Aspect TEACCH Pilot Final Report

aspect practice

autism spectrum AUSTRALIA

An independent outcome study of a TEACCH intervention for children with autism

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1.0 Introduction

1.1. Background

This report summarises the outcomes of a pilot intervention conducted by Autism Spectrum Australia (Aspect) focusing on an approach called Treatment and Education of Autistic and Communication-handicapped CHildren (TEACCH). In order to provide an independent appraisal of the outcomes, the data were evaluated by the University of Canberra which has particular expertise in teaching and researching the TEACCH approach.

Although for convenience the pilot will be referred to as "TEACCH" throughout this report, the pilot was really restricted to the structured teaching aspect of TEACCH. The full TEACCH program would involve other features such as parent collaboration which were beyond the scope of the pilot.

Following a five day hands-on TEACCH workshop in term 4, 2007 conducted by an Aspect staff member with expertise in TEACCH, the pilot was implemented in four classrooms over the 2008 school year. The final outcome data were collected in February 2009. With a view to informing decisions relating to the 2009 school year, the results of the evaluation are made available to Aspect in two reports. A preliminary report (March 2009) outlines the main aims, methodology and findings and makes preliminary recommendations. This second, final report (May 2009) provides a more comprehensive evaluation. In keeping with the commitment of both organisations to support evidence based interventions it has been agreed that this final report will provide the basis for at least one joint academic publication by the University of Canberra and Aspect, and at least one combined conference presentation. In relation to the latter, an abstract about the evaluation has been submitted by Kilham (UC), Williams (Aspect) and Costley (Aspect) and accepted for the Asia Pacific Autism Conference scheduled for August 2009.

The report begins with a concise summary of the services and philosophical underpinnings of Aspect and of Division TEACCH, in order to contextualise the evaluation.

1.2. Aspect and its educational services

Aspect is one of Australia's largest not-for-profit service providers for people with an autism spectrum disorder (ASD). *The organisation's mission is to provide information, education and other services through partnerships with people with autism spectrum disorders, their families and communities* (Aspect 2006a http://www.aspect.org.au/aspect/about.asp). An inspection of their services reveals that Aspect is committed to a "whole of life" philosophy which means that their programs cover the lifespan of affected individuals and encompass an extensive range of life domains including education, work, and leisure activities. The TEACCH data in this report is restricted to Aspect's educational program, which is briefly outlined below. This overview is informed principally by the publication Äspect's comprehensive educational approach (Aspect 2007a).

Autism Spectrum Australia's specialised autism educational program is now amongst the largest in the world. Established in 1966, it currently includes a network of six special schools located in the Sydney Metropolitan area, the Hunter region, the Central Coast and the South Coast. In addition Aspect has 57 satellite classes, or autism-specific classes based in mainstream settings. These satellite classes constitute an important plank in implementing Aspect's inclusive philosophy, as they provide opportunities for students from the six special schools to transition to settings which afford greater access to interaction with neurotypical peers in a supportive environment. In turn, students can transition from the satellite schools to more inclusive settings. During 2007, 85 of the 513 students in satellite classes made such a transition (Aspect 2008a - Autism Spectrum Australia 39th Annual Report p 11).

Aspect describes its educational approach as "comprehensive" – that is, it delivers ASD specialized programs that include a skill development focus together with therapeutic interventions, using a multi-disciplinary team including parents (Aspect 2007a). Aspect recognizes the highly individualized expression of autism in affected students which militates against a uniform approach for all students. TEACCH elements permeate Aspect's Comprehensive Educational Approach, particularly in relation to the use of structured environmental supports, where the research

of key TEACCH proponents (including Mesibov, Shea, Schopler, Marcus) is used to support Aspect's practices.

1.3. The TEACCH approach

Established in the early 1970s, TEACCH is an evidence-based service, training and research program for individuals of all ages and skill levels with ASDs. It is part of the Carolina Institute for Developmental Disabilities, one of the largest programs for developmental disabilities in North America. An abbreviated version of the TEACCH mission is: *to enable individuals with autism to live as independently as possible within the community; to provide exemplary services to people with autism, their families and supporters; and to conduct research* (http://www.teacch.com.html)

Division TEACCH is based at the University of North Carolina and there are nine regional centres. The TEACCH autism program is the legislated statewide program for the diagnosis, treatment and education of children and adults with autism and similar developmental disorders. In this capacity Division TEACCH embraces a range of programs and services, including supported employment, early intervention, social groups, clinical diagnostic services, and a vocational and residential program. In addition, staff at the Division train people throughout the world, research and publish widely, and develop assessment tools and other resources for dissemination.

TEACCH is probably best known for developing an intervention approach called Structured Teaching, which is widely applied in education (Mesibov & Howley, 2003; Mesibov, Shea, & Schopler, 2004). The principles of Structured Teaching include:

1. Understanding the culture of autism.
2. Developing an individualized person- and family-centered plan for each client or student, rather than using a standard curriculum.
3. Structuring the physical environment.
4. Using visual supports to make the sequence of daily activities predictable and understandable .
5. Using visual supports to make individual tasks understandable. (Source: http://www.teacch.com/whatis.html)

1.4 The Research Basis for the TEACCH approach

Although there are very few studies that show the outcomes of teacher training programs, a number of investigations studies have examined the effectiveness of TEACCH in various settings.

A recent study by Panerai et al. (2009) compared three different educational approaches: TEACCH in a residential centre, TEACCH at home and in school; and a nonspecific inclusive approach. The study confirmed the effectiveness of the TEACCH program in natural settings. In an earlier study, Panerai, Ferrante, and Zingale (2002) compared the TEACCH approach with a integration program for people with disabilities. They found that the TEACCH group improved to a greater extent that a control group when tested on the Psycho-Educational Profile-Revised and the Vineland Adaptive Behaviour Scale

Individual studies that evaluated TEACCH consistently reported significant findings for a variety of outcomes, including but not limited to fine motor and gross motor skills, cognitive performance, social adaptive functioning, and, to a lesser extent, communication (Ozonoff & Cathcart, 1998; Tsang et al, 2007; Van Bourgondien , Reichle, & Schopler, 2003; Hume & Odom, 2007; Panerai, Ferrante & Zingale, 2002).

Several studies have examined specific features of structured teaching. Hume and Odom (2007) found that when a work system was utilised, participants increased on-task behaviour, and completed more tasks or utilised more play materials. In addition, teacher prompts were reduced.

One of the few studies of teacher training programs based on structured teaching was conducted by Probst and Leppert (2008). The researchers found that there was significant improvement on the Classroom Child Behavioural Symptom Scale as well as on the corresponding Classroom Teachers' Stress Reaction Scale.

Some of the support for TEACCH is indirect. For example, TEACCH incorporates many of the elements that are considered integral to good interventions. TEACCH advocates the use of the following features which are key considerations of good practice, according to Ivannone, Dunlap, Huber, and Kinkaid. (2003):

- Supportive and structured learning environments
- Family involvement
- Early intervention
- Functional approach to problem behaviour
- Planned transitions
- Individualised support services
- Systematic planned instruction
- Intense engagement
- Developmentally appropriate practices

Another of the reasons for the popularity of TEACCH could be its relatively high social validity, or the social acceptability of goals, procedures and outcomes. Callahan, Henson and Cowan (2008) found there is extensive support for individualized programming, data collection evidence-based strategies, active collaboration and long term outcomes. These are features of TEACCH.

The preceding discussion suggests that the support for TEACCH comes from a number of sources, only one of which is empirical research. Based on an analysis of outcome studies that were considered methodologically rigorous, TEACCH has been described as "promising practice" as opposed to a "scientifically based practice" (Simpson, 2005). Many of the studies can be considered quaisi experimental because there is no random assignment of subjects to treatment groups and no monitoring of treatment implementation. The majority of the TEACCH studies are small case studies, without controls, and so further research such as the current evaluation, is warranted.

1.5 Synergies between Aspect and Division TEACCH

There are several similarities between Autism Spectrum Australia and Division TEACCH. Both began approximately 40 years ago and they are today highly influential in their respective states in matters related to autism. Aspect is increasingly engaged in researching and evaluating its own services. Division TEACCH has an established research and publication profile and pioneered many of the strategies – such as using visual supports – that are widely accepted today. There are some organisational differences in relation to education. Aspect has its own schools and provides some staff for government schools, in addition to training for parents and professionals. On the other hand, Division TEACCH has ten centres, is mandated statewide, and concentrates on training existing teachers, parents and other professionals in preference to running its own schools. These organisational synergies are mentioned by way of background information and will not be part of the current evaluation.

More germane to the current evaluation are the underlying philosophies of Aspect and Division TEACCH, which are highly compatible. A comparison of their mission statements, mentioned earlier, shows that they are closely aligned. The synergies are further apparent when examining the six principles underlying Aspects Comprehensive Educational Approach (2007a, pp 2-3).

Both organisations **embrace all autism spectrum disorders** (Aspect Principle 1) which include Autistic disorder, Asperger disorder, and Atypical autism (sometimes called Pervasive Developmental Disorder – Not Otherwise Specified [PDD-NOS]). Neither Aspect not TEACCH excludes individuals on the basis of developmental level, so their programs apply to individuals whose capacities range from profound intellectual disability through to superior intelligence and academic achievement

Aspect's Comprehensive Educational Approach and the TEACCH approach s**upport all areas of the child's development** (Aspect Principle 2). Structured teaching can be provided in any educational setting, from mainstream classes to special schools. The long term goals of the TEACCH approach include the fulfillment of fundamental human needs as well as skill development and academic achievement.

Both approaches are **based on an assessment and evaluation of the individual child's needs** (Aspect Principle 3). As noted by the TEACCH founder, Eric Schopler (1994): "the best understanding [through assessment] of each individual's learning problems and strengths is needed to identify the best individualized treatment possible." TEACCH assessment identifies emerging skills which are then targeted during intervention.

Both approaches **follow positive supportive models rather than deficit ones** (Aspect Principle 4). Division TEACCH respects the culture of autism and develops complementary learning approaches that attempt to maximise the potential positive impact of documented differences.

Both Aspect and TEACCH **cooperate and collaborate with parents, carers and professionals to meet the child's needs** (Aspect Principle 5). Schopler was one of the first to reject a deficit model of parenting over 40 years ago.

Aspect's Comprehensive Educational Approach is **based on research findings and clinical literature and may therefore be inclusive of other interventions** (Principle 6). The difference between Aspect and TEACCH in relation to this principle is more a matter of degree rather than kind. Both adopt an evidence-based approach. Division TEACCH allows for other interventions, but argues that these are measures of last resort and are usually unnecessary if TEACCH is applied properly. Differences of philosophy still exist between TEACCH and other approaches, however. For example, TEACCH is based on the notion that autism is life-long and cannot be "cured" although its presentation may change over time. Consequently, TEACCH practitioners try to accommodate the culture of autism and structure the environment so that they teach the way the person with autism learns best. This is different from behaviourist approaches, some of which attempt to cure the person and change their way of "being in the world" to resemble that of neurotypical individuals.

The observed congruence between Aspect and TEACCH, detailed above, supports the conclusion that a rigorous pilot implementation of TEACCH is compatible with Aspect's existing program. The emphasis of both approaches on evidence-based practices gives credence to an evaluation of the outcomes of the pilot.

1.6 Contribution of TEACCH to Aspect's Comprehensive Educational Approach: Focus for the evaluation

In the current evaluation, there are two major questions:

- What are the student outcomes as a result of implementing TEACCH?
- Is TEACCH being implemented as intended?

An evaluation of the outcomes of the Aspect TEACCH program must first establish program fidelity. That is, it needs to determine that Aspect staff are actually implementing TEACCH as it is meant to be implemented. Any program that deviates from the Division's recommended philosophy and practices cannot have its outcomes attributed to TEACCH.

In relation to the TEACCH philosophy, the previous section has demonstrated that there is high congruence between Aspect and TEACCH. Thus, an examination of adherence to overarching principles would help to establish whether the general TEACCH framework was being applied, but since these are compatible with Aspects Comprehensive Educational Program anyway, such an examination would not show the distinctive contribution of TEACCH. It is necessary, but not sufficient, step in the evaluation. What is needed is for the examination of Aspect staff's working principles to be complemented by a more detailed evaluation of TEACCH-in-practice. At this micro level the unique contributions of TEACCH practices that "value-add" to the existing program become apparent.

To provide a focus for the two major questions about student outcomes and program fidelity (above), six distinctive hallmarks of TEACCH practices were chosen for investigation. They are outlined below.

First, TEACCH is renowned for its careful and detailed exposition of **structure**. This includes:

(i) The physical structure of the room/setting.
(ii) The individual schedule - visual depictions of where when and what the activity will be.
(iii) The individual work system - a space where student complete tasks that have been previously mastered under adult supervision. It incorporates visual information that tells a student about participating in work or play areas. The work systems convey information about the nature of task, the amount of work to be completed, when the work is finished, and what to do next.
(iv) Routines and strategies.
(v) Visual organization - visually clear information that tells the student about the task.

TEACCH offers explicit guidelines about visual clarity, visual organisation and visual instructions to help practitioners plan how much detail to include and decide how to organise the information so that the most important details are the most salient. However the words visual supports have entered the everyday lexicon of autism practitioners worldwide and it is easy to assume there is a shared understanding when there is none. In relation to the current evaluation, the understanding and practice of Aspect staff in relation to visual structure needs to be assessed, in order to confirm that the outcomes can be attributed to TEACCH.

The second TEACCH contribution is the concept of the **"culture of autism"** as a way to respect and understand the distinctive information processing styles of people on the spectrum and to respond to their behaviour in light of this understanding. Division TEACCH practitioners use people's characteristics to advantage in programming and have amassed numerous examples of how these idiosyncracies interact with structure and predictability. Evidence in the evaluation that Aspect staff are aware of the culture of autism would help to substantiate program fidelity – that is, that they are "really" implementing TEACCH.

Third, TEACCH staff have published a number of **assessment** kits and observational scales which help teachers and other professionals to assess their students, develop interventions, and monitor progress. Staff should pay more than lip service to assessment – they should use these as a guide to understanding their students, customising the programming for each individual student, and monitoring outcomes. Furthermore, the assessments should be shared between staff, especially during transitions. The practice of Aspect staff when using TEACCH-based or other assessments should form another strand of the evaluation.

Fourth, TEACCH places a strong emphasis on **independence**. The TEACCH approach helps the person with autism to learn to visually "read" the environment (including their schedule or diary) so they no longer have to be prompted by individuals to tell them what to do. A feature of most TEACCH classrooms is the use of an independent table (or equivalent) coupled with generalisation across environments in order for students to practice skills they have learnt with minimal assistance. A TEACCH evaluation therefore needs to consider the strategies used by teachers help the student to become independent, as well as the actual level of independence that the student achieves.

Fifth, TEACCH has developed a well thought-out "hands-on" **training** package which links the various elements of its approach. Preliminary training covers five days. This would be the minimum expected for staff unfamiliar with the approach. Aspect has added a mentoring element from an expert coordinator which should form part of the evaluation, although it will not be a major focus.

Sixth, the **social validity** of the program is important. The social acceptability of goals, procedures and outcomes of TEACCH is related to whether those programs will be used. TEACCH was developed in collaboration with parents, and it is appropriate that this evaluation of TEACCH implementation in Australia solicits the stakeholder's views on the perceived worth of the intervention.

1.7 Design of the evaluation

In designing the evaluation, the following principles were incorporated (after Gresham, Beebe-Frankenberger and MacMillan, 1999). There should be:

- A wide range of behaviours and skills in the analysis, to help determine treatment effectiveness
- An outside evaluator, to help prevent bias in evaluation
- Longitudinal designs (over a year at least).
- An assessment of program fidelity

Table 1.1 Evaluation overview: questions and tools

Evaluation Questions	Evaluation Tool	Design Principles
What are the student outcomes?	Preschool Curriculum Guide (PCG) DVDs Blog Focus group Parent Questionnaire	Quantitative and qualitative
What are the effects on student independence?	PCG DVD Blog	Quantitative and qualitative
Is TEACCH being implemented as intended?	DVDs Coordinator comment Staff self evaluation	Quantitative and qualitative
Do teachers use elements of structure?	PCG DVD Staff self evaluation	Quantitative and qualitative
What is the staff attitude to the culture of autism?	Focus group DVD Blog	Quantitative
What are the teachers assessment practices?	PCG Coordinator comment	Quantitative and qualitative
What training is being implemented over time	Coordinator comment	Quantitative
What is the social validity of TEACCH?	Parent Q Focus group	Quantitative and qualitative

Further evaluation guidelines included using a mix of objective and subjective data, and using direct and indirect measures of functioning.

The design of the evaluation links the above principles with the two major questions (What are the outcomes for students? and Is program fidelity achieved?), together with the six foci discussed in the previous section, and the evaluation tools. These are depicted in the evaluation overview in Table 1.1.

The evaluation tools will be described in the next chapter which outlines the method of evaluation.

2.0 METHOD

2.1 Setting and participants

The pilot centred on two classrooms in two of the six special schools operated by Aspect. In this evaluation they are referred to as classes A, B, C, and D. Classes A and B belong to School AB, and classes C and D belong to School CD.

Students in each class are identified by their class letter followed by a number. There were 6 students in class A, for example, and they are represented as A1, A2, A3, A4, A5, A6

Teachers in each class are identified by their class letter followed by the capital letter T, and teaching assistants are identified by their class letter followed by the letters TA. In the case of more than one teacher or assistant per class, a number is added. For example, BTA2refers to the second teaching assistant who works in class B. The Aspect staff person with expertise in TEACCH who trained and monitored the teachers is identified by the letters EC (Expert Coordinator)

A total of two classrooms (A and C) from both schools catered for younger students (who turned 5 or 6 during the year of the intervention) and a total of two classrooms (B and D) from both schools contained older students (who turned 6,7, 8, 9, 10 or 11 during the year of the intervention). Most of the younger children were assessed as having a mild to moderate intellectual disability, whereas the older groups tended to have a moderate to severe intellectual disability. Classes were small, containing no more than six students, and were staffed by a teacher and a teacher's assistant.

Class A:
Class A consisted of 6 students, all of whom turned either 5 or 6 years during the TEACCH intervention year. Students attended school for 3 days during terms 1 and 2, then 4 days in term 3 then 5 days in term 4. According to the files, the students were diagnosed with Autism Spectrum Disorder (sic) Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), or Autistic Disorder. Diagnosis was made when the students were aged between one and five years. Diagnostic instruments included the Autism Diagnostic Observation Schedule (ADOS), Autism Diagnostic Interview – Revised (ADI-R), and the Diagnostic and Statistical Manual of Mental Disorders, fourth revision (DSM-IV). No details were provided as to the tests used to determine the diagnosis of three students. Four students were assessed as having at least moderate general ability, and two had a more severe intellectual disability as measured by the Wechsler Pre-School and Primary Scale of Intelligence – III (WPPSI-III) and the Griffiths Mental Development Scales.

Class A was staffed with one teacher and one aide each day. The teacher position was filled by one teacher for 4 days per week and one release teacher who had received 2 days of TEACCH training. The teacher aide position was shared between 3 TEACCH-trained aides on different days.

Class B
Class B contained four students who attained 8, 9, 10 or 11 years of age during 2008. Students attended class 5 days per week. All students had a diagnosis of Autistic Disorder, determined when they were between two and six years of age. No details were provided as to the tests used to determine the diagnosis.Students were assessed as having moderate to severe intellectual disabilities as measured by the Griffiths Mental Development Scales.

Class B was staffed with one teacher and one teacher aide. The teacher position was filled primarily by a teacher who had completed the 5-day TEACCH training; this was supplemented by a release teacher with 2 day TEACCH training who worked one day a fortnight. The teacher aide position was filled by three aides each of whom had completed the 2 day training.

Class C
There were 5 students in class C, all of whom turned 5 years of age during the year of the TEACCH trial. Students

initially attended school for 4 days, then transitioned to 5 days per week after term 1. All the students were diagnosed with "autism" (presumably Autistic Disorder). All students were diagnosed at 2, 3, or 4 years of age – that is, within two years of the TEACCH intervention for all except one student. No details were provided as to the tests used to determine the diagnosis. Most students had a mild to moderate intellectual disability as measured by the Wechsler Preschool & Primary Scale of Intelligence (WPPSI-III), the Vineland Adaptive Behavior Scales, the Griffiths Mental Development Scale (Griffiths 1996), the Gilliam Autism Rating Scale (GARS), the Adaptive Behavior Assessment System II (ABAS-II), the Child Behavior Checklist (Achenbach), and/or the Differential Ability Scales (DAS).

Staffing for Class C consisted of one teacher and one aide on class each day. The same teacher taught for 5 days, whereas the aide position was filled by two people. One aide, who completed the 2-day TEACCH training, worked 3 days per week. Another, untrained aide worked one day per week.

Class D

Class D consisted of 3 students in term 1, rising to 5 students in term 2, 2008. Students turned 6 or 7 in the year of the TEACCH intervention and attended class 5 days per week. Students were diagnosed with autism or Pervasive Developmental Disorder at between 3 and 6 years of age. No details were provided as to the tests used to determine the diagnosis. Most students had a moderate to severe intellectual disability, as measured by the Griffiths Mental Development Scale (Griffiths 1996), the Stanford-Binet Intelligence Scale (fifth edition), or the Adaptive Behavior Assessment System II (ABAS-II).

Class D was staffed with one teacher and one aide each day. The teacher position was shared between two teachers. One teacher taught 4 days, and had completed the 5-day TEACCH training. The other teacher completed 2 days of training. The teacher aide position was shared between two staff both of whom had completed the 2 day in-house TEACCH training.

2.2 The intervention

Training phase

During November 2007 the teachers who would be involved in the intervention participated in 5 days of training in which the principles of the TEACCH approach were explained by the Expert Coordinator (EC). The Expert Coordinator had previously attended workshops at the University of North Carolina run by Division TEACCH, and had subsequently been invited to act as a 5 day trainer for several weeks in July 2006, for Division TEACCH.

In 2008, the year following the 5 day Aspect training, most of the teaching assistants in the TEACCH classrooms also received 2 days of training.

Teachers were provided with follow-up mentoring and support from the Expert Coordinator in the form of face-to-face visits, emails and telephone calls.

Implementation phase

The TEACCH project was implemented in 2008. In the early stages of the year, there was a learning phase before the TEACCH program was fully implemented. Outcomes for that part of the year could not be unambiguously attributed to TEACCH, because the teachers were still learning the principles, and preparing resources. TEACCH fidelity was established by mid-year. In order to avoid contaminating the results, the pre-TEACCH data (late 2007 and early 2008) was compared primarily with data taken in the second half of 2008. The latter is referred to variously as TEACCH data or post-TEACCH data in this report.

Although it was originally intended that a control group be established, there were difficulties in finding good matches with the TEACCH student participants, and so a control group was not included in the current research.

Instead the design of the evaluation relies largely on testing over time, (but without an extended baseline), and using data from multiple sources to test the impact of the TEACCH pilot.

2.3 Measuring instruments

The following measuring instruments were used:

(i) Once each term in 2008 (one baseline and 3 follow-ups), all staff were asked to complete and submit the *TEACCH Preschool Curriculum Guide: A Curriculum Planning and Monitoring Guide for Young Children with Autism and Related Communication Disorders*

(ii) Three times in the year in 2008 (one baseline, one mid year and one final year), all staff were asked to videotape their pupils for approximately 15 minutes. The video footage will comprise interactions of the student with peers, staff and learning materials.

(iii) Throughout the year all staff were asked to keep a digital diary (blog), about significant interactions in the classroom. These were moderated by the Aspect coordinator and expert. Teaching assistants also provided handwritten blogs.

(iv) TEACCH staff participated in a teleconference/focus group for approximately an hour at the end of the project.

(v) All staff were asked to evaluate their own knowledge and application of TEACCH or general classroom strategies.

(vi) the Expert Consultant provided feedback and commentaries on the teachers skills.

(vii) Parents were invited to complete an anonymous questionnaire at the end of 2008

3.0 RESULTS

This chapter presents the results for the TEACCH Preschool Curriculum Guide, the DVDs, the Blog data, the Focus Group / Teleconference, the Staff self-evaluation, the Expert coordinator commentaries and the Parent anonymous questionnaire

3.1 Introduction: TEACCH Preschool Curriculum Guide: A Curriculum Planning and Monitoring Guide for Young Children with Autism and Related Communication Disorders

The Preschool Curriculum Guide is a comprehensive guide that assesses the child's use of elements of structure as well as cognitive readiness skills. The child's response is scored as "Fail" "Emerging" or "Pass". Subskills and examplars include:

Use of elements of Structure (3 categories)

- Individual Daily Schedule
  (For example: Child moves between classroom centres using transition object or picture independently)
- Work System
  (For example: Child independently places completed activity in 'finished' location [on right side])
- Types of Visual Instructions
  (For example: Child completes match-to-sample activities; and Child follows picture sequence/list to complete multi-step activity)

Cognitive Readiness Skills (10 categories)

- Basic Work Skills

(For example: Child attends to visual directions)

- Matching and Sorting
  (For example: Child matches/sorts items for more than 1 visual dimension [object, colour, shape, details])
- Number and Quantity Concepts
  (For example: Child places numerals in order – 1 to 5)
- Pre Reading
  (For example: Child matches letters with left to right sequence to form words)
- Expressive Communication
  (For example: Child requests a guiding adult hand to desired objects, actions, locations; and Child uses spoken words for simple interactions with others)
- Social
  (For example: Child takes turns with an adult in structured settings)
- Play Skills
  (For example: Child demonstrates functional (brief) use of toys)
- Fine Motor/Eye Hand Integration
  (For example: Child picks up small objects using pincer grip)
- Imitation
  (For example: Child imitates sounds/words with rhythmic action)
- Group Skills
  (For example: Child participates in circle-time by making choices of activities)

3.2 Analysis of the Preschool Curriculum Guide (PCG)

Data in the Preschool Curriculum Guide (PCG) were interrogated using an Analysis of Variance, Type III Tests of Fixed Effects. The statistics for these effects are depicted in Table 3.1

Table 3.1: Type III Tests of Fixed Effects(a)

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	4929.299	45996.451	.000
TIME	2	6648.815	270.344	.000
MAIN	12	4636.795	22.067	.000
TIME * MAIN	24	6532.102	10.443	.000
PERSON(TEACHER)	16	4705.104	34.358	.000
TIME * TEACHER	6	6632.890	59.093	.000

a Dependent Variable: RESPONSE.

There were three terms in the model:

TIME: a test of whether the mean (for all questions and persons) changed from the beginning of the year to the end of the year. In other words this is measuring the child's progress.
MAIN: a test of whether the mean (for all persons and times) was different for different groups and subgroups.
TIME*MEAN; or the interaction of time and mean, indicates whether the change in mean over time was the same for each of the different subskills.

Table 3.1shows that there were significant main effects in the students' responses, all beyond p = .001, for time, for Preschool Curriculum Guide category, and for teacher/classroom. Importantly, there were also significant

interactions beyond p = .001 between time and PCG category, and between time and teacher. These interactions showed that students' scores on the PCG improved over the period in which TEACCH was implemented, for the PCG categories, and for the four classrooms. In part, the highly significant results reflect the large number of items scored for each child during each school term.

Each of these effects will be discussed in turn. Before doing so, four features of the data should be noted. First, higher scores indicate a higher level of skills. Second, there was a large number of missing scores, because most of the teachers did not test students on items they believed the children would fail. Third, there were more untested items early in the year, which meant that the scores in Term 1 were overestimates. This overestimation tended to reduce the size of any improvements later in the year, and to reduce any differences between the 13 different categories of the PCG. Fourth, there were scoring inconsistencies noted, which limits interpretation of the data by other colleagues.

The time main effect showed that there was a highly significant improvement in the students' scores over the year in which TEACCH was implemented (p<.001). Each item on the PCG was scored 1 (Fail), 2 (Emerge) or 3 (Pass). When the items were not administered, the item was given a zero and not entered into the analysis. The average score on the PCG in March 2008 was 2.47; this improved to 2.69 in September 2008 so the students progressed in the direction of "Emerge" to "Pass". As mentioned above, this is a conservative estimate of the change over time, because the students were tested on fewer items early in the year.

The analysis shows that the student scores improved over time but it does not shed light on what led to this change. TEACCH is a likely candidate, but so is the fact that the students were 6 months older in September. The PCG does not provide standardised scores so it is not possible to tell whether this improvement is greater than would normally be expected over a six month period. As noted in the evaluation overview, evidence from teachers (from the focus group) and parents as to the students' previous levels of development could help establish reasons for the change.

The PCG category main effect demonstrated that students obtained different average scores on the 13 categories of the PCG. These average scores are depicted in column 2 of Table 3.2: Means and change over time for PCG categories. The differences between categories may have been underestimated due to the sizeable number of missing scores. Despite the missing data, a category main effect was obtained which illustrates that the ability profile of students with autism is an uneven one, a finding consistent with the literature.

As described earlier, there are two main dimensions within the PCG. One is called Use of elements of structure (which subsumes 3 categories that tap skills that are important when implementing TEACCH) and the other is called Cognitive Readiness Skills (which subsumes 10 categories that tap other skills). Inspection of Table 3.2 shows a comparatively low mean for category 3 (Types of visual instructions), which forms one of the three TEACCH-related categories. Category 3 measures the children's ability to complete various types of visual instructions including match-to-sample activities, self- contained manipulative tasks, left-to-right container organisation, inset jigs, picture jigs, picture sequences, product samples, picture dictionaries and simple written instructions. The relatively low mean for Category 3 suggests that the students might benefit from greater exposure to these different types of visual instructions in order to fully benefit from the TEACCH program. However it says little about the overall impact of the TEACCH program. For that analysis, change over time is required, as discussed in the next paragraph.

The significant interaction between the PCG category and time showed that almost all the PCG categories improved over the duration of the TEACCH program. With the exception of the final category (group skills), which remained the same, the students' scores in each category improved significantly over time. The group skills result may have reflected ceiling effects, as the Term 1 mean was the highest of all the category means, and so there was little room for improvement over the year. The greatest changes occurred in the students' ability to use two of the three TEACCH-related categories. That is, they improved most in their ability to (a) use the work system and (b) use the individual daily schedule. The third TEACCH-related category (Types of Visual Instructions) was ranked sixth in terms of the improvement over time. The generally high improvements in the TEACCH-related categories is a positive indicator of TEACCH effectiveness. The relatively high improvements in the TEACCH domain also supports the case for program fidelity – i.e. the conclusion that teachers were implementing TEACCH appropriately.

Table 3.2: Means and change over time for PCG categories

Category	Mean	Change over time	Significance
Use of elements of Structure			
1 Individual Daily Schedule	2.723	.363	P<.001
2 Work System	2.602	.484	P<.001
3 Types of Visual Instructions	2.331	.194	P<.001
Cognitive Readiness Skills			
4 Basic Work Skills	2.632	.252	P<.001
5 Matching and Sorting	2.632	.161	P<.001
6 Number and Quantity Concepts	2.512	.348	P<.001
7 Pre Reading	2.221	.340	P<.001
8 Expressive Communication	2.694	.078	P =.001
9 Social	2.563	.127	P<.001
10 Play Skills	2.745	.115	P<.001
11 Fine Motor/Eye Hand Integration	2.702	.142	P<.001
12 Imitation	2.730	.158	P<.001
13 Group Skills	2.764	.075	NS

The teacher (classroom) main effect demonstrated that the average student scores on the PCG differed between teachers (or classrooms). The means are presented in Table 3.3. Little can be made of the difference in average PCG scores between classrooms. Most probably it represented a combination of teacher and child factors. That is, teachers may have varied in the emphasis they placed on the skills taught by the PCG. In addition, the children in each class were of different average ages and abilities which would have affected the PCG score irrespective of their teaching environment.

Table 3.3: Means and change over time for different classrooms

Class	Mean	Change over time	Significance
A	2.913	.06	P<.01
B	2.433	.13	P<.001
C	2.304	.29	P<.001
D	2.669	.41	P<.001

The significant interaction between time and teacher (classroom) showed that students' PCG scores in every classroom improved over the duration of the TEACCH intervention. Students in three of the four classrooms improved to a highly significant extent (greater than p=.001). Students in the fourth classroom also improved significantly (P<.01), a result which may have reflected ceiling effects. That is, the teacher recorded relatively few failures and a relatively large number of blank scores at the beginning of the year so the initial scores of the students in March averaged 2.88 (almost all passes) which left little room for improvement later in the year.

3.3 Interpretation of results

This pattern of results is encouraging however interpretation of the data must be made with caution. The improvements over the year may be attributable to TEACCH, but they could also indicate factors such as chronological age. Thus, it is possible that the higher scores over time reflected the fact that the children were older at the end of the year, and had developed more skills independent of TEACCH. Alternatively, the results could also be a sign of teacher bias. The PCG was scored by the same teachers who implemented the TEACCH program, and not by an independent scorer who did not know whether or not the students had been exposed to TEACCH. Therefore the interpretation cannot be ruled out that teachers may have unintentionally given higher scores later in the year because they expected to see improvements in their students.

The use of a control group or comparison group would have helped to reduce the ambiguity in data interpretation. However in this evaluation a control group was not employed due to time and resource limitations in addition to the difficulty of finding a group that could be matched on relevant variables (including age, general ability and diagnosis). However may be still possible to take measures on a non-TEACCH group in the future, and compare with current results .

To summarise this section:

1. The students improved significantly over the year on the skills measured by the PCG.
2. This improvement occurred irrespective of which classroom or teacher the students were involved with.
3. This improvement was evident in all the skill categories measured by the PCG with the exception of group skills, which may have reflected ceiling effects.
4. The relatively high improvement in the skills directly linked to structured teaching supports the view that the teachers were implementing the TEACCH program as intended.
5. The improvement over time in the skills measured by the PCG is consistent with the interpretation that the TEACCH program contributed to this effect. However the improvement cannot be unambiguously attributed to the TEACCH program because there was no control group. It may have also reflected other influences including teacher expectation of improvement, or the students increase in chronological age.

3.4 DVDs

3.4.1 Purpose of the DVD analysis

The DVDs were used for two purposes. The first purpose was to determine whether progress was apparent in the students' skills and behaviour. The second purpose was to determine whether the teachers were actually using TEACCH. That is, it was used as a measure of program fidelity.

The **DVD student outcomes analysis** focuses on what the **student** is doing. This analysis is concerned with questions such as: "Is the student engaged?" "Do they successfully complete their work?" and "Can they do so without assistance from the teacher?"

The **DVD fidelity analysis** on the other hand places the spotlight on the **teachers'** actions. It ascertains whether the staff were in fact, implementing structured teaching according to the principles advocated by Division TEACCH. This analysis notes whether tasks, work systems and other environmental supports are structured, motivating and at the appropriate cognitive level so that the child can recognise relevant information, predict events, and become engaged. In order to determine TEACCH fidelity, the UC TEACCH Fidelity Proforma (Appendix 1) was used. Scoring in the proforma is based on opportunity to demonstrate any of the characteristics in the proforma. For example, if the video shows the child working on their own at the independent table, there would be no opportunity to demonstrate

joint attention or social interaction, so these would not be scored. This limitation needs to be borne in mind when discussing the results.

When analysing the Aspect TEACCH data, some adherence to TEACCH principles would be expected in the initial stages, because TEACCH principles underpin some of Aspect's teaching philosophy. However there should be even greater fidelity after the TEACCH training and over time, in line with the effect of ongoing mentoring. Fidelity is not the only condition, but it is necessary to make a case that TEACCH has positive outcomes for students.

3.4.1 DVD Scoring protocols

In order to determine student outcomes and program fidelity, ten DVDs were analysed from School AB, and nine videos were analysed from School CD. The students from School AB were filmed during individual instruction, independent work and small group work, both inside and outside the classroom. Activities included writing and other academic activities as well as art, music, drama, and self help activities. The students from School CD were filmed during group activities such as drawing, singing, morning welcome, cooking, name building, daily diaries, and Bingo. Data was also taken during independent work and table work including writing, tracing, cutting, numbers, and colouring.

In both schools, the teachers took some time to settle in to the TEACCH program, and so the students were not filmed until mid year.

School AB provided ten clips for analysis. Six were categorised as "pre TEACCH" and four as "TEACCH". The six pre-TEACCH clips consisted of four clips in classrooms A and B, and two probe clips. One probe clip consisted of exposing a student in a TEACCH classroom to a non-TEACCH environment, and the other probe consisted of filming a comparison group of non-TEACCH students in a non-TEACCH classroom. School CD provided nine clips – three pre-TEACCH clips and two TEACCH clips taken in terms 3 and 4.

The DVDs were scored by a research assistant who was unfamiliar with the participants and was not informed of the status of the clips (pre-TEACCH or TEACCH).

3.5 Results – DVD analysis

The outcome and fidelity data were analysed both quantitatively and qualitatively along 17 dimensions. Quantitative data were extracted for five variables: on-task engagement, independence (defined by the number of prompts), social interactions, joint attention, and requesting.

The quantitative data were analysed at school level rather than classroom level for two reasons. In the first instance, the DVDs often depicted students from both classrooms within their respective schools. In fact it was almost impossible to avoid mixing students from both classrooms in School CD, because classes C and D used a shared space while they waited for two new classrooms to be constructed. This generated a second reason to analyse the numerical data along school lines. The relatively cramped quarters of classes C and D made it more difficult to structure the physical environment unambiguously for the children. For example, several different activities took place in a single space.

Students were filmed on three occasions: Time 1 (T1), before TEACCH was fully implemented, and two occasions (T2 in term 3 and T3 in term 4) when TEACCH was being implemented by all four teachers and their assistants.

Student outcome data

3.6. On-task engagement

Students were depicted in various activities on the DVDs and not every activity required a student to be on task. Therefore, "On task engagement" was scored relative to opportunity, or when the student was expected to focus on the task at hand for at least 3 minutes. This yielded data taken from DVD excerpts that ranged from a minimum of 3 minutes to a maximum of 19 minutes. At the end of each minute of work time, a probe was taken to determine whether the student was on task. Because the DVD excerpts were of unequal length, engagement was expressed as a percentage of total time in order to facilitate comparisons across different work times. This statistic was determined by summing the times the student was observed to be on task, dividing by the total number of probe observations, and multiplying by 100.

For School AB, the average engagement for the pre-TEACCH sessions was 52%, versus 100% for the combined TEACCH sessions. For school CD, the average engagement for the pre-TEACCH sessions was 75%, versus 84% for the combined TEACCH sessions. When the schools are combined, the average level of engagement rose from 60% to 91%. This establishes that the change is in the expected direction

In order to determine whether these changes were significant the data were subjected to a Univariate Analysis of Variance. This is depicted in Table 3.3: Overall Engagement.

Table 3.3: Overall Engagement

Tests of Between-Subjects Effects

Dependent Variable: % on task

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.508[a]	5	.102	1.461	.268
Intercept	12.616	1	12.616	181.360	.000
Class	1.15E-005	1	1.15E-005	.000	.990
Time	.367	2	.184	2.639	.109
Class * Time	.057	2	.028	.406	.674
Error	.904	13	.070		
Total	14.090	19			
Corrected Total	1.413	18			

a. R Squared = .360 (Adjusted R Squared = .114)

The analysis showed that there were no significant effects. There were no differences in class means or time means, and classes behaved the same over time. In other words the analysis revealed:

- The average level of student engagement did not differ significantly between the two schools.
- The increase in student engagement over the period in which TEACCH was implemented failed to reach significance (p = 109)
- The students in the two schools did not differ significantly in the degree to which their engagement changed over time.

To further explore the change over time, the data from the middle of the intervention was eliminated and the pre-TEACCH engagement data was compared with data at the end of the year. As depicted in Table 3.4 Engagement at beginning and end of intervention, pairwise comparisons between engagement scores at time 1 (pre-TEACCH) and time 3 (Term 4) also just failed to reach significance (p = .056).

Table 3.4 Engagement at beginning and end of intervention

Pairwise Comparisons

Dependent Variable: % on task

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	-.253	.152	.121	-.581	.076
	3	-.319	.152	.056	-.648	.010
2	1	.253	.152	.121	-.076	.581
	3	-.067	.170	.702	-.434	.301
3	1	.319	.152	.056	-.010	.648
	2	.067	.170	.702	-.301	.434

Based on estimated marginal means

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

That is, Table 3.4 shows that:

- engagement did not increase significantly when the pre-TEACCH data was compared with the final data collected in Term 4.

Finally, an analysis was performed on the student engagement scores in each school to determine whether there was a significant effect over time. This analysis is depicted in Table 3.5 Change in engagement for each school.

The pairwise comparisons in Table 3.5 reveal that:

- There is no significant improvement in student engagement between the beginning and end of the intervention for School 1 (p = .095)
- There is no significant improvement between the beginning and end of the intervention for School 2 (p = .267)

Despite the relatively large difference in the overall means for engagement, the data was highly variable. This data variability entailed that significant effects beyond p = .05 were not observed.

The quantitative analysis was supplemented by a qualitative analysis which noted emotional and behavioural aspects of engagement. For example the DVDs for school 1 showed a remarkable positive change in the quality of student engagement (e.g. clip 7). One student even chose to work in her free time (clip 8) rather than to go outside - which had been her previously preferred behaviour. At other points the engagement was more subdued. Thus, engagement variability was evident in both the qualitative and quantitative analysis.

Table 3.5 Change in engagement for each school

Pairwise Comparisons

Dependent Variable: % on task

Class	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
2	1	2	-.117	.215	.597	-.582	.349
		3	-.250	.215	.267	-.715	.215
	2	1	.117	.215	.597	-.349	.582
		3	-.133	.215	.547	-.599	.332
	3	1	.250	.215	.267	-.215	.715
		2	.133	.215	.547	-.332	.599
1	1	2	-.388	.215	.095	-.854	.077
		3	-.388	.215	.095	-.854	.077
	2	1	.388	.215	.095	-.077	.854
		3	1.29E-015	.264	1.000	-.570	.570
	3	1	.388	.215	.095	-.077	.854
		2	-1.29E-015	.264	1.000	-.570	.570

Based on estimated marginal means

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

3.7. Student Independence

Student independence was defined as the average number of prompts per second. It was calculated by dividing the number of observed prompts by the observation period in seconds. Four categories of prompts were scored: verbal, physical, gestural and visual.

In order to determine whether independence increased (ie the level of prompting decreased) separate analyses were performed on the four different types of prompt.

3.7.1 Verbal prompts

Verbal prompts (Prompt Vb) were subjected to a Univariate Analysis of Variance. The analysis is depicted in Table 3.6 Verbal Prompts.

Table 3.6 Verbal Prompts

Tests of Between-Subjects Effects

Dependent Variable: Prompt Vb

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.062[a]	5	.012	9.050	.001
Intercept	.049	1	.049	35.573	.000
Class	.003	1	.003	2.330	.151
Time	.028	2	.014	10.085	.002
Class * Time	.012	2	.006	4.364	.035
Error	.018	13	.001		
Total	.181	19			
Corrected Total	.080	18			

a. R Squared = .777 (Adjusted R Squared = .691)

There was a significant main effect for time, and an interaction between class and time. That is:

- The average frequency of verbal prompts did not differ significantly between the two schools.
- There was a highly significant decrease in verbal prompting over the period in which TEACCH was implemented (p < 005)
- The two schools differed significantly in the degree to which verbal prompting decreased over time (p<.05).

To explore the differences between the two schools, pairwise comparisons were conducted, as shown in Table 3.7 Verbal Prompts According to School, and **Figure 3.1: Means for verbal prompts showing changes over time for two schools**

The analysis revealed that prompts in School 1 decreased over time. This occurred when pre-TEACCH prompting was compared with prompts in Term 3 or prompts in Term 4. As expected, there were no significant differences in the frequency prompting between Terms 3 and 4, when TEACCH was being fully implemented.

It was found that there was no significant effect for School 2, whether pre-TEACCH prompting was compared with prompt frequency in Term 3 or Term 4.

Table 3.7 Verbal Prompts According to School

Pairwise Comparisons

Dependent Variable: Prompt Vb

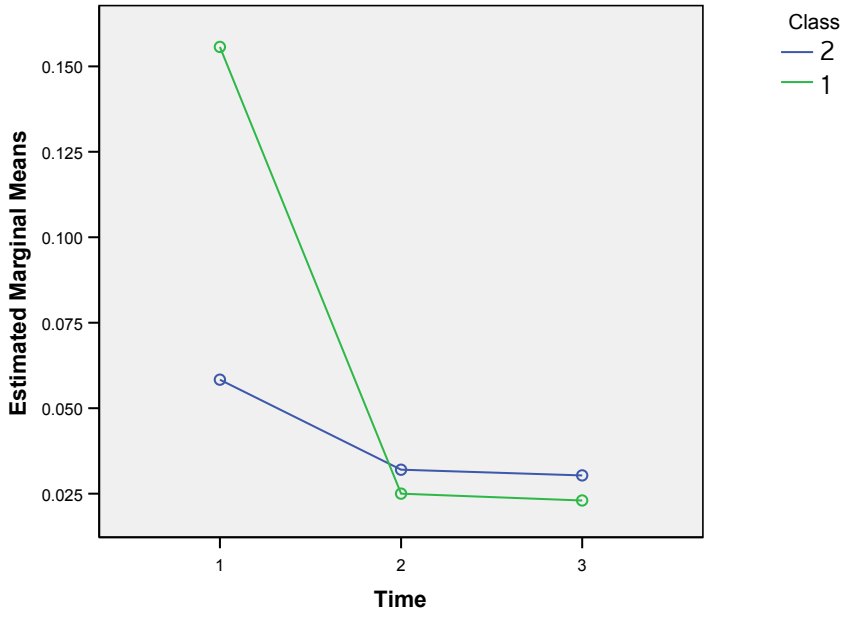
Class	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
2	1	2	.026	.030	.399	-.039	.091
		3	.028	.030	.370	-.037	.093
	2	1	-.026	.030	.399	-.091	.039
		3	.002	.030	.957	-.063	.067
	3	1	-.028	.030	.370	-.093	.037
		2	-.002	.030	.957	-.067	.063
1	1	2	.131*	.030	.001	.066	.196
		3	.133*	.030	.001	.068	.198
	2	1	-.131*	.030	.001	-.196	-.066
		3	.002	.037	.958	-.078	.082
	3	1	-.133*	.030	.001	-.198	-.068
		2	-.002	.037	.958	-.082	.078

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Estimated Marginal Means of Prompt Vb



3.7.2 Physical prompts

Physical Prompts (Prompt P) were subjected to a Univariate Analysis of Variance. The analysis is depicted in Table 3.8: Physical Prompts.

Table 3.8 Physical Prompts.

Tests of Between-Subjects Effects

Dependent Variable: Prompt P

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.004[a]	5	.001	1.482	.261
Intercept	.012	1	.012	22.994	.000
Class	.000	1	.000	.254	.623
Time	.002	2	.001	2.366	.133
Class * Time	.000	2	.000	.321	.731
Error	.007	13	.001		
Total	.029	19			
Corrected Total	.011	18			

a. R Squared = .363 (Adjusted R Squared = .118)

There were no main effects for school and time, and no interactions. That is:

- The average frequency of physical prompts did not differ significantly between the two schools.
- The change in student physical prompting over the period in which TEACCH was implemented failed to reach significance (p = 133)
- The two schools did not differ significantly in the degree to which student prompting changed over time.

3.7.3 Gestural prompts

Gestural prompts (Prompt G) were subjected to a Univariate Analysis of Variance. The analysis is depicted in Table 3.9 Gestural Prompts.

As Table 3.9 illustrates, there were no main effects for school and time, and no interactions. That is:

- The average frequency of gestural prompts did not differ significantly between the two schools.
- The change in student gestural prompting over the period in which TEACCH was implemented failed to reach significance (p = 220)
- The two schools did not differ significantly in the degree to which gestural prompting changed over time.

Table 3.9 Gestural Prompts

Tests of Between-Subjects Effects

Dependent Variable: Prompt G

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.015[a]	5	.003	1.763	.190
Intercept	.012	1	.012	7.333	.018
Class	.000	1	.000	.144	.711
Time	.006	2	.003	1.702	.220
Class * Time	.005	2	.002	1.435	.274
Error	.022	13	.002		
Total	.064	19			
Corrected Total	.037	18			

a. R Squared = .404 (Adjusted R Squared = .175)

3.7.4 Visual Prompts

Visual prompts (Prompt Vs) were subjected to a Univariate Analysis of Variance. The analysis is depicted in Table 3.10 Visual Prompts.

Table 3.10 Visual Prompts

Tests of Between-Subjects Effects

Dependent Variable: Prompt Vs

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.001[a]	5	.000	.440	.813
Intercept	.005	1	.005	12.141	.004
Class	.000	1	.000	.690	.421
Time	.000	2	.000	.282	.759
Class * Time	.001	2	.000	.641	.542
Error	.006	13	.000		
Total	.014	19			
Corrected Total	.007	18			

a. R Squared = .145 (Adjusted R Squared = -.184)

There were no main effects for school and time, and no interactions. That is:

- The average frequency of visual prompts did not differ significantly between the two schools.
- The change in visual prompting over the period in which TEACCH was implemented failed to reach significance (p = 282).
- The two schools did not differ significantly in the degree to which visual prompting changed over time.

The quantitative analysis of independence was supplemented by a qualitative analysis. Again, the DVDs for school 1 showed a dramatic and positive increase in the students' demeanour as the completed their work independently. This was evident both for table work and group work (e.g. clip 7).

3.8. Social (i.e. non-task) interaction

The students' attempts to initiate and respond to social interactions were scored throughout the tapes. However the students' responses were low and no significant differences were observed between the two schools or between the non-TEACCH or TEACCH time periods.

3.9. Joint attention

The students' joint attention behaviours were observed. Joint attention was scored as either I (initiate), IP (initiate by pointing) or R (respond). The initiation data excluded bids for attention by eye contact because this was too difficult to score reliably from the DVD. Similar to the social interaction, the students' joint attention behaviours were observed rarely and no significant differences emerged over time and there were no differences between the two schools.

3.10. Requesting

No significant differences were observed over time in the students' requesting behaviour. This included both initiating requests and responding to requests made by other people in close proximity to the student.

3.11 Summary of DVD quantitative analysis

Student engagement

- *The average level of student engagement did not differ significantly between the two schools.*
- *The increase in student engagement over the period in which TEACCH was implemented failed to reach significance (p = 109)*
- *The students in the two schools did not differ significantly in the degree to which their engagement changed over time.*
- *Engagement did not increase significantly when the pre-TEACCH data was compared with the final data collected in Term 4.*

Student independence: Verbal prompts

- *The average frequency of verbal prompts did not differ significantly between the two schools.*
- *There was a highly significant decrease in verbal prompting over the period in which TEACCH was implemented (p < 005)*
- *The two schools differed significantly in the degree to which verbal prompting decreased over time (p<.05).*

Student independence: physical prompts, gestural prompts, and visual prompts

- *There were no significant effects for school, and no significant changes over time. Effects did not differ between schools*

There were no significant effects over time for social (non-task) interaction, for joint attention or for requesting

Comment

The interpretation of the DVD quantitative analysis is that student independence increased following the implementation of TEACCH. Student engagement increased, but not to a significant level. Thus TEACCH was associated with a limited number of positive outcomes on the DVD.

Increased student independence (and a corresponding reduction in Teacher prompts) provides indirect evidence of TEACCH fidelity, because if the teachers implemented structure along appropriate TEACCH lines, then the students should required fewer verbal prompts.

Further evidence about whether the teachers were implementing structured teaching appropriately comes from a qualitative analysis of the videotapes to determine the extent to which teachers adhered to 12 further fundamental TEACCH principles. Each principle was analysed according to the school and the time of the videotape (pre TEACCH or post TEACCH). The findings are outlined below under the 12 headings.

3.12 Qualitative analysis of the DVDs

3.12.1 Functional communication systems

TEACCH requires that communication systems be useful and at the child's level.

School 1 Pre-TEACCH

Each pre TEACCH DVD clip showed that each child had a functional system of communication, either via gestures, photos, writing, Compic/Boardmaker, or speech.

School 1 post-TEACCH

Analysis of the four post TEACCH DVDs revealed that each child had a functional system of communication, including gestures, photos, writing, Compic/Boardmaker, speech or pictures.

School 2 Pre-TEACCH

Each pre TEACCH DVD indicated that students had at least some functional communication in place. Only one clip showed 6 types of communication (gestures, photos, writing, Compic/Boardmaker, speech or pictures); the two remaining clips lacked one and two of these respectively.

School 2 post-TEACCH

One clip showed 6 types of communication; the remaining clips revealed that 5 types of communication systems were in place.

3.12.2 Task structure

In TEACCH classrooms, the tasks are structured and individualised so that each child can recognise relevant information.

School 1 Pre-TEACCH

Task appeared to be minimally structured. It was observed on occasions that there were no finish boxes; that tasks in boxes were jumbled or disorganised; and that work was handed to the student without reference to a schedule or work system. Students had to flick through numerous pages before reaching the relevant work page. Some students had small single visual cards.

School 1 post-TEACCH

Activities and finish boxes were observed in the group area. There was a song choice board, and children's individual capabilities were catered for. For example a large photo was used for one child and smaller name tags with photos for others. Students were observed to have a variety of tasks – including folders, shoe box and tray tasks. Tasks were completed independently. Staff and students were seen to refer to the visuals during activities such as cooking. Tasks were stabilised and organised using snap-lock bags and other devices.

School 2 Pre-TEACCH

Students did not always have a copy of required information. For example during a cooking activity only the staff member could access the recipe. In another classroom, the worksheets were piled on the table, so students were confused about which sheets they had finished and which worksheet they were required to do. It was up to the adults to place the worksheets in the child's locker. During a group task the materials were in a pile on the floor at the teacher's feet.

School 2 post-TEACCH

During group time, student photos were placed on chairs. Other visuals indicated days of the week, song choice, and who was present. Work and finish boxes were at work stations; students had diaries with their picture pasted on the cover; staff had visuals on lanyards; and tasks were broken down into steps. Occasionally the same task was recycled through different children.

3.12.3 Visual environmental supports

The TEACCH program advocates that environmental supports should be available to facilitate the child's ability to predict events, activities & change.

School 1 Pre-TEACCH

Visual schedules were evident in various places within the classroom, but they were not always used by staff and students. Other teachers were observed with small visuals on a ring but were not seen to use them with the students. Staff tended to hover over the students and direct them, rather than relying on visual supports. Visual work systems were not observed on desks.

School 1 post-TEACCH

Visual cue cards were employed, as well as individual schedules with posting pockets. A large whole-class daily schedule was posted in the group time area, and individual schedules were tailored to each child. Student name tags included a photo of each student.

School 2 Pre-TEACCH

A finish box and visuals were in the background but not used consistently.

School 2 post-TEACCH

Finish boxes were observed (although not consistently used). "Check timetable" cards; a turn-taking dial; and folders with pens attached helped older students to check off their tasks. Individual work schedules were observed at some but not all desks. Timetable formats were individualised.

3.12.4 Physical environmental supports

According to TEACCH, the physical environment should be structured to inform the students about expected behaviour. For example, work spaces should be separated from play and leisure spaces, and screens can reduce distractions

School 1 Pre-TEACCH

There was little evidence of attempts to reduce distractions through the use of bookcases or screens, or by rearranging the desks so that students could face the wall during work times. Some work areas were open and used by everyone. Children sitting at desks in the middle of the classroom appeared quite cramped. Some desks were grouped together during work periods.

School 1 post-TEACCH

Schools were clustered around a common bench in the kitchen, and pigeon holes for work were clearly labelled with visuals. Task cards were placed at the large group table. Adults were more in the background than in the pre-TEACCH video. Desks were rearranged to make individual work stations.

School 2 Pre-TEACCH

The classroom appeared cluttered, with six children and two adults around two joined tables. More room for group work would assist.

School 2 post-TEACCH

The shared classroom was still cluttered. Children were working at the one table, with no room for the work boxes which were on chairs beside them. Some tables appeared too small for particular students. The aide was in close proximity to a student who appears capable of independent work.

3.12.5 Generalisation

TEACCH advocates that learned skills be practised in new and/or different environments, in order to promote generalisation.

School 1 Pre-TEACCH

Generalisation practice was not observed or recognised as such because the DVD scorer was not aware of which skills had recently been taught.

School 1 post-TEACCH
Several instances of generalisation were observed.
School 2 Pre-TEACCH
Generalisation of learned skills was not apparent to the observer.
School 2 post-TEACCH
Efforts to promote generalisation were not observed during the clips.

3.12.6 Materials and furniture are age-appropriate

Furniture should be at an appropriate height for the student, and activities and materials should be suitable for the students' chronological age.

School 1 Pre-TEACCH
The furniture appeared age appropriate on most occasions although one student seemed to have a small desk. In addition at least one of the older students was observed to be colouring in a young child's book character.
School 1 post-TEACCH
One finish box consisted of a drawer that is pulled open. Tasks are individualised. However one student flicked through his tasks very quickly, suggesting the tasks were not appropriate
School 2 Pre-TEACCH
Furniture appeared age appropriate but the work materials may have been difficult for some children because the aide appeared to be doing most of the students' work.
School 2 post-TEACCH
Apart from some undersized chairs the furniture appeared to be age-appropriate. Some of the recycled tasks appeared to be too easy for some students although this was an infrequent finding.

3.12.7 Work systems

In a TEACCH classroom the work system should be organised to be consistent with reading practices (Left-to-Right or Top-to-Bottom in most western countries). Staff should also tell the student what work they need to do, how much work, how they will know when they are finished, and what comes next

School 1 Pre-TEACCH
Only one 1 DVD clip was observed to give all the required information. In the remaining clips, one, two or three characteristics of the work system was not observed.
School 1 post-TEACCH
Work systems in all clips were organised left to right and/or top to bottom. The work systems indicated what work was required, how much work was expected, how students knew when they were finished, and what would come next.
School 2 Pre-TEACCH
Some work systems were noted in the background but were not used during the clip. Other work systems gave partial information (work from top to bottom; what to do when finished).
School 2 post-TEACCH
In five of the DVD clips, at least five different features of work systems were observed. In the remaining clip, four systems were observed.

3.12.8 Communication – directive and encouraging

The TEACCH approach advocates that directive communication toward/with child is clear & relevant. Communication towards and with the child should encourage dialogue when appropriate

School 1 Pre-TEACCH
Directive communication was appropriate in the four out of the six clips, although some unnecessary directions

were observed in the remaining two clips. Some staff talked loudly and for lengthy periods which did not necessarily promote communication.

School 1 post-TEACCH

All clips provided instances of clear direct communication, and encouraged dialogue.

School 2 Pre-TEACCH

Some feedback was non-specific (e.g. "good boy" – for doing what?)

School 2 post-TEACCH

Most communication was clear and relevant although occasionally negative language was heard (e.g. "No" "Stop it" –in cross tones). Some superfluous prompting and directives were noted despite adequate visual instructions.

3.12.9 Tasks are at appropriate difficulty level

TEACCH advocates that tasks promote high rates of successful performance.

School 1 Pre-TEACCH

There were low rates of independent work observed. Finish boxes were not seen on or near the work desk, and the work was often handed out by the staff or the staff stepped in relatively quickly to help the child.

School 1 post-TEACCH

Students enjoyed the song choice board. Some shoe box tasks were extremely successful. Most tasks were clear, well prepared and accompanied by simple instructions. However more organisation and structure were required for some students.

School 2 Pre-TEACCH

Some group activities were relatively lengthy and children's interest seemed to flag. Some tasks were presented all at once, so there were sheets of paper all over the work table. Staff completed subtasks for students without structuring for independence (e.g. staff handed pencils/textas to students; measured ingredients; opened jars).

School 2 post-TEACCH

Tasks mostly promoted successful performance. However some group activities took a long time to complete and students' engagement waned. In one clip (clip 15), task materials (glue sticks) were not ready, and staff continued to complete subtasks (e.g. winding glue sticks for capable children). Before BINGO, students were not reminded of the rules of the game. Other tasks were well organised e.g. song choices.

3.12.10 Child's strengths & interests are used to maintain consistently positive behaviour

TEACCH maintains that appropriately structured tasks are rewarding in themselves for the child

School 1 Pre-TEACCH

Staff appeared to use motivating materials including dinosaurs, high fives, swings, stickers and toys. Students were allowed to choose certain activities. Motivating materials were sometimes used as a reward after the activity, rather than incorporating the motivator in the activity.

Two DVD clips showed escalating behaviour by one student. In one of the clips the student was deliberately put in a new classroom which lacked structure. The student reacted badly and began hair pulling, throwing objects, shouting and leaving the room.

School 1 post-TEACCH

Cars, rice shakers, and pillows in quiet area were seen to maintain interest and engagement.

School 2 Pre-TEACCH

Utilisation of strengths and interests was not apparent to the observer.

School 2 post-TEACCH

Utilisation of strengths and interests was not apparent to the observer.

3.12.11 Tasks use a variety of instructional formats

TEACCH maintains that instruction should be varied to expose the child to different systems and help to promote generalisation.

School 1 Pre-TEACCH
One to one individualised instruction was the most common form of instruction, followed by whole group and small group.
School 1 post-TEACCH
Whole group, independent work, individual instruction, and work stations were observed.
School 2 Pre-TEACCH
Whole group, sometimes with 1:1 assistance was observed.
School 2 post-TEACCH
Whole group; small group; working alone were observed – all with 1:1 with assistance as required.

3.12.12 Transitions between tasks are clear and prompt

Transitions and change should be structured so the child knows what to expect.

School 1 Pre-TEACCH
Transitions were generally clear and prompt although not all students responded well to transitions.
School 1 post-TEACCH
Transitions were generally clear and prompt.
School 2 Pre-TEACCH
Transitions were generally clear and prompt but were filmed in only 33% of the DVDs.
School 2 post-TEACCH
All transition (observed in 5/6 DVDs) were clear and prompt.

3.13 Summary and comment

The overall differences between Pre-TEACCH and TEACCH observations suggests that:

- TEACCH practices were being employed by the teachers by Term 3
- There were individual differences in student outcomes
- The teachers use of task structure improved over time
- Visual environmental supports improved over time
- A crowded classroom presents challenges for physically restructuring the environment
- Verbal communication was mixed

In order to highlight the influence of structure, probe testing was conducted. For example, one older student, whose behaviour was challenging at times, was filmed in one classroom where TEACCH practices were established, and then filmed in a different classroom without the support of TEACCH structure (clip 4). The DVD showed a dramatic decline in her compliance, demeanour and general behaviour when the TEACCH structure was removed. When structure was removed, this student's behaviour escalated to the point where she had to be removed from the classroom

Comment

The videotapes/DVDs supported the conclusion that TEACCH principles were being used by the staff, so the TEACCH program should be used as a possible explanation for changes in the students behaviour over the year. (Without a

control, other possibilities, such as increasing age, cannot be ruled out, however.)

Students easily become prompt dependent, so it is important to provide as few prompts as possible, and to withdraw these at the earliest opportunity. It appears that some teachers may not have been clear as to whether they were talking to the student:

- in order to prompt them to begin or persevere with the task (prompt dependence is an issue here); or
- in order to engage in a social conversation with the student (rather than prompting them to complete the task).

3.14 Blog data

A blogsite was established for teachers to share their experiences and this was launched in July, 2008.

The teachers' blogs were subjected to a content analysis where each paragraph was coded according to the following criteria:

- Positive comments about TEACCH
- Negative comments about TEACCH,
- "Take 2" Analysis of how TEACCH had failed to achieve a specified goal and what needed to be done to improve TEACCH implementation. Appreciation of the culture of autism
- Examples of using TEACCH
- References to student independence
- References to time to prepare for TEACCH
- Issues arising from implementing TEACCH

Results are presented overleaf in Table 3.11: Blog content analysis:

Table 3.11: Blog content analysis

Blog Element	Description	Frequency
Positive	"To my surprise it worked. The children knew exactly what to do, the teachers just watched as the class worked. TEACCH is fantastic!!"	44
Negative	"I know that new resources will have to be made and I don't know how motivated I will be"	1
Examples	"After completing the task at the table they then get up and put it in the finish box next to the shelf. They then get their next task and return to the table. At the moment the students are completing three tasks in a row independently using this system and are enjoying doing so."	23
Revision of activity	What did I learn? –Next time] have the materials organized into smaller containers within their "working box.'" In order of when to start eg coloured pencils, scissors, glue and then a finish sign"	1
Student Outcomes	Independence	16
	Tantrums (or lack of)	5
	Successful transitions and changes	7

Blog Element	Description	Frequency
Issues	**Time=**"I feel I do not have enough spare time to be making [shoebox tasks] every couple of weeks	5
	Space ="The difficulty we have is the place to put [timetable folders] as we are so restricted with space and whenever we leave anything out the classes children like to touch things."	3
	Parent knowledge about TEACCH "I don't think my parent really understand how TEACCH works so it would be very beneficial for them to see TEACCH in action"	3
	TEACCH suitability for HFA "I'm still not convinced that TEACH is the best model for students with high functioning Autism or Asperger's Syndrome (though that may just be because of my inexperience). Some elements of TEACCH are definitely very useful, but I think a true TEACCH model would not be as effective as the comprehensive education approach Aspect is already using at the moment."	1
	Informing colleagues about TEACCH "It was an eye opener to see how even this one part of TEACCH was so amazing for those that do not know TEACCH to see. Realising this made me think that I should be reporting back to my own colleagues more regularly about how TEACCH is going in my room"	1
	Transitioning to non-TEACCH classroom "What happens next year ... [when] ... our TEACCH students transition our of a TEACCH class into a non-TEACCH class?"	1
	Individualising work "How can I incorporate this particular strategy with another student?"	1
	Communication "[Communication] is covered in the one on one sessions and group but as a teacher once the students become accustomed and competent with the system, we stand back and let the environment and equipment (timetable and schedules) do the talking. There is a lack of verbal direction as we just say "check time" and we don't even need a verbal reply from the students. They just get up and move to the appointed tasks. They work through their work tasks removing or marking off the visuals. Once finished place them in the finish box. Once all is completed they pack away and move to "check time" and then the next task. This can all occur without a word being spoken. So we need to make a definite time for interactive communication..."	

3.15 Focus Group / Teleconference

A focus group was held in February 2009. A separate teleconference was held for a staff person who was unable to attend the focus group. Attendees at the focus group included the teachers, the two school principals, the Expert Coordinator, and an Aspect Coordinator.

The following broad explanations and questions (in the boxed section below) were asked in the focus group:

Preamble:
Welcome everyone and thank you for participating. This teleconference gives you an opportunity to talk about your experience with the TEACCH intervention and to air your views, rather like a focus group. Notes will be taken of our discussion today. These notes will be sent to you and you will have an opportunity to make any corrections of the actual conversation or interpretation of it. Material discussed today will remain confidential.

You may withdraw at any time without any penalty. This focus group is expected to last for about an hour

1. What are your general impressions of the TEACCH program that you have implemented this year?
(i) Did you notice any changes about yourself, the ways you teach, and your knowledge of autism?
(ii) Did you notice any changes about the outcomes for your students?
Describe student by student
- Independence
- Engagement
- Skills
- Language
- Social
- Communication
- Repetitive & restricted behaviours
- Anxiety
- Coping with change/transition
- Sensory

Most significant change – during the last year (term?), in your opinion, what was the most significant change that took place fr participants in the program?

2. Are there positive features of your experience with TEACCH this year? (Discuss)
3. Are there negative features of your experience with TEACCH this year? (Discuss)
4. Some of the themes arising from the blogs throughout 2008 were (note major themes). (Discuss) Were other things happening in the children's life that might have explained their outcomes (eg divorce, new therapist etc)
5. Did you have any feedback from parents?
6. Are there other comments you would like to make?
7. Thank you for your participation

3.16 Focus group analysis

An analysis (verified with participants) included the following themes:

General impressions
- It is a different way of teaching
- Culture of autism: teaches appreciation of underlying issues as to why children were behaving in a certain way
- TEACCH gave a chance to reflect on how we should collect and reflect on data
- A more individual approach – not teaching the same (KLA) content to everyone
- Greater calm; less anxiety in the class
- Independence, even for students with high support needs
- You feel you are doing something useful – not just time filling
- TEACCH is good for whole school.

- Students more confident to attempt tasks
- TEACCH was a real survival technique for one schools that was undergoing renovations
- With a less limited working space, achievements may have been even greater

Student outcomes
- Independence and time on task increased dramatically
- Maintenance and generalization were assisted by the TEACCH structure
- Transitions to non-TEACCH classrooms requires planning. Satellite class teachers should be given information about TEACCH
- More engagement
- Transition between tasks much easier
- Unwanted behaviour decreased (some students0
- Language improved(some students)
- Social skills improved (some students)
- Ensuring others used TEACCH structure (some students)
- Students more willing to come to class
- Initiating communication (some students)

Most significant changes
- Independence increased
- Anxiety decreased
- It was easier to deal with transitions and change

Other positives
- Focus on "the problem" changed from locating the problem to locating it in teaching
- Casual staff found it easier to teaching a TEACCH classroom
- Interest from other staff in TEACCH, and adoption of some practices
- "Progress in the last 6 months is more than in the last 4 years"

Negatives
- It is time consuming to prepare TEACH resources
- Beginning TEACCH is hard and time consuming – next year should be easier
- Lots of paperwork

Issues
- Structure reduced the need to communicate verbally – was this isolating?
- It is difficult to know what curriculum to give students (whether TEACCH is used or not) Preschool Guide has some limitations, especially for older students
- Does TEACCH reduce spontaneity?
- Parents were generally positive and wanted to know more

3.17 Staff self-evaluation

TEACCH staff filled out a self evaluation at the end of 2007, and the end of 2008. There were two questionnaires for staff self evaluation:
- "Teacher self assessment questionnaire" and
- "Specific Elements of TEACCH questionnaire"

The teacher self assessment questionnaire required the teacher to rate herself on questions relating to their knowledge and understanding about the specific learning needs of students with ASD, and of structured teaching. They also rated their confidence in their skills, their physical environment and so on.

The specific elements of TEACCH included items such as *tasks are structured to help students recognise relevant information and I promote generalisation of learned skills to new and / or different environments*

Both the questionnaires are reproduced in Appendix 2

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

3.17.1 Results of Teacher Self Assessment Questionnaire

Different teachers had varying levels of familiarity with TEACCH at the outset. 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.

The degree of change was in a positive direction, as shown in Table 3.12. 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 average degree of change for the four teachers was 5.5 points.

Table 3.12: Change in (a) self assessment and (b) Specific elements of the TEACCH approach in classrooms

Teacher	Teacher Self Assessment	Specific elements of the TEACCH approach in classrooms
TA	2	10
TB	8	8
TC	8	4
TD	4	3

Teacher self assessment – average change: 22/4 = 5.5
Specific Elements of TEACCH – average change = 25/4 = 6.25

3.17.2 Results of Specific Elements of TEACCH Questionnaire

The same scoring logic as in the above paragraph was applied to the Specific Elements of TEACCH 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 degree of change was in a positive direction. The average change for the four teachers was 6.25 points. This indicates that teachers were implementing the TEACCH practices more comprehensively over time.

3.18 Expert coordinator commentaries

An analysis revealed that

- Feedback was regularly provided
- Feedback was comprehensive and included visuals where necessary to illustrate points
- Feedback was given diplomatically
- Feedback dealt with more sophisticated aspects of TEACCH practices over time

3.19 Parent anonymous questionnaire

At the end of the TEACCH implementation, in 2008, parents were invited to complete two anonymous questionnaires:

- "Changes in Skills, Behaviour or Characteristics" and
- "Involvement Level in School Program"

Eleven parents returned the questionnaires.

Both questionnaires were adapted from The Autism Spectrum Disorders Outcome Study and Training Project (Parent Survey of Child Outcomes), details of which can be found at:. http://www.autismstudy.pdx.edu/index.htm

The two questionnaires are reproduced in Appendix 3.

3.19.1 Changes in Skills, Behaviour or Characteristics Questionnaire

In the Changes in Skills, Behaviour or Characteristics Questionnaire the parents were invited to comment on changes that they had noticed over the time of the TEACCH intervention.

Overall, parents indicated that they thought there were no characteristics which had decreased over the year. In 22 instances, parents indicated that they thought their child's skills, behaviour or characteristics had remained static, and 110 occasions where they thought their child had made gains in those areas.

Table 3.13 summarises the comments the parents made, in relation to changes they had noticed:

Table 3.13: Parent comments about changes

Please describe any other changes you have seen in your child this past school year:
[Child] is overall more confident and happy. Being able to communicate on a higher level has taken away his frustrations greatly. I really think this was a great program for [Child].
Improved fine motor skills Independently attempting to self-help eg obtaining objects, opening objects, seeking desired objects
[Child] is much more cooperative and is understanding so much more of what is going on around him. He does not always join in with others but he is observant and when he is confident in his understanding he will join in
Happier. I can have a conversation with my child now
We believe our child has made quite significant changes this year and we are extremely happy with his progress this year. We only hope it improves and continues into 2009. Thank you to Aspect for helping us to reach out too (sic) our child

Please describe any other changes you have seen in your child this past school year:
I cannot speak highly enough about [teacher] and the Teacch programme. I cant compare it to other principles but [child] has improved so much this last year I can only account his improvement to his schooling.
My child has become an independent and confident little boy. The TEACCH program has given him skills to make decision and see the plan for the day – which makes him feel comfortable and secure
Overall there has been a lot of improvement

3.19.2 Involvement level in the school program

Table 3.14 : Involvement level in the school program

Question	1 not at all	2	3	4	5	6	7	8	9	10 extremely	Average
Please rate your level of involvement with your child's overall school program. (Scale: 1 = not involved at all / 10 =extremely involved)	1			1	2	1	2	2	1		6
Please rate your level of involvement with your child's TEACCH school program. (Scale: 1 = not involved at all / 10 =extremely involved)	1				3	1	2	3			6
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)	1		1		1	1	1	1		4	7
Please rate how satisfied you are with your involvement with your child's TEACCH school program. (Scale: 1 = not at all satisfied / 10 =extremely satisfied)	1		1		1	1	1	3		2	6.6
Please rate your level of knowledge about TEACCH			1	1	1		2	3	1		5.9
Please rate how interested you are in implementing TEACCH at home. (Scale: 1 = not at all interested / 10 =extremely interested)				1	1			4		4	7.3

Responses for the parents involvement level in the school program are reproduced in Table 3.14 below. Responses are averaged, assuming that there are 10 equal intervals between "not at all" and "Extremely":

All the mean responses are positive. The highest mean score is for the item "Please rate how interested you are in implementing TEACCH at home". To determine if there was a relation between home implementation and involvement, satisfaction or knowledge, Pearson correlations were performed on the data. The correlations are represented in Table 3.15. The main findings, significant at p<.01, are:

- Parents who are involved in their child's overall school program are also involved in and knowledgeable about the TEACCH program;
- Parents who are satisfied with their child's overall school program are also involved in and satisfied with the TEACCH program
- Parents who are satisfied with TEACCH are also involved in the TEACCH program

However there was no association between interest in implementing TEACCH at home and any of the other measures of involvement, satisfaction or knowledge.

Table 3.15 Correlations for Involvement in School Program questionnaire

Correlations

		Inv-all	Inv-T	Satis-all	Satis-T	Know-T	T-home
Inv-all	Pearson Correlation	1	.851**	.686*	.599	.811**	-.122
	Sig. (2-tailed)		.002	.029	.067	.004	.736
	N	10	10	10	10	10	10
Inv-T	Pearson Correlation	.851**	1	.844**	.794**	.643*	.000
	Sig. (2-tailed)	.002		.002	.006	.045	1.000
	N	10	10	10	10	10	10
Satis-all	Pearson Correlation	.686*	.844**	1	.968**	.753*	-.119
	Sig. (2-tailed)	.029	.002		.000	.012	.743
	N	10	10	10	10	10	10
Satis-T	Pearson Correlation	.599	.794**	.968**	1	.722*	-.198
	Sig. (2-tailed)	.067	.006	.000		.019	.583
	N	10	10	10	10	10	10
Know-T	Pearson Correlation	.811**	.643*	.753*	.722*	1	-.150
	Sig. (2-tailed)	.004	.045	.012	.019		.678
	N	10	10	10	10	10	10
T-home	Pearson Correlation	-.122	.000	-.119	-.198	-.150	1
	Sig. (2-tailed)	.736	1.000	.743	.583	.678	
	N	10	10	10	10	10	10

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

*. Correlation is significant at the 0.05 level (2-tailed).

=

On the Parent Involvement Questionnaire, parents were also asked to indicate whether their child was receiving additional treatments.

Table 3.16 provides a summary of additional treatments that were being utilised:

Table 3.16: Summary of additional treatments

Number of parents	Summary of treatments
2	Occupational therapy
5	Speech therapy
1	Music therapy
1	Sound therapy
1	Movement therapy
1	Kinesiology (LEAP) therapy
2	Gluten free diet
2	Casein free diet
1	Dietary supplements
2	Floortime
1	Swimming
1	Gymnastics

Table 3.16 reveals a large number of additional treatments. This is fairly typical of the cohort however. It does represent another source of "noise" in the data.

Parents were also asked whether they wished to make additional comments. Their responses are reproduced in Table 3.17 below:

Table 3.17 Summary of additional parent comments

	Are there any comments you wish to make about the TEACCH program or your child's progress this year?
P2	Some parent training or information sessions may be useful? The TEACCH program really suits our child's learning style
P3	We feel [Child] has progress this year, and TEACCH was helpful to him
P4	I am so pleased with [Child's] progress. He was a child who used little language and tanrtrummed most of the time and was behaviourally difficult. He is now compliant when he understands and appears happy!
P5	It has been good for him
P6	I like the independent skills that TEACCH teaches students
P7	I would like to have had an information day/night session to explain exactly what the program involved and how I could help. We only skimmed the surface of the program at our parent/teacher evening and it was not enough to know how it all works
P8	[Child] has developed and improved his language, numeracy, behaviour and general knowledge so much in the last year. He is a different boy!!

	Are there any comments you wish to make about the TEACCH program or your child's progress this year?
P9	I thought the TEACCH program was great. My only drawback would be the amount of paperwork and/or the testing, retesting the teacher must do. It did seem an extreme burden on an already difficult job. But it did have great benefit for my child
P11	Even though I was aware he was doing the program I would have liked to implement it at home so maybe he'd improve more academically

Clearly the parents were interested in knowing more about the program.

4.0 Discussion and recommendations

4.1 Summary of findings

It is important to be clear what conclusions this project does and does not support.
There are three major issues

- First - program fidelity, or the extent to which the implementation by the teachers faithful to the principles and practices of TEACCH
- Second - outcomes for students
- Third - recommendations for future practice, and in particular, whether the results support the continued implementation of TEACCH in Aspect special schools in 2009.

To address these issues, the questions presented at the outset of the evaluation in Table 1.1 will be revisited, along with the results from the suggested evaluation tools (namely PCG, DVDs, blogs, focus group, parent questionnaire, staff self evaluation and coordinator comments).

The first evaluation question asked: *What are the outcomes for students, of the TEACCH pilot?*
The preschool curriculum guide revealed that there were significant positive changes over time, for all the TEACCH classrooms, for 12 of the 13 skill categories. The DVDs suggested there was an increase in independence, corresponding to a significant decrease in verbal prompting over time. The blogs provided examples of the students positive responses to the introduction of structure, particularly for engagement and independence. The focus group provided further affirmative examples of student engagement and 'behavioural improvements, and the parent responses to the questionnaire were generally positive.

The second evaluation question was: *What are the outcome effects on student independence in particular?*
An increase in independence was supported by a quantitative analysis of the PCG and the DVDs. Á reduction in staff proximity to students during task time was also noted in the qualitative analysis of the DVDs. The blog and focus group were consistent with this interpretation. The PCG analysis indicated that the students understanding of visual structure increased – which suggests the proviso that students will be more independent of adult guidance as long as the teacher provides them with visual structure.

The third evaluation question focused on Program fidelity: *Is TEACCH being implemented as intended?*
The data indicated that the teachers were implementing structured teaching at an acceptable level of fidelity by the latter half of 2008, the intervention year. An improvement over time was noted in the DVD analysis, and staff also assessed their own practices as being more "TEACCH-like" by the end of the year. In addition, an examination of the

coordinator comments noted an exchange of views the showed understanding of TEACCH principles

That means that TEACCH must be considered a possible factor in the outcomes noticed for students and teachers.

The data also indicate that teachers need time to become accustomed to a new approach, and that follow-up monitoring and support is important to help increase their skill levels and confidence, and reach a satisfactory level of program fidelity, even after an extensive 5 day (or 2 day) professional experience workshop. Maintenance of skills is also important

The fourth evaluation question is really a subquestion in the fidelity analysis and centres on *to what extent do teachers use elements of structure?* The PCG showed that the students improved in their use of structure – because the teachers were using it in their own teaching. There may be room for improvement in the variety of visual instructions used by teachers, a conclusion consistent with the DVD analysis.

Fifth, *the evaluation investigated What is the staff attitude to the culture of autism?* An appreciation of the different learning style was communicated in the focus group and the blogs. The DVD qualitative analysis also revealed that teachers understood the importance of individualising materials and using the child's strengths and interests.

Sixth, the evaluation was interested in illuminating: *What are the teachers assessment practices?* An evaluation of the teachers assessments practices in general was not observed directly. However the existence of some adequate informal assessment could be inferred from the manner in which the teachers utilized the students strengths and interests in the DVD material. Of more concern was the fact that a relatively large amount of the PGC was filled out differently by different teachers, with much of the data missing instead of scored – even if this meant recording a fail. The coordinator encouraged the staff to observe and assess, but some teachers commented that it was difficult to find the time to do so.

The seventh evaluation question investigated the *training over time*. The teachers spoke positively about their initial 5 day training, but the many questions covered by the expert coordinator in subsequent months showed that time for consolidation was necessary, and that a vigilant expert coordinator or mentor paid dividends.

The final evaluation question asked: *What is the social validity of TEACCH?* The predominantly positive comments by parents in the questionnaires, and their desire to implement TEACCH at home, suggests that the TEACCH social validity is high. Most of the teachers were also positive about TEACCH in the focus group, although two caveats are worth mentioning. The first is that they found the preparation of visual supports to be very time consuming, which was a deterrent. The second is that some staff found that when the students were working independently and were engrossed in a task, they were not interested in engaging socially with those around them. Further clarification of the role of structured teaching and how it can promote social interaction would be appropriate. Nevertheless the generally positive response suggests that the TEACCH principles and assumptions are valued, so are likely to be implemented.

4.2 Implementation of TEACCH in Aspect special schools

The data were overwhelmingly positive, in relation to student outcomes. Students appeared to be more independent, more confident, less anxious, and coped with transitions and change more easily under the TEACCH program. On most measures they spent more time on task, were more engaged, and some students made progress in language, communication, and social skills.

Teachers' attitudes also changed. They looked less to find problems "in the child" than in the environment or their

own teaching, and they raised their expectation for low functioning students.

TEACCH classrooms seemed easier for casual staff.

TEACCH was able to be implemented in a variety of settings and with children of different ages and abilities. However the program was not implemented with sufficient numbers of students of high general ability, so it is difficult to discuss the success of TEACCH in mainstream settings. It should be noted though that some students who transitioned to satellite classes using TEACCH did so relatively easily.

4.3 Recommendations

- TEACCH should continue to be used in special schools, with the option of expanding to the whole school.
- Time needs to be allowed for teachers to develop expertise in a new program.
- Support should be provided for teachers to assist them to make resources and completing paperwork. This appears to be especially important when teachers are beginning the program.
- A consistent set of protocols should be observed when completing records. For example when completing the Preschool Curriculum Guide, teachers should be encouraged to test the students on all items.
- Record keeping should be rigorous and consistent, and forms should be developed so that it is minimally onerous.
- Videotaping, if used for assessment should be short, focused, and of uniform length to facilitate comparisons
- The practice and function of prompting, particularly verbal prompting, needs to be clarified with teachers.
- Attention to prompt dependence should be part of staff development
- Parents should be involved to a greater extent. Most parents indicated that they desired this, and parent involvement is part of the TEACCH philosophy. To the extent that parents were not involved, the program lost some TEACCH fidelity.
- Clarification for teachers of the different types of visual instructions (as described in the Preschool Curriculum Guide) may help students to benefit from the TEACCH program.
- Limitations in the physical environment, such as cramped classrooms, make the program more difficult to implement.
- A whole school approach to implementing TEACCH would increase consistency for the students
- Planning for transitions from a TEACCH setting to a non-TEACCH setting requires thoughtful planning
- The role of Expert Coordinator or similar position is essential to the success of implementing a new program.
- Staff may find the Psycho-educational profile, third edition (PEP-3) useful if they intend to continute with the TEACCH approach on a larger scale. The PEP-3 contains a performance scale and a caregiver report which can be combined to assess the developmental level of young children with autism who otherwise might be difficult to engage and test. The results can inform the generation of an educational program based on the measured profile of learning development, emerging skills and autistic behaviours.
- Future evaluations of other pilot programs should investigate the possibility of using similar measures to this evaluation in order to create a comparison group and increase the rigor of the research.
- That this report should provide the foundation for a joint publication between Aspect and the University of Canberra

4.4 Strengths and limitations of the current evaluation

The current research was limited by the fact that there was no control group. Thus, it was not possible to feasible to rule out the possibility that the students' progress over the year was attributable to non-TEACCH factor(s), such as increased chronological age. It would be useful to compare levels of development over the same time span in previous years to rule out this possibility, if such data is available.

One way to address the lack of a control group would be to take baseline data for a longer time so the child could act as their own control. An alternative (and ethically complex) strategy would be to implement a withdrawal design where students could be withdrawn from the TEACCH program for a period of time, and see the effects on their performance. A third possibility would be to use a control or comparison group in the future which used the same questionnaires and other sources of data.

In relation to student selection, data about the tests used to diagnose autism was not consistently available. Given Aspect's interest in evidence-based practice, this is a limiting factor in publication in high quality academic journals.

On the positive side, one of the strengths of the current evaluation was that it is based on data collected over a whole school year. In addition, the evaluation was done independently, at arms length which reduces the chance of bias. Most importantly ,the evaluation investigated a wealth of data from different sources. In almost all cases the conclusions from different types of data led to similar conclusions, which gives confidence in their veracity.

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 ones 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
20 May 2009

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APPENDIX 1 – TEACCH Fidelity Proforma

UC –TEACCH Fidelity Proforma TEACCH Element
1. Child displays on-task engagement. Defined as child/client on task at one minute probes.
2. Adult encourages child independence using prompts. P-physical Vb – verbal G – gestural V – visual
3. Social (ie. non task) interaction I – initiate R - respond
4. Joint attention I – initiate IP – initiate point R - respond
5. Requesting I – initiate R – respond
6. Each child has in place a functional system(s) of communication for receptive & expressive skills. O – object P – photos D – drawings G – gestures/physical S – speech C – compic W – writing *Only a preliminary analysis of type*
7. Tasks are structured to help child recognise relevant information.
8. Environmental supports are available that facilitate child's ability to predict events, activities & change.
9. Environments are structured to promote active engagement of child.
10. An effort is made to promote generalisation of learned skills to new and/or different environments.
11. Materials & furniture are age-appropriate.
12. Work systems - Left to Right - Top to Bottom - Tell what work - How much work - When finished - What comes next
13. Directive communication toward/with child is clear & relevant.
14. Communication toward & with child encourages dialogue (when appropriate).
15. Child requests objects or help.
16. Tasks promote high rates of successful performance.
17. Child's strengths & interests are used to maintain consistently positive behaviour.
18. Tasks use a variety of instructional formats.
19. Transitions between tasks are clear & prompt.
20. Teacher interactions with child are consistent.

APPENDIX 2: 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: 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: 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 structured teaching and how to apply the principles of the TEACCH approach into my classroom						
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						

Specific elements of the TEACCH approach in classrooms

Element	In place	Partially in place	Not in place	Comment
1.Each students has a functional system of communication for receptive & expressive skills				
2.Tasks are structured to help students recognise relevant information				
3.Environmental supports are available that facilitate my students' ability to predict events, activities and change				
4. My classroom environment is structured to promote active engagement of my students				
5. I promote generalisation of learned skills to new and / or different environments				
6. Materials and furniture in my classroom are age appropriate				
7.I have established work systems for my students - Left – to right - Top-to bottom - tell what work - when finished - what comes next				

Additional Comments:

Thank you for taking the time to complete this evaluation

APPENDIX 3: Parent Questionnaire
Changes in Skills, Behaviors or Characteristics

This year, your child has been enrolled in a class that is guided by TEACCH principles which emphasise visuals and structured teaching to help children understand the world they live in. 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 behaviour			

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

Parent Questionnaire
Involvement Level in School Program

This year, your child has been enrolled in a class that is guided by TEACCH principles which emphasise visuals and structured teaching to help children understand the world they live in. 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 TEACCH 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 TEACCH school program. (Scale: 1 = not at all satisfied / 10 =extremely satisfied)										
Please rate your level of knowledge about TEACCH (Scale: 1 = not at all knowledgeable / 10 =extremely knowledgeable)										
Please rate how interested you are in implementing TEACCH 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 TEACCH 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