. The program fidelity results showed that teachers did not markedly change the degree to which they used PRT strategies during the baseline and the implementation phases. Therefore, there was no expectation that the effect of PRT could be demonstrated by obtaining an accelerated rate of progress later in the year.
- ii. The children’s behaviour was found to be highly context dependent, and this could mask behavioural changes.
- iii. The staff observations for each child typically occurred over about a week. Demonstration that change has occurred typically requires more distributed measurement.

10.2 Summary of teacher observations findings

- i. School 2 provided a suite of observations for each child for qualitative analysis. These were taken in terms 2 and

- 4, and consisted of five observations of positive behaviour, five of undesirable behaviour, and five observations of difficult situations.
- ii. Taken together, the 5x3 interactions provided qualitative evidence that the staff were using a PRT framework when dealing with a variety of child behaviours. Therefore for the majority of the time they were implementing the PRT program faithfully. There were some possible exceptions, particularly around prompting but these may simply reflect a lack of detail in the teacher's notes.
 - iii. The five children displayed a wide range of positive and negative behaviours and difficult situations. For each child, the five observations of a particular behaviour typically occurred over a week, and there was no clear change in the frequencies or duration of child behaviours over that short time.
 - iv. Children on the spectrum may require many repetitions before they gain a new skill so it would be unwise to speculate on possible links between PRT implementation and child outcomes on the 5x3 observational data.
 - v. The child behaviours and complex situations however, attest to the versatility and skill of the teachers who dealt with them.

PART IV. DISCUSSION

11.0 Discussion and conclusions

11.1 Summary of findings

This section provides an overview of the main results for each of the evaluation tools. Before doing so, it is important to reiterate that overall, the staff in both schools are to be commended for the ways they approached the children and their families and dealt empathically with individual personalities whose behaviours could be challenging and unexpected.

i. Standardised test results

- Overall, students in School 1 obtained higher measured abilities and a less severe autism diagnosis than those in School 2. Most children consistently performed better on non-verbal tests over verbal tests.
- The Stanford-Binet is a test of general cognitive ability. More than half the class in School 2 were more responsive and assessable at the end of the intervention than at the beginning.
- The CARS-2 is a diagnostic test for autism. There was no strong evidence of substantial change over the year.
- The CELF is a test of language. There were no consistent changes in test results between pre and post tests.
- The Vineland-II measures adaptive functioning for daily living. It was administered in School 2 only, for whom no significant change over time was detected.

Comment:

If the children's performance on standardised tests had improved during the same period that PRT was implemented, this would be encouraging support for PRT.

The absence of change in most of the tests is not surprising in that characteristics such as autism and general cognitive ability are hypothesised to be stable attributes.

Nevertheless, Pivotal Response Training is used to teach language and academic abilities among other skills, so an increase in the current study of test scores in the verbal domain of the SB-5 from pre to post would be consistent with the underlying rationale of PRT. No consistent changes in verbal ability were evident in School 1. However if

the increased verbal testability in 2011 of the School 2 children is taken as a guide, then there is soft evidence that PRT may be implicated. The increased responsivity of class 2 is presumably underpinned by increased ability and/or motivation to attend, engage in a task and attempt a response – all of which are targeted in PRT.

The standardised assessments at the beginning of the intervention underline the challenges faced by teachers when implementing any new intervention. They also highlight the differences in ability level between the children in the two schools. These differences need to be taken into account when considering the responses of the children to the PRT intervention.

ii. DVDs: Program Reliability and Fidelity

- Inter-rater reliability of DVD scoring was satisfactory, so according to research protocols it was legitimate to conduct a PRT fidelity analysis.
- To assess PRT fidelity, the following criteria were examined:
 - » Instructions are clear, appropriate to the task, uninterrupted, and the child is attending
 - » Multiple cues are presented if appropriate for the child's developmental level
 - » The child is given a significant role in choosing the stimulus item(s).
 - » Rewards are immediate, contingent, uninterrupted, and effective
 - » Direct reinforcers are used the majority of the time
 - » Rewards are contingent on response attempts (even if incorrect)
- Both schools attained satisfactory fidelity ratings on all DVDs (assuming a lenient inclusive definition of "direct reinforcement")
- Attaining the PRT fidelity criteria was highly dependent on context.
- The proportion of specific praise was relatively low, at 20%

Comment:

School 1 practised PRT authentically on the available (end of year) DVDs, and School 2 DVDs demonstrated high PRT fidelity throughout the year including during the baseline before the PRT began.

Because the inter-rater reliability was satisfactory, and because the teachers practised PRT faithfully, then we can conclude that PRT may contribute to student outcomes. However the relatively uniform fidelity over time means that a clear cause and effect relationship cannot be demonstrated between PRT and student outcomes at this point.

iii. DVD Student Outcomes

Student outcomes in four pivotal areas were assessed:

- Motivation (Were children engaged /independent?)
- Responsivity to multiple cues (Did the child respond selectively?)
- Initiations (Did the child make requests?)
- Empathy (Did the child initiate social interactions?)

Students in both schools appeared to be well motivated, showing relatively high levels of engagement, and to a lesser extent, independence. They were also highly responsive to multiple cues. In contrast, social interactions and requesting both occurred infrequently. Not unexpectedly, School 1 students tended to be more independent than those in School 2.

Comment:

Student outcomes can be described, but they cannot be attributed unambiguously to PRT for either school, because there was very little change in the measured program fidelity. (School 1 produced three DVDs with no baseline, and

School 2 DVDs showed unexpectedly high fidelity at baseline and later in the year.)

Children's high responsivity to multiple cues suggests they could be extended in this area.

iv. 5.5 Teacher diaries

The teachers' diaries revealed they enjoyed using PRT and linked it to some of the successful student outcomes. This suggests PRT had high social validity for these professionals.

Overall, the teachers' diaries supported a positive assessment of basic program fidelity over three terms in 2010 and demonstrated an awareness of fundamental PRT principles. Teachers tended to be eclectic and pragmatic in their use of strategies, and mentioned strategies in their diaries that, while being effective, were not strictly part of a PRT approach.

Comment:

The conclusion that PRT was being implemented faithfully is consistent with, but does not prove, the interpretation that some of the positive child outcomes were attributable to PRT.

However there was little discussion of more sophisticated PRT practices such as thinning schedules of reinforcement to manage overdependence on reward. Similarly, whilst teachers were aware of the different types of prompting they did not mention in their diaries that they systematically manipulated a prompting hierarchy or recorded the effectiveness of doing so.

The conclusion that PRT has high social validity is consistent with the teacher's adherence to PRT even during the baseline. It also suggests that teachers are likely to wish to continue with PRT into the future.

v. Staff Focus Group

A key point consistently made in the focus group was that positive interactions about PRT occurred between home and school. Staff attributed improved student outcomes to the PRT implementation, particularly in communication, motivation, independence, and socialisation.

Teachers were keen to begin the PRT trial and focused on using rewards effectively and incorporating the child's interest when teaching new skills. When asked to nominate the greatest changes in their own practice, teachers mentioned PRT methods but also mentioned strategies that were not unique to PRT, such as routines, visuals, structure, and choice-making.

Teachers mentioned several drawbacks of PRT implementation, including children's unrealistic expectations about receiving rewards; loss of progress when children transferred out of the PRT program, and increased time demands

Teachers suggested that PRT should be embedded into current practices, including Individual Education Plans. They valued consistency and simplicity. They wished to see basic face to face PRT training for parents (including fathers) and relevant satellite staff as early as practicable. Clarity for teachers who wished to use their PRT training to qualify for the Certificate was also advocated.

Comment:

The focus group findings show high social validity, consistent with the teacher diaries, and some evidence of fidelity. Their comments reinforce Aspect's position that teachers should be supported when trialing new practices. Teachers appear to be implementing PRT in concert with other validated intervention principles.

vi. Parent teleconferences /discussion

Parents made favourable observations about their relationship with the school and about PRT. They believed PRT assisted their child's development in language and behaviour, and should be implemented more widely. Discussion of PRT implementation in the home centred around motivation (particularly the use of rewards, and building on existing skills and interests).

Between them, parents canvassed all the five pivotal areas which suggests that the school provided a broad overview of major concepts.

Comment:

The overall impression was that PRT had high social validity for the parents. However individual parents needed ongoing assistance to apply PRT consistently in their own homes.

The influence of a halo effect cannot be ruled out, because parents also incorporated other strategies in the home which are not unique to PRT, such as the use of visual schedules.

vii. Staff self-evaluations

The Teacher Self Assessment questionnaire and Specific Elements of the PRT approach in classrooms questionnaire showed teachers were marginally (not statistically significant) more likely to implement PRT at the end of the year. The Autism Treatment Philosophy questionnaire results showed relatively little change in the teachers' commitment to the philosophical underpinnings of PRT over the year. Areas of uncertainty included assessment and documentation.

Comment:

These results are congruent with the interpretation that teachers were familiar with PRT right from the outset and that PRT fidelity remained relatively constant over the year. Pockets of uncertainty, such as documentation, should be addressed.

viii. Parent questionnaires

According to the Changes in skills, behaviour or characteristics questionnaire parents agreed that their child's behaviour had increased in a desirable direction on at least two thirds of questionnaire items. In the same questionnaire Aspect achieved comparable results with the Portland Autism Spectrum Disorders Outcome Study. This is encouraging because the Aspect students were older and hence less likely to make gains.

Between two thirds and 100% of parents rated their involvement as at least six out of ten, suggesting acceptable social validity. Nevertheless, parents still wanted more information about how to physically carry out PRT. They also wanted more training for the relevant Satellite class when their child transitioned out of Aspect to a new school.

There was a high rate of additional treatments used by the respondents.

Comment:

The high social validity suggests that parents are likely to wish to continue with PRT. The use of additional treatments is a relatively common feature of many home intervention programs for students on the spectrum. Particularly when children are young, parents feel the urgency to intervene and may adopt a "scatter gun" approach, in the hope that at least one of the interventions will bring about positive change. Unfortunately, whilst

understandable, this practice does obscure the interpretation of results.

ix. 5x3 teacher observations

School 2 provided a suite of 5x3 observations for each child which indicated that the staff were implementing the PRT program faithfully on most occasions throughout the year. The five children in School 2 displayed a wide range of positive and negative behaviours and difficult situations.

Comment:

The data are consistent with the interpretation that children on the spectrum benefit from repetition during skill acquisition, and that the staff displayed versatility and skill.

11.2 Discussion: Introduction

The main purpose of the current study is to examine:

- the fidelity of the PRT intervention (that is, whether the practice of PRT is adhered to. Processes and documentation will also be discussed.)
- the effectiveness of the PRT intervention (particularly in terms of student outcomes)
- the social validity (acceptability) of PRT

Each of these is discussed in turn

11.3 Fidelity (Is PRT adhered to?)

There was strong support for the fidelity of PRT and the conclusion that staff implemented PRT appropriately during the intervention phase. On at least 80% of sampled occasions staff instructions were clear, appropriate to the task, uninterrupted, and the child was attending. Teachers presented and noted the use of multiple cues (“big red plane”); they incorporated child choice; their rewards were immediate, contingent and uninterrupted; they used authentic direct reinforcers; and they acknowledged the importance not just of correct responding, but attempting to do so.

Satisfactory PRT fidelity was evident in the analysis of the DVDs, the teacher diaries, the staff focus group and the staff questionnaires. We can conclude that the program was feasible, and resourced at a level that would enable teachers to implement the program properly.

Satisfactory PRT fidelity also implied that the teachers’ professional development was effective, assuming that the teachers did not know a lot about PRT before the training commenced.

The PRT fidelity data also produced some unexpected findings. Chief of these was that the DVDs showed that some staff were already relying on PRT practices during the baseline period, before the PRT implementation was scheduled to begin. The reasons for this unforeseen behaviour probably lie in the professional development timeline – that is, that the teachers were already familiar with the PRT before the study started. However they had agreed to suspend the use of PRT in the first term with their new pupil intake in order to find a point of comparison when PRT began in Term 2. Why then, did they not put this agreement into practice – why did they use PRT in term 1? There are at least two possible reasons:

1. It is understandably difficult, and ethically problematic, for teachers to temporarily cease implementing strategies that they have found to be, or believe to be, effective.
2. It is difficult to draw a line between what is PRT-based, and what is simply good teaching. For example, it would

be hard to find anyone, irrespective of their theoretical orientation, who would object to using instructions that are clear, appropriate to the task, uninterrupted, and given when the child is attending. Aspect's Comprehensive Educational Approach (ACEA) aspires to take the best and most relevant features of evidence-based education, and it is likely that the teachers had encountered many of the PRT principles even before they were trained in PRT.

In terms of the research, the pattern of fidelity results meant that there were limitations imposed on the questions that could be answered. The School 2 DVDs indicated that staff were using PRT strategies fairly consistently throughout the year, with no abrupt change from baseline to intervention period. School 1 videos indicated staff implemented PRT appropriately in the second half of the year but no DVDs were available regarding their baseline performance. Therefore, for both schools (but for different reasons) it was not possible to identify a shift to PRT that could be linked to any observed changes in the children's behaviour. Behavioural changes might be linked to PRT, but other factors - such as the children growing older, or the presence of experienced teachers - could not be ruled out either. Therefore it was not possible to provide a definitive answer to the question: "Did PRT cause the student outcomes?" The strongest statement that can be made about any positive student outcomes is that they were consistent with the use of PRT.

11.4 Student outcomes

Student outcomes were generally favourable over the year. The children's scores on standardised tests remained fairly stable. This was not surprising, in that most of the tests were designed to assess stable cognitive traits and potential, such as general ability. That said, it was encouraging to see that a majority of School 2 students moved from being "non-assessable" to "assessable" over the year on two standardised tests. One interpretation of these findings is that this movement reflected improvements in the pivotal area of motivation, so the children were more likely to interact with the examiner.

Student outcomes were mostly positive on the remaining measures (DVDs, teacher diaries, staff focus group; parents teleconference; staff questionnaires, parent questionnaires, teacher 5x3 observations). It was encouraging to see that engagement was high, and the children responded well to the multiple cues. The parents' responses compared favourably with a large PRT study conducted in Portland with a sample of younger children. Teachers considered that PRT helped to develop skills and decrease the frequency of unwanted behaviour. Parents mentioned improvements in anger management, waiting ability, cooperation, and the ability to follow directions. Parents and teachers considered that the children were more motivated to communicate although this was not evident in the DVDs, where the rates of self initiations and requests were fairly low, particularly for social interactions which typically prove challenging for many children on the autism spectrum.

Taken together, the data showed that the children in School 2 had lower general ability and more severe autism than those in School 1. This was apparent in the standardised tests, and also their lower rates of social interactions in the DVDs. School 2 parents were more likely than School 1 parents to agree that their child's behaviour had increased in a desirable direction, but it would be unwise to conclude that PRT is more suited to more severely affected children, because the sample size was small and school 2 parents were generally more involved with the school.

Teachers and parents considered that the most significant changes were evident in the children's:

- increased use of language and communication
- improved self management and decreased incidence of undesirable behaviours
- increased skill development (for example in play, co-operation, waiting and self-help behaviours).

The preponderance of positive student outcomes is encouraging. It is also consistent with research indicating that

early intervention typically produces the best results at home and school. In the study most children were five or six, and no child was older than seven years of age. Aspect's decision to study younger children early in their school career was likely to maximise the possibility of favourable results (Koegel & Koegel, 2006).

Given the majority of the student outcomes are positive, what can we make of these outcomes? Can they be attributed to the staff use of PRT, or to the teachers' professional development, which is a step even further removed? This evaluation is not about the PRT professional development program, but it is briefly mentioned here to contextualise the discussion.

In considering the array of data, it is helpful to consider evidence about professional development as consisting of a number of levels, with each successive level providing stronger evidence than its predecessor (after Guskey, 2003).

Level	Description
1	Participants' reactions. (Was the Professional development enjoyable?)
2	Participants' learning. (What knowledge did participants gain?)
3	Organisational support and change. (Were the teachers supported?)
4	Participants' use of new knowledge and skills.
5	Student outcomes.

The current evaluation is not concerned with Levels 1 and 2. It did not specifically aim to investigate Level 3, although some of the focus group, diary and teleconference feedback touched on this area and can be used to inform recommendations for the future. Rather, the evaluation focuses on Level 4 (through the PRT fidelity and social validity analyses) and Level 5, the most ambitious level of all.

Even if a baseline (no PRT) were established, the process of linking student outcomes to professional development, and even to participants' new skills (through the fidelity analysis) would be a difficult undertaking. It is difficult because the teachers' actions and student responses are highly context dependent, (as demonstrated in the video analysis) and so they are hard to trace over time. It is difficult because we need to decide which student actions to track over time (because only some student skills will change substantially, and we need to make educated guesses about which these skills might be. The 3x3 analysis highlighted some of these difficulties.) It is difficult to demonstrate convincingly because some indirect evidence (such as teacher and parent reports) might be open to bias. It is difficult to demonstrate because students were undergoing other therapies (e.g. speech therapy) at the same time that PRT was introduced. Finally, linking student outcomes to participants' outcomes is difficult because when we use direct (observational/DVD) evidence we have to sample only a small subset of the children's behaviour and we need to ensure that this is representative so we did not simply observe the child on a "bad" day.

It should come as no surprise therefore, that although the student outcomes over the year are mostly positive, they cannot be definitively attributed to the use of PRT. Parents indicated that their children were also accessing other interventions (such as speech therapy) and using strategies (such as visual supports) that are not unique to PRT. Therefore, the positive student outcomes are consistent with the use of PRT, but the relationship is not proven.

11.5 Social validity (acceptability) of PRT

Social validity can be evaluated on at least three levels:

- whether the goals of the PRT intervention were significant to the participants
- whether the PRT intervention was acceptable to teachers and parents

c. whether the parents and teachers were satisfied with the outcomes of the intervention

The first (goal) level is achieved largely through negotiations during the IEP process, which should be the starting point for most interventions, PRT or otherwise. The data indicated that both parties (teachers and parents) were usually satisfied with this aspect, as long as they met and communicated often enough.

The second (treatment acceptability) level is concerned with whether the PRT procedures are appropriate and feasible in terms of time, cost and appearance. These considerations ultimately affect the success of the intervention, because costly or time-intensive interventions are less likely to be implemented and maintained at home and school. The teacher diaries, the staff focus group, the parent teleconference, the staff questionnaire and the parent questionnaire all indicated that social validity was fairly high for both teachers and parents. Some participants had reservations about using rewards for 100% of the time, and the staff mentioned the increased workload, although part of this was for data for the current report.

The third (outcome acceptability) level is related to the practical significance of the changes brought about by PRT. Increased independence is significant if it translates into (for example) the child efficiently packing up his things at the end of an activity without taking longer than his peers to do so,

The high social acceptability of PRT on all three levels suggests that if Aspect were to recommend the approach in any of its schools, it would have high acceptability with parents and teachers, which would form good grounds for a productive partnership. To increase the social acceptability, parents and teachers may need assistance to address perceived shortcomings such as “There always has to be a reward” and the perception that PRT is “imposed” and “contrived”. In general though, the number of parents who attended PRT training meetings was encouraging. All parents in both schools indicated that they would be interested in implementing PRT at their home and some explicitly mentioned that they would recommend it to other families.

11.6 Strengths and limitations of the current research

The stronger the design of a study, the more confidence can be placed in its conclusions. As discussed in the introduction, this evaluation contained both strong points and limitations. Amongst the latter were included the following:

- A simple AB design was planned, where measurements would be taken during the baseline (“A”) then PRT would be implemented (“B”). If there were changes in student outcomes, then PRT could be thought to have an effect. However because it was found in this evaluation that there was no period without PRT, the strongest conclusion that could be drawn was that PRT probably contributed to positive outcomes (because it was delivered in the same timeframe that these outcomes occurred), but competing interpretations could not be ruled out.
- There was also a prospect of unintended bias. It was not possible to hide the fact that PRT was being implemented, so parents and teachers’ expectations of positive outcomes may have unintentionally biased the results.
- The sample of students was relatively small, which limits the generalisability of results. This is important given the finding that the outcomes for children were highly dependent on the context.
- The sample of behaviour on DVD was also relatively limited. Each school supplied about 45 minutes of videotaping to cover the year-long intervention, so it is evident that the analysis only dealt with a small sample of behaviour.

On the other hand, there were a number of safeguards instituted to strengthen the study. These included the following:

- Control. Although there is no control group, the child is his own control, which circumvents the difficulty of finding two children who are similar in all respects except that one receives the treatment and the other does not.
- Normed and standardised measurements (CARS, Stanford-Binet-5, Vineland and CELF)
- Repeated measures during baseline and intervention. This helps to counter the difficulty that the current study only had a relatively small number (eleven) of child participants.
- Triangulation. There were eight different kinds of data collected. This makes it more likely that any deficiencies of one data tool will be compensated for by the strengths of another.
- Direct and indirect measures. Indirect measures, such as third person reports of child behaviour, are convenient but may contain elements of bias. Staff or parents who are involved in a study may report changes in behaviour because they expect to see them. Taking direct measures, such as independent observations of the DVDs can help to counteract this
- Inter-rater reliability, to ensure that DVD codes are consistently applied.
- Treatment fidelity measures (enhanced by mentoring and assessed by DVDs, diaries, and observations).
- Qualitative data in addition to quantitative data, to contextualise and complement numerical results and provide a more comprehensive overview.
- A cross section of respondents, with different interests and priorities, in order to minimise the possibility of reporting bias
- An independent evaluation, conducted by a person external to the organisation to ensure greater objectivity

11.7 Recommendations /Points for consideration

i. Top level recommendations:

- It is feasible to adopt PRT. (This is supported by program fidelity and social validity data, and positive responses from stakeholders.)
- PRT implementation was coexistent with positive student outcomes, which suggests that PRT should (continue to be) incorporated into Aspect's Comprehensive Educational program, especially as it complements other approaches such as TEACCH (Treatment and Education of Autistic and related Communication-handicapped Children).
- Parents should continue to be involved in the PRT program
- During implementation of PRT, documentation should be consistent across classrooms.
- The children's progress and the teaching staffs' dedication under the current evaluation should be celebrated.
- This report should provide the foundation for a joint publication between Aspect and the University of Canberra

Several other points for consideration arise from the study, concerning the implementation of PRT, parents' involvement, fidelity, and the documentation of PRT. Some of these points are already consistent with Aspect's current practices.

ii. Implementation recommendations

- In the current study, PRT implementation was contemporaneous with positive student outcomes, so PRT techniques should be included in professional development for Aspect staff. One possible model is a mentoring system where more experienced teachers mentor teachers and teaching assistants who are just beginning to use the approach.
- PRT is most effective if a whole school approach is adopted, with professional development provided to ensure consistency in understanding and implementation and particularly, record-keeping.

- Staff require support to implement a new procedure such as PRT. Teaching staff benefit from opportunities to share their strategies and concerns with other colleagues who are also implementing PRT. If PRT is implemented more widely, beginning teachers will need to develop a repertoire of creative ways to use autism-friendly ways to develop the five pivotal areas. Staff meetings to model strategies and share knowledge about effective motivators for particular students would be valuable.
- Teachers and their assistants may require help to address implementation issues such as:
 - » Managing the expectation of continuous rewards, and helping “wean children away” from highly preferred rewards such as chocolate, through an improved understanding of schedules of reinforcement
 - » Demonstrating the children’s progress via documentation of prompt hierarchies
 - » Using tokens to assist the children to delay reinforcement when rewards are difficult to implement
 - » Assisting children to collect data on those behaviours (e.g. circling a smiley face at the end of an activity to signify their enjoyment)
 - » Using behaviour specific praise with the assistance of unobtrusive self-recording systems such as moving paperclips from one pocket to another; using cueing software that can be downloaded on to an iPhone or iPod to remind the teacher to praise the student; or using tokens or pictures paired with praise for predetermined behaviour (Musti-Rao & Haydon, 2011)
 - » Embedding the PRT goals into what staff are already doing. For example the goals in an IEP Action Plan can incorporate specific PRT outcomes.
 - » Devising creative ways to employ direct (intrinsic) reinforcement in activities
 - » Using assessment to enable them to identify starting points and to measure progress for students in their class
- Students’ responses to multiple cues were very accurate in the current study, suggesting that staff can be encouraged to increase the frequency and difficulty level of this activity.
- When transitioning to a new Satellite class, children who have responded well to PRT would benefit from continued exposure. Consideration should be given to the issue of professional development in PRT for Satellite teaching staff.
- Pathways to the Certificate or other statements of attainment need to be clarified, so staff understand what is required of them if they wish to gain further qualifications.
- A seamless integration of PRT with leading practice principles (not unique to PRT) is recommended. For example: incorporating the child’s interests; using a visual schedule of activities; encouraging the child to communicate to obtain a desired reward; providing “down time” when the child is fatigued; and analysing difficult tasks into their subcomponents.

iii. Parent involvement recommendations

Home-school liaison was much appreciated by parents, therefore:

- If possible, parents should be involved in the PRT implementation. This should be scheduled as early as practicable, preferably before a child starts school (if pre-school facilities available).
- Activities to encourage fathers to participate should be promoted. Invitations to assist in practical activities may help to encourage father involvement.
- Parents benefit from liaising and problem-solving with staff, and have expressed a wish for face-to-face contact over e-learning or mobile learning. This would enable the modelling to parents of how to physically carry out PRT. These activities should be recognised in staff workloads.

- When collaborating with parents about PRT, it is helpful to invite at least one knowledgeable parent at the initial meeting run by school, so the new parents could have program meetings with someone who had done it before and who had a home perspective.
- Provide “trouble-shooting” assistance to parents particularly around over-reliance on rewards
- Parents benefit from particular PRT strategies and incorporating leading practice Home-school liaison should include discussions of goal attainment and how well the child is generalising their skills. Children benefit when they are helped to generalise their knowledge in new contexts, so teachers should explicitly plan and discuss with parents how some of the children’s school learnings can be integrated into family activities.
- Start with the fundamental principles of PRT when working with parents, and aim for simplicity wherever possible.

iv. Fidelity recommendations

- To promote high fidelity, key factors that should be considered include:
 - » Involving stakeholders in program review, selection, and adoption
 - » Ensuring the program is a good match with the needs of the target population and school site
 - » Providing program specific training for providers and on-going support throughout implementation
 - » Promoting positive attitudes toward and support for programs among administrators and teaching staff at all levels (including teaching assistants)
 - » Inviting a mix of newer teacher to the profession, in addition to teachers who are confident in their ability, to trial the program
 - » Integrating the programs into normal school activities and operations

v. Documentation recommendations

- Future evaluation procedures would benefit from the inclusion of an allied health professional, skilled in PRT and assessment, who would assist in the data collection process.
- Aspect should continue to monitor the success of PRT in a range of classrooms
- Skill attainment should be well documented, so that when students transition to a new classroom (PRT or otherwise), the maintenance of skills will be addressed.
- Documentation should be shared with parents, to highlight the child’s progress.
- When documenting and interpreting the children’s progress, the influence of context on their responses should be recognised.
- Documentation of maintenance tasks should be ongoing.
- Students should be assisted to document their progress in child-friendly and visual ways appropriate to their capacity.
- Documentation should occur continuously throughout the whole school year

Final comments

I wish to express my appreciation for the whole hearted way in which Aspect has collaborated in this evaluation. Taking data consistently over time is not easy, and videoing one’s own teaching can be especially challenging. The fact that Aspect is prepared to transparently evaluate its own practices speaks volumes for the organisation.

Thank you for the opportunity to contribute.

Chris Kilham
14 October 2011

PART V. REFERENCES

12.0 References

- Arick, J., Loos, L., Young, H., Gense, M., Falco, R., Johnson, S., & Krug, D. (n.d.). *Autism Spectrum Disorders Outcome Study and Training project. Final project report*. Available at http://www.rpats.ed.pdx.edu/pdf/Autism_Outcome_Study_2010.pdf
- Austin, J. L., & Soeda, J. M. (2008). Fixed-time teacher attention to decrease off-task behaviors of typically developing third graders. *Journal of Applied Behavior Analysis*, 41, 279-283.
- Baker-Ericzén M.J., Stahmer A.C., Burns A. (2007). Child demographics associated with outcomes in a community-based pivotal response training program. *Journal of Positive Behavior Interventions*, 9(1), 52-60.
- Brereton, A., Tonge, B., & Einfeld, S. (2006). Psychopathology in children and adolescents with autism compared to young people with intellectual disability. *Journal of Autism and Developmental Disorders*, 36, 863-870.
- Bryson, S.E., Koegel, L.K., Koegel, R.L., Openden, D., Smith, I.M., & Nefdt, N. (2007). Large scale dissemination and community implementation of Pivotal Response Treatment. *Research & Practice for Persons with Severe Disabilities*, 21(2), 142-153.
- Chalk, K., & Bizo, L. (2004). Specific praise improves on-task behaviour and numeracy enjoyment: A study of year four pupils engaged in the numeracy hour. *Educational Psychology in Practice*, 20, 335-351.
- Committee on Educational Interventions for Children with Autism, National Research Council. (2001). *Educating Children with Autism*. Available at <http://www.nap.edu/openbook.php?isbn=0309072697>
- Coolican J., Smith I.M., & Bryson S.E. (2010). Brief parent training in pivotal response treatment for preschoolers with autism. *Journal of Child Psychology and Psychiatry*, 51(12), 1321-1323.
- Cunningham, A.B. (2011). Measuring change I social interaction skills in young children with autism. *Journal of Autism and Developmental Disorders*, DOI 10.1007/s10803-011-1280-3 (E-pub ahead of print).
- Francis, K. (2005). Autism interventions: a critical update. *Developmental Medicine & Child Neurology*, 47, 493-499.
- Fullerton, E. K., Conroy, M. A., & Correa, V. I. (2009). Early childhood teachers' use of specific praise statements with young children at risk for behavioral disorders. *Behavioral Disorders*, 34, 118-135.
- Gillett, J., & LeBlanc, L.A. (2007). Parent-implemented natural language paradigm to increase language and play in children with autism. *Research in Autism Spectrum Disorders*, 1(3), 247-255.
- Guskey, T.R. (2003). What makes professional development effective? *Phi Delta Kappan*, 748-750.
- Harper, C.B., Symon, J.B.G., & Frea, W.D. (2008). Recess is time-in: Using peers to improve social skills of children with autism. *Journal of Autism and Developmental Disorders*, 38(5), 815-826.
- Jennett, H.K., Harris, S.L., & Mesibov, G.B. (2003). Commitment to philosophy, teacher efficacy, and burnout among teachers of children with autism. *Journal of Autism and Developmental Disorders*, 33(6), 583-593.

- Jones, E.A., Carr E.G., & Feeley, K. (2006). Multiple effects of joint attention intervention for children with autism. *Behavior Modification*, 30(6), 782-834.
- King, J.J., & Caldoynos, M.G. (2009). Social validity of behavioural practices on the treatment of autism. *Research in Autism Spectrum Disorders*, 3(1); 173-178.
- Koegel, L.K., Carter, C.M., & Koegel, R.L. (2003). Teaching children with autism self-initiations as a pivotal response. *Topics in Language Disorders*, 3(2), 134-145.
- Koegel, R.L., & Koegel, L.K. (2006). *Pivotal Response Treatments for autism*. Sydney: Paul Brookes.
- Koegel, L. K., & Koegel, R. L. (1995). Motivating communication in children with autism. In E. Schopler & G. B. Mesibov (Eds.), *Learning and cognition in autism* (pp. 73-87). New York: Kluwer Academic/Plenum Publishers.
- Koegel, R. L., Schreibman, L., Good, A., Cerniglia, L., Murphy, C., & Koegel, L. K. (1989). *How to teach pivotal behaviors to children with autism: A training manual*. Santa Barbara, CA: University of California.
- Koegel, R.L., Symon, J.B.G., & Koegel, L.K. (2002). Parent education for families of children with autism living in geographically distant areas. *Journal of Positive Behavior Interventions*, 4(2), 88-103.
- Koegel, L. K., Talebi, J. L., Koegel, R. L., & Carter, C. (2006). Improving social-communication, empathy, and pragmatics in individuals with Asperger syndrome. In R. L. Koegel & L. K. Koegel (Eds.), *Pivotal response treatments for autism - Communication, social, and academic development* (pp. 229-244). Baltimore: Brookes Publishing.
- Kuhn, L.R. et al. (2008). *Using pivotal response training with peers in special education to facilitate play in two children with autism*. *Education and Training in Developmental Disabilities*. 43(1), 37-45.
- MacDermott, S., Williams, K., Ridley, G., Glasson, E., & Wray, J. (2007). *The prevalence of autism in Australia*. Advisory Board on Autism Spectrum Disorders.
- Mayes, S.D., & Calhoun, S.L. (2003). Ability profiles in children with autism: Influence of age and IQ. *Autism*, 7(1), 65-80.
- Musti-Rao, S., & Haydon, T. (2011). Strategies to increase behavior-specific teacher praise in an inclusive environment. *Intervention in School and Clinic*, July 29, doi: 10.1177/1053451211414187
- National Autism Center .(2009). *National Standards Report: Addressing the need for evidence-based practice guidelines for autism spectrum disorders*. <http://www.nationalautismcenter.org/affiliates/reports.php>
- Nefdt, N., Koegel, R., Singer, G., & Gerber, M. (2010). The use of a self directed learning program to provide introductory training in Pivotal Response Treatment to parents of children with autism. *Journal of Positive Behavior Interventions*, 12(1), 23-32.
- Offit, P. (2008). *Autism's false prophets: Bad Science, Risky Medicine, and the Search for a Cure*. NY: Columbia University Press.
- Pierce, K., & Schreibman, L. (1997). Multiple peer use of pivotal response training to increase social behavior of classmates with autism: Results from trained and untrained peers. *Journal of Applied Behavior Analysis*, 30(1), 157-160.

Centers for Disease Control and Prevention (CDC). (2009). Prevalence of Autism Spectrum Disorders – Autism and developmental disabilities monitoring network, United States, 2006. *MMWR Surveillance Summaries*, 58 (SS10); 1-20.

Roid, G.H. (2003). *Stanford-Binet Intelligence Scales*, Fifth Edition. Itasca, IL: Riverside Publishing.

Schopler, E, Van Bourgondien, M. E., Wellman, G. J., & Love, S. R. (2010). *Childhood autism rating scale, second edition*. Los Angeles, CA: Western Psychological Services.

Schopler, E., Lansing, M.D., Reichler, R.J., & Marcus, L.M. (2005). *Psychoeducational Profile: TEACCH individualised psychoeducational assessment for children with autism spectrum disorders (Manual) – third edition*. Austin, TX:Pro-Ed.

Semel, E., Wiig, E.H., & Secord, W.A. (2003). *Clinical evaluation of language fundamentals, fourth edition (CELF-4)*. Toronto, Canada. The Psychological Corporation. A Harcourt Assessment Company.

Sherer, M.R., & Schreibman, L. (2005). Individual behavioral profiles and predictors of treatment effectiveness for children with autism. *Journal of Consulting and Clinical Psychology*, 73(3), 525-538.

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

Skokut, M., Robinson, S., Openden, D., & Jimerson, S.R. (2008). Promoting the social and cognitive competence of children with autism. *California School Psychologist*, 13, 93-107.

Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984) *Vineland Adaptive Behavior Scale*. Circle Pines, MN: America Guidance Service.

Sparrow, S. S., Cicchetti, D. V., & Balla, D.A. (2005). *Vineland Adaptive Behavior Scale*, Second Edition (VABS-II). Minneapolis, MN: Pearson Assessment.

Stahmer A.C., & Schreibman L. (2006). Social validation of symbolic play training for children with autism. *Journal of Early and Intensive Behavior Intervention*, 3(2), 196-210.


Stevens, C., Sldener, T.M., Reeve, S.A., & Sidener, D.W. (2011). Effects of behavior-specific and general praise, on acquisition of tacts in children with pervasive developmental disorders. *Research in Autism Spectrum Disorders*, 5, 666-669.

Suhrheinrich, J., Stahmer, A., & Schreibman, L. (2007). A preliminary assessment of teachers' implementation of pivotal response training. *The Journal of Speech-Language Pathology and Applied Behavior Analysis*, 1-2, 1-13.

Vismara, L. A. (2009). *Implementation checklist for PRT*. Sacramento, CA: The National Professional Development Center on Autism Spectrum Disorders, M.I.N.D Institute, University of California at Davis Medical School.

Vismara L.A., & Lyons G. (2007). Using perseverative interests to elicit joint attention behaviours in young children with autism: Theoretical and clinical implications for understanding motivation. *Journal of Positive Behavior Interventions*, 9(4), 214-228.

Volkmar, F., Paul, R., Klin, A. & Cohen, D. (Eds.). (2005). *Handbook of autism and pervasive developmental disorders*.



3rd Edition. NJ: John Wiley & Sons Inc.

Volkmar, F., Lord, C., Bailey, A., Schultz, R. T., & Klin, A. (2004). Autism and pervasive developmental disorders. *Journal of Child Psychology and Psychiatry*, 45, 135-170.

Young, H., Loos, L., Krug, D., Falco, R., Arick, J., Gense, M., & Johnson, S. (2003). *Autism Spectrum Disorders outcome study and training project: Final Project Report*. Available at http://www.autismstudy.pdx.edu/pdf/autism_outcome_study.pdf

PART VI. APPENDICES

Appendix A

Aspect's Pivotal Response Treatment Project Teacher Self Assessment

Name:

Date:

Code: SD - strongly disagree, D- Disagree , NS- Not sure, A- Agree, SA - Strongly Agree

Element	Description	SD	D	NS	A	SA	Comments
Understanding and knowledge	I have a deep knowledge and understanding about the specific learning needs of students with ASD						
Confidence	I feel very confident that I have the skills to ensure that students with ASD in my class are achieving improved outcomes in their learning						
Application :	I use a range of assessment measures to enable me to identify starting points and to measure progress for students in my class						
Assessment	I use a range of assessment measures to enable me to identify starting points and to measure progress for students in my class						
Application :	I have a deep understanding about structured teaching and how to apply the principles of the TEACCH approach into my classroom						
Assessment	I am confident in my knowledge about the use of assessments that enable me to identify starting points and to measure progress for students in my class						
Application: Classroom practices	I have a deep understanding about pivotal response treatment and how to apply the principles of PRT approach into my classroom						

Element	Description	SD	D	NS	A	SA	Comments
Relationships students	Interactions between staff - students and students - students reflects a focus on the proactive teaching and the support of social and emotional empathy / regulation						
Relationships : families	I feel confident that I am incorporating the students families wishes and lifestyle when planning / programming for students						
Learning environments (physical)	I feel confident that the physical environment of my classroom assists all my students to participate successfully in learning						
Pivotal areas	I understand how to use PRT to (a) motivate students						
	(b) help students respond to multiple cues						
	(c) improve student self management						
	(d) encourage self-initiations						
	(e) develop empathy						

Appendix B

Specific Elements Of The Prt Approach In Classrooms

Element	In place	Partially in place	Not in place	Comment
1. Training is integrated into everyday routines				
2.Tasks are structured to provide generalization opportunities across environments				
3. Tasks are structured to provide generalization opportunities across people				
4. Tasks are structured to provide generalization opportunities across materials				
5. I follow the child's lead				
6. Children can choose items that interest them in learning trials				
7.I have established record systems for my students learning that include:				
(a) Stimulus items				
(b) Prompts				
(c) Interactions				
(d) Responses				
(e) Consequences				

Additional Comments:

Thank you for taking the time to complete this evaluation

Appendix C

Autism Treatment Philosophy Questionnaire

Below are statements that may or may not reflect your value system in the teaching of children with autism. Please indicate the degree to which you agree or disagree with each statement by circling the appropriate number below.

Please use the following scale:

1 = Strongly disagree with the statement.

2 = Moderately disagree with the statement.

3 = Disagree slightly more than agree with the statement.

4 = Agree slightly more than disagree with the statement.

5 = Moderately agree with the statement.

6 = Strongly agree with the statement.

Question	Strongly agree							Strongly disagree		
	1	2	3	4	5	6	7	8	9	10
1. I would very rarely teach a cognitive skill to a child without that child showing some interest or partial ability in it.										
2. My approach to teaching focuses on both observable behaviors and other unobservable variables, such as how my student thinks, understands the environment, and integrates information.										
3. I structure the environment to stimulate my student's use of spontaneous communication.										
4. The use of schedules can help children make transitions.										
5. Although some children will make enough progress to be fully integrated, many will still need some form of support throughout their lifespan.										
6. The learning characteristics of children with autism make it necessary for them to have specialized education services.										
7. It is very important to collect systematically graphed data on all of a student's learning programs on a very frequent basis.										
8. Making available powerful reinforcers is one of the best ways to engage a child in an activity.										
9. It is important to plan for generalization and independence of skills.										
10. Principles of learning, like reinforcement, shaping, and chaining, are key aspects to the way I approach teaching.										
11. A large part of my educational plan for a student with autism is to remediate his or her areas of deficit.										
12. Children make the most educational progress when there is a close link between home and school.										
13. I regularly introduce novelty to prevent resistance to change.										
14. I expect my student to respond to instructions in the natural environment despite all its distractions and interruptions.										
15. One of my responsibilities as a teacher is to understand the personal experience of a student with autism.										

Question	Strongly agree							Strongly disagree		
	1	2	3	4	5	6	7	8	9	10
16. To track the development of my students' emerging skills, I evaluate their performance early in the school year and then later on.										
17. It is important that I show respect for all the children in my classroom.										
18. I'm less concerned with finding powerful reinforcers for a child than making sure activities are meaningful to him or her.										
19. I find that my students with autism learn the best when their strengths and interests are emphasized and their deficits are accepted and minimized.										
20. When a student demonstrates a behaviour problem, I try to figure out the underlying autism deficit or causative factor that could be the trigger mechanism.										
21. I try to find the communicative intent of a student's misbehaviour.										
22. Perhaps the most powerful tool I have as a teacher of students with autism is to pair positive consequences with desirable behaviour.										

Adapted from Jennett, H.K., Harris, S.L., & Mesibov, G.B. (2003). *Journal of Autism and Developmental Disorders*, Vol. 33(6), December 583-593

Appendix D

Parent Questionnaire

Changes In Skills, Behaviors Or Characteristics

This year, your child has been enrolled in a class that is guided by PRT principles which emphasise teaching in key skill areas to help children overall development. To help Aspect evaluate the program and improve its services, it would be helpful if you could respond to the questions below.

Please let us know whether the following skills, behaviors or characteristics have decreased, stayed the same, or increased for your child during the school year:

Skill or Behavior	Decreased	Stayed the same	Increased
Using language or other means to communicate			
Using spontaneous communication to request foods, toys, or activities			
Labeling items and pictures in response to questions			
Understanding and responding to directions			
Imitation of other children and adults during play			
Playing with toys in ways that are appropriate to his/her age			
Play with other children			
Engagement in imaginative or pretend play			
Self-care and independence in areas such as eating, dressing, and toileting			
Coping with change or transitions			
Enjoyment of school			
Appropriate behavior			

Please describe any other changes you have seen in your child this past school year:

Thank you for completing this questionnaire.

Questionnaire adapted from *The Autism Spectrum Disorders Outcome Study and Training Project (Parent Survey of Child Outcomes)* <http://www.autismstudy.pdx.edu/index.htm>

Appendix E

Parent Questionnaire

Involvement Level In School Program

This year, your child has been enrolled in a class that is guided by PRT principles which emphasise teaching in key skill areas to help children overall development. To help Aspect evaluate the program and improve its services, it would be helpful if you could respond to the checklist below.

Question	1 not at all	2	3	4	5	6	7	8	9	10 extremely
Please rate your level of involvement with your child's overall school program. (Scale: 1 = not involved at all / 10 =extremely involved)										
Please rate your level of involvement with your child's PRT school program. (Scale: 1 = not involved at all / 10 =extremely involved)										
Please rate how satisfied you are with your involvement with your child's overall school program. (Scale: 1 = not at all satisfied / 10 =extremely satisfied)										
Please rate how satisfied you are with your involvement with your child's PRT school program. (Scale: 1 = not at all satisfied / 10 =extremely satisfied)										
Please rate your level of knowledge about PRT (Scale: 1 = not at all knowledgeable / 10 =extremely knowledgeable)										
Please rate how interested you are in implementing PRT at home (Scale: 1 = not at all interested / 10 =extremely interested)										
Please list any treatments your child is receiving or has received during this school year (eg speech therapy, casein free diet)										
Are there any other comments you wish to make about the PRT program or your child's progress this year?										

Thank you for your participation!

Questionnaire adapted from The Autism Spectrum Disorders Outcome Study and Training Project (Parent Involvement Survey) <http://www.autismstudy.pdx.edu/index.htm>