The effectiveness of the *Picture Exchange Communication System* (PECS) as an *augmentative* communication system for children with Autism Spectrum Disorders (ASD): a South African pilot study.

A dissertation presented to the
Division of Communication Sciences and Disorders
Faculty of Health Sciences
University of Cape Town
Cape Town

In fulfilment of the requirements for the
degree of M.Sc. Speech and Language Pathology

Julia Travis
August 2006

Declaration

I, **Julia Travis**, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise), and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

I empower the University of Cape Town to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

Signed by candidate

Signature

31 August 2006

Date

Dedication

I dedicate this thesis to the beautiful children of the spectrum…

You have captured my heart and fascinated me each and every day over the past 6 years.

You have taught me to see the world from a whole different perspective,

reminded me to appreciate the simple things,

and helped me find purpose…

To the moms, dads and teachers who love them and nuture them…

I am so humbled.

Acknowledgements

I would like to acknowledge Martha Geiger, my amazing supervisor, for her important role in this thesis. Your endless support through the ups and downs of the research process was greatly appreciated. Your involvement in this process has been invaluable - your guidance, knowledge and patience as well as your enthusiasm for my research have kept me strong.

To the principal, staff, parents and learners of the school where I conducted my research. Your support and willingness to accommodate my research study was hugely appreciated. I have learned so many things from each of you and I am privileged to be part of the most amazing team of people.

Special thanks to the 2 learners, their parents and educators for participating in this research with such enthusiasm and dedication. You embraced the process, gave of your time and energy and most importantly carried out the research with me and gave me new perspectives on my research and ideas for the future.

A special word of thanks to Gené Jones for giving of her time to be a second observer for my study.

To my friends who have supported me and understood my absence over busy periods of this research, thank you.

And finally to my family, who have been my support and constant throughout my life. "Thank you" is simply not a big enough word.

Abstract

This South African pilot study investigated the effect of introducing an augmentative communication system (i.e. the *Picture Exchange Communication System*) on the frequency of *requests* and *comments* of 2 children with autism. Both children presented with some spoken language, but limited use of their language in communicative exchanges. A *mixed research design* was used, including a quantitative component (a single-subject multiple-baseline design across 2 behaviours) and a qualitative component. Data was collected in the pre-training, training, post-training and follow-up stages, in both structured and unstructured settings. The effect of PECS Training on the mean length of utterances was also investigated. The quantitative data was visually represented and statistically analysed to determine the effectiveness of the Picture Exchange Communication System (PECS). The qualitative component expanded on this data by investigating the impact of PECS in other areas (e.g. speech complexity, communication profile, and pragmatic skills). The findings revealed that PECS Training was highly effective in increasing *requesting behaviour* in both settings for both participants. Increases in requesting behaviour were maintained in the Follow-up Stage (3 months after the training) in both settings for Participant 2, but only in the structured setting for Participant 1. *Commenting behaviour* increased during Phase VI of the PECS Training for both participants in the structured setting only. In the unstructured setting, commenting behaviour was only recorded occasionally and there were almost no gains in this behaviour. The PECS training was moderately effective in increasing commenting in the structured setting and ineffective in the unstructured setting for Participant 2, and only mildly effective in both settings for Participant 1.

The PECS training was highly effective in increasing *mean length of utterance* in both settings for Participant 1. The PECS Training was ineffective treatment for increasing the MLU of Participant 2. Participant 2 had longer utterances in a few of the baseline measures and a smaller increase in the length of utterances in the training stage in both settings. The PECS training resulted in a shift from a majority of 1- and 2-element utterances to 3-element utterances involving expansion on the phrase level in both participants. Participant 1 gained 18 months in his level of expressive language, while Participant 2 gained 12 months. Dramatic increases in intentional communicative acts (ICAs) were recorded in the communication profiles of both participants. The most increase occurred in requesting, with smaller increases in commenting for both participants. After PECS training, forms of communication were primarily pictures with speech and speech only. Parent and educator perspectives were investigated in semi-structured interviews. Research, clinical and educational implications were identified and discussed.

Glossary of Terms

Autism Spectrum Disorder **(ASD)** = the latest umbrella term for the spectrum of disorders, also referred to as Pervasive Developmental Disorders (PDD). ASD encompasses Autistic disorder (Autism), and non-Autistic PDDs (Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), Asperger's Syndrome, Fragile X Syndrome, Rett's Syndrome and Childhood Disintegrative Disorder). It is a neurogenetic disorder, resulting from abnormalities in the structure and functioning of the brain (Siegel, 1996; Paris 2000).

Augmentative and Alternative Communication **(AAC)** = defined as "the field or area of clinical/educational practice to improve the communication skills of individuals with little or no functional speech (Lloyd, Fuller & Arvidson, 1997, p.524). *Augmentative* refers to an approach to communication that provides an addition to natural speech and/or writing aimed at improving the effectiveness of communication. *Alternative* refers to interventions that are developed to temporarily or permanently replace speech.

Picture Exchange Communication System **(PECS)** = "a systematic behavioural program that teaches a child to initiate communicative requests by approaching the communicative partner and exchanging the symbol for the desired object. It includes protocols for expanding communication from single to multiple words and for increasing communicative function from requesting to labelling and commenting" (Lord & McGee, 2001).

Effectiveness = "the demonstration of behaviour change as a direct result of intervention". Effectiveness research is "research that documents the acquisition of behaviour change, the maintenance of behaviour change and the generalisation of behaviour change" (p. 19, Schlosser, 2003b). Effectiveness of an intervention, when deployed in the field, indicates that it does what it is intended to do for a defined population (test in 'real life settings') (Russell, 2004).

Evidence-based practice (EBP) = "the integration of the best and current research evidence with clinical/educational expertise and relevant stakeholder perspectives to facilitate decisions for assessment and intervention that are deemed effective and efficient for a given direct stakeholder" (Schlosser, 2003a, p. 2)

Mixed research design = a research design employing both quantitative and qualitative data collection and analysis.

Multiple-Baseline Design (MBD) = "The MBD includes multiple baselines with the baselines being extended sequentially from the first to the second baselines, the second to the third baseline and so forth. Accordingly the intervention is introduced sequentially rather than simultaneously across the multiple baselines… MBDs may be run across (1) settings, (2) behaviours, or (3) subjects." (Schlosser, 2003d, p.92).

Intentional Communicative Act **(ICA)** = "an event in which the child directs a motoric and/or vocal act toward the adult as evidenced by eye gaze, body orientation or physical contact and awaits a response from the adult, as evidenced by looking at the adult, hesitating or persisting in the communicative act" (Wetherby, Yonclas and Bryan, 1989, p.151).

Requests = when a child makes an initiation towards an adult in order to get his/her needs met and persists in engaging the adult until he/she responds (Schwartz, Garfinkle, & Bauer, 1998, p. 150).

Comments = when a child initiates a behaviour toward a communicative partner, that directs the partner's attention to a person, action or event) (Schwartz , Garfinkle, & Bauer, 1998, p.150).

Mean Length of Utterance (MLU) = a child's average utterance length, calculated by dividing the total number of words uttered in the session, by the total number of utterances to obtain an average length of verbal utterances in each session (Brown, 1973 in Owens, 2005).

Percentage of Non-overlapping Data (PND) = PND is a technique used to summarise data from single-subject experimental designs, by calculating the percentage of treatment data points that do not overlap with the baseline data points. This is determined by identifying the highest data point in the baseline and calculating the percentage of data points during the intervention phase that exceed this level (Schlosser, 2003g; Scruggs, Mastropieri & Casto, 1987; Scruggs & Mastropieri 2001; Wendt, Schlosser & Lloyd, 2004).

Participant = an individual participating in a research study. Also referred to as 'subject' when discussing previous specific research findings (e.g. of single-subject experimental design studies). In this research study the participants are 2 children with ASD.

Educator = a person responsible for educating a child in a classroom. Also referred to as a 'teacher' when discussing previous research findings.

Learner = a child that attends an educational setting daily. Also referred to as a 'student' when discussing previous research findings.

List of Abbreviations

1. AAC	Augmentative and Alternative Communication
2. ADHD	Attention Deficit Hyperactivity Disorder
3. ASD	Autism Spectrum Disorder (previously referred to as Autistic Spectrum Disorder)
4. CARS	Childhood Autism Rating Scale
5. DD	Developmental Delays
6. DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
7. EBP	Evidence-based practice
8. ELSEN	Education for Learners with Special Education Needs
9. ICA	Intentional Communicative Act
10. ICD-10	International Classification of Diseases, Tenth Edition
11. IQ	Intelligence Quotient
12. JSAIS	Junior South African Intelligence Scale
13. LARSP	Language Assessment Remediation Screening Procedure
14. max.	Maximum
15. min.	Minimum
16. MBD	Multiple-Baseline Design
17. MLU	Mean Length of Utterance
18. PDD	Pervasive Developmental Disorder
19. PDD-NOS	Pervasive Developmental Disorder – Not Otherwise Specified
20. PECS	Picture Exchange Communication System
21. PND	Percentage of Non-overlapping Data
22. POD	Percentage of Overlapping Data
23. SLD	Severe Learning Difficulties
24. SSAIS	Senior South African Intelligence Scale
25. TEACCH	Treatment and Education of Autistic and related Communication-handicapped CHildren
26. σ	Standard deviations

Table of Contents

List of Tables

List of Figures

Chapter One

Introduction

The *Picture Exchange Communication System* (PECS) is an augmentative and alternative communication (AAC) system that was developed by Andy Bondy and Lori Frost as a means of teaching children with autism and related developmental disabilities a functional communication system (Bondy & Frost, 1998a). The PECS system is unique in comparison to other AAC systems as it requires the child to approach a communicative partner and initiate interaction prior to performing a referential communicative act (Bondy, 2001; Charlop-Christy, Carpenter, Le, LeBlanc & Kellet, 2002). It emphasises teaching the child to initiate requests, respond to questions and to comment. Training occurs across settings and communicative partners to encourage generalisation (Charlop-Christy, et al., 2002; Frost & Bondy, 2002). The PECS was only recently introduced to South Africa when the first PECS training workshop was held in Cape Town in April 2004. It is therefore important that pilot research be conducted to determine the effectiveness of PECS for individuals with Autism Spectrum Disorder (ASD) within the South African context.

Purpose:

The purpose of this study was to evaluate the effectiveness of the PECS system within the South African context to provide evidence of its effect on the development of intentional communicative acts (ICAs), specifically the ***requesting*** and ***commenting*** behaviours of children with Autism Spectrum Disorder (ASD).

Literature Review

1.1 Introduction to Autism Spectrum Disorders

Autism Spectrum Disorders (ASD) is the latest umbrella term for the spectrum of disorders, also referred to as Pervasive Developmental Disorders (PDD) (*Diagnostic and Statistical Manual of Mental Disorders*, 2000). ASD encompasses Autistic disorder (Autism), and non-Autistic PDDs, that is; Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), Asperger's Syndrome, Fragile X Syndrome, Rett's Syndrome and Childhood Disintegrative Disorder (Siegel, 1996; Paris 2000).

Autism Spectrum Disorders (ASD) can co-exist with any other condition and occur equally across all racial, ethnic and social groups. Autism occurs four times more often in boys than in girls (Paris, 2000). The estimated incidence rate varies considerably from source to source, ranging from 2 to 5 in 10,000 births; to 11 to 15 in 10,000 births and higher incidence rates are not uncommon (Paris, 2000). In a recent study conducted by Chakrabarti and Fombonne in 2001 for the National Health Service Trust in Staffordshire, England; prevalence rates of 16.8 per 10,000 for Autistic disorder, 8.4 per 10,000 for Asperger's syndrome and 36.1 per 10,000 for PDD-NOS (Towbin, Mauk & Batshaw, 2002) were reported. Incidence rates for the South African population are not available.

ASD is currently recognised as a neurogenetic disorder, resulting from abnormalities in the structure and functioning of the brain (Siegel, 1996). Increasing evidence shows that the difficulties associated with ASDs are due to structural differences in the brain that develop during pregnancy as a result of genetic factors interfering with normal brain development or due to brain injury (Paris 2000; Siegel, 1996; Towbin, Mauk & Batshaw, 2002; Mirenda & Mathy-Laikko, 1989).

1.2 Diagnosing Autism Spectrum Disorders

Diagnosis of an ASD can be complicated by the fact that it can co-occur with any other condition (e.g. mental retardation, inattention, hyperactivity and epilepsy) and that the behaviour profile of each individual with ASD is unique. Hence, careful evaluation by experienced professionals is needed before a diagnosis is made (Siegel, 1996; Paris, 2000; Towbin, Mauk & Batshaw, 2002). In the diagnosis of an ASD, one of two diagnostic standards, the *Diagnostic and Statistical Manual of Mental Disorders* - Fourth Edition - Text Revision (DSM-IV-TR) (American Psychiatric Association, 2000) or the ICD-10 (*International Classification of Diseases*, World Health Organisation, Tenth Edition, 1994) is used. There are close parallels between the two sets of diagnostic criteria and these would essentially identify the same individuals (See Table 1 for comparison of diagnostic criteria). The DSM-IV provides 12 diagnostic criteria for the diagnosis of an Autistic Disorder. The ICD-10 provides 16 diagnostic criteria within the same triad of impairment. Both sets of criteria are grouped into three areas: qualitative impairment in social interaction, communication and restricted repetitive and stereotyped patterns of behavior, interests, and activities, which mirror the concept of autism consisting of a triad of impairments (Paris, 2000; Siegel, 1996). To be diagnosed with *Pervasive Developmental Disorder, Not Otherwise Specified* (PDD-NOS), an individual has either less severe or fewer symptoms, but should still meet some criteria in the social development and communication areas (not necessarily in the behaviour area) (American Psychiatric Association, 2000).

Autism is a developmental disorder affecting many aspects of how an individual experiences the world and learns from his or her experiences (Siegel, 1996). It is characterised by qualitative impairments in reciprocal *social interaction* (e.g. marked lack of awareness of the feelings of others, impaired social play and imitation), in verbal and nonverbal *communication and imagination* (e.g. abnormal use of eye gaze, gestures or body language, echolalia, impaired ability to initiate and sustain interaction) and a *restricted repertoire of interests and activities* (e.g. stereotyped body movement, distress over changes in routine or environment) with onset during infancy or early childhood (Mirenda & Mathy-Laikko, 1989; Paris, 2000; Towbin, Mauk & Batshaw, 2002).

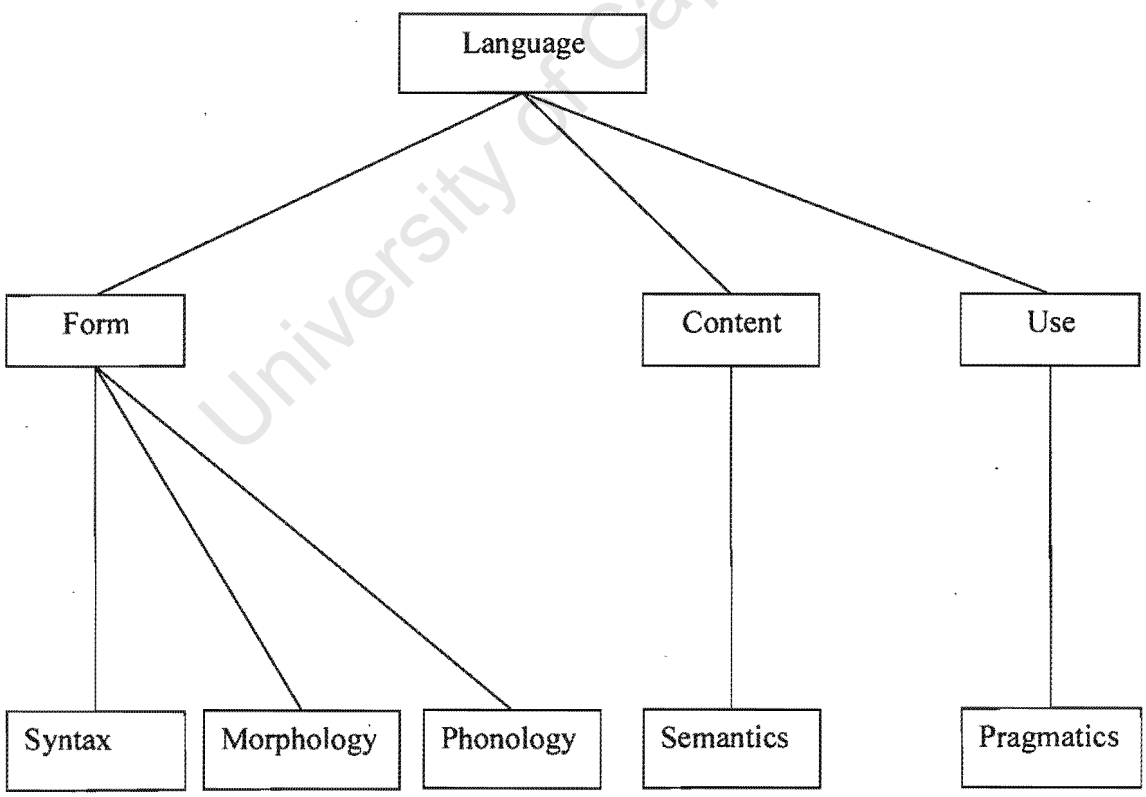
Table 1: Comparison of Diagnostic Criteria compiled from DSM-IV and ICD-10

Diagnostic Criteria for 299.00 Autistic Disorder DSM-IV-TR (American Psychiatric Association, 2000)	**Diagnostic Criteria for Autism Disorder ICD-10 (WHO, 1992)**
A. A total of six (or more) items from (1), (2), and (3), with at least two from (1), and one each from (2) and (3): **1. Qualitative impairment in social interaction, as manifested by at least two of the following:** **a.** Marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction **b.** Failure to develop peer relationships appropriate to developmental level **c.** A lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g., by a lack of showing, bringing, or pointing out objects of interest) **d.** Lack of social or emotional reciprocity **2. Qualitative impairments in communication as manifested by at least one of the following:** **a.** Delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime) **b.** In individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others **c.** Stereotyped and repetitive use of language or idiosyncratic language **d.** Lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level **3. Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:** **a.** Encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus **b.** Apparently inflexible adherence to specific, nonfunctional routines or rituals **c.** Stereotyped and repetitive motor mannerisms (e.g., hand or finger flapping or twisting, or complex whole-body movements) **d.** Persistent preoccupation with parts of objects **B.** Delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years: (1) social interaction, (2) language as used in social communication, or (3) symbolic or imaginative play. **C.** The disturbance is not better accounted for by Rett's Disorder or Childhood Disintegrative Disorder.	At least 8 of the 16 specified items must be fulfilled. **a. Qualitative impairments in reciprocal social interaction, as manifested by at least three of the following five:** 1. failure adequately to use eye-to-eye gaze, facial expression, body posture and gesture to regulate social interaction. 2. failure to develop peer relationships. 3. rarely seeking and using other people for comfort and affection at times of stress or distress and/or offering comfort and affection to others when they are showing distress or unhappiness. 4. lack of shared enjoyment in terms of vicarious pleasure in other peoples' happiness and/or spontaneous seeking to share their own enjoyment through joint involvement with others. 5. lack of socio-emotional reciprocity. **b. Qualitative impairments in communication:** 1. lack of social usage of whatever language skills are present. 2. impairment in make-believe and social imitative play. 3. poor synchrony and lack of reciprocity in conversational interchange. 4. poor flexibility in language expression and a relative lack of creativity and fantasy in thought processes. 5. lack of emotional response to other peoples' verbal and non-verbal overtures. 6. impaired use of variations in cadence or emphasis to reflect communicative modulation. 7. lack of accompanying gesture to provide emphasis or aid meaning in spoken communication. **c. Restricted, repetitive and stereotyped patterns of behaviour, interests and activities, as manifested by ate least two of the following six:** 1. encompassing preoccupation with stereotyped and restricted patterns of interest. 2. specific attachments to unusual objects. 3. apparently compulsive adherence to specific, non-functional routines or rituals. 4. stereotyped and repetitive motor mannerisms. 5. preoccupations with part-objects or non-functional elements of play material. 6. distress over changes in small, non-functional details of the environment. **d. Developmental abnormalities must have been present in the first three years for the diagnosis to be made.**

1.3 Communication and Language Difficulties in Autism Spectrum Disorders

Autism is defined as primarily a social-communicative disorder. It presents as a wide range of complex difficulties with the form, content and especially the use of language in social interactions (See Figure 1) Deviant or delayed speech and language development is one of the hallmark features of children with autism (Charlop-Christy, et al., 2002; Mirenda & Mathy-Laikko, 1989). Most parents of children with ASD will first become concerned about their child's development when an early delay or regression becomes evident in their speech development (Lord & Paul, 1997; Paris, 2000; Schwartz, Garfinkle & Bauer, 1998; Siegel, 1996). Approximately 50% of individuals with autism do not develop sufficient speech to meet their basic communication needs (Peeters & Gillberg, 1999; Wing and Attwood, 1987).

Figure 1: Components of Language [Adapted from Owens, 2005; p 18]



Deficits vary depending on the child's age and level of functioning, ranging from children with no speech at all, to those using complex speech with some peculiarities or errors. However, the problem is not simply a lack of an effective output system for communication. Those individuals who develop speech, still present with certain abnormalities (e.g. echolalia, repetitiveness, literalness of meaning, monotone intonation, and idiosyncratic language use). The most noticeable being an inability to use speech as a means of social interaction (Lord & Paul, 1997; Mirenda & Mathy-Laikko, 1989; Siegel, 1996).

Lack of pragmatic skills prevents children from describing how or what they feel, from making requests, asking questions for clarification, commenting or even realising that they have a reaction or question in a situation (Paris, 2000). Nonverbal communication is often severely impaired; this includes an inability to interpret facial expression, delayed development of social gestures (waving, pointing) and social aloofness. Vocal features, such as abnormal pitch, intonation, rate and rhythm and monotone or robotic speech are sometimes present. In terms of grammatical structure, these individuals frequently use immature structures characterised by repetitive and often irrelevant phrases. Language impairments are common, with severe delays in receptive language characterising the majority of young children with autism (Lord & Paul, 1997; Mirenda & Mathy-Laikko, 1989; Paris, 2000; Siegel, 1996).

Individuals with autism also experience significant difficulty in the acquisition and use of functional communication skills (Schwartz, Garfinkle & Bauer, 1998). This impacts on their basic social interaction with the people in their daily environment and negatively influences all their interpersonal relationships. Although many learn to speak, some never develop the ability to communicate effectively, be it through verbal or nonverbal means. Unlike other disorders or disabilities where individuals do not have speech, some individuals with ASD lack the inherent capacity to communicate and are unable to compensate through nonverbal means (i.e. gestures, facial expression, body language, etc.). These difficulties can affect the child's interaction with others and negatively impact on other developmental areas. The importance of communication for the child's overall development and its significance for family members results in communication difficulties being a priority for intervention (Paris, 2000; Schwartz, et al. 1998).

1.4 Introduction to Augmentative and Alternative Communication

Augmentative and Alternative Communication (AAC) is defined as "the field or area of clinical/educational practice to improve the communication skills of individuals with little or no functional speech (Lloyd, Fuller & Arvidson, 1997, p.524). *Augmentative* refers to an approach to communication that provides an addition to natural speech and/or writing aimed at improving the effectiveness of communication. *Alternative* refers to interventions that are developed to temporarily or permanently replace speech. AAC systems include *unaided* systems that do not require external devices (e.g. gestures and signs) and *aided* systems that require external devices (ranging from low-tech communication boards to high-tech computer-based technology with voice output and/or print output) (Lloyd, Fuller & Arvidson, 1997; Mirenda, 2002).

AAC interventions are typically multimodal in their approach, and attempt to make full use of all the individual's communication abilities, including natural speech, gestures, signs, communication books and computer-based technology (Light, Roberts, Dimarco & Greiner, 1998, Mirenda, 2002). Current research in the field of AAC supports the use of a two-pronged model of assessment-intervention focusing both on the individual (to ensure that he/she develops the means and ability to communicate effectively) and on the facilitators/communication partners, to ensure that they provide both support and opportunities for the individual to communicate effectively (Beukelman & Mirenda, 1998; Light et al., 1998; Light, Dattilo, English, Gutierrez & Hartz, 1992). The overall goal should be to enhance the individual's functional communication within the context of his/her daily life (Light et al. 1998).

Practitioners in the field of AAC intervention seek to improve the communication skills of the AAC users and those who support them. This is only possible if practitioners know which interventions work. ***Evidence-based practice*** (EBP) has become an important focus in the field of research and clinical work.

EBP is defined at "the integration of the best and current research evidence with clinical/educational expertise and relevant stakeholder perspectives to facilitate decisions for assessment and intervention that are deemed effective and efficient for a given direct stakeholder" (Schlosser, 2003a, p. 2).

With growing interest in EBP in the fields of health care and education, it has become imperative that educators, clinicians, AAC users, parents, researchers and other relevant stakeholders critically evaluate the research in the field of AAC to ensure that the direct stakeholders (i.e. the AAC users) receive the intervention that is proven most effective (Schlosser, 2003 a, b). EBP is important to ensure accountability in clinical and educational practice; ensure that decision-making is based on research; and to inform researchers of the issues and gaps in the research. It places equal value on the expertise of clinicians and educators, the perspectives of stakeholders and the research evidence. For the researcher, EBP is a vehicle for translating research findings into practice and influencing the practices of clinicians and educators. The inclusion of stakeholder perspectives is important for any client-centred or family-centred approach to intervention (Schlosser, 2003 a, b).

Efficacy research in AAC involves a) demonstrating the acquisition, maintenance and generalisation of behaviour changes as a direct result of an intervention (*effectiveness*), b) comparing the effectiveness of two or more interventions along one or more criteria (*efficiency*) and c) demonstrating links between specific components of the intervention and specific changes (*effects*). Efficacy research is conducted under ideal conditions. The results of such research speak to the "probability of benefit" of an AAC intervention in a defined population for a specific communication difficulty under ideal conditions (Schlosser, 2003 b). ***Outcomes research*** involves the same process of demonstrating effectiveness, efficiency and effects, but under average or less-than-average conditions. The results of such research would only be applicable under average or less-than-average conditions of use (Schlosser, 2003 b). ***Outcomes measurement*** in AAC is a process used to index differences between observations before an intervention and observations made during or after an intervention (Schlosser, 2003 b).

This occurs on a continuum from efficacy research (under ideal conditions) to outcomes research (under average or less-than-average conditions). Typically, efficacy research should precede outcomes research (Schlosser, 2003 b).

Effectiveness can further be divided into *intervention effectiveness* (research studies evaluating the acquisition of behaviour change), *maintenance effectiveness* (studies evaluating the maintenance of behaviour change after treatment is terminated) and *generalisation effectiveness* (the degree to which a change in behaviour generalises to conditions beyond those in the instruction). ***Effects*** include *intermediate effects* (changes that are preconditions for using other interventions or changes that facilitate continued intervention), *instrumental effects* (changes resulting in effects other than those specifically targeted for further intervention) and *ultimate effects* (changes that reflect the objectives and goals that are the aim of intervention efforts) (Schlosser, 2003 b).

1.5 Augmentative and Alternative Communication in Autism Spectrum Disorders

Augmentative and Alternative Communication (AAC) offers the possibility of augmenting the comprehension and expression of many individuals with autism either temporarily or permanently (Light et al. 1998; Tincani, 2004). Without effective intervention, other strategies for communicating (e.g. pulling others, reaching for and grabbing a desired item, vocalising or crying) often develop (Beukelman & Mirenda, 1998). Children with autism need a clear and effective way to communicate in order to reduce frustration and reduce challenging or unacceptable behaviour (Howlin & Rutter, 1987; Webb, 2000). Intervention needs to focus on communication and include all available modes and forms of communication (Lord & Paul, 1997). Interventions that were developed to provide alternative communication strategies for children who do not develop speech involve non-vocal methods of communication including sign language, picture communication systems and electronic devices (Charlop-Christy, et al., 2002; Mirenda & Schuler, 1988; Reichle, Yorke & Sigafoos, 1991, Tincani, 2004).

Traditionally AAC interventions for individuals with autism have focused on the use of unaided modes of communication (gestures and signs) as most of these individuals have enough motor dexterity to produce signs and this mode of communication has the advantages of being portable, durable and accessible (Light et al., 1998). Although research does show that individuals with autism can successfully learn to use unaided communication, many have difficulty with producing spontaneous communication, understanding the symbolic nature of signs and combining signs to communicate more complex information. Furthermore, communicating with those who do not know the signs is difficult. Many of the traditional approaches to developing speech and communication in children with ASDs (e.g. speech imitation and signing) assume that attending, making eye contact and motor and verbal imitation are prerequisites for learning functional communication (Liddle, 2001; Webb, 2000).

These approaches are highly dependent on whether the child can make eye contact, sit still, respond to verbal instructions, and point. The instructional strategies used to teach AAC systems often rely on a lot of verbal and/or physical prompts (e.g. what do you want? Point to what you want). Children with ASDs can be unresponsive to such approaches and tend to lack spontaneity or become "prompt-dependent" (Bondy and Frost, 1994; Kravits, Kamps, Kemmerer & Potucek, 2002; Mirenda & Dattilo, 1987). These approaches start by requiring the child to respond to the adult's request and do not teach the child how to initiate social contacts (Baker, 2000; Webb, 2000). Recently, interest in the field of autism and AAC has shifted to investigating the use of aided communication systems with these individuals (Beukelman & Mirenda, 1998; Light et al., 1998; Mirenda & Mathy-Laikko, 1989). Although aided modes are not as portable or durable, they offer distinct advantages to this population. They are understood by a wider range of communication partners and they use visual symbols relying on visual-spatial processing, which is often a strength of individuals on the autistic spectrum (Light et al., 1998; Mirenda & Mathy-Laikko, 1989).

Interventions in this population must address the pragmatic aspects of communication and not only the form of the language (Mirenda & Mathy-Laikko, 1989). Highly structured intervention programmes that emphasise grammatic complexity and accuracy for beginning communicators, often result in failure to develop spontaneous communicators who understand that communication is a dynamic and interpersonal process (Locke & Mirenda, 1988, Mirenda & Santogrossi, 1985; Webb, 2000). In order for communication training to be functional, children should be able to generalise communication skills developed in training to other settings, situations and daily events. These skills should not only be used across environments, but should also be used spontaneously in appropriate contexts and in various settings. The effectiveness of an intervention should be judged by whether it promotes the acquisition and generalisation of functional communication skills (Schwartz, et al., 1998).

Wendt, Schlosser and Lloyd (2004), conducted a meta-analysis of research in the field of AAC in Autism between 1976 and 2004. This revealed only 263 published research studies of which only 127 used empirical research designs. Of these, 29 studies had design flaws and the majority (77) were single subject designs. As such, the application of various AAC strategies has limited empirical support and there is an urgent need to establish the effectiveness of these interventions in the ASD population (Mirenda, 2003). Which AAC strategies are the most effective for this population, remains controversial.

1.6 The Development of the Picture Exchange Communication System

The *Picture Exchange Communication System* (PECS) was developed especially for children with social-communicative deficits (e.g. ASD) to overcome the limitations of traditional communication training methods (e.g. speech imitation, sign language and picture pointing systems). PECS focuses on teaching functional communication as opposed to teaching speech production (Baker, 2001; Bondy & Frost, 2002; Charlop-Christy, et al., 2002, Liddle, 2001). It was developed to provide an effective AAC system for nonverbal children while minimising prompt dependency by teaching children to spontaneously initiate communication through the exchange of a picture to request a corresponding item or activity. It also provides consistent verbal models to encourage speech development (Kravits, et al, 2002).

"PECS has become a widely known and used augmentative system for teaching functional communication skills and potentially providing a bridge to speech acquisition" (Schwartz, et al., 1998, p.144). It has gained widespread use in the USA, UK, Europe, Australia and New Zealand; and most recently in developing countries. The popularity of PECS may be due to the following factors: it does not require a child to have any prerequisite skills, it is relatively low cost and simple, the system only requires basic motor dexterity on the user's part, it does not require the communicative partner to know an additional language (e.g. sign language), it is portable and can be used in various settings, it appears to facilitate speech development, it can be taught to an individual relatively quickly and it incorporates functional communication promoting meaningful interaction between the individual and the environment. The system is developed around the child's greatest motivators, thus making communication more rewarding and meaningful (Bondy & Frost, 1998a, 2002; Charlop-Christy, et al., 2002; Kravits et al., 2002; Liddle, 2001; Webb, 2000).

The main objective of PECS is to help children develop a functional communication *system* and acquire functional communication *skills*. It teaches children to initiate communication within a social context. PECS combines a behavioural and functional developmental approach and is based on principles of behaviour analysis. It therefore focuses on acquiring a sequence of functional behaviours and uses developmental guidelines with an emphasis on functional language. The teaching protocol also incorporates a number of previously researched techniques, namely child choice and preference, time delay, environmental arrangement and differential reinforcement (Kravits, et al, 2002). Although it initially teaches spontaneous requesting, it rapidly progresses to teaching sentence structure, vocabulary concepts and commenting. Children do not need to reach a certain developmental age before PECS training can begin. The only prerequisite skill is that the child can clearly indicate what he or she wants (e.g. by reaching for a desired item). Although frequently used with nonverbal children with autism, it has also been suggested that the PECS has been used effectively with those children who *say* some words, but *do not initiate* with these words (Bondy & Frost, 1998a, 2002; Tincani, 2004).

1.7 Review of Previous Research in Picture Exchange Communication Systems

Despite its growing clinical use, very few well-controlled, empirical investigations have been conducted to test the effectiveness of PECS. Support for PECS has come from anecdotal reports, programme evaluation data, and A-B design case studies (Charlop-Christy, et al., 2002; Kravits, et al., 2002). The Wendt, Schlosser and Lloyd (2004) meta-analysis revealed only 7 PECS intervention studies of which only 3 single-subject designs were included (Charlop-Christy et al., 2002; Kravits, et al., 2002; Tincani, 2004). Three descriptive studies were excluded due to deficient quality and a group study was analysed separately. Of the 3 studies included in this meta-analysis, the 2 studies showed highly effective treatment outcomes (Kravits, et al., 2002; Tincani, 2004), while the other study showed unreliable treatment results (Charlop-Christy et al., 2002). Few published research studies are available to support the use of PECS, although many papers have been presented at various international conferences. Both pilot studies and long-term studies are presently underway in various countries around the world. Initial studies suggest that most children trained to use PECS acquire independent use of the system and may even acquire functional speech (Bondy & Frost, 1994, Charlop-Christy et al, 2003; Schwartz et al. 1998).

The first study of PECS was published by its developers, ***Bondy and Frost (1994).*** They reported on 66 preschool children with ASDs and learning difficulties who were trained in the use of the PECS. The results of the study showed that 39 (59%) children developed speech and no longer used their PECS; 20 (30%) developed speech while continuing to use the PECS; and 7 (11%) did not develop speech but learned to use the PECS after more than a year. Anecdotal reports also suggested that PECS training resulted in decreased problem behaviour and improved social behaviour (Bondy & Frost, 1994; Peterson, Bondy, Vincent & Finnegan, 1995). Bondy and Frost have since published the PECS training manual and training materials, various other articles and books (Bondy, 2001; Bondy & Frost, 1998a; Bondy & Frost, 2002; Frosty & Bondy, 2002).

Schwartz, Garfinkle and Bauer (1998), conducted two studies documenting the implementation of PECS in 31 preschool children with ASDs and a range of other developmental disabilities (involving severe social, communicative and cognitive delays). This involved the collection of programme evaluation data from a 4-year period in which PECS was included as part of a comprehensive education programme. Due to the lack of experimental control, it is not possible to directly attribute the cause of growth in communication to the PECS training. Data from these studies did suggest that in terms of rate of acquisition, spontaneous use and generalisation of PECS use, PECS appeared to teach functional communication. The children acquired the system relatively quickly and they also used the system to communicate with different people across settings. The children also demonstrated the mastery of different communication functions and 44% (N=31) of the sample demonstrated a marked increase in speech output.

Webb (2000), reported on a UK study of a class of 6 children with ASDs and severe learning difficulties, and found that all the children could be taught to use PECS and be motivated to communicate spontaneously across various contexts. All 6 children developed spontaneous speech, which they used with and without the pictures. Webb found that the PECS appeared to facilitate their understanding of the purpose of communication and how to communicate effectively with others to meet their needs. This was an anecdotal report from an educator's perspective. This study had no experimental control and the researcher relied on her working knowledge of the children prior to the PECS training and parental reports.

Baker (2001) reported on the first pilot project for PECS in the UK, considering the effectiveness of PECS with a group of 34 children with autism in 8 special schools in England. Although no experimental control was used, an independent evaluation of the project was conducted by Howlin and Magiati (2001). They found that following the PECS training, the children made rapid and noticeable gains in their PECS vocabulary and frequency of use over time. They also found that their communication skills improved, although this occurred more slowly.

Data from the project was then collated by the PECS consultants and their findings were similar to those of the independent evaluation, supporting their conclusions. All the children made progress through the phases of PECS with 85% (N=34) of them reaching the level of sentence structures and above. Educator perspectives reported in questionnaires concluded that the PECS intervention resulted in the greatest changes in the areas of 'communication' and 'initiation', improvements in speech, vocalisations and eye contact; and significant improvement in behaviour was reported for 53% (N=34) of the children. All educators reported that the PECS had affected their teaching style, whereby they allowed more student initiation and reduced their own verbal input (Baker, 2001).

Frea, Arnold, & Vittimberga (2001) reported on a single-case study employing a multiple baseline design (MBD) to investigate the effects of PECS on severely aggressive behaviour. The subject was a boy with autism, taught to use PECS in an integrated preschool setting. Results indicated that his aggressive behaviour was extinguished in a short period of time when PECS was implemented. The researchers recommended the integration of augmentative communication intervention (such as PECS) into planning of behavioural support for such children.

Liddle (2001) reported on the establishment of PECS in a special school setting in a joint effort between educators and speech and language therapists with 21 children with ASD and severe learning difficulties (SLD). Results showed that 20 of the children learned to use PECS. One child failed to achieve Phase I and was excluded from the project. Of the 20 children remaining, 55% (N=20) learned to use the sentence strip (Phase IV onwards with 72% of these children (N=11) combining up to 4 pictures to request items or comment on things) and 45% (N=20) learned single picture exchanges (Phase I-III). Nine of the children (42%) (N=20) had increased attempts at spoken language (seven using single words, one using sentences and one attempting words, but unintelligible). Results showed benefits for children with ASD or severe learning and communication difficulties.

There was no control group and future research was recommended using a control group (either a separate group of non-PECS users or the PECS users as their own controls) to compare progress in requesting and commenting behaviours and investigate speech output before and after the PECS training (Liddle, 2001).

Teacher, parent and *clinician perspectives*: Teachers reported improvement in some of the children's ability to participate in class activities (especially group activities) and understand group rules. Parents reported that they found it easier to communicate with their children and liked having a communication system that their child understood and enjoyed. The researcher (one of the clinicians) felt that PECS was a way to extend the communication skills of a group of children that had previously been unable to initiate communication with adults or peers. She reported that the children who had progressed to the later phases could use concepts such as colour, shape and number. They could communicate both general requests and specific information. The researcher made recommendations for implementing PECS effectively in a school setting. Proper training and support for staff and parents, additional support in terms of material preparation and extra hours of therapy were felt to be essential. Liddle (2001) suggested that PECS should only be implemented when the teachers have attended a training course and have an extra staff member in the class for the initial phases of the training.

Adkins & Axelrod (2002) employed an alternating treatments design to evaluate the effectiveness of two approaches, the *PECS* (selection-based responses) and *American Sign Language* (topography-based responses). Selection-based responses consist of pointing to or selecting a stimulus from a selection (e.g. communication boards, PECS), while topography-based responses involve giving a response with the consequences contingent upon certain characteristics of topography (e.g. sign language, writing or speaking). The authors reported an increase in the use of selection-based techniques in AAC for individuals with severe language delays, with no empirical support for these interventions (Adkins & Axelrod, 2002).

While most research has focused on tacts (comments) and intraverbals, there has been little focus on mands (requests). Mands have been proposed as the first type of verbal relation acquired by humans (Skinner, 1957). This study investigated the ease of acquisition of the two systems, spontaneous use, and generalisation of mands trained in the two approaches. The single subject was a boy (aged 7 years) with a diagnosis of Pervasive Developmental Disorder (PDD) and attention deficit hyperactivity disorder (ADHD). Measures were taken in the naturalistic classroom setting in 4 different types of sessions (PECS training sessions, sign language training sessions, and sessions testing the generalisation for each condition) (Adkins & Axelrod, 2002).

The researchers concluded that PECS was a more effective method for this child and its use generalised to other conditions. The use of PECS produced a better rate of acquisition, more spontaneous use and higher rates of generalisation than the sign language. The subject started with a blank stare and a lack of focus, but learned to scan the PECS pictures before presenting the appropriate one to the researcher. Overall, more words were uttered in the PECS conditions than the sign language conditions. Future research was recommended to investigate improvement in scanning repertoires, the comparison of PECS with other approaches, and the investigation of the theory that PECS encourages vocalisations (Adkins & Axelrod, 2002).

A study conducted by ***Charlop-Christy, Carpenter, Le, LeBlanc & Kellet (2002)*** supported the use of PECS by providing empirically-controlled data on the PECS programme, using a multiple baseline design across 3 participants. The findings demonstrated the efficacy of PECS with 3 children with autism, the emergence of speech and the collateral gains in social-communicative behaviours and simultaneous decreases in challenging behaviours. All 3 children in this study mastered PECS (Phases I – VI) within a relatively short time. One of the most important findings of this study was the significant increase in speech of the subjects (measured using mean length of utterance). More speech gains were noted when a delay was incorporated in the training procedure.

Emergent speech also occurred with unfamiliar adults in non-training settings. This suggests that the PECS programme promotes the generalisation of skills by encouraging interactions with different trainers throughout the day in a number of natural settings. The small sample size was the main limitation of this study and replication with additional subjects was recommended (Charlop-Christy et al., 2002).

Kravits, Kamps, Kemmerer & Potucek (2002) employed a multiple baseline design across settings with 1 participant (aged 6 years). This study demonstrated the effectiveness of PECS in increasing spontaneous communication for a young child with autism, supporting earlier descriptive studies. It expanded on previous findings by including the home setting in the intervention. The participant demonstrated successful use of the augmentative system and an increase in the frequency of spontaneous language across settings. Intelligible verbalisations also increased in 2 of the 3 settings, although there was no significant increase in the range of spoken vocabulary during the intervention. The impact of PECS on social interaction was also investigated. PECS was combined with social skills training and the results showed an increase in the duration and frequency of peer interaction. This provided evidence of the social validity of the system in the school setting, although the introduction of the social skills training at the same time as PECS is a confounding factor. The participant only received training up to Phase III of PECS and there was also no generalisation or maintenance probes. Future research was suggested with multiple participants at varying levels of functioning, long-term studies with the completion of the 6 training phases and alternative social interventions in combination with PECS.

Heneker & Page (2003) evaluated the effectiveness of introducing PECS intervention in whole classes in the school setting. The authors investigated two groups of learners with ASD, a class of children aged 6 - 8 years and a class of children aged 9 - 10 years. Observations of the amount, function and form of communication and the level of adult support required were recorded across 4 settings (free play, snack, swimming and structured teaching).

The results were as follows: group 1 (6-8 year olds) increased in the amount of communication during all activities (except swimming), requesting was the most frequent function during baseline and follow-up and the form of communication was symbols at baseline and in the follow-up it was symbols in snack and structured teaching and physical communication in free-play and swimming. In group 2 (9-10 years olds), total communicative acts increased for all activities except for structured teaching (where more independent skills of commenting were taught for the first time). Requesting was again the most frequent function and more formal means of communication were observed. In a follow-up, the children in this study showed less frustration, accepted when their requests were not always met and waited patiently for adult attention.

Magiati & Howlin (2003) conducted a pilot study to determine the effects of training educators of learners with ASD in the use of the PECS. Thirty-four children in 8 special schools were selected. The educators attended a 2-day PECS workshop and 6 half-day consultations with PECS consultants. Data was collected before and at set times after the workshop for the participant's use of PECS, spontaneous communications and adaptive behaviours. The majority of the children improved in their ability to use PECS, had significant and rapid increases in level of PECS attained, frequency of communicating using PECS, increased the amount of vocabulary used over time. Improvements in overall levels of communication were slower to occur.

Ganz & Simpson (2004) investigated the effect of PECS on communicative requests and speech development in 3 children with ASD and developmental delays (aged 3years 9months, 5years 8months and 7years 2months) using a single-subject design within subjects (inter-rater coefficients 92 - 94%). The three variables recorded were length of time to master each phase (Phase I – IV), number of intelligible spoken words and the presence of non-word vocalisations. All three participants rapidly mastered the four PECS phases taught (in an average of 23 sessions).

There were large gains in mean number of words per trial for all three participants, particularly in Phase III and IV (except one participant, who only increased her number of words in Phase IV). The trainers consistently modelled complete sentence requests throughout the training and the two participants that showed gains in Phase III were echolalic and it was speculated that this training may have provided an opportunity to utilise echolalia in a functional context. The participants also used longer phrases and more complex syntax by the end of the training, increasing from single and two- word utterances to three- and four word utterances. The delayed verbal modelling in Phase IV occurred at the same time as a large increase in word per trial was evident for each participant (Ganz & Simpson, 2004).

Due to fluctuations on non-word vocalisations and no clear visual pattern, the researchers concluded that there was no clear relationship between changes in spoken words and the use of non-word vocalisations. Recommendations for future research included: direct replication of the study with individuals with similar characteristics (systematically investigating the relationship between PECS and speech development) to establish external validity; systematic replication (to determine the characteristics of PECS that resulted in increases in word utterances in the study) and measures of fidelity of implementation (to determine how consistently the training is implemented according to the protocol in the PECS manual). The authors emphasised the importance of bringing the positive results of the research to the attention of educators to develop awareness of the possibilities of AAC systems in this population (Ganz & Simpson, 2004).

Tincani (2004) employed an alternating treatments design with 2 participants (aged 5 years 10 months and 6 years 8 months) comparing the effect of PECS training and sign language training on the acquisition of mands (requests) and the effect of the different modalities of training on vocalisations. The findings of this study were mixed. For one participant, PECS training produced a higher percentage of independent requests, while the sign language training produced a higher percentage in the other participant. For both participants, the sign language training produced a higher percentage of vocalisations.

This suggests that acquisition of PECS and sign language may vary as a function of individual characteristics, particularly motor imitation skills prior to training (the participant with moderate hand-motor imitation skills performed better in the sign language training, while the other participant had weak hand-motor imitation skills). The sign language training procedure used a second trainer to physically prompt the child, an adaptation of the PECS training procedure (Tincani, 2004).

In this study, PECS training only occurred up to Phase III of the training, therefore the lack of vocalisations cannot be generalised to children who have received all 6 phases of training. Bondy and Frost (1994) reported that vocalisations generally developed during the later phases of PECS training (a time delay of 3-5 seconds is introduced in Phase IV). Tincani (2004) introduced a reinforcement delay procedure of 4 seconds during Phase III, which increased the participant's speech (not part of the PECS protocol). Procedural limitations of this study included: the use of only one listener (communicative partner), the stimulus preference assessment used sequential presentation of single items without choices, fluctuating circumstances in the setting which threatened internal validity, and a limited number of communication opportunities within the training sessions. Several areas for future research were suggested, namely fluency (the optimal rates of response to establish fluency of PECS and sign language use), instructional efficiency (the teaching procedure that is most efficient at producing the desired outcome in as little instructional time as possible) and speech development (possible procedural modifications to stimulus presentation to enhance speech production) (Tincani, 2004).

Ganz, Cook, Corbine-Newsome, Bourgeois & Flores (2005) conducted a case study with a single participant, a 5 year 1 month old girl with significant global developmental delays with ASD characteristics. Due to the participant's failure to reach criterion level for Phase I, the authors altered the training protocol using a single trainer to teach the child to touch a transparent box with a preferred item in it, to pick up the box (with a photograph of the item attached) and then to discriminate between two boxes (one with a preferred item and the other with a non-preferred item) and then to discriminate between two boxes containing preferred items.

Finally the two boxes were removed and the photographs remained and the participant had to discriminate between the photographs. The error correction and correspondence check procedures were used from the original PECS protocol. Although unable to make independent exchanges (Phase I) after 33 sessions, the participant was able to master each of the adapted phases (noticeably the photograph discrimination) at or above the 80% criterion level. The authors recommended that when designing a communication system for learners with ASD, one needs to incorporate a variety of strategies and techniques from effective practice. By introducing more concrete methods of learning and a more gradual process of selecting and exchanging pictures, the authors were able to promote the acquisition of new skills, although still within a limited setting (a controlled training setting within her home) and with limited choice of two items only. Future training was recommended to generalise communication skills to different settings, communicative partners and a wider variety of items. The importance of addressing the unique needs of individuals with ASD by tailoring communication skills training based on empirical investigation and collective expertise was highlighted (Ganz et al. 2005).

In *summary* (see Table 2 below), there are a growing number of research studies into the effectiveness of PECS, with data coming from programme evaluations, anecdotal reports, pilot studies, case studies and empirical studies (mostly single-subject experimental designs including MBDs across participants and settings, changing criterion design, and alternating treatments design comparing PECS and sign language intervention). Participants in these studies were initially children with ASD in preschool settings with little or no functional speech, but recent studies have included children with Severe Learning Difficulties (SLD), and Developmental Delays (DD), ages ranging from 3 to 12 years and varying levels of speech ability (including those with no speech, limited functional speech, those with single words and short utterances when prompted and those that lack communication skills). There have been limited research studies comparing PECS intervention to other interventions (e.g. sign language) to determine efficiency of this AAC system (Adkins & Axelrod, 2002; Tincani, 2004).

There have also been a range of variables measured in these studies including: measures specific to **PECS** (rate and ease of PECS acquisition, number of independent exchanges, level of adult support required, level of PECS attained, spontaneous use of PECS, frequency of PECS use - requests, and PECS vocabulary), **communication skills** (spontaneous communication, observations of form and function of communication), and **speech** and **language skills** (spoken language use, spontaneous speech and imitation, mean length of utterance, number of words spoken, and complexity and length of phrases). Many of the behavioural changes were measured in a variety of contexts and with a variety of communication partners, to investigate **generalisation effects**. The impact of PECS on social-communicative behaviours (i.e. play, joint attention or eye contact), social interaction, non-word vocalisations, and challenging behaviours has also been investigated in some studies. A few studies have included the **perspectives** of educators, parents and clinicians (e.g. questionnaires). This makes the synthesis of results more complicated, as certain outcomes are targeted by the PECS Training, while others seem to be collateral gains in non-targeted behaviours (e.g. speech, social interaction, challenging behaviour, complexity and length of utterances).

In general, the research indicated that implementing PECS resulted in successful use of the AAC system, with positive outcomes reported in initiations, frequency of use, independent exchanges to request and gains in speech, social behaviour and communication skills for some participants and decreased challenging behaviours. Most children in these studies learned to use PECS relatively quickly and easily, except for 2 children specifically mentioned by Liddle (2001) and Ganz et al. (2005) as participants who were unable to learn the independent picture exchange (Phase I). There have also been promising results in terms of the generalisation effects of the PECS intervention, with PECS use generalising to other communication partners and settings. This would suggest that PECS can be an effective intervention strategy for children with ASD and developmental delays (Adkins & Axelrod; 2002; Baker, 2001; Bondy & Frost; 1994, Bondy & Frost, 1998a; Charlop-Christy et al., 2002; Frea et al.; 2001; Ganz & Simpson, 2004; Kravits et al. 2002; Heneker & Page 2003; Liddle, 2001; Magiati & Howlin, 2003; Schwartz et al., 1998; Webb, 2000).

Table 2: Summary of Previous PECS Research

Study	Research Design	Number of Participants	Ages	Speech Skills	Variables Measured	Outcome
Bondy & Frost (1994)	Programme Evaluation data	66 children with ASD and SLD	Preschool	Mostly non-verbal	- Acquisition - Use of PECS after a year	59% Speech ; 30% Speech+ PECS ; 11% PECS Improved social behaviour and decreased problem behaviour
Schwartz et al. (1998)	Programme Evaluation data	31 children with ASD and DD	Preschool	Mostly non-verbal	- Rate of Acquisition, - Spontaneous use - Generalisation	Teaches functional communication, acquired relatively quickly, generalised to different people & settings, mastered different functions 44% marked increase in speech output
Webb (2000)	Anecdotal report of educator (1 year study)	Class of 6 children ASD and SLD	55 – 70 months	Limited communication skills, echolalic speech.	- Acquisition - Motivation - Generalisation	All learned PECS & motivated to use; generalised use. All developed spontaneous speech (with and without PECS). PECS facilitated understanding of effective ways to communicate needs.
Baker (2001)	Pilot Project in UK – single case report design – each child as own control.	34 children with autism and DD in 8 special schools	Mean age 7.8 years	60% non-verbal or using occasional single words 80% no prior PECS training	- PECS vocabulary - Frequency of use Questionnaires - teachers	All made progress through PECS phases. 85% reached Phase IV-VI. Teachers reported: greatest changes reported in communication and initiation, improved speech, vocalising and eye contact. 53% reported improved behaviour. All reported change in teaching style (allows more initiations, reduce verbal input).
Frea et al. (2001)	MBD	1 child with autism	Preschool		Aggressive behaviour	Implementing PECS extinguished aggressive behaviour.
Liddle (2001)	Programme Evaluation data – school setting	Started with 6 children with autism, later included 15 children with ASD and/or SLD	Not in article	Initial 6 – little or no functional speech. Further 15 – lack of comm. skills with educator & peers	-Acquisition of PECS - Phase Progression -Spoken language use	20 learned to use PECS. 1 child failed to achieve Phase I (excluded from the project) 55% (N=20) learned to use the sentence strip (Phase IV onwards with 72% of these children (N=11) combined up to 4 pictures to request items or comment on things 45% (N=20) learned single picture exchanges (Phase I-III). 9 children (42%) - increased attempts at spoken language (7 using single words, 1 using sentences and 1 attempting words, but unintelligible). Teacher, parent and therapist perspectives discussed.
Adkins & Axelrod (2002)	Alternating treatments design (PECS vs. American Sign Language)	1 subject – PDD and ADHD	7 yrs	No spont. speech. Vocabulary: 3-5 sign words and 10-15 PECS words.	- Ease of acquisition - Spontaneous use - Generalisation of mands (requests)	PECS - more effective method, generalised to other conditions. The use of PECS produced a better rate of acquisition, more spontaneous use and higher rates of generalisation than the sign language. Overall, more words were uttered in the PECS conditions than the sign language conditions. Anecdotal information – child started with a blank stare and a lack of focus, but learned to scan the PECS pictures before presenting the appropriate one to the researcher.

Study	Research Design	Number of Participants	Ages	Speech Skills	Variables Measured	Outcome
Charlop-Christy et al. (2002)	MBD across participants	3 participants with autism	12 yrs 3.8 yrs 5.9 yrs	Ltd. spont. speech Non-verbal (Some imitation of gestures and some sounds) No spont. speech	- PECS Acquisition - Spontaneous speech - Verbal imitations - MLU Social-communicative behaviours (i.e. play, joint attention or eye contact) Challenging behaviours	Significant increase in speech (esp. Phase IV when delay procedure introduced) Emergence of speech also generalised (unfamiliar people and settings) Collateral gains in social communicative behaviours and simultaneous decreases in challenging behaviours.
Kravits et al. (2002)	MBD across settings	1 participant with autism	6 yrs	Used 1-2 word utterances with prompting	- Use of PECS (Phase I-III) - Frequency of spontaneous language - Impact on social interaction (Across settings)	Demonstrated the effectiveness of PECS in increasing spontaneous communication. Successful use of augmentative system. Increase in frequency of spontaneous language across settings. Intelligible verbalisations increased in 2 settings No significant increase in range of spoken vocabulary during PECS training. Increase in duration and frequency of peer interaction (when combined with social skills training).
Heneker & Page (2003)	Classroom evaluation	Classes of Learners with ASD in the school setting	Class 1: 6-8 yrs Class 2: 9-10 yrs	Limited speech and communica-tion skills	Observations: - Amount, function & form of communication - level of adult support required (Across 4 settings)	Class 1: increase in amount of communication in all activities (except swimming). Requests - the most frequent function during baseline and follow-up. Form of communication was symbols at baseline and in the follow-up it was symbols in snack and structured teaching and physical communication in free-play and swimming. Class 2: total communicative acts increased for all activities except for structured teaching. Requesting - most frequent function and more formal means of communication were observed. Follow-up - children showed less frustration, accepted when their requests were not always met and waited patiently for adult attention.
Magiati & Howlin (2003)	Pilot Study - effects of training educators	34 Children with autism and DD in 8 special schools	Mean age 7.8 years	60% non-verbal or using occasional single words 80% no prior PECS training	- Use of PECS - Spontaneous communication - adaptive behaviours	Most children improved in their ability to use PECS, had significant and rapid increases in level of PECS attained, frequency of communicating using PECS, increased the amount of vocabulary used over time. Improvements in overall levels of communication were slower to occur.

Study	Research Design	Number of Participants	Ages	Speech Skills	Variables Measured	Outcome
Ganz & Simpson (2004)	Changing Criterion Design	3 participants with ASD and DD	3.9 yrs 5.8 yrs 7.2 yrs	All had ltd. speech (not used functionally/ consistently)	- Number of words spoken - Complexity and length of phrases - Non-word vocalisations	Rapid mastery of PECS (average 23 sessions) Large gains in Mean number of words per trial in all 3, especially in Phase III and IV. More complete syntax (from 1 and 2 word utterances to 3 and 4 word utterances) – large increase during delayed prompt in Phase IV. No clear relationship between change in spoken words and use of non-word vocalisations.
Tincani (2004)	Alternating Treatment design (PECS vs. sign language)	2 participants with ASD Autism and mental retardation PDD-NOS	5.10 yrs 6.8 yrs	Imitate some words with prompting – no spont. speech Imitate words and phrases – no spontaneous speech	Phase I-III - Acquisition of mands (requests) - Effect on word vocalisations	Mixed results PECS produced higher percentage of independent requests for one participant and sign language produced higher percentage of requests in the other participant. Acquisition of PECS and sign language – dependent on individual characteristics (e.g. motor imitation skills) Both PECS and sign language training using second trainer for physical prompting.
Ganz et al. (2005)	Case Study	1 participant with significant global DD with ASD features	5.1 yrs	No speech	- No. of independent exchanges - 80% Criterion for each adapted phase	Failed to reach criterion: Phase I – altered training protocol. Unable to make independent exchanges (Phase I) after 33 sessions, was able to master each of the adapted phases at or above the 80% criterion level. Recommended incorporating a variety of strategies and techniques from effective practice when designing a communication system.

Rationale for this Study

To date, a thorough search of the literature and collaboration with the developers of PECS has indicated that there has not been any research into the use of the *Picture Exchange Communication System* (PECS) in the South African context. It is therefore important that pilot research be conducted to determine the effectiveness of PECS for individuals with ASD within the South African context. With the growing number of interventions available for this population, it is important that the interventions recommended by clinicians be supported by evidence and research demonstrating the effectiveness of the intervention (Schlosser, 2003a). Its pragmatic features and potential benefit, has led to PECS being accepted by many in the autism intervention community. However, its widespread use has preceded the empirical evidence needed to support it (Charlop-Christy, et al., 2002; Kravits, et al., 2002).

This study has been prompted by the research implications of previous studies and the researcher's clinical experience of working with children with ASD. AAC systems are commonly introduced when individuals are non-verbal; hence most of the previous PECS research has focused on young, non-verbal children with autism (Baker 2001; Bondy and Frost, 1994; Ganz & Simpson, 2004; Schwartz, et al., 1998; Tincani, 2004; Webb, 2000). The research has also focused on the acquisition and use of the system, the initial phases of the PECS training and the speech skills of these children. To date there has been limited evidence of the effectiveness of PECS for developing ***requesting*** and ***commenting*** behaviour, which are the behaviours targeted by the training protocol (especially commenting which is taught in the final phase of the training) and the impact of PECS on the communication profile (forms and functions of communication) and pragmatic skills of the individuals that use it. Further perspectives from educators, parents and clinicians are also required.

Many children with ASD who present with some spoken language often receive more traditional speech therapy intervention. Because they are verbal, AAC systems are not considered appropriate. In the researcher's clinical experience, many of these children (even those who reach more complex language levels through traditional intervention) experience difficulty in understanding the meaning and function of language. Language learning appears to be very mechanical, situation-specific and occurs in a non-functional manner. Although some individuals are able to produce sentences, they do so in structured, familiar activities, but these skills often do not generalise and are rarely used in spontaneous, meaningful communicative exchanges.

Clinical observations indicate those children with some spoken language (but limited use of their language to communicate effectively) who were introduced to PECS, developed a general awareness of the function of language, improved in their ability to direct their initiations to a communication partner, and on reaching Phase IV (when sentence structure is introduced) of the training, showed almost immediate gains in their language structure and complexity. It was therefore felt that this study would provide empirical evidence for this subgroup of children with ASD, to determine the effects of the introduction of PECS on their requesting and commenting behaviour, length of verbal utterances and language structure and complexity. The impact on their communication profiles and pragmatic skills as well as the educator and parent perspectives on this AAC system were also investigated. The researcher hoped to add to the current available research evidence in order to help inform decision-making with regard to AAC interventions for these children in the future.

Chapter Two

Methodology

2.1 Aims

The main aim of this study was to determine the effect of introducing the *Picture Exchange Communication System* (PECS) on the frequency of requesting and commenting behaviour of 2 children with autism spectrum disorders (ASD). These children presented with *some* verbal language, but limited *use* of their language abilities to communicate effectively.

The subsidiary objectives of the study were to:

1. To investigate whether the expected behaviour changes occurred during the phases of the PECS training that targeted these behaviours (*intervention effectiveness*).
2. To determine the *effect* (if any) of the PECS training on the *length of verbal utterances* of each participant.
3. To monitor each participant's progress *during* the PECS training and skill maintenance *after* PECS training.
4. To determine the impact of the PECS training on the structure and complexity of each participant's verbal utterances.
5. To investigate the effect of the introduction of the PECS on each participant's communicative profile.
6. To investigate the effect of the introduction of the PECS on each participant's pragmatic skills.
7. To investigate the parents' and educators' perspectives on the respective participant's communication skills before and after the PECS training, their attitude towards AAC interventions and the impact of the PECS training on each participant (the benefits, limitations and difficulties and their ideas for the way forward).

2.2 Research Design

A **mixed research design** involving a *quantitative* component and a *qualitative* component was employed. The *quantitative* component was a *single-subject experimental design* involving a ***multiple baseline design*** (MBD) *across 2 behaviours* (i.e. requesting and commenting). This design was replicated with two participants to measure the effect of the introduction of PECS (consisting of 6 different phases of training) on multiple dependent measures i.e. *requesting* and *commenting* for each participant, as well as effect on mean length of utterance (Charlop-Christy, et al. 2002; Christensen, 2001; McReynolds & Kearns, 1983; Schlosser, 2003d). The MBD was used to evaluate behaviour changes in the *requesting* and *commenting* behaviours that are targeted in this AAC intervention (i.e. PECS). Data was collected at regular intervals in structured and unstructured settings before, during and after the PECS training. Data was also recorded in a follow-up stage (to investigate maintenance). Continuous data collection is preferred as it provides a complete picture of the participant's performance (Schlosser, 2003d). The *qualitative* component consisted of the *expansion type* to extend the range of results, by using different methods (e.g. semi-structured interviews, language sampling and analysis and profiles) to address the various objectives of this study (Christensen, 2001; McMillan & Schumacher, 2001).

Due to the heterogeneity of the characteristics of children with autism spectrum disorders (ASDs), attempts to employ standard research methodology to determine effectiveness of treatments for this population have been problematic (Lord & McGee, 2001). It has even been suggested that this heterogeneity of characteristics is as much a defining feature of ASD as the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) (American Psychiatric Association, 2000) criteria (Lord & McGee, 2001). Even when matched for age, gender, diagnosis, and IQ score, these children may well present with different characteristics in other areas (e.g. communication skills, play skills, challenging behaviours).

It is therefore very difficult to match these individuals to controls, and random assignment within a relatively small, heterogeneous sample does not ensure equivalent groups (Lord & McGee, 2001).

Single-subject experimental designs are the most commonly used research designs for AAC intervention studies in this population and offer a sound basis for determining the efficacy of AAC interventions (Schlosser, 2003, Wendt, Schlosser & Lloyd, 2004). Wendt, Schlosser and Lloyd (2004) conducted a meta-analysis of all the AAC intervention studies in the ASD population between 1976 and 2004. According to this meta-analysis, 77 out of the 127 empirical studies (61%) utilised single-subject experimental designs (Wendt, Schlosser and Lloyd, 2004).

According to McReynolds and Kearns, (1983), the *advantages* of using single-subject designs include:

- the ability to use a small number of participants selected directly from the population to which the treatment applies,
- allowing more in-depth analysis of behavioural changes during treatment and,
- allowing pilot research of new intervention strategies in an applied setting.

Many AAC interventions cannot be readily unlearned or reversed. The *multiple baseline design* (MBD) therefore has greater applicability to AAC research (Schlosser, 2003d). The participants in this study were trained to use an augmentative communication system that, for ethical reasons, could not involve a reversal phase whereby the AAC *system* would be removed. Rather, there was a withdrawal of treatment in the Post-Training and Follow-up Stages, when no further direct PECS *training* occurred. An MBD design was therefore selected for this intervention study. In this design, the intervention is introduced in sequence rather than simultaneously across the 2 behaviours (requesting in Phase I and commenting in Phase VI) (Schlosser, 2003d). The PECS training sequence lends itself to systematic probing throughout the training to investigate its effect on the behaviours observed. While requesting behaviour is the focus of the initial phases, the focus of training in the final phase shifts to commenting behaviour.

The MBD initially establishes a baseline for each behaviour and any noticeable changes in the behaviour measures after initiating the specific phases of the PECS training that target each behaviour would therefore be considered the effect of the intervention (McReynolds & Kearns, 1983, Schlosser, 2003d).

The verbal utterances of each participant were recorded during each session to determine the *mean length of utterance* for each session. This measure was used to determine the effect of the PECS training on the length of verbal utterances of each participant. Although speech development is not a direct aim of the PECS Training, an increase in speech output has been reported as a positive outcome of training in some individuals (Bondy & Frost, 1994, Schwartz et al., 1998; Liddle, 2001; Adkins & Axelrod, 2002; Charlop-Christy et al., 2002; Kravits et al., 2002, Ganz & Simpson, 2004). The researcher wished to demonstrate any *instrumental effects* that occurred without direct intervention.

2.3 Participant Information

2.3.1 Description of the School Context

A South African ELSEN (Education for Learners with Special Education Needs) school for learners with autism was the setting of this research study. The natural school setting was selected to promote generalisation of skills, as is consistent with the best practice literature (Koegel, 2000). The school caters for learners with ASD between the ages of 3 – 18 and consists of 11 small classes (between 6 to 8 learners) with each class having an educator with one assistant. The school has an eclectic approach to intervention that emphasises early intervention, individual educational programmes (IEP), individual and group interventions, therapeutic interventions (including occupational therapy and speech therapy input), autism-specific methods such as TEACCH (Treatment and Education of Autistic and related Communication-handicapped CHildren), and the use of AAC systems such as Makaton and PECS. The educators and assistants are typically trained in these interventions by recognised individuals or consultants in the field.

As such, this is not a typical school setting in the South African context, with only 4 other government schools in the country providing specialised services for individuals with ASD. There was only one speech therapist at the school (the researcher). Approximately half the learners (about 40 children) had little or no functional speech. The school held the first 2-day PECS training course in the country (run by the Director of Pyramid Educational Consultants, UK and another PECS consultant) in April 2004 and this was followed up with 2 full days of consultation and a 1-day PECS Workshop: Review, Practise and Problem-Solving in July 2005, also followed by 2 full days of consultation with the 2 PECS consultants. The PECS programme had been operating at the school for approximately a year before the research study took place.

2.3.2 Sample Size

The sample consisted of 2 children diagnosed with Autism Spectrum Disorder (ASD) attending a special school for learners with autism. The training of these children involved the school speech therapist (as the researcher and primary trainer) and the educator and class assistant of each child. The primary caregiver(s) of each child were also participants in the data collection process.

2.3.3 Participant Selection Criteria

In a multiple baseline design (MBD) it is critical to match participants as closely as possible. Using participant selection criteria helps to minimise sources of variability (Bedrosian, 2003). The following selection criteria were established for this study:

1. Participants were required to have been diagnosed by a multidisciplinary team (including an educational psychologist, educator, occupational therapist and speech therapist) with a Pervasive Developmental Disorder – Autistic type, according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) (American Psychiatric Association, 2000). Participants had to be rated on the severely autistic section of the *Childhood Autism Rating Scale* (CARS) (Schopler, Reichler & Renner, 1988). This ensured that the participants represented the population under investigation.

2. Participants were required to attend the same Western Cape Education Department ELSEN (Education for Learners with Special Education Needs) school for learners with autism. This ensured that the children were receiving similar educational approaches and that the educators and class assistants had received the necessary training in the implementation of PECS (as this was the only ELSEN School where all the staff had received the recognised training in PECS implementation).
3. Participants were required to be in different classes, so that they did not influence each others performance (McMillan & Shumacher, 2001).
4. Participants were required to speak South African English as their home language. This ensured that second language effects were not a factor in this study and that the participants and the primary caregivers involved share the same mother tongue as the researcher.
5. Participants were required to have no visual or auditory deficits. Such deficits would create barriers to implementing the PECS that are not the focus of this investigation. The researcher also selected participants with adequate visual discrimination skills to ensure that they would not spend prolonged periods of time in the picture discrimination phase of the training. It should be noted however, that many children with ASDs present with sensory processing difficulties (Paris, 2001). These difficulties did not preclude them from this research study.
6. Participants were required to have had no prior PECS training. Thus the effects of the training in this study would not be the result of previous PECS training.
7. Participants were required to present with some verbal language, but with limited intentional communication (less than 10 requests or comments in each 10 minute session recorded during the pre-training stage of the research, also used to establish baseline measures for each behaviour).
8. Participants were required to have had a recent cognitive assessment conducted by the same school psychologist. The Revised Griffiths Extended Scales of Mental Development (Luiz, Barnard, Collier, Kortas & Stewart, 2000) and the Junior South African Intelligence Scale (JSAIS) (Madge, 1981) were used in this assessment, based on the child's age and level of functioning.

This provided information regarding the child's current developmental level. Many children with ASDs also present with mental retardation, but this did not preclude them from this study. This information was obtained as part of the participant profile and to determine the developmental delay (i.e. the gap between chronological and mental age).

9. Participants were required to be born in the same year and therefore age differences were controlled for.

2.3.4 Sampling Strategy

Purposive sampling was used to select individuals from the ASD population who were representative of the specific population of interest (i.e. children with ASD who are verbal, but still presented with limited communicative skills and would therefore be possible candidates for an AAC system). The researcher utilised her knowledge of the learners and their primary caregivers, within the school setting in which she worked, to select participants who would provide "information rich" sources of data to address the objectives of this research study (Joubert & Katzenellenbogen, 1997; McMillan & Schumacher, 2001).

2.3.5 Description of Participants

Participant 1 (M.M.)

M.M. was a 9-year 10-month old boy diagnosed in 1999 with PDD-Autism (according to the DSM-IV criteria) by a multidisciplinary team. He received a score of 39 on the Childhood Autism Rating Scale (CARS) (Schopler, Reichler & Renner, 1988), placing him on the severely autistic section of the scale.

M.M. attends a Western Cape Education Department ELSEN (Education for Learners with Special Education Needs) school for learners with autism where he has attended school since 1999. A recent cognitive assessment conducted by the school psychologist, the *Junior South African Intelligence Scale* (JSAIS), (Madge, 1981) revealed the following test ages [Chronological Age: 10 years 4 months] on the *Verbal Scale*: Vocabulary: 5.3 years, Picture Riddles: 5.5 years, Word Associations: 4:4 years; Story

Memory: no score; Ready Knowledge: 6.2 years and on the *Performance* (Non-verbal) *Scale*: Form Board: 8.0+ years, Absurdities A: 8.0+ years, Absurdities B: 8.0+ years, Form Discrimination: 7.5 years and Block Design 8.0+ years. The norms were not used to obtain Intelligence Quotient (IQ) scores as M.M. was too old for the test norms. He obtained the ceiling for most of the subscales on the performance scale as these required visually-based skills, which are M.M.'s strength. The *Senior South African Intelligence Scale* (SSAIS) (van Eeden, 1992), an appropriate assessment for M.M.'s chronological age, could not be conducted due to M.M.'s limited receptive and expressive language skills. It should be noted that M.M. had very strong visual perceptual skills and strong visual reading skills, despite his difficulties processing language. M.M. displayed very limited use of spontaneous verbal utterances in the school context.

M.M. was in a class of 8 children with spontaneous communication skills and high levels of interaction. During the training, he was the only learner in the class using an augmentative communication system. His educator and her assistant had attended the initial PECS training and taken part in some of the follow-up consultation with the Pyramid Educational Consultants. However, during the year that followed the initial workshop, the educator and assistant had limited experience implementing PECS with children in the school. Both attended the one-day review workshop. It should also be noted, that M.M. had a new educator during the 2 months after the PECS training who had no PECS training. This change occurred unexpectedly after the PECS training was completed and could not be controlled for. M.M. then started in a new class in 2006, when the follow-up measures were completed and his new teacher and assistant had attended the PECS training workshops, but had limited experience implementing the system.

Participant 2 (N.N.)

N.N. was a 9-year 6-month old boy diagnosed in 1999 with PDD-Autism (according to the DSM-IV criteria) by a multidisciplinary team. He received a score of 43 on the *Childhood Autism Rating Scale* (CARS) (Schopler, Reichler & Renner, 1988), placing him on the severely autistic section of the scale.

N.N. attends a Western Cape Education Department ELSEN (Education for Learners with Special Education Needs) school for learners with autism where he has attended school since 1999. A recent cognitive assessment conducted by the school psychologist, the *Revised Griffiths Extended Scales of Mental Development* (Luiz et al., 2000), revealed a General Quotient of 38 [Chronological Age: 119 months. Age equivalents obtained in the subscales: Locomotor: 46 months, Personal /Social: 50 months, Hearing/Speech 40 months, Eye/Hand Coordination: 42 months, Performance 56 months and Practical Reasoning 36 months]. The *Senior South African Intelligence Scale* (SSAIS) (van Eeden, 1992), an appropriate assessment for N.N.'s chronological age, could not be conducted due to N.N.'s limited receptive and expressive language skills. N.N. had some verbal language skills, but verbal utterances were often repetitive and echolalic and used without meaning. His communication skills were limited in the school setting. N.N. was in a class of 8 learners, all using PECS due to little or no functional speech. The educator and assistant had attended the initial PECS workshop and review workshop, had consultations with the Pyramid Educational Consultants and both had a full year's experience of implementing PECS with all the learners in the class. N.N. had a history of using an augmentative system (i.e. Makaton) to transition to first words. N.N. had used Makaton for a period when he was non-verbal, and used the signs in combination with the initial sounds of words. Once able to produce complete words, he had stopped using the signs (at least 3 years prior to the PECS training). This was not considered to be a confounding factor and no signs were evident during the baseline or treatment period.

2.4 Ethics Protocol

Every effort was made to ensure that the research study complied with the ethical principles outlined in the Declaration of Helsinki (2000) (*South African Guidelines on the Ethics for Medical Research,* MRC, 2004). The research proposal was initially passed by the University of Cape Town, Faculty of Health Sciences Research Ethics Committee (reference no.**056/2005**). Prior to data collection, an application to conduct the research study in schools in the Western Cape was approved by the Head of Education for the Western Cape Education Department (Appendix A).

Written permission to use the PECS training in a research study was obtained from Andy Bondy from Pyramid Educational Products, Inc. (USA), one of the developers of the Picture Exchange Communication System (Appendix B). Permission was obtained from the selected special school's principal and governing body to conduct the research with learners at the school and during school hours (Appendix C). The parents of the selected participants were then contacted (Appendix D) to obtain their written permission for their child to be a participant in the research study. Participant assent was therefore obtained by way of parental consent from the participant's primary caregiver. Parental consent was based on clear information regarding the aims, objectives, the procedures involved, and the duration and scope of the study. This information was fully disclosed to the primary caregiver in their first language and the researcher ensured that it was fully understood, prior to signing of the consent form. Participation was on a voluntary basis and the primary caregivers were informed of their right to confidentiality and their right to withdraw consent for their child's participation in the study at any time, without reprisal and without withdrawal or changes to the intervention programme (Durrheim & Wassenaar, 1999; IJsselmuiden, 1997; MRC, 2004). By obtaining informed consent, the *principle of autonomy* was ensured.

Principle of beneficence: There were no known risks in participating in this research study in terms of the procedure and equipment to be used and the PECS training that was implemented. Both primary caregiver and child stood to benefit from the individual input, although the caregiver had to sacrifice his/her time in order to participate in the study and this may have had financial implications. Although the participants spent part of their school day engaged in the PECS training, it did not interfere with curriculum delivery and was part of the daily activities and routine in the classroom. The interests of the participants and all persons directly or indirectly involved (the children, parents, educators and assistants) were protected at all times. The training aimed to develop a functional communication system which has a direct impact on an individual's quality of life. This research also offered potential benefit for the population with ASD as the results determined the effectiveness of this intervention to assist educators and therapists in the selection of appropriate AAC systems for the many children with ASD who present with limited communication skills (Durrheim & Wassenaar, 1999; IJsselmuiden, 1997; MRC, 2004).

Confidentiality: The participants were video-recorded and records were kept during the study, however all personal information was kept confidential and the identities of the participants were coded in all written records and in the writing up of this study. (Durrheim & Wassenaar, 1999; IJsselmuiden, 1997; MRC, 2004). Video footage was only viewed by the researcher and the second observer. This footage was then safely stored away (in a clearly identified storage container in a locked storage facility at the school) where it shall remain for 2 years after the completion of this thesis and any publications ensuing from it, and then be destroyed. Use of the video footage in any presentations would only be done with prior written consent from the parents of the children and any other individuals in the video footage. Should any parent or individual not consent, the footage would not be used.

Qualifications of the Researcher, Educator and assistant (the PECS trainers): The researcher was a qualified speech-language pathologist, with 4 years of working experience with children with ASD. She completed the introductory PECS training course in April 2004, which was run by two Pyramid Educational Consultants. The researcher also spent two days with these two consultants within a school setting as the PECS was implemented with various children with ASD. She attended a second 1-day PECS Workshop on 'Review, Practise and Problem-Solving' in July 2005, followed by 2 full days of consultation with the 2 PECS consultants. The teachers and class assistants involved in the training also attended the 2 day PECS training course and the 1 day review workshop, ensuring that the PECS training offered to the participants was of a high standard (Durrheim & Wassenaar, 1999; IJsselmuiden, 1997; MRC, 2004).

Dissemination of Information: The researcher ensured that the results of this research study were made available to all the relevant stakeholders. Primary caregivers received regular verbal feedback regarding their child's individual progress and a written summary report regarding their child's progress at the end of the training stage. The school will receive feedback in the form of an oral presentation and a copy of the completed thesis.

The results will be presented as a written article and submitted to an appropriate peer-reviewed journal so that the findings are made available to the relevant professions. The results will be presented at relevant conferences (IJsselmuiden, 1997; MRC, 2004).

Stakeholders

In this research study, the following stakeholders were identified:

a) *Direct Stakeholders*: the participants in the research (i.e. the 2 children with ASD, their parents and educators)

b) *Indirect Stakeholders*: other children with ASD (potential AAC users)

c) *Immediate community stakeholders* (all those involved with AAC user, educators, class assistants, peers, professionals)

d) *Extended community stakeholders* (the people in the AAC user's community)

2.5 Data Collection

The *multiple baseline design* (MBD) requires multiple measures of the behaviours under investigation. This involved the videotaping of 10-minute structured and unstructured sessions, using *communication temptations* (Appendix E) in the structured sessions and a meal time context with the educator and/or class assistant for the unstructured sessions. This was repeated during each stage of the research study. Research studies have demonstrated that the use of structured procedures (particularly communicative temptations) is an effective and efficient method of sampling the communication skills of children with delayed development. In addition, the use of the unstructured context provides additional and complimentary information (Wetherby & Rodriguez, 1992, Iacono, Waring & Chan, 1996). The data (video footage of each session) was analysed to obtain frequency counts for the occurrence of requesting and commenting behaviours during each session. The mean length of utterance (MLU) was also recorded during each session. All data was collected by the researcher at each stage of the study. A second observer (blinded with regard to the stage of training) made judgements about 10 percent of the data.

2.5.1 Intervention Materials, Tests and Equipment

Intervention Materials:

For the PECS training the following materials were required:

- Laminated colour pictures
- A PECS Communication file for each participant with a sentence strip, insert pages and a strap
- A supply of visual and tactile reinforcers, food reinforcers and other items to serve as communication temptations.

Other equipment and software used in creating these materials included:

- A laminator
- Velcro hook and loop,
- The *Pics for PECS* CD (Pyramid Educational Products, Inc., 2005)
- The Clicker 4, Software programme (Crick Software, 2002-2003) with Mayer-Johnson picture library (Mayer-Johnson, 2004).
- The *Introduction to PECS* video (Pyramid Educational Products, Inc., 2003) was used during the parent information sessions.

Tests and assessments:

1. Expressive Language assessment – language sample analysed using the *Language Assessment Remediation Screening Procedure* (LARSP) Profile (Crystal, Fletcher & Garman, 1981).(Appendix F)
2. The *Vocabulary Selection Worksheet* (Frost & Bondy, 2002b) developed by Pyramid Education Products Inc. (Appendix G) was used, as well as a *daily record sheet* for daily recording of PECS use (Appendix H).
3. The *Profile of Pragmatic Skills in Young Children* (Naudé, 2004) (Appendix I).
4. Semi-structured interview using a Topic Guide (Appendix J)

Equipment:

A digital video camera (Panasonic model NV-GS11) was used to record each of the structured and unstructured sessions during each stage of the research study, as well as the training sessions for both participants. A mini cassette recorder (Panasonic model RQ-L30) was used to record the interviews.

2.5.2 Assessment Protocol

The assessment protocol (See Table 3) involved:

1. The videotaping of a 10 minute structured and unstructured session, repeated during the Pre-Training Stage, the PECS Training Stage, and the Post-Training Stage, as well as the Follow-up Stage. These sessions were then scored in terms of the frequency of occurrence of requesting and commenting behaviour and the mean length of utterances (MLUs) for each session. MLU was calculated by dividing the total number of words uttered in the session, by the total number of utterances to obtain an average length of verbal utterances in each session (Brown,1973 in Owens, 2005)

2. The *Language Assessment Remediation Screening Procedure* (LARSP) (Crystal, Fletcher & Garman, 1981) was used to analyse all meaningful verbal utterances from all sessions in the Pre-Training Stage and Post-Training Stage to determine levels of expressive language functioning and complexity of language structures before and after the PECS training (Appendix F).

3. The samples taken in the Pre-Training Stage and a combination of the Post-Training and Follow-up Stages were used to determine each participant's communication profile *before* and *after* the intervention to investigate the impact of the PECS training on the form and function of each participant's communication. In combination the structured and unstructured settings provided a profile of both the horizontal (the variety of communicative acts / *functions*) and vertical (the linguistic level / *form*) dimensions of communication (Wetherby & Rodriguez, 1992, Iacono, Waring & Chan, 1996).

4. The *Profile of Pragmatic Skills in Young Children* (Naudé 2002) was completed in the Pre-Training and Post-Training stage to investigate pragmatic skills before and after the PECS training (Appendix I).

5. Two semi-structured interviews were conducted with each participant's educator and primary caregiver during the Pre-Training and Follow-up Stage of the study.

Table 3: Assessment Protocol

1. Sampling – structured and unstructured sessions (videotaped)
1.1 Frequency count of Intentional Communicative Acts (ICAs) - Requests - Comments 1.2 Mean Length of Utterance (MLU)
2. Language Assessment Remediation Screening Procedure (LARSP) (Crystal, Fletcher & Garman, 1981) (administered by the researcher)
Language sample analysed according to the LARSP Profile to determine level of spontaneous expressive language on the clause, phrase and word level.
3. Communication Profile (administered by the researcher)
2.1 *Functions* of ICAs • Requests • Comments • Responses: fulfil an obligation e.g. provide specific information requested by the adult • Others: protesting, rejecting, drawing attention, giving information, asking for information, communicating about feelings, and social routines.
2.2 *Forms* of communication • Pre-communicative • Motor • Object • Gesture • Sign • Pictures • Written • Vocalisations • Speech • And combinations of the above
4. Profile of Pragmatic Skills in Young Children (Naudé, 2002) (administered by the researcher with collateral from the educator)
5. Semi-structured interview with primary caregiver and educator

2.5.3 Procedure

Prior to data collection, the researcher obtained the necessary written permissions, selected 2 participants who met the selection criteria, and obtained written parental consent for each participant. The parents and educators were requested to complete the *Vocabulary Selection worksheet* (Appendix G) developed by Pyramid Educational Products to assist with the selection of reinforcers for the PECS training.

The data collection consisted of 4 stages: a *Pre-Training*, *Training*, *Post-Training* and *Follow-up* Stage.

Stage 1: Pre-Training *(3 weeks)*

Baseline measurements were obtained for each behaviour (i.e. requests and comments); by obtaining a frequency count for these behaviours during a 10-minute structured and unstructured session. These sessions took place bi-weekly over a 3-week period to establish the baseline prior to initiating the PECS training. Mean length of utterance (MLU) during each session was also calculated. This process resulted in 5 baseline measures for each behaviour in each setting for Participant 1 (M.M.) and 6 baseline measures for each behaviour in each setting for Participant 2 (N.N.). The baseline measures for Participant 2 (N.N.) commenced once the baseline measures for Participant 1 (M.M.) were completed.

An expressive language assessment was conducted using the LARSP profile (Appendix F) and a *communication profile* (profiling the variety of forms and functions of each participant's communication) obtained using the same structured and unstructured samples taken over the three weeks used to establish the baseline. *The Profile of Pragmatic Skills in Young Children* (Appendix I) was completed after observation by the researcher and in consultation with the educator. This established the functioning level of each participant prior to the training. The educator and primary caregiver provided complimentary information regarding each participant's communication skills in a semi-structured interview.

Stage 2: PECS Training **(treatment)** *(9 weeks)*

During the PECS training, measurements were taken at regular intervals during a 10-minute structured and a 10-minute unstructured session which took place bi-weekly throughout the PECS training. These sessions occurred separately from the PECS training sessions. The same behaviour measures (i.e. of requests, comments and MLUs) were obtained in an identical procedure as was used to establish the baseline. At the beginning of the PECS training, a *reinforcer assessment* was conducted by the researcher to determine the reinforcer hierarchy of each participant. This was informed by the Vocabulary Selection worksheets completed in Stage 1.

PECS Training consisted of 6 phases briefly described in Table 4 below:

Table 4: The 6 Phases of the PECS Training protocol (Compiled from Frost & Bondy, 2002a)

PHASE	*Description of Phase*
Phase I: ***"How" to Communicate***	The child is taught to pick up a picture, reach over to the communicative partner and release the picture into the trainer's hand when he/she sees a 'highly preferred' item in order to **request** and receive the item (i.e. to exchange the picture for the item).
Phase II: ***Distance and Persistence***	The child is taught to **request** items by going to their communication file, removing the picture, going to the trainer and getting his/her attention, then releasing the picture into the trainer's hand in order to receive the desired item (i.e. moving across a distance and being persistent in exchanging the picture for the item).
Phase III: ***Picture Discrimination***	The child is taught to **request** desired items by going to his/her communication file, choosing the appropriate picture from a selection of pictures and then going to the communication partner and exchanging the picture for the item (i.e. discriminating between pictures, selecting and then exchanging the picture that corresponds with the desired item).

PHASE	*Description of Phase*
Phase IV: *Sentence Structure*	The child is taught to **request** items using multi-word phrases, by going to the file, placing a picture representing "I want" on a sentence strip, choosing the picture of the desired item and placing this on the sentence strip, removing the sentence strip from the communication file, approaching the communicative partner and giving the sentence strip. During this phase, children also learn to "read" (either via pointing or verbalising) each part of the sentence strip and to make more specific requests using attributes (e.g. colours, size, shapes, and numbers).
Phase V: *Responding to "What do you want?"*	The child learns to spontaneously **request** a variety of items and answers the question "What do you want?" by building a request on his/her sentence strip (i.e. responsive requesting).
Phase VI: *Commenting*	The child learns to answer questions: "What do you want?", "What do you see?", "What do you have?", "What do you hear?" and "What is it?" and learns responsive and spontaneous **requests** and **comments.**

Both participants progressed through the various phases of the PECS training at similar rates and the researcher allowed enough time and training to acquire all 6 phases. The participants selected had adequate visual discrimination skills and therefore Phase III (picture discrimination) was not prolonged. According to the PECS manual, each phase is considered mastered when the participant has reached criterion level (i.e. 80% of trials correct without prompting) (Frost & Bondy, 2002). Training was considered complete when the participant had learned all 6 phases of the PECS and was using the communication system independently in a variety of contexts. Training sessions occurred bi-weekly (approximately 30 minutes per session) and were videotaped and the progress during each session recorded.

Between training sessions the PECS use continued in the classroom, with guidance from the researcher. Daily records were kept by the researcher and the educator of the exchanges that occurred during the day (in terms of the PECS training phase, the number of exchanges, the context of the exchanges, reinforcers used, the vocabulary added, the behavioural changes noted, verbal responses and sentence structures used).

Although the focus of the PECS intervention in this study was the school environment, the involvement of all the caregivers in the child's life (i.e. parents and educators) was considered vital and it was therefore important that parents be included in the training process. Parents were invited to observe and participate in the PECS training in the classroom. *Parent information sessions* were held during the PECS training stage to help the parents develop an understanding of the PECS and how it is implemented. These sessions were held with the parent(s) of both participants when they were available (separate sessions were necessary) in the home setting.

These sessions involved:

a) Viewing "*An Introduction to PECS*" video produced by Pyramid Educational Consultancy (Bondy & Frost 1998b)
b) Observing the child use his PECS to request a variety of items and activities, with the researcher as the communicative partner
c) The child using PECS with the parent as the communicative partner, with the guidance of the researcher
d) Discussing ways to create opportunities for communication in the home environment
e) Expanding vocabulary in the communication file (supplying new PECS pictures to request the items that are available in the home setting)

The mother of *Participant 1* (M.M.) attended a 1-day PECS Workshop: Review, Practise and Problem-Solving conducted by 2 PECS Consultants from the United Kingdom in July 2005 at the school. M.M.'s mother was available during the PECS training to observe his PECS use in the classroom (she came to school daily to transport M.M. to and from school). Three weeks of the PECS training was conducted in the home environment during a 3-week school holiday. M.M.'s father was not available during training sessions and workshops as he was overseas during most of the training.

The father of *Participant 2* (N.N.) attended a 3-hour parent information workshop conducted by 2 PECS Consultants from the UK in April 2004 at the school. N.N.'s parents both worked during the day and were not available during school time. Information sessions were provided for both parents in their home environment towards the end of the PECS training.

Stage 3: Post-Training *(2 weeks)*

During the 2 weeks of the Post-Training stage, measurements were taken at regular intervals during a 10 minute structured and unstructured session held weekly [i.e. 2 measures in each setting].

The same behaviour measures (i.e. requests, comments and MLUs) were obtained in an identical procedure as was used to establish the baseline and during the PECS training. The sample of verbal utterances from these sessions was analysed according to the LARSP Profile (Crystal, Fletcher & Garman, 1981) (Appendix F). No further PECS training occurred during this stage of the research study. All communicative acts in Stage 3 were combined with those recorded in Stage 4 and analysed to develop a *communication profile* for each participant.

Stage 4: Follow-up *(2 weeks)*

A follow-up stage took place *3 months after* the completion of the PECS training.

During the 2-week follow-up stage, measurements were taken at regular intervals during a 10-minute structured and a 10-minute unstructured session held bi-weekly [i.e. 4 measures in each setting]. The same behaviour measures (i.e. requests, comments and MLUs) were obtained in an identical procedure as was used during the previous stages of the research study. A *communication profile* was obtained by analysing all communicative acts that occurred in Stage 3 and Stage 4 during both structured and unstructured sessions. Due to the fact that Participant 1 (M.M.) only had 5 baseline measures for each setting (used to develop the communication profile in Stage 1), only the first 3 sessions during Stage 4 were used to develop the profile (combined with the 2 sessions from Stage 3). Participant 2 (N.N.) had 6 sessions during the baseline (Stage 1) therefore all 4 sessions were analysed from Stage 4 (combined with the 2 sessions from Stage 3).

The *Profile of Pragmatic Skills in Young Children* (Naudé, 2002) (Appendix I) was repeated by the researcher in consultation with the educator. A semi-structured interview was conducted with the participant's educator and parent(s) during the follow-up phase to obtain qualitative information regarding the effects of the PECS training on each participant. These important stakeholders were given the opportunity to discuss the successes, limitations and difficulties with the intervention and share ideas for future intervention. No further PECS training occurred during this stage of the research study.

The follow-up interview for the educator of Participant 1 was conducted one month after the PECS training, as she unexpectedly left to go overseas for the rest of the school year. The researcher felt it important to obtain the perspective of this important role player in the implementation of the PECS training for M.M. and therefore interviewed her before she left. The parent interview took place in the follow-up period, three months after the PECS training.

2.6 Data Analysis

Both quantitative and qualitative data analysis was applied to the data. The researcher felt that the combination of quantitative (descriptive statistical analysis, visual data analysis) and qualitative methods (descriptive comparison, content analysis) would maximise the meaning of results in this research study.

2.6.1 Quantitative Data Analysis

Single-subject *experimental* designs require operational definitions, dependent and independent variables. Issues of reliability and validity need to be considered (McReynolds & Kearns, 1983). ***Operational definitions*** define the concept with observable, measurable units (McReynolds & Kearns, 1983).

The behaviours under investigation were *intentional communicative acts* (ICAs), defined as any event where the child directs a motoric and/or vocal act toward the adult as evidenced by eye gaze, body orientation or physical contact and awaits a response from the adult, as evidenced by looking at the adult, hesitating or persisting in the communicative act (Wetherby, Yonclas and Bryan, 1989, p.151).

The ***independent variable*** was the *Picture Exchange Communication System* (PECS) training (the treatment); the ***dependent variables*** were frequency of *requesting* (when a child makes an initiation towards an adult in order to get his/her needs met and persists in engaging the adult until he/she responds); and *commenting* (when a child initiates a behaviour toward a communicative partner, that directs the partner's attention to a person, action or event) (Schwartz, Garfinkle & Bauer, 1998).

The ***units of measurement*** in this study were the *frequency of occurrence* of the requesting and commenting behaviours within each sample. The *mean length of utterance* (MLU) was also calculated for each sample. These units were then plotted on a graphical representation (Appendix K - Raw data). This form of ***visual data analysis*** is the most common form of data analysis for this research design (Lindegger, 1999, McReynolds & Kearns, 1983).

The effectiveness of the PECS training was determined by visually representing the data points to evaluate the overall patterns of the data, look at variability between stages and the PECS phases, overlap of data points in adjacent stages (i.e. percentage of non-overlapping data and percentage of overlapping data), changes in trends between adjacent stages and phases, and changes in levels between stages and the PECS phases (McReynolds & Kearns, 1983).

The *frequency of requests* and *comments* was recorded in each session (structured and unstructured) across the 4 stages of the research process (Appendix K - Raw data). The data points obtained were grouped into:

- Stage 1 (Pre-Training)
- Stage 2 (PECS Training)
- Stage 3 (Post-Training)
- Stage 4 (Follow-up)

There appears no clear consensus regarding which, if any statistical tests should be applied to the data from a MBD study (Jones, 2004). The researcher selected to use *descriptive statistics* (i.e. mean, standard deviation, minimum and maximum) to compare the data points and nonparametric statistics i.e. *percentage of non-overlapping data* (PND) between baseline and treatment stages to determine treatment effectiveness (Scruggs, Mastropieri & Casto, 1987), and *percentage of overlapping data* (POD) to determine maintenance effectiveness (in the Post-Training and Follow-up stages) (Schlosser, 2003; Wendt, Schlosser & Lloyd, 2004). When synthesising the results of single-subject experimental designs, it is important to investigate *intervention* effectiveness, *generalization* effectiveness and *maintenance* effectiveness (Schlosser, 2003g). A common nonparametric statistic used to measure effectiveness is the *percentage of non-overlapping data* (PND) (Scruggs, Mastropieri & Casto, 1987).

Percentage of non-overlapping data (PND) is a technique used to summarise data from single-subject experimental designs, by calculating the percentage of treatment data points that do not overlap with the baseline data points. This is determined by identifying the highest data point in the baseline and calculating the percentage of data points during the intervention phase that exceed this level (Schlosser, 2003g; Scruggs, Mastropieri & Casto, 1987; Scruggs & Mastropieri, 2001; Wendt, Schlosser & Lloyd, 2004). The resulting PND score determines effectiveness, the higher the percentage, the more effective the treatment (See Table 5).

Table 5: Interpretation of Percentage of Nonoverlapping Data (Compiled from Scruggs & Mastropieri, 2001)

90% +	Highly effective treatment
70 - 90%	Moderately effective
50 - 70%	Mildly effective
> 50 %	Ineffective treatment

According to Schlosser (2003g) and Scruggs & Mastropieri (1994), the relative *strengths* of the PND statistic and its variations include:

- Providing a meaningful measure of treatment effectiveness
- Useful for small samples
- Easy to calculate and interpret
- It correlates with the visual judgements of experts
- Produces results which complement qualitative reviews of the same literature
- It has been used successfully in at least seven separate integrative reviews
- This method has been field-tested most widely in the syntheses of single-subject research.
- It is a nonparametric statistic and is therefore not affected by issues with heterogeneous variances or nonlinearity.

Criticisms of the use of the PND score to determine effectiveness of an intervention include:

- PND scores may miss important idiosyncrasies in behaviour within and across studies (Salzberg, Strain & Baer, 1987). This may lead to the misrepresentation of facts and outcomes and inappropriate conclusions regarding the relative merits of broad categories of intervention may be drawn.
- There may be errors in representing treatment effects when outliers are present in the baseline – the treatment can be shown to be ineffective due to one or two data points in the baseline being located at the floor or ceiling (Schlosser, 2003g).
- The PND measure ignores changes in slope – only a consistent and clear change in level of scores will result in a high PND score (Schlosser, 2003g).
- The number of data points in a graphic display results in a change in the expected value of the PND (i.e. as the number of points increases, the PND value decreases) (Schlosser, 2003g).
- Changes over time are represented by a single number, which may overlook important information provided by single-subject designs (Salzberg et al., 1987).

To investigate the **maintenance effect** of the PECS Training, the frequency of requests and comments recorded in the Post-Training Stage (Stage 3: 2 weeks after the PECS training) and Follow-up Stage (Stage 4: 3 months after the completion of the PECS Training) were compared to the frequency of requests and comments obtained in Stage 2, to determine any noticeable changes in these measures. To investigate maintenance effect, the ***percentage of overlapping data*** (POD) provides a percentage of the maintenance data points that are within or above the last three intervention data points (Schlosser, 2003g).

Although the PECS Training does not specifically target verbal utterances, gains in speech have reportedly occurred during Phase IV of the PECS Training when delayed prompting is introduced (Bondy & Frost, 1998; Charlop-Christy et al., 2002; Ganz & Simpson, 2004). To determine the *effect* of the PECS training on the length of verbal utterances of each participant, the *mean length of utterance* (MLU) was recorded for each session during the 4 stages of the research (Appendix K - Raw Data).

The non-targeted responses were monitored concurrently over both structured and unstructured settings. Due to the sequential nature of the PECS Training, it was possible to determine if the training had a generalisation effect on the MLU of each participant at the point in the training when it has been suggested that speech output increases in some children (i.e. Phase IV). The percentage of non-overlapping data (PND) was calculated to determine effectiveness of the treatment in increasing length of verbal utterances and the percentage of overlapping data (POD) between the Training and the Post-Training and Follow-up Stages was calculated to determine maintenance effects.

All the meaningful verbal utterances were recorded during the Pre-Training Stage (Stage 1). This language sample was then analysed according to the ***Language Assessment Remediation Screening Procedure*** (Crystal, Fletcher & Garman, 1981) (Appendix L – LARSP profile sample). This analysis was then compared to the analysis of a sample from the Post-Training Stage (Stage 3). Percentage of verbal utterances in each stage of the LARSP Analysis (Stage I-VI) was calculated. The ***communication profiles*** of each participant from the Pre-Training (Stage 1) and Post-Training and Follow-up stages (Stage 3 + 4) were compared. Rates of communicative functions (i.e. requests, comments, responses + others) and forms (i.e. pre-communicative, motor, object, gesture, sign, picture, written, and speech) were calculated and represented in a graphical format (i.e. bar graphs) (Appendix M – Raw data).

Inter-Rater Reliability

A point-by-point agreement ratio was used to calculate observer agreement. The number of agreements was divided by the total number of agreements plus disagreements and then multiplied by 100 to obtain a percentage of agreement. An agreement occurred when both observers (the researcher and the second observer) independently recorded the same behaviour in a session (Kazdin, 1982). This was done for 10% of the data, randomly sampled for each participant in both structured and unstructured settings and from all 4 stages of the research process. The second observer was blinded to which stage of the research the participant was on. It is generally accepted that a percentage of agreement below 70% would indicate questionable reliability (McMillan & Schumacher, 2001).

2.6.2 Qualitative Data Analysis

A content analysis of the ***semi-structured interviews*** with the parents and educators generated data in *predetermined categories* and *themes* based on the research questions as outlined in the Topic Guide (Appendix F).

- *Data organisation:* The data was organised by typing out the transcripts from each interview (Appendix N and Appendix O - original transcripts).
- *Immersion:* The transcripts were read numerous times to get an overall sense of the data, with notations being made regarding the content and themes that started to emerge.
- *Categorisation:* The data was segmented into units of meaning (*topics*), which were grouped into larger clusters to form *categories* (including the predetermined categories and adding newly discovered ones).
- The researcher then examined the data categories and looked for patterns of meaning amongst them and emerging *themes*.
- Finally the data was represented in a narrative and in a visual representation (i.e. a table) (Creswell, 1998; McMillan & Schumacher, 2001).

Further qualitative data analysis involved a ***descriptive comparison*** of the information obtained in the *expressive language assessment* (Appendix L – sample), the *communication profile* and the *pragmatic skills profile* (Appendix P – sample) between the Pre-Training stage and the Post-Training and/or Follow-up stage. The researcher felt that the combination of descriptive statistical analysis, visual data analysis and the qualitative methods used (descriptive comparison, content analysis) would maximise the meaning of results in this research study.

2.7 Quality Control – Reliability, Validity and Trustworthiness

2.7.1 Reliability

Reliability refers to the 'reproducibility' or 'repeatability' of results i.e. the extent to which similar measures are obtained when performed more than once. Variation between measurements may be a result of variation in the behaviour being measured (subject variation), variation due to the measuring instruments (instrument variation), and variation in the person collecting the information (observer variation) (Abramson & Abramson, 1999).

The following steps were taken to reduce variation and therefore establish the ***reliability*** of the data:

- An independent observer made judgements of the participant's responses for 10% of the data for each participant. This 10% of the data was randomly sampled for each participant in both structured and unstructured settings and from all 4 stages of the research process. The second observer was blinded to the stage of research the participant in the video footage was on. It is generally accepted that a percentage of agreement below 70% would indicate questionable reliability (McMillan & Schumacher, 2001).
- The second observer was a colleague with the same level of training and experience as the researcher and the necessary training was provided in the recording and analysis of data to ensure the same process was used (Abramson & Abramson, 1999), thus reducing observer variation.
- The detailed assessment protocol and use of specific coding of behaviours observed allow the study to be replicated and reduce instrument and observer variation.
- The use of repeated measures also increases reliability (Abramson & Abramson, 1999) by reducing subject variation.

2.7.2 Validity

The validity of a study refers to the capacity of the study to produce sound conclusions and how adequate were the measures used (Abramson & Abramson, 1999). When evaluating the efficacy of AAC interventions, at least four types of validity should be considered: internal validity, external validity and generality, social and ecological validity. These types of validity should form the foundation of any study that evaluates the efficacy of AAC interventions (Schlosser, 2003c).

Internal validity "evaluates the extent to which changes in the dependent variable can be attributed to the independent variable, rather than to extraneous variables" (Schlosser, 2003c, p. 28). To establish internal validity, the researcher attempted to control for *maturation and history* by limiting the timeframe to an 8-month period and using the multiple-baseline design (MBD) (the effects of maturation and history would have shown on the untreated baselines prior to introducing the treatment). The researcher used her knowledge of the participants' history of AAC interventions to ensure that there was no recent interventions had occurred that may have had a positive or negative *carryover effect* on the current study and that this intervention was clearly discernable from previous interventions (Schlosser, 2003c). *Inter-observer agreement* for the dependent variable was high (90.1% agreement), indicating believability and reflecting that the biases of the observers were minimal. The use of a second observer also counteracted changes in the researcher's definitions of behaviour over time and demonstrated that the dependent variables could be measured consistently (Schlosser, 2003c).

Treatment integrity refers to the "degree to which an independent variable is implemented as intended" (Schlosser, 2003e, p. 182). The researcher ensured treatment integrity by providing a detailed description of the independent variable (i.e. the PECS training), implementing this training according to the developers' manual (Frost & Bondy 2002), and ensuring that the PECS training was only implemented by the researcher and educators that had completed the introductory workshop as required by Pyramid Educational Consultants.

The researcher ensured that the *instrumentation* (i.e. the video camera and mini cassette recorder) were repeatedly checked prior to and during the study and that *testing* was not a threat to internal validity by relying on observable behaviours and using well-established baseline measures to ensure that improvement through repeated testing had not occurred or had stabilised before starting the intervention (McMillan & Schumacher, 2001; Schlosser, 2003c).

The researcher implemented the intervention at a randomly selected and predetermined point in time (3 weeks after commencing with the baseline measures) to prevent *regression* effects.

To reduce the *Hawthorne effect* (when a participant responds to the extra individual attention provided along with the treatment, rather than to the treatment alone) and the *novelty effects* (when the participant responds positively to the new intervention as it is a refreshing change from his/her daily routine), the researcher made the device (the PECS communication file) available during the baseline measures and the baseline measures still involved individual attention from the researcher and the same communication temptations available in the treatment stage (Schlosser, 2003c).

The *internal validity* of the study was increased by using *repeated measures*, ensuring enough data points to demonstrate *baseline stability* in the behaviours under investigation and ensuring *the 'single variable' rule* was adhered to (i.e. only one variable was manipulated at a time by introducing the treatment in sequential order, Phase I-IV targeting requesting, Phase VI targeting commenting).

External validity and ***generality*** refers to the "extent to which conclusions of a research study can be extended to other participants, variables and conditions" (Schlosser, 2003c, p.28). External validity was increased by *direct replication* of the intervention with a second participant and using two settings (a structured and an unstructured setting) to look at whether the changes in the dependent variables differed in the two settings (*condition generality*).

The researcher also used generalisation probes to investigate the effect of the PECS training on another variable (the length of verbal utterances) and investigated the impact of the PECS training on the language structures and complexity, pragmatic skills and communication profiles of each participant (*variable generality*).

Due to the small number of participants, these results cannot be generalised to the whole ASD population (*subject generality*), but should be considered within the context of the results of other intervention studies in the implementation of the PECS in the ASD population (Schlosser, 2003c). The two participants were selected according to strict selection criteria; however individual differences could not be excluded as these differences are characteristic of all individuals with ASD (Lord & McGee, 2001).

Social validity refers to the "extent to which the goals, methods, and outcomes are socially significant" (Schlosser, 2003c,f, p.28). *Subjective evaluation* (soliciting the opinions of persons who have a special position due to their expertise or their relationship to a client) was an important part of the research process and interviews were conducted with both the parents and educators of the participants before and after the intervention to evaluate their opinion of the intervention. These stakeholders offer invaluable information and a unique perspective of the impact of this AAC intervention in the participant's natural environment (i.e. home and school setting). The results of this study therefore had social validity to the stakeholders involved (Schlosser, 2003c,f).

Ecological validity refers to "the extent to which the settings, treatment agents and materials are valid as measured by what is considered appropriate for the experimental context or the environment in which the skill is expected to be performed" (Schlosser, 2003c, p.28). In this study, the researcher attempted to measure the effect of the PECS training in 2 *settings*, the natural classroom setting and a structured individual setting. The PECS training was conducted in the classroom setting with the researcher (the school speech therapist), the educator and her assistant, as well as individual sessions with the researcher.

The classroom setting was a typical environment in which the communication skills taught would be used and although the individual sessions were more typical of an experimental condition, individual training sessions are generally part of the PECS training and use reinforcers (e.g. toys, food, etc) to motivate the child to communicate (similar to the communication temptations used in the structured sessions).

The *treatment agents* (e.g. researcher, educators, assistants, and parents) were the individuals who would typically implement the PECS training for any child within this school setting. In the school environment, the researcher would play a primary role in the training as the speech therapist in the school, although her role in the training in this study was more intensive and regular than would be typical in the daily practices of the school. The educator and assistant had the necessary training to implement PECS and did not receive any additional training, other than the regular input of the researcher throughout the PECS training. In the general South African context, this is considered an ideal situation, but would not be typical of most special needs schools, as most schools do not have trained staff in this communication system and at present this is the only school in South Africa where the entire staff having completed the prerequisite workshop and implemented the communication system in direct consultation with two PECS consultants. At present this service is not available to other schools in the country as there is no local Pyramid Consultancy agency.

Despite the treatment agents receiving the same initial training in the implementation of the PECS, there were differences in the experience of the treatment agents. The educator and assistant of Participant 2 (N.N.) had more experience in implementing PECS, whereas the educator and assistant of Participant 1 (M.M.) had very limited experience in implementing the PECS training since their initial training the year before. M.M.'s new educator (this change occurred after the PECS training had occurred), had no PECS training which was not ideal, but is a typical condition at the school, as new staff often have little or no experience in implementing the PECS. This may have impacted on the maintenance of the skills learned during the treatment stage. The training of both participants was primarily conducted by the researcher and the classroom input was overseen by the researcher.

The *materials* used, i.e. the communication files, pictures and reinforcers were appropriate in the context in which the participants were expected to use their communication system (both school and home). The materials used were according to the PECS Training Manual (Frost & Bondy, 2002).

The ideal conditions are not always possible in the classroom context, both in terms of *environment* (the classroom can have high levels of noise, distractions and interruptions and the educator and assistant typically have to focus on more than one learner at a time) and the *treatment agents* (lack of training, limited experience and incorrect implementation of the system), but these factors were controlled as far as possible and the 'ideal' conditions (for treatment integrity) were balanced with 'typical' conditions to ensure that the study had ecological validity, i.e. investigated the effect of the treatment in the typical conditions in which the PECS training would take place and the communication skills taught would be utilised. Limited investigation of the effect of the training in the home environment occurred and this would be an important context to investigate as it is an important environment in which a child would be expected to use communication skills on a daily basis (Schlosser, 2003c,e,f).

2.7.3 Trustworthiness

There are four criteria to assess the truth value of qualitative research findings: *credibility, dependability, confirmability* and *transferability* (Schwandt, 2000; Ulin, Robinson, Tolley & Mc Neill, 2002).

Credibility: Interpretations of the data need to be consistent with the data collected, contextually rich and sensitive to differing views. The researcher ensured credibility by being consciously aware of her initial expectations (i.e. having had clinical successes with the PECS training, positive outcomes were expected) and comparing these to the actual data obtained and the researcher's interpretation of this data. The researcher moved beyond her initial research question and the quantitative results of the study to gain a better understanding of the perspectives of the stakeholders (parents and educators), a more detailed knowledge of the impact of the PECS training on each participant's communication profile, pragmatic skills and language complexity and structure. The researcher also looked to explain inconsistencies in the data obtained.

Dependability: The researcher ensured process dependability by detailing the research process and the specific training of the researcher, the educators and assistants involved in the PECS training, allowing for replication. A second observer was used for a percentage of the data for the quantitative data and part of the qualitative data (data used for the communication profiles).

Confirmability: The researcher created an audit trail of the data analysis process that included the raw data, the coding and categories produced, data reduction and analysis products, process notes and the instrument developed for the semi-structured interviews (i.e. the topic guide). This allows other researchers to review the interpretations of the researcher and to confirm that these are well-grounded in the data. The researcher was conscious of her own subjectivity and her relationship with the parents and educators (having worked at the school where the research was conducted) and the impact of this on the research process. The researcher attempted to create opportunities for these stakeholders to express their own expectations (prior to the training) and their experiences during the PECS training by conducting semi-structured interviews before and after the training. These interviews involved open-ended questions to allow the parents and educators to share these experiences. The researcher probed for further details on any experience shared or comment made that had relevance to the research and required further investigation.

Transferability: The researcher carefully described the research context and each participant's profile and made sure that the conclusions drawn were supported by the qualitative and quantitative data. The researcher also looked for patterns across the two participants and reasons for differences. The results obtained are felt to be transferable to similar children in similar educational contexts.

Chapter Three

Results & Discussion

This chapter is organised in seven sections:

1. The acquisition of the *Picture Exchange Communication System* (PECS) for each participant.
2. The effect of introducing the PECS as an augmentative communication system on the frequency of *requesting* and *commenting* behaviour for each participant and the maintenance of gains in requesting and commenting behaviour in the Follow-up Stage.
3. The effect of the PECS training on the *mean length of utterances* (MLU) of each participant and the maintenance of any changes during the Follow-up Stage.
4. The analysis of each participant's verbal utterances before and after the PECS training to determine its effect on the *complexity of the verbal utterances* of each participant.
5. A comparison of the *communication profiles* of each participant before and after the PECS training.
6. A comparison of the *pragmatic profiles* of each participant before and after the PECS training.
7. The content analysis of *semi-structured interviews* conducted with the educator and parents of each participant before and after the PECS Training.

3.1 Acquisition of the Picture Exchange Communication System (PECS):

3.1.1 Participant 1: M.M.

M.M. began the PECS training in June 2005 and completed the PECS training in August 2005. During this 9-week training period, M.M. quickly progressed through the 6 phases of the PECS training. He received 2 individual training sessions per week (of approximately 30 minutes per session) and his educator and mother were regularly updated regarding his progress and level of PECS use.

The training sessions included both individual sessions and training within the classroom context (involving educator and assistant) and at home (involving his mother). Between these sessions, the implementation of the PECS continued in the classroom, with the guidance of the researcher. Guidance was also provided in the home setting regarding the implementation of the PECS. During the PECS Training Stage, M.M. made an average of 43 exchanges per day in the classroom setting (ranging from 15-63 exchanges); with the highest number of exchanges occurring on those days when individual training sessions took place. At home he made an average of 19 exchanges per day (ranging from 6-35); with the highest number of exchanges occurring on those days when individual training sessions took place (these sessions were held at home during a 3-week school holiday in July 2005).

During later phases of training, emphasis was placed on using PECS across the day (by expanding its use to activities such as morning ring, group rhymes, tuckshop, speech therapy groups, outings, telling news, etc.) as well as developing use of PECS with his peers. At the end of the training his communication file contained over 130 pictures and he had several extra communication and activity boards (e.g. for the playground, for sentence building activities, for commenting, and to request songs and rhymes during group activities). M.M. was able to spontaneously use the PECS file to build a request or comment, bring this to an adult or peer and verbalise what was on the sentence strip. He could also make his requests more specific using attributes of colour, size, and shape, and combine requests for items on the sentence strip. M.M. demonstrated a clear understanding of how this visual system of communication works. He made his needs known using clear, complete verbal requests (with the aid of his sentence strip) and could also make clear choices.

3.1.2 Participant 2: N.N.

N.N. began the PECS training in August 2005 and completed the PECS training in October 2005. During this 9-week training period, he quickly progressed through the 6 phases of the PECS training.

He received 2 individual training sessions per week (of approximately 30 minutes each) and his educator was regularly updated regarding his progress and level of PECS use. The training sessions included both individual sessions and training within the classroom context (involving educator and assistant). Between these sessions, implementation of the PECS continued in the classroom, with the guidance of the researcher. Guidance was provided in the classroom context and the home setting regarding the implementation of PECS, although access to the home environment and involvement of the parents was limited. In the classroom setting, N.N. made an average of 50 exchanges per day (ranging from 24 -76 exchanges), with the highest number of exchanges occurring on those days with individual training sessions. No records were kept of exchanges made in the home environment and a home visit only occurred towards the end of the PECS training.

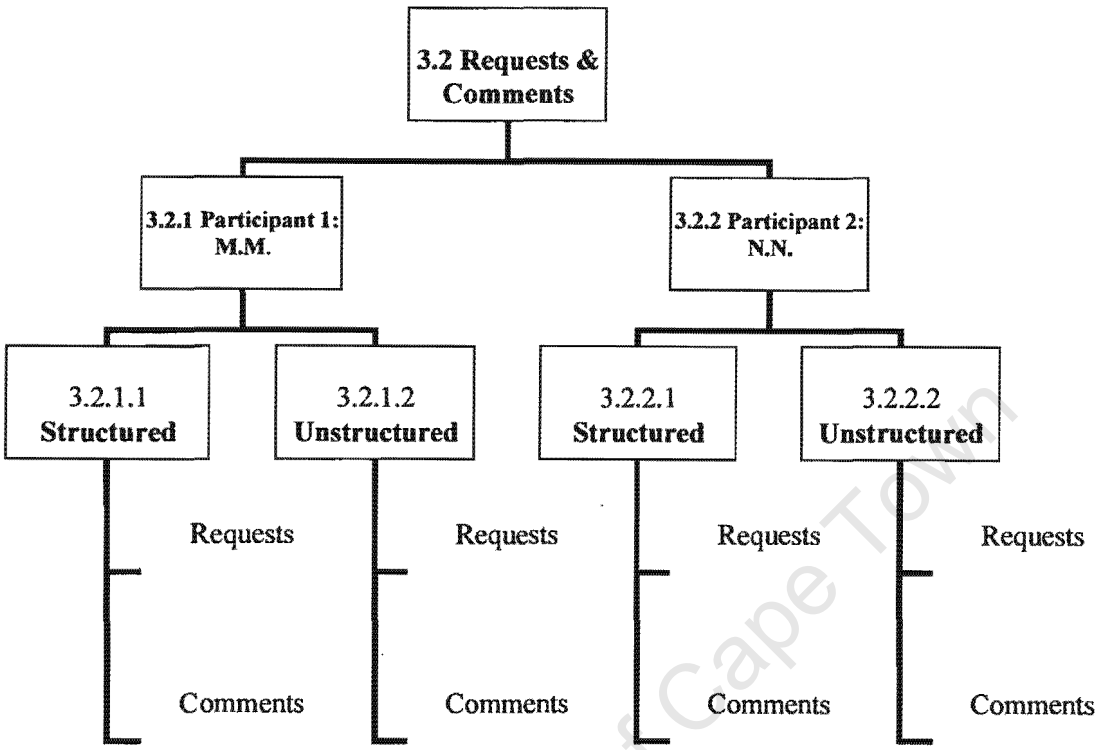
At the end of the training, N.N.'s communication file contained approximately 70 pictures. He also had a few additional activity boards (e.g. for commenting and to request songs and rhymes during group activities). N.N. was able to spontaneously use the PECS file to build a request or comment, bring this to an adult and verbalise what was on the sentence strip. He could also make his requests more specific using attributes of colour, size, and shape and combined requests for items on his sentence strip. N.N. demonstrated a clear understanding of how this visual system of communication works. He made his needs known using clear, complete verbal requests (with the aid of his sentence strip) and could also make clear choices. There was limited involvement of his peer group in the PECS training.

Conclusions

The ease of acquisition of the PECS system and rapid growth in vocabulary (PECS pictures) for both participants supports previous research studies and programme evaluation data (Adkins & Axelrod, 2002; Bondy & Frost, 1994; Ganz & Simspon; 2004; Kravits et al.; 2002; Magiati & Howlin, 2003; Schwartz et al., 1998; Webb, 2000;).

3.2 Effect of the PECS Training on Requests and Comments

Figure 2: Organisation of Results for Requests and Comments



The ***independent variable*** was the *Picture Exchange Communication System* (PECS) training (the treatment); the ***dependent variables*** were frequency of *requesting* (when a child makes an initiation towards an adult in order to get hi/her needs met and persists in engaging the adult until he/she responds) and *commenting* (when a child initiates a behaviour toward a communicative partner, that directs the partner's attention to a person, action or event) (Schwartz, Garfinkle & Bauer, 1998). The *PECS Training* occurred over **6** phases. *Requesting* behaviour was targeted from **Phase I** to the end of the training. *Commenting* behaviour was targeted during **Phase VI** of the PECS Training (Bondy & Frost, 1998a).

The frequency of requests and comments was recorded in each session (structured and unstructured) across the four stages of the research process for each participant.

The data points obtained were grouped into:

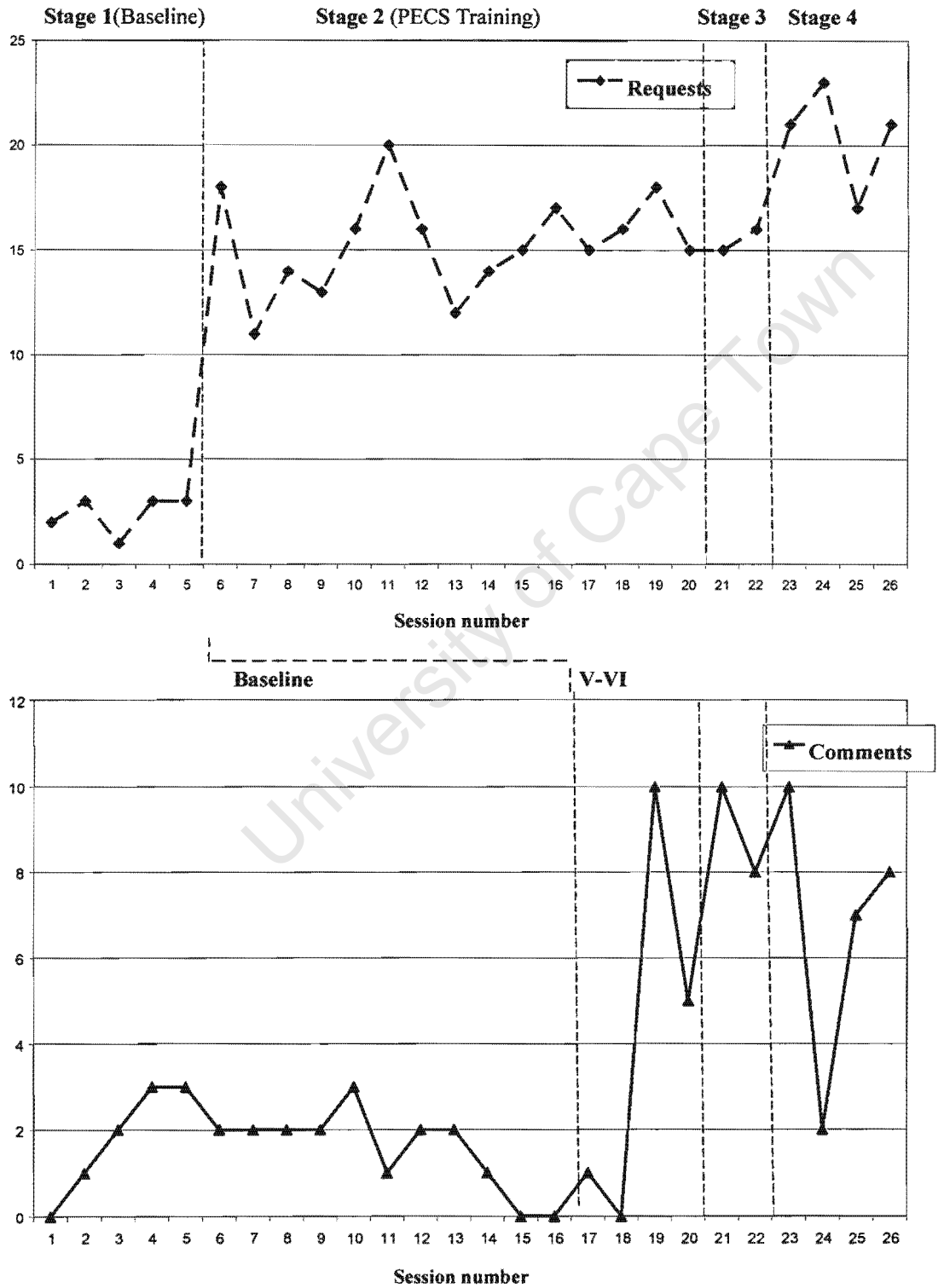
- Stage 1 (Pre-Training baseline)
- Stage 2 (PECS training)
- Stage 3 (Post-Training)
- Stage 4 (Follow-up)

The frequency of requests and comments in each session was plotted on a graph for visual analysis (Appendix K – raw data). The *percentage of non-overlapping data* (PND) was also recorded between the baseline and treatment stage. The frequency of requests and comments recorded in Stage 4 of the research process (3 months after the PECS Training) was compared to the frequency of requests and comments obtained in the treatment phase to determine the maintenance effects of the treatment. *Percentage of overlapping data* (POD) was used to determine whether the level of requesting and commenting was maintained. *Descriptive statistics* (mean, standard deviation, minimum and maximum) were used to compare requesting and commenting data points obtained across the stages of the research.

3.2.1 Participant 1: M.M.

3.2.1.1 Structured Sessions

Figure 3: Number of Requests & Comments for Participant 1 during structured sessions



Requests

Visual analysis of Figure 3 revealed a noticeable increase in requests from session 6 onwards (i.e. the start of Stage 2 PECS Training), with some variation in levels of requesting (between 11 and 20 requests per session) during Stage 2. The level of requesting was steady in Stage 3. In Stage 4, there was an increase in the level of requesting. The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 100%. This indicates that the PECS training was a highly effective treatment for increasing requesting behaviour in a structured setting. The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 100% and between Stage 2 and Stage 4 (Follow-up) was 100%. This suggests that the level of requesting was effectively maintained in the Post-Training and Follow-up stages.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for requests in structured sessions during the 4 Stages of the research study (See Table 6).

Table 6: Participant 1: Descriptive Statistics for Requesting in Structured sessions

Stage	Requests				
	N	Mean	σ	Min	Max
Pre-Training	5	2.40	0.89	1.00	3.00
PECS Training	15	15.33	2.38	11.00	20.00
Post-Training	2	15.50	0.71	15.00	16.00
Follow-up	4	20.50	2.52	17.00	23.00

During the Pre-Training Stage (baseline measures) M.M. obtained a mean of 2.40 requests per session, ($\sigma = 0.89$). The low standard deviation ($\sigma < 1$) indicated stability in the baseline. In the PECS Training Stage, M.M. obtained a mean of 15.33 requests per session ($\sigma = 2.38$). This suggests an increase in the frequency of requesting behaviour with the introduction of the PECS Training (there is a 12.93 difference between the means of Stage 1 and 2), with some variance in the data points ($\sigma > 1$, min. =11, max. =20).

The mean obtained in Stage 2 (Mean = 15.33) was similar to the mean obtained during the Post-Training Stage (Stage 3) (Mean = 15.50) with a difference of 0.17 between the means ($\sigma = 0.71$). In the Follow-up Stage, M.M. obtained a mean of 20.50 requests per session ($\sigma = 2.52$). This suggests an increase in the level of requesting in the Follow-up Stage (there is a 5.00 difference between the means of Stage 3 and 4) and some variance in the requesting behaviour ($\sigma > 1$, min.=17, max.=23).

Comments

Visual analysis of Figure 3 revealed there was a slight increase in comments during the baseline (Stage 1) which started at 0 comments for the first session, but increased to 3 comments in session 4 and 5. Analysis revealed a noticeable increase in comments from session 19 onwards (i.e. from the last 2 sessions of Phase VI of the PECS Training), with some variation in levels of commenting (between 0 and 10 comments per session). This resulted in a slight decrease in the mean obtained in this stage. In Stage 4 there was a lot of variation in the frequency of comments (2 - 10 comments per session); however these were still noticeably greater than at baseline. One data point fell noticeably below the other data points in Stage 4 (i.e. 2 comments in session 24).

The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 50% indicating that the PECS training was mildly effective in increasing commenting behaviour. The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 100% and between Stage 2 and Stage 4 (Follow-up) was 75%. This suggests that the level of commenting was maintained in the Post-Training Stage and Follow-up Stage, although moderately maintained in the Follow-up stage due to the one low data point.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for comments in structured sessions during the 4 Stages of the research study (See Table 7 below).

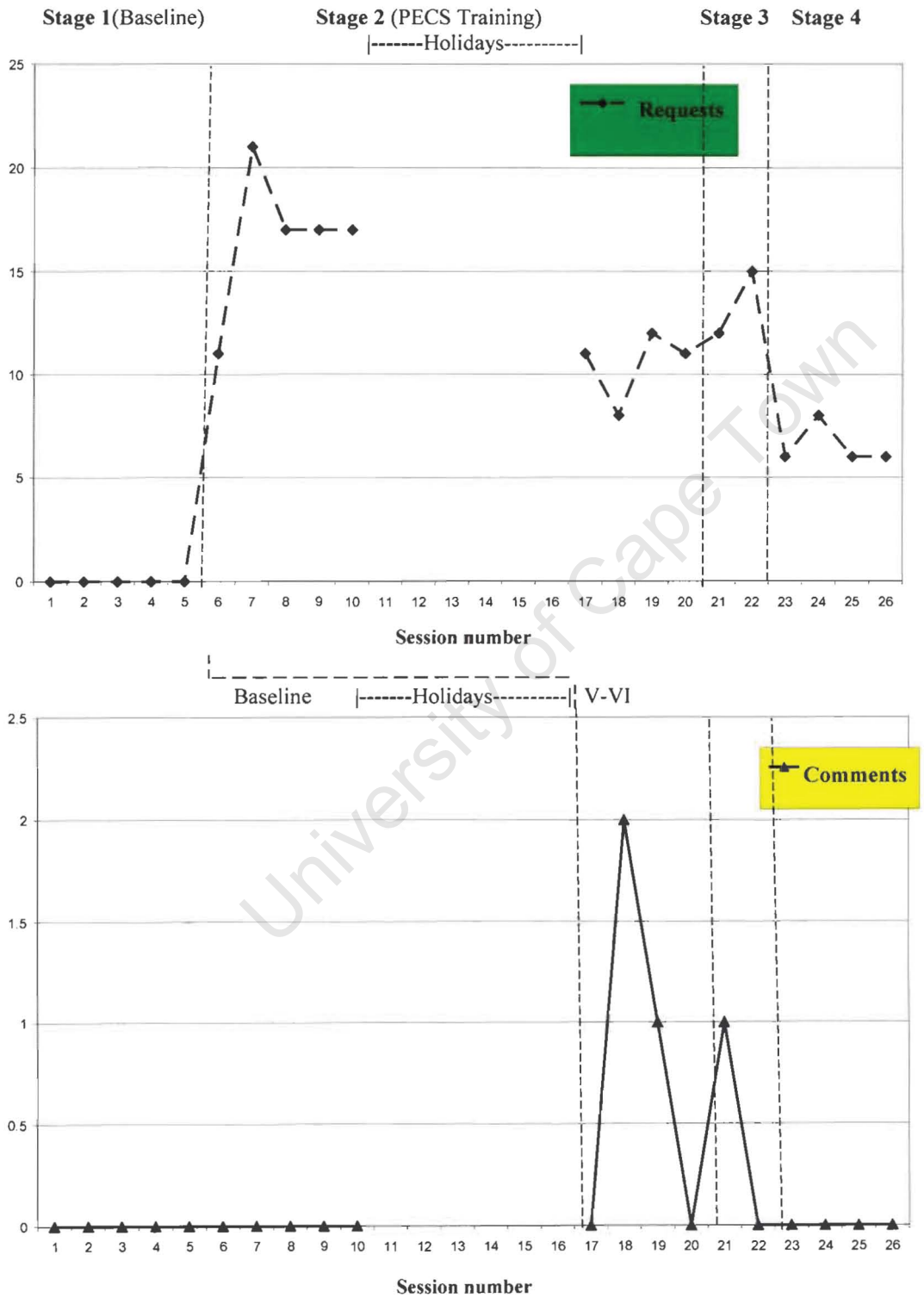
Table 7: Participant 1: Descriptive Statistics for Commenting in Structured sessions

Stage	Comments				
	N	Mean	σ	Min	Max
Pre-Training	16	1.63	1.02	0.00	3.00
PECS Training	4	4.00	4.55	0.00	10.00
Post-Training	2	9.00	1.41	8.00	10.00
Follow-up	4	6.75	3.4	2.00	10.00

During the Pre-Training Stage (baseline measures) M.M. obtained a mean of 1.63 comments per session ($\sigma = 1.02$). The standard deviation is just above 1, suggesting that the baseline is fairly stable. In the PECS Training Stage M.M. obtained a mean of 4.00 comments per session ($\sigma = 4.55$, min. = 0, max. = 10). The mean suggests a slight increase in the frequency of commenting behaviour with the introduction of the PECS Training (there is a 2.37 difference between the means of Stage 1 and 2) with high amounts of variance in the data points ($\sigma > 1$). There is a further increase in the level of commenting during Stage 3 (mean = 9.0) with a 5.0 difference between the means and more stability in the scores ($\sigma = 1.41$, min. = 8, max. = 10). In the Follow-up Stage, M.M. obtained a mean of 6.75 comments per session ($\sigma = 3.4$, min. =2, max. =10). This suggests a decrease in the level of commenting in the Follow-up Stage (there is a 2.25 difference between the means of Stage 3 and 4) and high amounts of variance in the data points ($\sigma > 1$).

3.2.1.2 Unstructured sessions

Figure 4: Number of Requests & Comments for Participant 1 during unstructured sessions



Requests

Visual analysis of Figure 4 revealed a noticeable increase in requests from session 6 onwards (i.e. the start of Stage 2 PECS Training), with some variation in levels of requesting (between 8 and 21 requests per session) during Stage 2. There is a gap in the data points that occurred during the 3-week school holiday in which only structured sessions took place. After the holiday, there is a noticeable decrease in the number of requests per session. This level is maintained during Stage 3. In Stage 4, there was a decrease in the level of requesting. The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 100%, indicating that the PECS training was effective in increasing requesting in unstructured settings. The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 100% and between Stage 2 and Stage 4 (Follow-up) was 25%. This suggests that the level of requesting was effectively maintained in the Post-Training stage only.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for requests in unstructured sessions during the 4 Stages of the research study (See Table 8).

Table 8: Participant 1: Descriptive Statistics for Requesting in Unstructured sessions

Stage	Requests				
	N	Mean	σ	Min	Max
Pre-Training	5	0.00	0.00	0.00	0.00
PECS Training	9	13.89	4.23	8.00	21.00
Post-Training	2	13.50	2.12	12.00	15.00
Follow-up	4	6.50	1.00	6.00	8.00

During the Pre-Training Stage (baseline measures) M.M. obtained a mean of 0.00 requests per session (σ = 0.00) indicating stability in the baseline. In the PECS Training Stage, M.M. obtained a mean of 13.89 requests per session (σ = 4.23, min. 8, max. 21). This suggests an increase in the frequency of requesting behaviour with the introduction of the PECS Training (there is a 13.89 difference between the means of Stage 1 and 2), with a lot of variations in the scores.

The mean obtained in Stage 2 (Mean = 13.89) was similar to the mean obtained during the Post-Training Stage (Stage 3) (Mean = 13.5) with a difference of 0.39 between the means. The scores were more stable in this Stage, although some variance is still present (σ = 2.12, min. = 12, max. = 15). In the Follow-up Stage, M.M. obtained a mean of 6.50 requests per session (σ = 1.00, min. = 6 and max. = 8). This suggests a decrease in the level of requesting in the Follow-up Stage (there is a -7.00 difference between the means of Stage 3 and 4) with low variance in the scores obtained.

Comments

Visual analysis of Figure 4 revealed only 3 sessions where any commenting occurred in the unstructured setting (session 18: 2 comments, session 19 and 21: 1 comment). This suggests no significant increase or decrease in commenting across the stages in the unstructured sessions. There is a gap in the data points that occurred during the 3-week school holiday in which only structured sessions took place. The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 50%. This indicates a mild effect of the treatment on commenting behaviour. The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 100% and between Stage 2 and Stage 4 (Follow-up) was 100%. This suggests that the low level of commenting was maintained in the Post-Training and Follow-up stages.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for comments in unstructured sessions during the 4 Stages of the research study (See Table 9).

Table 9: Participant 1: Descriptive Statistics for Commenting in Unstructured sessions

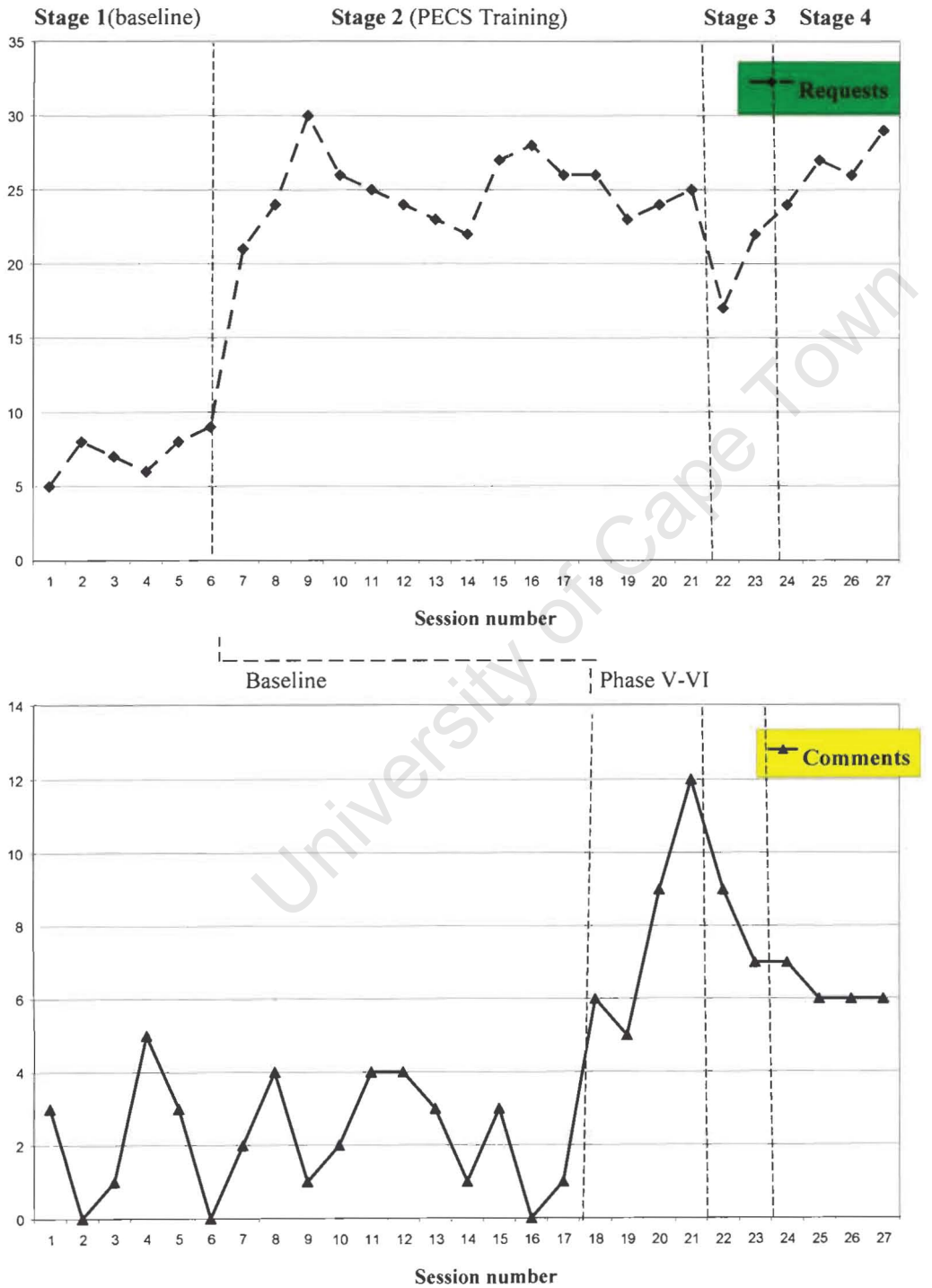
Stage	Comments				
	N	Mean	σ	Min	Max
Pre-Training	10	0.00	0.00	0.00	0.00
PECS Training	4	0.75	0.96	0.00	2.00
Post-Training	2	0.50	0.71	0.00	1.00
Follow-up	4	0.00	0.00	0.00	0.00

During the Pre-Training Stage (baseline measures) M.M. obtained a mean of 0.00 comments per session ($\sigma = 0.00$) indicating stability in the baseline. In the PECS Training Stage, M.M. obtained a mean of 0.75 comments per session ($\sigma = 0.96$, min. = 0, max. = 2). This suggests a minimal increase in the frequency of commenting behaviour with the introduction of the PECS Training (there is a 0.75 difference between the means of Stage 1 and 2). The mean obtained in Stage 2 (Mean = 0.75) was similar to the mean obtained during the Post-Training Stage (Stage 3) (Mean = 0.5) with a difference of 0.25 between the means. In the Follow-up Stage, M.M. obtained a mean of 0 comments per session ($\sigma = 0.00$). This suggests a slight decrease in the level of commenting in the Follow-up Stage (there is a -0.5 difference between the means of Stage 3 and 4) when commenting returned to baseline level. .

3.2.2 Participant 2: N.N.

3.2.2.1 Structured sessions

Figure 5: Number of Requests & Comments for Participant 2 during structured sessions



Requests

Visual analysis of Figure 5 revealed a noticeable increase in requests from session 7 onwards (i.e. the start of Stage 2 PECS Training), with some variation in levels of requesting (between 21 and 30 requests per session) during Stage 2 and a slight decrease in requesting during Stage 3. In Stage 4, there was an increase in the level of requesting. The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 100%, indicating that the PECS training was highly effective in increasing requesting in structured settings. The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 0% and between Stage 2 and Stage 4 (Follow-up) was 100%. This suggests that the level of requesting was not maintained in the Post-Training Stage but was maintained in the Follow-up Stage.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for requests in structured sessions during the 4 Stages of the research study (See Table 10).

Table 10: Participant 2: Descriptive Statistics for Requesting in Structured sessions

Stage	Requests				
	N	Mean	σ	Min	Max
Pre-Training	6	7.17	1.47	5.00	9.00
PECS Training	15	24.93	2.34	21.00	30.00
Post-Training	2	19.50	3.54	17.00	22.00
Follow-up	4	26.50	2.08	24.00	29.00

During the Pre-Training Stage (baseline measures) N.N. obtained a mean of 7.17 requests per session (σ = 1.47, min. = 5, max. = 9). This suggests some variance in the baseline (σ > 1). In the PECS Training Stage, N.N. obtained a mean of 24.93 requests per session (σ = 2.34, min. = 21, max. = 30). This suggests an increase in the frequency of requesting behaviour with the introduction of the PECS Training (there is a 17.76 difference between the means of Stage 1 and 2), with some variance in requesting behaviour (σ > 1).

The mean obtained in the Post-Training Stage (Stage 3) was 19.50 (σ = 3.54, min. = 17, max. = 22) which suggests a decrease in the level of requesting during this stage with a difference of 5.43 between the means and some variance in requesting behaviours. In the Follow-up Stage, N.N. obtained a mean of 26.50 requests per session (σ = 2.08, min. = 24, max. = 29). This suggests an increase in the level of requesting in the Follow-up Stage (there is a 7.00 difference between the means of Stage 3 and 4) and more stability in the level of requesting behaviour. The level of requesting in Stage 4 is similar to that of Stage 2 with a 1.57 difference between the means.

Comments

Visual analysis of Figure 5 revealed a noticeable increase in comments from session 18 onwards (i.e. the start of Stage 2 Phase VI of the PECS Training), with some variation in levels of commenting (between 5 and 12 comments per session) during Stage 2 Phase VI. There was also some variation in comments during the baseline (Stage 1 between 0 and 5). Commenting remained steady at a similar level to that of Stage 3 (Post-Training), but both Stage 3 and 4 were at a slightly lower level that the peak of the commenting behaviour in Stage 2: Phase VI. The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 75%, indicating moderately effective treatment of commenting behaviour in structured settings. The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 100% and between Stage 2 and Stage 4 (Follow-up) was 100%. This indicates that the level of commenting was effectively maintained in the Post-Training and Follow-up Stages.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for comments in structured sessions during the 4 Stages of the research study (See Table 11).

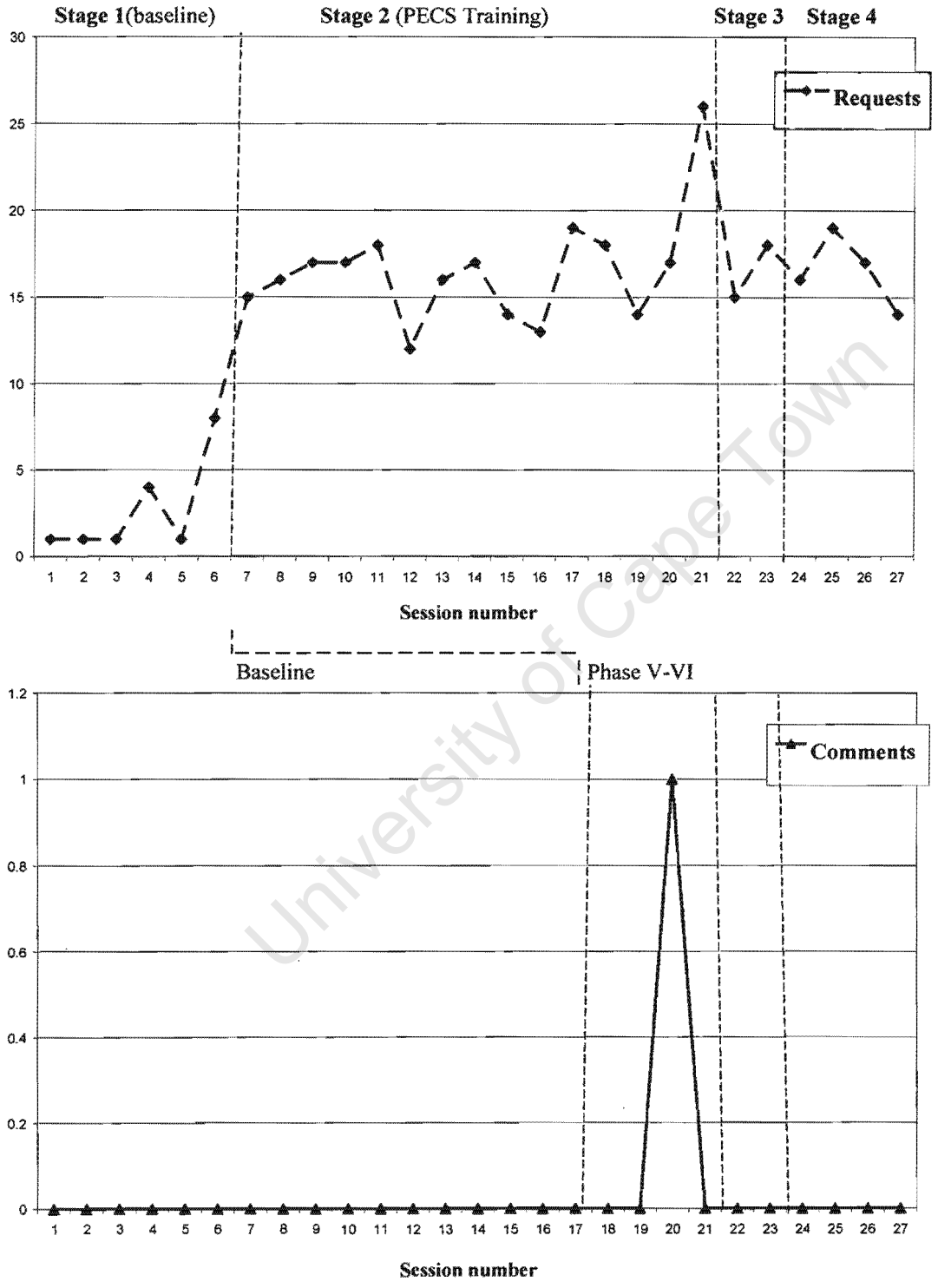
Table 11: Participant 2: Descriptive Statistics for Commenting in Structured sessions

Stage	Comments				
	N	Mean	σ	Min	Max
Pre-Training	17	2.18	1.59	0.00	5.00
PECS Training	4	8.00	3.16	5.00	12.00
Post-Training	2	8.00	1.41	7.00	9.00
Follow-up	4	6.25	0.50	6.00	7.00

During the Pre-Training Stage (baseline measures), N.N. obtained a mean of 2.18 comments per session ($\sigma = 1.59$, min. = 0, max. = 5). This suggests mild instability in the baseline for commenting behaviour ($\sigma > 1$). In the PECS Training Stage N.N. obtained a mean of 8.00 comments per session ($\sigma = 3.16$, min. = 5, max. = 12). This suggests an increase in the frequency of commenting behaviour with the introduction of the PECS Training (there is a 5.42 difference between the means of Stage 1 and 2), with some variance in commenting behaviour. The means for Stage 2 and 3 were the same with a 0.00 difference between the means. In the Follow-up Stage, N.N. obtained a mean of 6.25 comments per session ($\sigma = 0.50$, min. = 6, max. = 7). This suggests a slight decrease in the level of commenting in the Follow-up Stage (there is a 1.75 difference between the means of Stage 3 and 4). The level of commenting is more stable ($\sigma < 1$).

3.2.2.2 Unstructured sessions

Figure 6: Number of Requests & Comments for Participant 2 during unstructured sessions



Requests

Visual analysis of Figure 6 revealed a noticeable increase in requests (above 10 per session) from session 7 onwards (i.e. the start of Stage 2 PECS Training), with some variation in levels of requesting (between 12 and 26 requests per session) during Stage 2 and 3. There was also a slight increase in requests during the baseline (Stage 1) which started at 1 request for the first 3 sessions, but increased to 4 and 8 in session 4 and 6 respectively. Visual analysis revealed that requesting behaviour remained steady at a similar level achieved during the PECS training (except for a peak of 26 requests in session 21). The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 100%, indicating that the PECS training is a highly effective treatment for requesting in unstructured settings. The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 100% and between Stage 2 and Stage 4 (Follow-up) was 100%. This suggests that the level of requesting was effectively maintained in the Post-Training and Follow-up Stages.

Descriptive statistical analysis revealed the following means, standard deviation (σ), minimums and maximums for requests in unstructured sessions during the 4 Stages of the research study (See Table 12).

Table 12: Participant 2: Descriptive Statistics for Requesting in Unstructured sessions

Stage	Requests				
	N	Mean	σ	Min	Max
Pre-Training	6	2.67	2.88	1.00	8.00
PECS Training	15	16.60	3.27	12.00	26.00
Post-Training	2	16.50	2.12	15.00	18.00
Follow-up	4	16.50	2.08	14.00	19.00

During the Pre-Training Stage (baseline measures) N.N. obtained a mean of 2.67 requests per session (σ = 2.88, min. = 1, max. = 8). This suggests some degree of instability in the baseline ($\sigma > 1$) with high variance in the levels of requesting.

In the PECS Training Stage, N.N. obtained a mean of 16.60 requests per session (σ = 3.27, min. = 12, max. = 26). This suggests an increase in the frequency of requesting behaviour with the introduction of the PECS Training (there is a 13.93 difference between the means of Stage 1 and 2), with high variance in the levels of requesting during this stage (σ >1). The mean obtained in Stage 2 (Mean = 16.60) was similar to the mean obtained during the Post-Training Stage (Stage 3) (Mean = 16.50) with a difference of 0.10 between the means. In the Follow-up Stage, N.N. obtained a mean of 16.50 requests per session (σ = 2.08, min. = 14, max. = 19). The level of requesting in Stage 4 was the same as that of Stage 3 with a 0.00 difference between the means.

Comments

Visual analysis of Figure 6 revealed only 1 session where any commenting occurred in the unstructured setting. This suggests no significant increase or decrease in comments across the stages of the research process. No commenting behaviour was observed during or after the PECS training (except for 1 comment made in session 20). The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 (Phase VI) was 25%, indicating ineffective treatment for commenting in unstructured settings.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for comments in unstructured sessions during the 4 Stages of the research study (See Table 13).

Table 13: Participant 2: Descriptive Statistics for Commenting in Unstructured sessions

Stage	Comments				
	N	Mean	σ	Min	Max
Pre-Training	17	0.00	0.00	0.00	0.00
PECS Training	4	0.25	0.50	0.00	1.00
Post-Training	2	0.00	0.00	0.00	0.00
Follow-up	4	0.00	0.00	0.00	0.00

During the Pre-Training Stage (baseline measures), N.N. obtained a mean of 0.00 comments per session (σ = 0.00) indicating a stable baseline. In the PECS Training Stage, N.N. obtained a mean of 0.25 comments per session (σ = 0.5). This suggests no significant increase in the frequency of commenting behaviour with the introduction of the PECS Training (there is a 0.25 difference between the means of Stage 1 and 2). The mean obtained in Stage 2 (Mean = 0.25) was similar to the mean obtained during the Post-Training Stage (Stage 3) (Mean = 0.00) with a difference of 0.25 between the means. In the Follow-up Stage, N.N. obtained a mean of 0 comments per session (σ = 0.00). This was the same level of commenting as that of the Pre-Training (baseline) and Follow-up Stage (mean = 0.00 for both).

3.2.3 Summary

3.2.3.1 Effectiveness of PECS for Requesting Behaviour

Figure 7: Number of Requests during structured and unstructured sessions for Participant 1 & 2

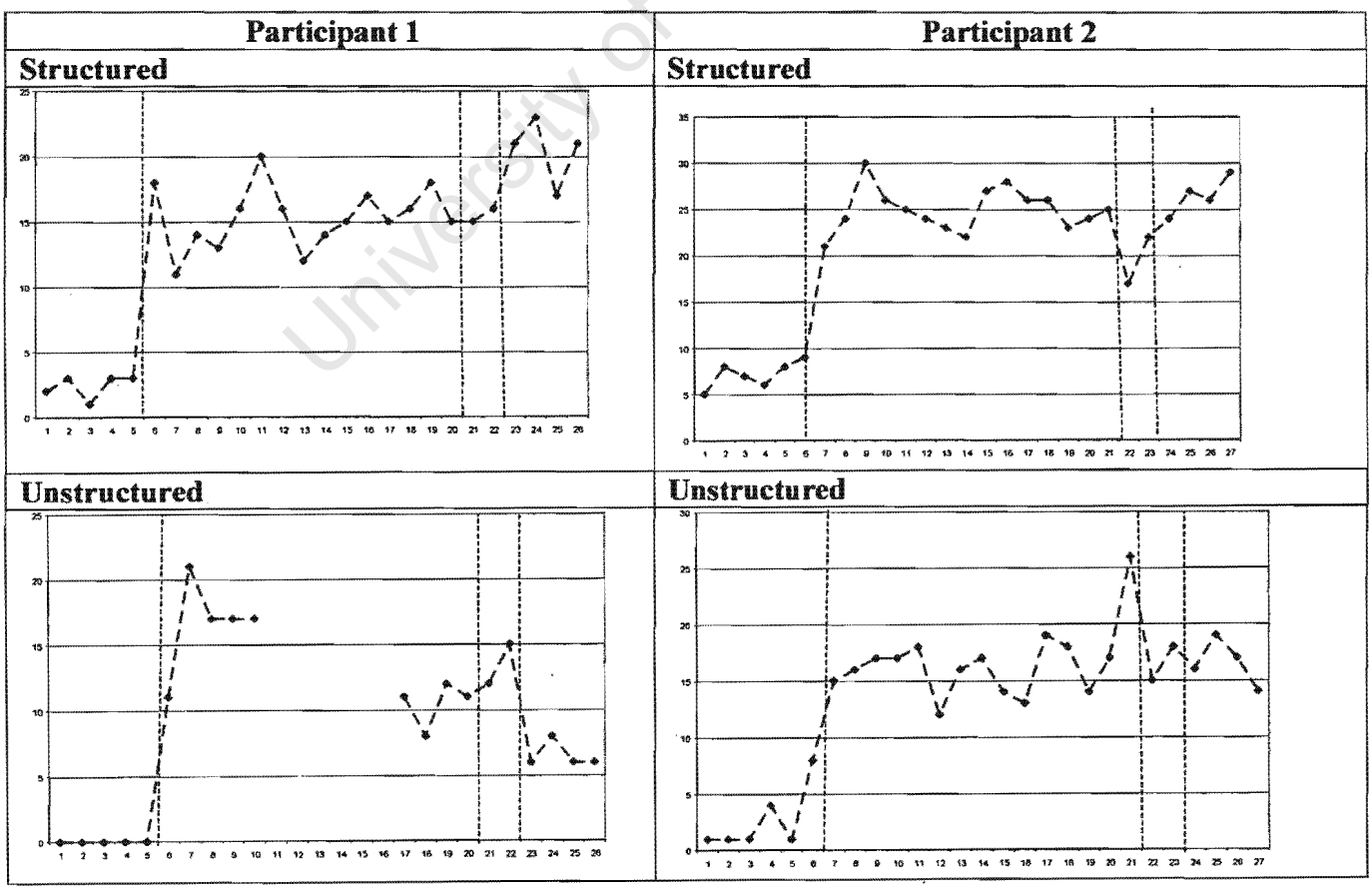


Table 14: Summary of Percentage of non-overlapping data (PND) and overlapping data (POD) for Requests:

Participant	Participant 1		Participant 2	
Setting	**Structured**	**Unstructured**	**Structured**	**Unstructured**
PND	100	100	100	100
POD (Stage 3)	100	100	0	100
POD (Stage 4)	100	25	100	100

The findings indicate that the PECS training was highly effective in increasing **requesting behaviour** in both *structured and unstructured settings* for both participants (see PND scores in Table 14). This was evident in the immediate increase in the level of requesting from the onset of the PECS training (Phase I) (see Figure 7) and the increase in the mean number of requests in the treatment stage (see Table 15). Increases in requesting behaviour were maintained in the Post-Training stage for both participants in the unstructured setting and only for Participant 1 in the structured setting. There was a noticeable decrease in requesting behaviour for Participant 2 in the Post-Training Stage (structured setting).

Table 15: Summary of Descriptive Statistics for Requests

Participant	Participant 1			Participant 2		
Stage	**N**	**Mean**	**σ**	**N**	**Mean**	**σ**
Structured						
Pre-Training	5	2.40	0.89	6	7.17	1.47
PECS Training	15	15.33	2.38	15	24.93	2.34
Post-Training	2	15.50	0.71	2	19.50	3.54
Follow-up	4	20.50	2.52	4	26.50	2.08
Unstructured						
Pre-Training	5	0.00	0.00	6	2.67	2.88
PECS Training	9	13.89	4.23	15	16.60	3.27
Post-Training	2	13.50	2.12	2	16.50	2.12
Follow-up	4	6.50	1.00	4	16.50	2.08

The effectiveness of the PECS training on requesting was maintained in the Follow-up Stage (3 months after the training) in both settings for Participant 2, whereas Participant 1 showed a slight increase in requesting behaviour in the structured setting and a noticeable decrease in requesting in the unstructured setting.

This decrease in the unstructured setting may be due to the change in educator that occurred after the PECS training was completed (the new educator had no training in the PECS) and the difficulties the participant's mother had in maintaining the PECS use at home during this period. Participant 2 had the same educator throughout the PECS Training and the Post-Training stage and the Follow-up stage (3 months after the training).

Despite many anecdotal reports of improvements in requesting, there is limited empirical evidence for the effectiveness of PECS for requesting behaviours. *Kravits et al. (2002)* measured the frequency of initiations (including requests, comments and expansions) across 3 settings in an MBD design. The level of initiations increased in each setting as PECS was implemented, although the functions of the initiations were not specified. *Adkins & Axelrod (2002)* measured spontaneous use of mands (requests) in a school setting to evaluate generalisation. Only 3 measures were made during the training and the number of mands was higher using the PECS vocabulary than the sign language vocabulary. Other studies measured the percentage of independent PECS exchanges and independent mands (requests) (Ganz & Simpson, 2004; Tincani, 2004).

Charlop-Christy et al. (2003) measured the frequency of requests and initiations with the following results: Participant 1 increased from an average of 11 requests and initiations per session during baseline to an average of 28 per session following PECS training and 52 during the follow-up sessions. Participant 2 increased from an average of 2.9 requests and initiations per session to an average of 38 per session following the PECS training and Participant 3 went from an average of 2.8 requests and initiations to 27 per session following the PECS training. Of the 8 social-communicative behaviour measures the most increase was reported for requests and initiations. This was maintained (and in fact increased) in the follow-up stage, demonstrating positive outcomes of the PECS intervention. The current study supports these findings, with the most gain occurring in the requesting behaviour of both participants. The current study therefore provides further evidence that the PECS intervention is highly effective in increasing requesting behaviour, which is the focus of most of the phases of the training protocol (i.e. Phase I-IV).

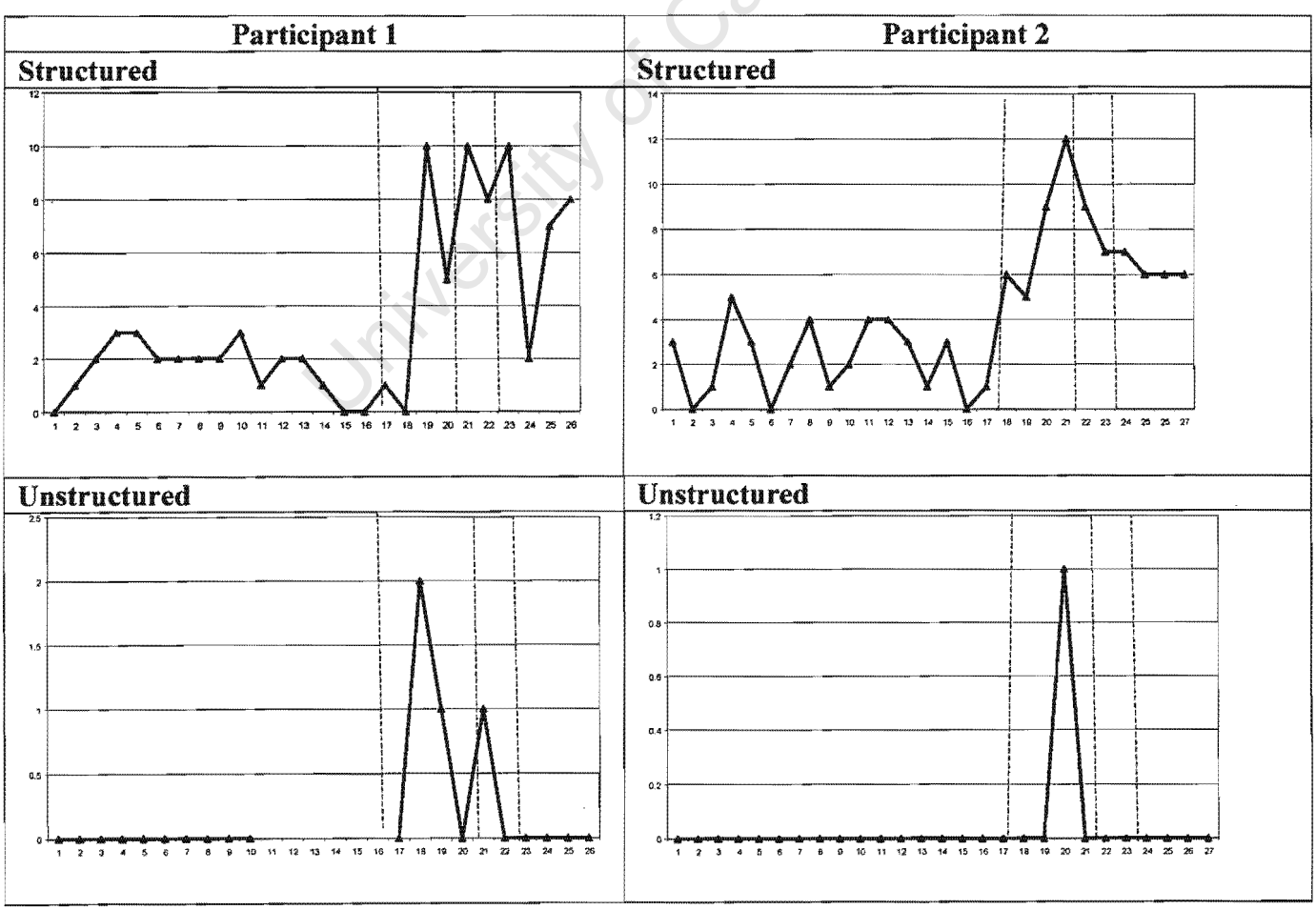
3.2.3.2 Effectiveness of the PECS Training for Commenting Behaviour

The findings indicate that the PECS training was moderately effective in increasing **commenting behaviour** in the *structured setting* for Participant 2 (see PND scores in Table 16 below) and mildly effective in the *structured* and *unstructured settings* for Participant 1.

Table 16:Summary of Percentage of non-overlapping data (PND) and overlapping data (POD) for Comments

Participant	Participant 1		Participant 2	
Setting	Structured	Unstructured	Structured	Unstructured
PND	50	50	75	25
POD (Stage 3)	100	100	100	N/A
POD (Stage 4)	75	100	100	N/A

Figure 8: Number of Comments during structured and unstructured sessions for Participant 1 & 2



The PECS training was ineffective in the *unstructured setting* for Participant 2. The changes in levels of commenting were maintained in the Post-Training and Follow-up Stages for both participants. Commenting behaviour increased during Phase VI of the training (when commenting was targeted) for both participants in the *structured setting* only (See Figure 8). In the *unstructured setting*, commenting behaviour was only recorded occasionally and there were almost no gains in this behaviour.

This is possibly due to limited opportunities created during mealtime to comment, limited experience of the researcher and educators in implementing Phase VI of the PECS training, the relatively short period of time spent on this phase of the PECS training and the innate difficulty that children with autism experience with commenting. Commenting behaviours are reinforced through social responses and this type of social reinforcement has limited importance for many individuals with ASD.

Table 17: Summary of Descriptive Statistics for Comments

Participant	Participant 1			Participant 2		
	N	Mean	σ	N	Mean	σ
Structured						
Pre-Training	16	1.63	1.02	17	2.18	1.59
PECS Training	4	4.00	4.55	4	8.00	3.16
Post-Training	2	9.00	1.41	2	8.00	1.41
Follow-up	4	6.75	3.40	4	6.25	0.50
Unstructured						
Pre-Training	10	0.00	0.00	17	0.00	0.00
PECS Training	4	0.75	0.96	4	0.25	0.50
Post-Training	2	0.50	0.71	2	0.00	0.00
Follow-up	4	0.00	0.00	4	0.00	0.00

These mixed results for the effectiveness of PECS Training on commenting behaviour were also evident in the descriptive statistics obtained (See Table 17 above). There were no significant changes in the means for commenting behaviour in the unstructured settings for either participant. In the structured setting, Participant 1 had some increase in the means for commenting in the PECS Training Stage and the most increase in the mean during the Post-Training Stage. The mean number of comments in the Follow-Up Stage was lower than the Post-Training Stage.

Participant 2 showed a larger increase in the mean number of comments during the training and this was maintained in the Post-Training Stage, while the mean number of comments decreased in the Follow-up Stage. There were high levels of variance in the number of comments in the PECS Training Stage in the structured setting for both participants. This did not stabilise in the Follow-up Stage for Participant 1, but stabilized for Participant 2 at a lower level of commenting compared to the PECS Training and Post-Training Stages.

Apart from Kravits et al. (2002), who measured the frequency of initiations (including requests, comments and expansions) across 3 settings, no other research study was found that collected data on the commenting behaviour of the participants. *Kravits et al. (2002)* only completed Phase I-III of the PECS training, hence commenting was not targeted in the study. A number of the other research studies did not implement all 6 phases of the PECS training and therefore commenting was not targeted or measured. According to Bondy & Frost (1998), teaching spontaneous commenting is often difficult, hence they developed the strategy of teaching the child to respond to a question with concrete rewards (e.g. What do you want?) in Phase V and then introducing commenting in a similar format i.e. as a response to a question (e.g. What do you see?) in Phase VI. Despite this teaching strategy, not all children with autism will learn spontaneous commenting (Bondy & Frost, 1998a). It has been suggested that this may depend on a child's responsiveness to social reinforcers.

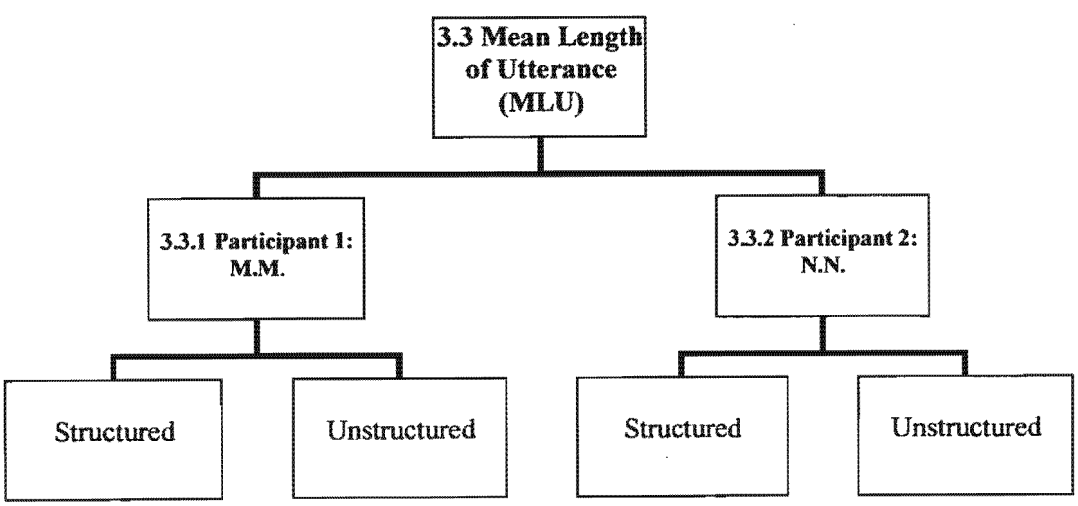
Inter-rater Reliability

To establish the *reliability* of the data, an independent observer made judgements of the participant's responses for 10% of the data for each participant. The degree to which the observers agreed was an indicator of how reliable the data was (McMillan & Schumacher, 2001). The overall inter-rater reliability (percentage of agreement between the researcher and the second observer) in this study was 90.1 % (Participant 1: 89.7% and Participant 2: 90.4%). This suggests a high degree of reliability. It should also be noted that almost all the points of disagreement between the observers involved slight differences in the recording of verbal utterances. These were possibly due to loss of sound quality in the copying of the video footage and familiarity of the researcher with the participant's speech and the context of the utterances recorded, having been present during all structured and unstructured sessions and part of the participant's daily routine.

3.3 Effect of the PECS Training on Mean Length of Utterance (MLU)

The effect of the PECS Training on the *mean length of utterance* (average number of words per utterance) was used to determine any generalisation effects on the verbal utterances of the participants. Although the PECS Training does not specifically target verbal utterances, gains in speech have reportedly occurred during **Phase IV** of the PECS Training when delayed prompting is introduced (Bondy & Frost, 1998).

Figure 9: Organisation of Results for Mean Length of Utterance (MLU)



The **mean length of utterance** (MLU) was recorded in each session (structured and unstructured) across the four stages of the research process for each participant (Appendix K – raw data).

The data points obtained were grouped into:

- Stage 1 (Pre-Training baseline)
- Stage 2 (PECS training)
- Stage 3 (Post-Training)
- Stage 4 (Follow-up)

The *mean length of utterance* (MLU) in each session was plotted on a graph for visual analysis. The *percentage of non-overlapping data* (PND) was also recorded between the baseline and treatment stage. The MLUs recorded in Stage 4 of the research process (3 months after the PECS Training) were compared to the MLUs obtained in the treatment phase to determine the maintenance effects.

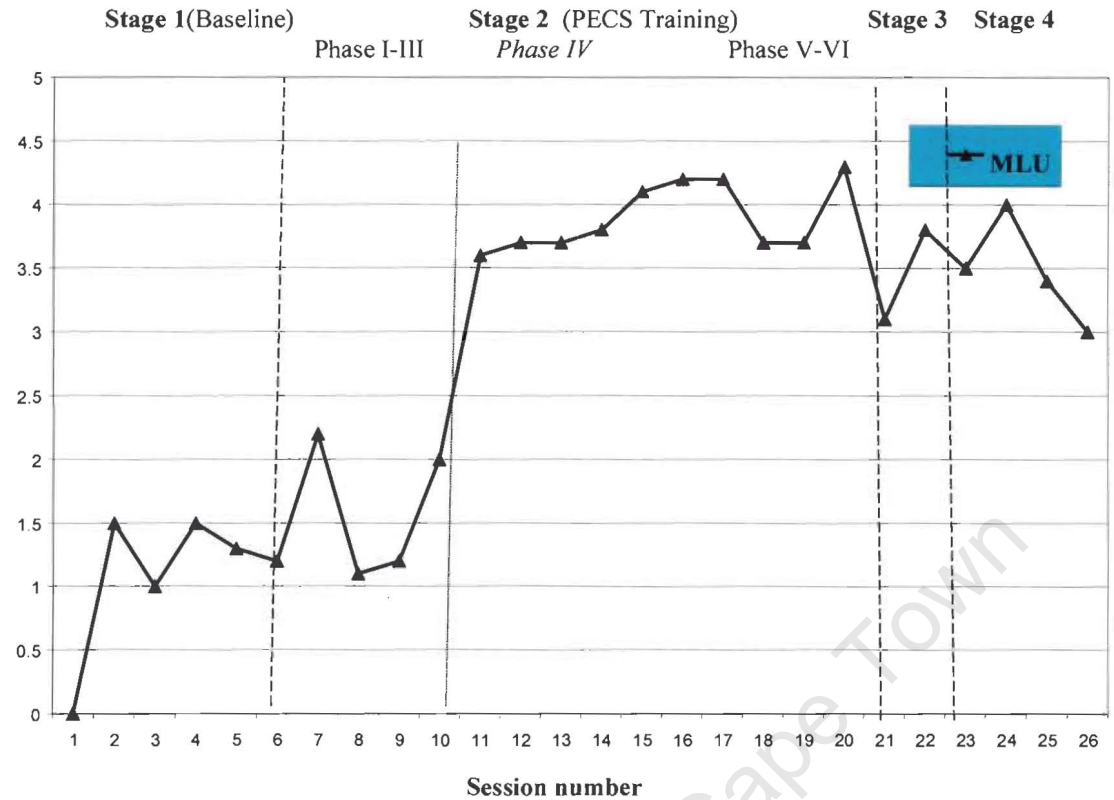
Percentage of overlapping data (POD) was used to determine whether the level of the MLU was maintained in the Post-Training and Follow-up Stages. *Descriptive statistics* (mean, standard deviation, minimum and maximum) was used to compare MLU data points obtained across the stages of the research.

3.3.1 Participant 1:M.M.

Structured sessions

Visual analysis of Figure 10 revealed some variation in MLU during the baseline (Stage 1 between 0 and 2.2 words per utterance). There was a noticeable increase in MLU from session 11 onwards (i.e. the start of Stage 2 Phase IV of the PECS Training), with some variation in MLU (between 3.6 and 4.3 words per utterance) during Stage 2 Phase IV-VI. Further variation in MLU was noted in Stage 3 and 4, although these remain at a higher level than at baseline.

Figure 10: Participant 1: Mean Length of Utterance (Structured)



The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 100%, indicating that the PECS Training was highly effective in increasing the MLU of this participant in the structured setting. The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 50% and between Stage 2 and Stage 4 (Follow-up) was 25%. This suggests that the MLU was not effectively maintained in the Post-Training and Follow-up Stage.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for the mean length of utterance (MLU) in the structured sessions during the 4 Stages of the research study (See Table 18).

Table 18: Participant 1: Descriptive Statistics for MLU in Structured sessions

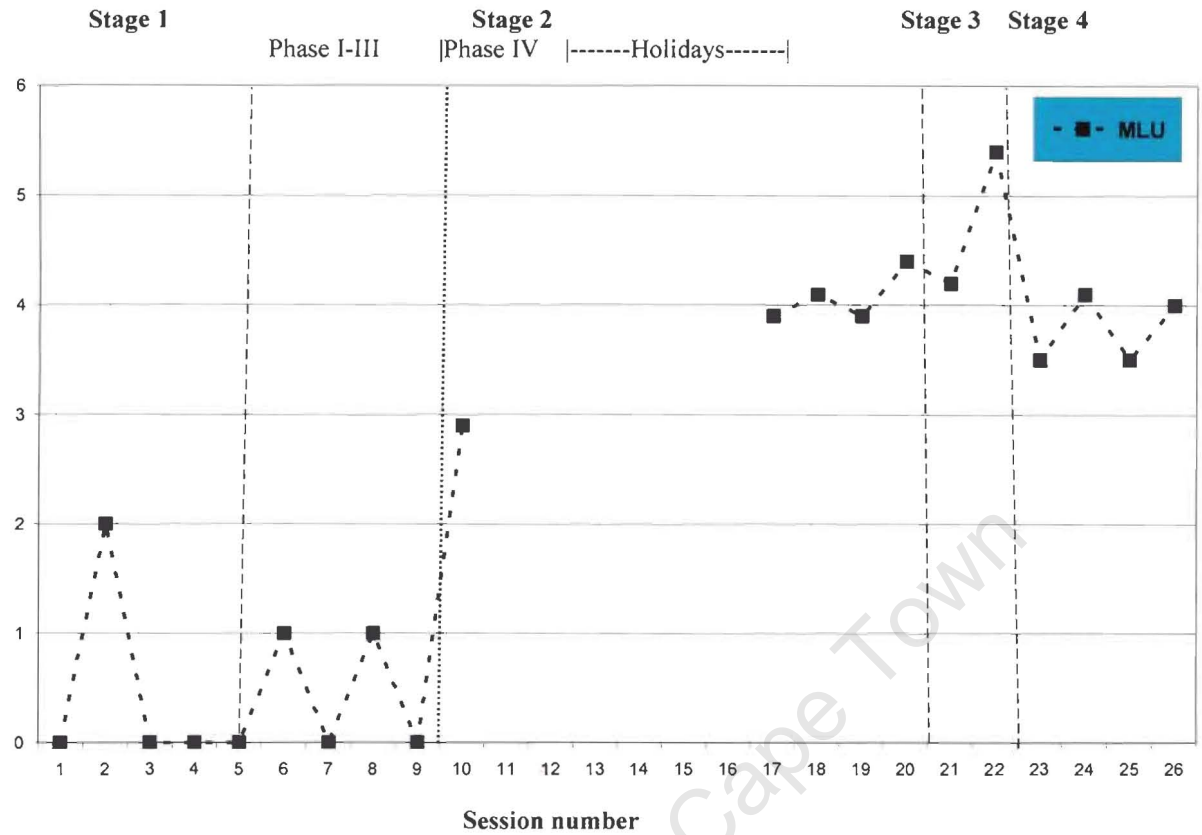
Stage	N	Mean	σ	Min	Max
Pre-Training	10	1.30	0.60	0.00	2.20
PECS Training	10	3.90	0.27	3.60	4.30
Post-Training	2	3.45	0.49	3.10	3.80
Follow-up	4	3.48	0.41	3.00	4.00

During the Pre-Training Stage (baseline measures) M.M. obtained an MLU of 1.3 words per utterance per session ($\sigma = 0.60$, min. = 0, max. = 2.20). This indicates a stable baseline ($\sigma < 1$). In the PECS Training Stage, M.M. obtained an MLU of 3.9 words per utterance per session ($\sigma = 0.27$). This suggests an increase in the length of verbal utterances with the introduction of the PECS Training (there is a 2.6 difference between the means of Stage 1 and 2). There is a slight decrease in the MLU level during Stage 3 (mean = 3.45) with a 0.45 difference between the means. In the Follow-up Stage, M.M. obtained a MLU of 3.48 words per utterance per session ($\sigma = 0.41$). This suggests that the MLU level was similar between Stage 3 and 4 with a difference of 0.03 between the means. There was low variation (i.e. stability) in measures of MLU in each stage ($\sigma < 1$).

Unstructured Sessions

Visual analysis of Figure 11 revealed a noticeable increase in MLU (3.0+ words per utterance) from session 17 onwards (i.e. after the introduction of Stage 2 Phase IV of the PECS Training), with some variation in MLU (between 2.9 and 4.4 words per utterance) during Stage 2 Phase IV -VI. There was also some variation in MLU during the baseline (between 0 and 2.0 words per utterance). It should be noted that during session 2 (highest MLU of 2.0), only 4 words were uttered ("peanut butter" and "right here", creating this inflated MLU). There was a gap in the data points that occurred during the 3-week school holiday in which only structured sessions took place. MLU appears steady, but at a slightly lower level than during Stage 2 (Phase V-VI) and Stage 3.

Figure 11: Participant 1: Mean Length of Utterance (Unstructured)



The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 100%, indicating a highly effective treatment for MLU.

The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 100% and between Stage 2 and Stage 4 (Follow-up) was 50%. This indicates that while the PECS training was effectively maintained in the Post-Training Stage, the PECS training was only mildly effective in maintaining changes in the MLU in the Follow-up Stage.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for the mean length of utterance (MLU) in the unstructured sessions during the 4 Stages of the research study (See Table 19).

Table 19: Participant 1: Descriptive Statistics for MLU in Unstructured sessions

Stage	N	Mean	σ	Min	Max
Pre-Training	9	0.44	0.73	0.00	2.00
PECS Training	5	3.84	0.56	2.90	4.40
Post-Training	2	4.80	0.85	4.20	5.40
Follow-up	4	3.77	0.32	3.50	4.10

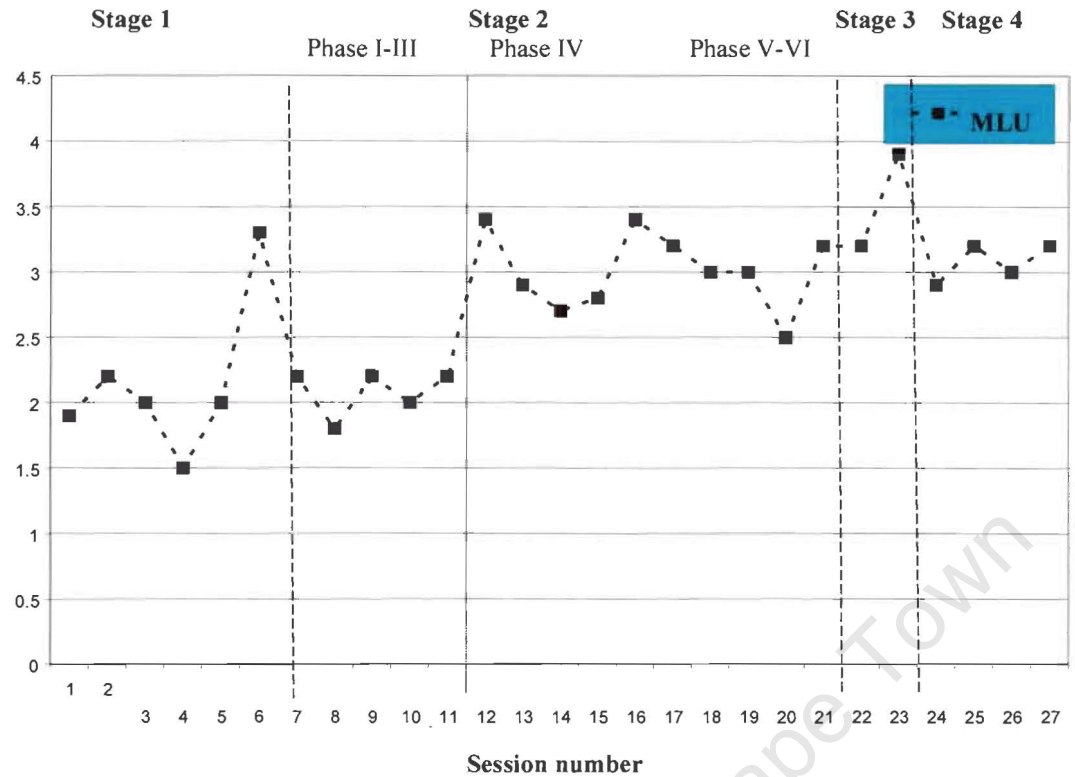
During the Pre-Training Stage (baseline measures) M.M. obtained an MLU of 0.69 words per utterance per session (σ = 0.44, min. = 0, max. = 2.0). The standard deviation is below 1, suggesting a stable baseline. In the PECS Training Stage M.M. obtained an MLU of 3.84 words per utterance per session (σ = 0.56, min. = 2.9, max. = 4.4). This suggests an increase in the length of verbal utterances with the introduction of the PECS Training (a 3.40 difference between the means of Stage 1 and 2). There is a noticeable increase in the MLU level during Stage 3 (mean = 4.8) with a 0.96 difference between the means. In the Follow-up Stage, M.M. obtained a MLU of 3.77 words per utterance per session (σ = 0.32, min. = 3.5, max. = 4.1). This suggests that the MLU level decreased in Stage 4 with a difference of 1.03 between the means. There was low variation (i.e. stability) in measures of MLU in Stage 2, 3 and 4 (σ <1).

3.3.2 Participant 2: N.N.

Structured sessions

Visual analysis of Figure 12 below revealed a noticeable increase in MLU from session 12 onwards (i.e. the start of Stage 2 Phase IV of the PECS Training), with some variation in MLU (between 2.5 and 3.4 words per utterance) during Stage 2 Phase IV-VI. There was also some variation in MLU during the baseline (Stage 1 between 1.5 and 3.3). MLU increased in Stage 3 (to the highest level of 3.9 words per utterance) and remained steady in Stage 4 at a level similar to Stage 2.

Figure 12: Participant 2: Mean Length of Utterance (Structured)



The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 20%, indicating that the PECS Training was ineffective for increasing MLU in structured settings for this participant. This result is due to the outlier in the baseline in session 6 when an MLU of 3.3 words per utterance was recorded.

A comparison of session 6 with session 16 (during the PEC Training stage) where the same MLU occurred (Appendix Q), revealed that while the MLU was similar there were noticeably more meaningful utterances during session 16. If this outlier is removed, then the PND is 100%, indicating highly effective treatment. The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 100% and between Stage 2 and Stage 4 (Follow-up) was 100%. This indicates that MLU measures from Stage 2 were maintained in the Post-Training and Follow-up Stages.

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for the mean length of utterance (MLU) in the structured sessions during the 4 Stages of the research study (See Table 20).

Table 20: Participant 2: Descriptive Statistics for MLU in Structured sessions

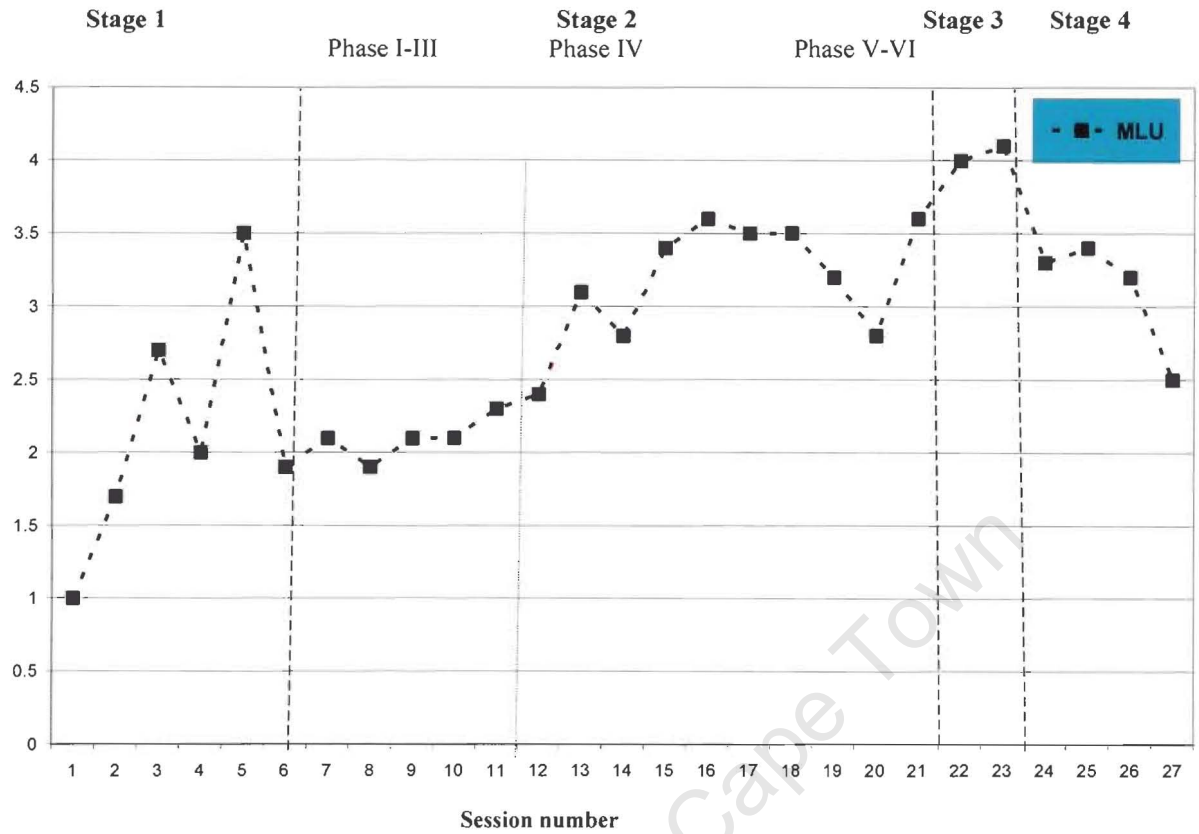
Stage	N	Mean	σ	Min	Max
Pre-Training	11	2.12	0.45	1.50	3.30
PECS Training	10	3.01	0.30	2.50	3.40
Post-Training	2	3.55	0.49	3.20	3.90
Follow-up	4	3.08	0.15	2.90	3.20

During the Pre-Training Stage (baseline measures), N.N. obtained an MLU of 2.12 words per utterance per session (σ = 0.45, min. = 1.5, max. = 3.3). This indicates stability in the baseline measures. In the PECS Training Stage, N.N. obtained an MLU of 3.01 words per utterance per session (σ = 0.3, min. = 2.5, max. = 3.4). This suggests a slight increase in the length of verbal utterances with the introduction of the PECS Training (there is a 0.49 difference between the means of Stage 1 and 2). There is a slight increase in the MLU level during Stage 3 (mean = 3.55) with a 0.54 difference between the means. In the Follow-up Stage, N.N. obtained a MLU of 3.08 words per utterance per session (σ = 0.15, min. = 2.9, max. = 3.2). This suggests that the MLU level decreased slightly in Stage 4 with a difference of 0.47 between the means of Stage 3 and 4. There was low variation (i.e. stability) in MLU measures in each stage (σ < 1).

Unstructured sessions

Visual analysis of Figure 13 (below) revealed no clear data trends in the MLU during the PECS training. There is some variation in the baseline MLUs (between 1.0 and 3.5 words per utterance). There is a slight increase in MLU from session 13 onwards (i.e. Stage 2 Phase IV-VI of the PECS Training), with some variation in MLU during Stage 2: Phase IV- VI (between 2.4 and 3.6 words per utterance).

Figure 13: Participant 2: Mean Length of Utterance (Unstructured)



The percentage of non-overlapping data (PND) between Stage 1 and Stage 2 was 20% indicating ineffective treatment. There were 2 outliers in the 11 data points in the baseline (session 3 – 2.7 words per utterance and session 5 – 3.5 words per utterance). If these outliers are removed, then the PND is 100%, indicating highly effective treatment. A comparison of session 3 and 5 with session 17 and 20 (during the training stage) where the same MLUs occurred (Appendix Q), revealed very few meaningful utterances in the pre-training sessions, compared to more meaningful utterances with consistent utterance length.

The percentage of overlapping data (POD) between Stage 2 and Stage 3 was 100% and between Stage 2 and Stage 4 (Follow-up) was 75%. This indicates that MLU measures from Stage 2 were maintained in the Post-Training (effectively) and Follow-up Stages (moderately).

Descriptive statistical analysis revealed the following means, standard deviations (σ), minimums and maximums for the mean length of utterance (MLU) in the unstructured sessions during the 4 Stages of the research study (See Table 21 below).

Table 21: Participant 2: Descriptive Statistics for MLU in Unstructured sessions

Stage	N	Mean	σ	Min	Max
Pre-Training	11	2.12	0.62	1.00	3.50
PECS Training	10	3.19	0.41	2.40	3.60
Post-Training	2	4.05	0.07	4.00	4.10
Follow-up	4	3.10	0.41	2.50	3.40

During the Pre-Training Stage (baseline measures), N.N. obtained an MLU of 2.12 words per utterance (σ = 0.62, min. = 1, max. = 3.5). The standard deviation (σ < 1) suggests stability in the baseline, although there is more variance in the baseline that the other 3 stages of the research (which have stable measures with low variation σ < 1). In the PECS Training Stage, N.N. obtained an MLU of 3.19 words per utterance per session (σ = 0.41, min. = 2.4, max. = 3.6). This suggests a slight increase in the length of verbal utterances with the introduction of the PECS Training (there is a 1.07 difference between the means of Stage 1 and 2). There is also a clear increase in the minimum MLU in Stage 2. There is a slight increase in the MLU level during Stage 3 (mean = 4.05, σ = 0.07, min. = 4, max. = 4.1) with a 0.46 difference between the means. In the Follow-up Stage, N.N. obtained a MLU of 3.10 words per utterance per session (σ = 0.41, min. = 2.5, max. = 3.4). This suggests that the MLU level decreased slightly in Stage 4 with a difference of 0.55 between the means of Stage 3 and 4.

3.3.3 Summary: Effectiveness of PECS for Increasing MLU

The findings indicated that the PECS training was highly effective in increasing **mean length of utterance** in both *structured and unstructured settings* for Participant 1 (see PND scores in Table 22).

According to the PND scores, the PECS Training was ineffective treatment for increasing the MLU of Participant 2. These ineffective PND scores could be accounted for by a few outliers in the data points (1 in the structured and 2 in the unstructured setting). These unusually high MLU measures (when compared to the other baseline measures) overlapped with many of the MLU measures in the PECS Training Stage.

Table 22: Summary of Percentage of non-overlapping data (PND) and overlapping data (POD) for MLU

Participant	Participant 1		Participant 2	
Setting	**Structured**	**Unstructured**	**Structured**	**Unstructured**
PND	100	100	20 (100) *	20 (100) *
POD (Stage 3)	50	100	100	100
POD (Stage 4)	25	50	100	75

* (Outliers removed)

With removal of the outliers, an effective treatment PND score was obtained (See Table 20) and a pattern of gradually increasing MLU with the onset of Phase IV of the PECS Training was evident in the visual analysis (See Figure 14 below). The levels of MLU were maintained for Participant 2, however Participant 1 had limited maintenance of MLU in the Post-Training Stage (structured was mildly effective and the unstructured was highly effective) and Follow-up stages (structured was ineffective and unstructured was mildly effective).

Participant 1 had a slight decrease in the MLU in the unstructured setting (See Figure 14). The Post-Training stage had some of the longest verbal utterances recorded during the 4 stages of the research study. *Participant 2* had a few sessions in the baseline measures where his verbal utterances were noticeably longer than the rest of the baseline measures and these affected the means obtained. This resulted in a lot of overlapping data points between the baseline measures (Stage 1) and the other stages of the research.

Figure 14: Mean Length of Utterance during structured and unstructured sessions for Participant 1 & 2

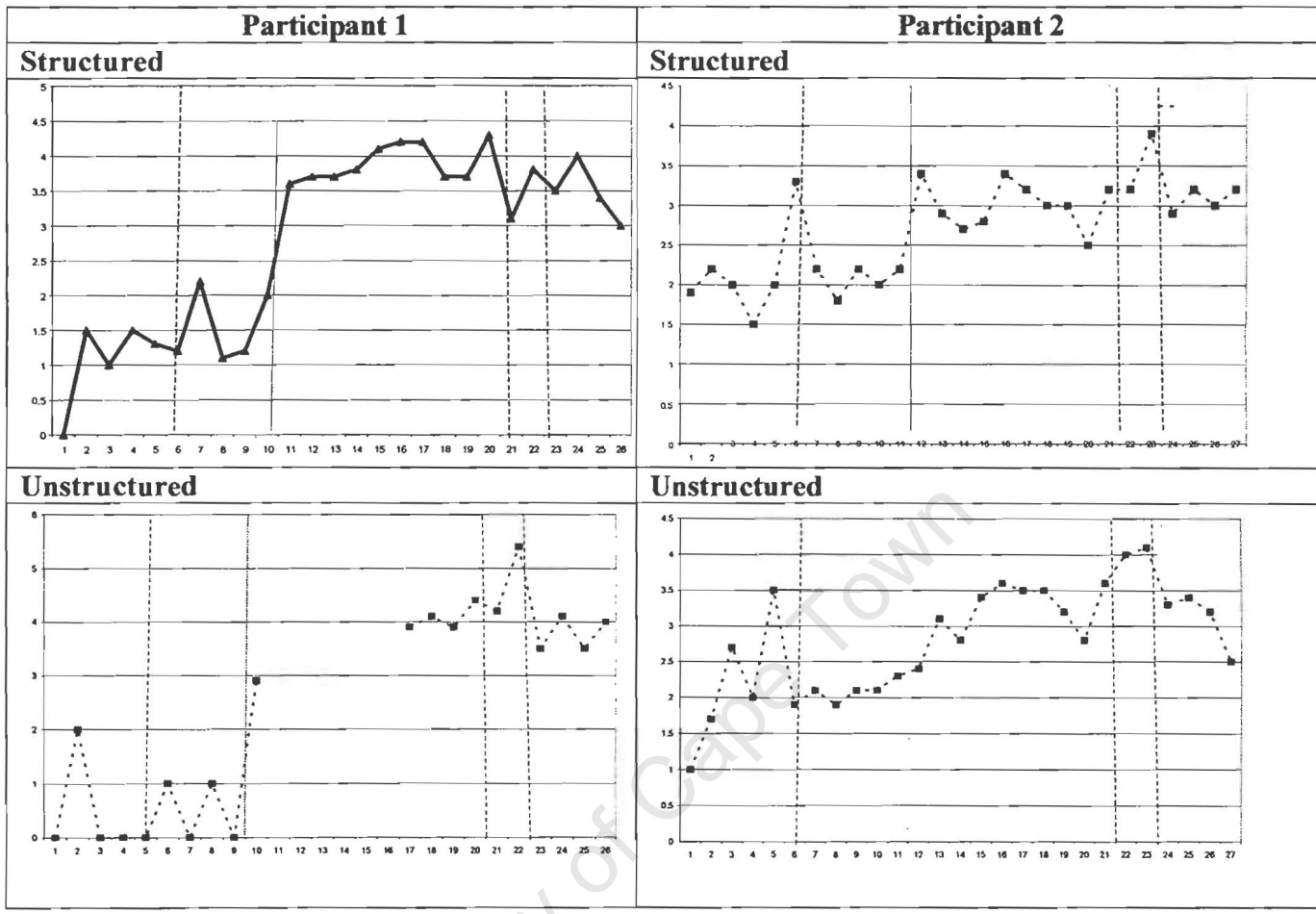


Table 23: Summary of Descriptive Statistics for MLU

Participant	Participant 1			Participant 2		
	N	Mean	Std Dev	N	Mean	Std Dev
Structured						
Pre-Training	10	1.30	0.60	11	2.12	0.45
PECS Training	10	3.90	0.27	10	3.01	0.30
Post-Training	2	3.45	0.49	2	3.55	0.49
Follow-up	4	3.48	0.41	4	3.08	0.15
Unstructured						
Pre-Training	9	0.44	0.73	11	2.12	0.62
PECS Training	5	3.84	0.56	10	3.19	0.41
Post-Training	2	4.80	0.85	2	4.05	0.07
Follow-up	4	3.77	0.32	4	3.10	0.41

These findings were confirmed by descriptive statistics that revealed an increase in the mean length of verbal utterances in both the *structured and unstructured settings* for Participant 1 (See Table 23). Participant 2 had longer utterances in the baseline and a smaller increase in length of utterances in both settings in the PECS Training stage.

To date, changes in speech output have been a popular outcome variable in PECS research. Programme evaluation data often included percentage of children in the programme showing improvements in speech. *Bondy & Frost (1994)* reported 59% of the children (N=66) used speech only and 30% speech and PECS as their mode of communication after PECS intervention. *Schwartz et al. (1998)* reported that 44% of the children (N=31) showed marked increases in speech output. *Webb (2000)* reported on a class of 6 children who all developed spontaneous speech (with and without PECS) after the PECS intervention. Improvements in speech were also reported by teachers in *Baker (2001). Liddle (2001)* reported that 42% (9) of the children (N=20) displayed increased attempts at spoken language (7 using single words, 1 using sentences and 1 attempting words, although unintelligible).

Evidence of the effect of PECS on speech development has also emerged in a few experimental studies (Charlop-Christy et al., 2002; Kravits et al., 2002; Ganz & Simpson, 2004). *Charlop-Christy et al. (2002)* demonstrated a significant increases in speech output (Participant 1: percentage of spontaneous speech increased from 28% of trials during pre-training to 100% of trials during post-training, MLU of 2 words in academic sessions and 1.7 words in free-play during pre-training, increased to 2 and 2.3 respectively in the post-training sessions. Participant 2: percentage of spontaneous speech increased from 0% of trials during pre-training to 83% of trials during post-training, MLU of 0 words in academic and free-play sessions during pre-training, increased to an MLU of 2 words in the academic sessions and 1.8 words in the free-play sessions during the post-training sessions. Participant 3: spontaneous speech increased from 2% of trials during pre-training to 68% of trials during post-training, only a single word was uttered during all pre-training session, this increased to an MLU of 1.5 words in the academic sessions and 1.6 words in the free-play sessions during the post-training sessions).

Ganz & Simpson (2004) reported large gains in mean number of words per trial. A trial was defined as beginning when the communicative partner enticed the child with a preferred item and ended once the picture exchange was completed. Participant 1 had the following mean number of words per trial in each phase of the training: Phase I: 0.36, Phase II: 0.65, Phase III: 0.13, and Phase IV: 2.70. Participant 2: Phase I: 0.04, Phase II: 0.14, Phase III: 0.93, and Phase IV: 3.68. Participant 3: Phase I: 0.64, Phase II: 0.25, Phase III: 1.00, and Phase IV: 2.89. For Participant 2 and 3 the increase occurred gradually in Phase III, whereas Participant 1 only showed increases in Phase IV. The authors suggested a possible reason for this increase in Phase III was that the 2 participants had larger echolalic vocabularies than Participant 1 and the trainers modeled the complete sentence requests throughout the training (whereas in the current study verbal modeling of sentence structure was only introduced in Phase IV). The introduction of the delayed verbal modeling prompt in Phase IV coincided with the largest increase in words per trial in all 3 participants. These results are confirmed by the current research findings.

Tincani (2004) reported on 2 participants exposed to sign language and PECS interventions (alternating treatment). One of the participants used more than twice as many word vocalisations in the sign language training as the PECS training, while the other participant initially increased word vocalisations (with both interventions), but then this decreased as the picture exchanges became more independent, whereas the word vocalisations in the sign language intervention remained consistently high. It should be noted that neither participant received training beyond Phase III and when a reinforcement delay procedure was implemented, the word vocalisations increased significantly for the second participant. This would suggest that the delayed prompt procedure is effective in increasing word vocalisations. *Adkins & Axelrod (2002)* found that overall more words were uttered in the PECS intervention than the sign language intervention for a single participant. These conflicting results would suggest the need for further research comparing PECS to other AAC interventions.

3.4. A Comparison of Complexity of Participants' Verbal Utterances: Pre- vs. Post-Training

All the meaningful utterances were recorded during the Pre-Training Stage (Stage 1: Participant 1 M.M.: a 100-minute sample over 10 sessions; Participant 2 N.N.: a 120-minute sample over 12 sessions). This language sample was then analysed according to the ***Language Assessment Remediation Screening Procedure*** (LARSP) (Crystal, Fletcher & Garman, 1981). This analysis was then compared to the analysis of a sample from the Post-Training Stage (Stage 3: a 40-minute sample recorded over 4 sessions for each participant). The **structure** of verbal utterances in each sample was analysed on the ***clause***, ***phrase*** and ***word*** level.

3.4.1 Participant 1

Only **17** utterances were recorded in the Pre-Training Stage, whereas **81** utterances were recorded and analysed in the Post-Training Stage. The sample from the Pre-Training Stage was small due to the lack of meaningful verbal utterances during these sessions.

The majority of verbal utterances during the **Pre-Training Stage** were analysed as LARSP Stage I (47%) and Stage II (18%) utterances, with 5 minor responses (29%) that could not be analysed further (see Table 22). Only one Stage III utterance was evident. The mean length of utterance (MLU) was **1.4** words per utterance. This placed M.M. (C.A. 9.10 years) in LARSP **Stage I**, with an expressive language age equivalent of 1.0 – 1.6 years. The majority of verbal utterances during the **Post-Training Stage** were analysed as LARSP Stage III (54%) and Transition Stage III-IV (14%) utterances. There were also a number of utterances in Stage I (15%) and Stage II (9%), with only 1 minor response (1%) that could not be analysed further (see Table 15). A number of Stage IV utterances were evident (6%). The mean length of utterance (MLU) was **4.1** words per utterance. This placed M.M. (C.A. 10.1 years) in LARSP **Transition Stage III-IV**, with an expressive language age equivalent of 2.6 – 3.0 years (see Table 24 below).

Participant 1 (M.M.) progressed from **Stage I** in the Pre-Training Stage to **Transition Stage III-IV** in the Post-Training Stage. His **MLU** increased from **1.4** to **4.1** words on average per utterance (see Table 24).

Table 24: Participant 1: Pre-Training vs. Post-Training – LARSP Stages

Pre-Training (Stage 1)			**Post-Training (Stage 3)**		
LARSP Stages	No. of Utterances	% of sample	LARSP Stages	No. of Utterances	% of sample
Stage I	8	47%	Stage I	12	15%
Stage II	3	18%	Stage II	7	9%
Stage III	0	0%	Stage II-III	1	1%
Stage III	1	6%	Stage III	44	54%
Stage III-IV	0	0%	Stage III-IV	11	14%
Stage IV	0	0%	Stage IV	5	6%
Minor	5	29%	Minor	1	1%
MLU	24/17 = **1.4**		MLU	329/81 = **4.1**	
LARSP Stage	Stage I		LARSP Stage	Transition Stage III-IV	
Age level	1.0 – 1.6 years		Age level	2.6 – 3.0 years	

An **in-depth LARSP analysis** was conducted, comparing verbal utterances from Pre-Training and Post-Training Stages on the *clause*, *phrase* and *word* level (see Table 25):

Table 25: In-depth LARSP Analysis - Participant 1: M.M.

Level of Analysis	**Pre-Training (Stage 1)**	**Post-Training (Stage 3)**
Clause Level	Statements (11) Commands (1) Questions (0) Stage I: V (1), N (6), Other (1) Stage II: AX (1) Stage III: SVA (1) Minor Responses (5): wow, yuck, yes, oh no	Statements (76) Commands (4) Questions (1) Stage I: N (7), Other (2), V (1), Q (1) Stage II: VX (3), SV (1), VO (1) Stage II-III: X+V:VP (1) Stage III: SVO (54), SVC (1), Let XY (1) Stage III-IV: XY+O:NP (13), XY+V:VP (2) Stage IV: SVOA (4)
Phrase Level	Stage II DN (2)	Stage II: DN (8), AdjN (3), NN (7), PrN (1) Stage III: PrDN (2), cop (2), PronP I (54) Stage IV: NPPrNP (4), XcX (1)
Word Endings	Regular plural ending –s (3) Copula 'm (I am → I'm) (1)	Use of plural (20), -ed (1), 'cop (2)

Pre-Training (Stage 1):

The majority of his utterances were statements with only one command and no question forms evident in the sample. On the *clause* level, most utterances were one element, with the occasional two-word combination. On the *phrase* level, M.M. mostly used nouns to label items, with some evidence of determiner + noun (e.g. a tower, the end) and adverb (e.g. right here). On the *word* level, regular plural –s ending and contracted copula (I'm for I am) were the only evidence of word endings (see Table 25 above). Many of the verbal utterances in these sessions were either unintelligible or consisted of delayed and immediate echolalia which were not analysed.

Post-Training (Stage 3):

The majority of his utterances were statements, with four commands and only one question evident in the sample. On the *clause* level, most utterances consisted of three elements, with some expansion on the phrase level of the object (into a noun phrase) and the verb (into a verb phrase). On the *phrase* level, use of determiners (a, the), adjectives (shapes, colours, sizes), pronoun (I) and prepositions (of, with) in combination with nouns and noun phrases were evident in the sample. On the *word* level, regular plural –s ending was used frequently, with 2 utterances using contracted copula -'s (It's for It is) and 1 utterance including past tense marker (–ed) (see Table 25 above). M.M. did not use word endings: past participle (-en), third person singular present tense (3s), genitive form of a noun (-'s), contracted negative (-n't), contracted form of the auxiliary verb, superlative (–est) and comparative (-er) form, or ending –ly to mark adverb word class.

3.4.2 Participant 2

An equal number of utterances were analysed from Stage 1 and Stage 3 (**99** utterances).

The majority of verbal utterances during the **Pre-Training Stage** were analysed as LARSP Stage I (49%) and Stage II (26%) utterances, with a number of Stage III utterances (18%). One Transition Stage II-III utterance and five Transition Stage III-IV utterances were recorded in the sample (see Table 24). The mean length of utterance (MLU) was **2.3** words per utterance. This placed N.N. (C.A. 9.6 years) in LARSP **Stage I-II**, with an expressive language age equivalent of 1.6 – 2.0 years. Many of the verbal utterances in these sessions were either unintelligible or consisted of delayed and immediate echolalia. The repetition of parts of adverts was noted during these sessions, as well as repetitive utterances relating to his being out of the classroom context (e.g. go back to class, we go back to class, when we finished). These were not included in the analysis. Some of the longer verbal utterances in the baseline measures may be repetitive, echolalic utterances used in context, possibly accounting for the outliers in the MLU measures.

The majority of verbal utterances during the **Post-Training Stage** were analysed as LARSP Transition Stage III-IV (60%) and Stage III (19%) utterances. There were also a number of utterances in Stage I (7%) and Stage II (8%), and Transition Stage II-III (3%) (See Table 26 below). A small number of Stage IV utterances were evident (3%). The mean length of utterance (MLU) was **3.8** words per utterance. This placed N.N. (C.A. 9.10 years) in LARSP **Transition Stage III-IV**, with an expressive language age equivalent of 2.6 – 3.0 years.

Participant 2 (N.N.) progressed from **Stage I-II** in the Pre-Training Stage to **Transition Stage III-IV** in the Post-Training Stage. His MLU also increased from **2.3** to **3.8** words on average per utterance (see Table 26 below).

Table 26: Participant 2: Pre-Training vs. Post-Training – LARSP Stages

Pre-Training (Stage 1)			Post-Training (Stage 3)		
LARSP Stages	No. of Utterances	% of sample	LARSP Stages	No. of Utterances	% of sample
Stage I	49	49%	Stage I	7	7%
Stage II	26	26%	Stage II	8	8%
Stage II-III	1	1%	Stage II – III	3	3%
Stage III	18	18%	Stage III	19	19%
Stage III - IV	5	5 %	Stage III - IV	59	60%
Stage IV	0	0%	Stage IV	3	3%
MLU	223/99 = **2.3**		MLU	380/99= **3.8**	
LARSP Stage	Stage I-II		LARSP Stage	Transition Stage III-IV	
Age level	1.6 – 2.0 years		Age level	2.6 – 3.0 years	

An **in-depth LARSP analysis** was conducted, comparing verbal utterances from Pre-Training and Post-Training stages on the *clause*, *phrase* and *word* level (see Table 27):

Table 27: In-depth LARSP Analysis - Participant 2: N.N.

Level of Analysis	Pre-Training (Stage 1)	Post-Training (Stage 3)
Clause Level	Statements (78), Commands (19), Questions (2) Stage I: V (18), N (31), Other (1) Stage II: VO (9), NegX (6), SV (3), VC (1), AX (1) Stage III: SVO (19), SVA (4) Stage III-IV: XY+V:VP (5) (XY+A:AP)	Statements (93), Commands (6), Questions (0) Stage II: VX (1) VO (6), AX (1) Stage III: LetXY (1), VXY, (2), SVO (72), VOA (1), SVC (2) Stage III-IV: XY + O:NP (58) XY+V:VP (1) Stage IV: SVOdOi (1), use of Subord (Tag) when, then (2)
Phrase Level	Stage II: DN (4) Stage III: Cop (1), Aux (1), Pron P (I, you) (22) Pron O (he, it) (2)	Stage II: DN (31), AdjN (19), NN (3). Stage III: AdjAdjN (12), PronP & O (I, my, us, it, we) (78), PrDN (1), copula (2).
Word Endings	Use of –ing (2), plural –s (10), 'cop (1) and 'aux (1), n't (6)	Use of Plural form (regular and irregular) (10) Use of copula 's (2) Use of regular past tense –ed (1)

Pre-Training (Stage 1):

The majority of N.N.'s utterances were statements (78 out of 99) with a number of commands (19 out of 99) and only two question forms evident in the sample. On the *clause* level, most utterances were one and two element structures (75%). There were also a number of three element structures (18 out of 99). Only 6% of utterances were expanded on the phrase level, all involved the expansion of the verb into a verb phrase (e.g. want to go, want to blow, go to play). 18 utterances were single verbs used as commands (mostly 'open', 'spread', 'pull', 'clap') and 31 utterances were single nouns (to label or request items). The only evidence of question forms was the utterance "We go play outside?" Negative form only occurred in the form of "don't want" (6 utterances) (see Table 27 above).

On the *phrase* level, there was some evidence of determiner + noun (e.g. Roll the ball, I want the toys) and copula (e.g. its green) and auxiliary (e.g. he's sleeping). There were many examples of personal pronouns (I, you) and a few other pronouns (he, it). There was no evidence of use of adjectives and very limited use of prepositions. On the *word* level, regular plural ending (–s), present continuous tense marker (–ing), contracted negative form (-n't), contracted auxiliary (he's) and contracted copula (it's) were evident (see Table 27 above). The following word endings were not evident: past tense marker –ed, past participle (-en), third person singular present tense (3s), genitive form of a noun (-'s), superlative (–est) and comparative (-er) form, or ending –ly to mark adverb word class.

Post-Training (Stage 3):

The majority of his utterances were statements (93 out of 99), with six commands and no question forms evident in the sample. On the *clause* level, most utterances consisted of three elements (78 out of 99), with 72 of these utterances consisting of subject + verb + object and 59 of these utterances expanded on the phrase level. Expansion of the object (noun phrases) accounted for 58 of the utterances, while only 1 utterance involved expansion of the verb (verb phrase). One four-element utterance and the use of subordinating conjunctions (when, then) to ask questions (e.g. "then we go to class?") was evident. A few commands using three-element utterances (Let XY and VXY) were recorded in the sample (see Table 27).

On the *phrase* level, frequent use of determiners (a, the), adjectives (shapes, colours, sizes) and pronouns (I, my, we, us, it) was evident. Only a few utterances included prepositions (off, with) and copulas, while no auxiliary verbs were evident in the sample. Most phrase expansion involved combinations of determiner + noun, adjective + noun, and adjective + adjective + noun. On the *word* level, plural form (both regular –s ending and irregular form) was used in ten utterances, with two utterances using contracted copula -'s (that's, it's) and one utterance including past tense marker (–ed) (see Table 27 above). N.N. did not use word endings: present continuous form (-ing), past participle (-en), third person singular present tense (3s), genitive form of a noun (-'s), contracted negative (-n't), contracted form of the auxiliary verb, superlative (–est) and comparative (-er) form, or ending –ly to mark adverb word class.

3.4.3 Conclusion: Effect of PECS Training on the complexity of the verbal utterances

A comparison of the verbal utterances from the Pre-Training Stage with the Post-Training Stage revealed that the PECS training resulted in a shift from a majority of 1- and 2-element utterances to 3-element utterances involving expansion on the phrase level in both participants. Participant 1 gained 18 months in his level of spontaneous expressive language, while Participant 2 gained 12 months. There was a noticeable increase in the number of spontaneous, meaningful verbal utterances for both participants in the Post-Training sample. Participant 1 increased from 17 utterances in the 100-minute pre-training sample to 81 utterances in the 40-minute post-training sample. Participant 2 had the same number of utterances (i.e. 99) in the 120-minute pre-training sample as the 40-minute post-training sample.

The *types of structures* present in the Post-Training samples were mostly statements, with decreased use of questions and commands for Participant 2 and the emergence of a few commands and a question for Participant 1. Both requests and comments would be recorded as statements and these made up the majority of the sample after the PECS Training. On the *clause level*, structures that were evident in both participants **after** the PECS training included; 3-element utterances mostly subject + verb + object (SVO) with expansion of the object and verb phrase and the emergence of a few 4-element utterances.

There was limited use of 3-element utterances, other than the SVO structure after the PECS Training. This structure is the one introduced by the PECS Training (i.e. I want ___) (Frost & Bondy, 2002). On the *phrase level*, there was a noticeable increase in the use of determiners and pronouns in both participants. While Participant 1 used pronouns only in the Post-Training sample, Participant 2 used more pronouns and a greater variety of pronouns in the Post-Training sample. Both participants used adjectives in combination with nouns that were not present before the PECS training. Adjectives were specifically taught in the PECS Training protocol (during Phase IV). *Liddle (2001)* reported that the children in her study who had progressed to the later phases of the PECS training could use concepts such as colour, shape and number. The expansion of PECS on the sentence level (Phase IV) to include attributes appeared to have an impact on the use of adjectives in these participants, who prior to the PECS training had very limited use of these.

Participant 1 also started to use compound nouns and noun phrases linked by prepositions. Determiners were modelled for the participants during 'read-back' of the sentence strip (despite these words not being represented on the sentence strip) (Frost & Bondy, 2002). For *word endings,* the only noticeable improvement an increase in the use of plural endings for Participant 1 after the PECS training. Participant 2's use of word endings after the training was similar to before the training, except for a decrease in the use of the contracted negative form (-n't). The PECS Training did not appear to develop word endings such as; present continuous form (-ing), past participle (-en), third person singular present tense (3s), genitive form of a noun (-'s), contracted negative (-n't), contracted form of the auxiliary verb, superlative (–est) and comparative (-er) form, or ending –ly to mark adverb word class.

The current research study provides detailed analysis of the structure of verbal utterances of children using PECS that has not been found in other research. The current findings are similar to those reported by *Ganz & Simpson (2004)*, who reported an increase from 1- and 2-word utterances to 3- and 4-word utterances, thus providing further evidence that PECS intervention results in longer and more complex sentence structure for some children with ASD and developmental delays.

Stage 3: Post-Training Profile

The following *functions* were observed and/or reported according to Naudé's (2002) profile:

- *Instrumental* (N.N. was able to request a variety of objects, actions and activities effectively using verbal utterances, with some augmentation with the PECS for those items or activities he struggled to request verbally),
- *Regulatory* (N.N. used verbal utterances for calling, asking for help spontaneously and teasing of adults and peers to obtain a desired reaction. His ability to reject or protest verbally had developed, but at times he still protested through pre-communicative behaviours e.g. screeching. Use of verbal utterances, e.g. "I don't want" or "no thank you", still required modeling at times. Denial was not evident and directives were present, but often used in a ritualistic manner),
- *Personal/expressive* (N.N. could call attention to himself, comment on an action and make choices between familiar or concrete items. Verbal utterances used to comment on events were often used out of context. The ability to express his feelings was emerging, but was still verbalised with prompting or modeling. Use of verbal utterances for self-guidance and use of meaningful utterances was not observed during play),
- *Explorative* (N.N. could label objects and used a variety of repetitive phrases to request information or predict routine), and
- *Informative* (limited use of verbal utterances to indicate possession, and to describe objects or events was observed, however attributes of shape and colour to specify requests or label items were used accurately).

In the area of *rules for conversation* it was noted that N.N. initiated conversation by making eye contact and making both appropriate and inappropriate verbal statements. The appropriate use of pointing to initiate communication was evident. He would also repeat utterances until the communicative partner responded. Use of the communicative partner's name to get his/her attention before requesting was observed. Topic maintenance was poor unless the exchange was highly structured by an adult.

Conversation still tended to be ritualistic and associated with specific adults. The content of conversation still sometimes centred on obsessive interests and talking about changes in routine that were distressing him.

In the *rules for interaction*, N.N. was able to greet and used polite words appropriately and spontaneously as well as followed basic instructions.

In the *rules for turn-taking*, N.N. made eye contact and greeted appropriately. Interruption was more appropriate (he tapped the person's shoulder to interrupt) and N.N. showed some understanding of having to wait his turn. N.N. was unable to terminate conversation or repair conversational breakdown appropriately. Breakdown of conversation was indicated when N.N. either repeated information, becoming distressed or he would 'switch off' and ignore the communicative partner's attempts to communicate. Reciprocity and turn-taking skills have improved according to his educator.

In the *rules for narratives*, N.N. displayed emerging interest in storybooks and requesting a storybook had become part of his daily routine. He had developed some rote memory recall of information from familiar stories, but content of narratives tended to be repetitive utterances and N.N. could not recount experiences or generate his own narratives. Echolalia and repetitive use of related questions was still used to recount events, but this was often without meaning for the communicative partner, as there was no shared context.

Summary

After the PECS Training, N.N.'s verbal utterances have expanded in terms of the instrumental, regulatory and personal *functions* (i.e. can ask for help, tease, make choices, get an adult's attention, use specific attributes to specify requests or label objects and the ability to share basic feeling was emerging). He could now request a variety of objects, actions and activities with the augmentation of the PECS for those utterances he had previously struggled with. His utterances were more spontaneous, with more complete sentence structure and required less prompting, although the presence of repetitive utterances and immediate and delayed echolalia were still evident.

Some of the functions that the educator reported as present in the Pre-Training Stage were now reported as areas of difficulty or emerging skills in Post-Training Stage. The educator seemed more certain of N.N.'s skill level than during the Pre-Training Stage and although these functions were still reported as present, his educator acknowledged that these areas still required input and improvement. N.N. still initiated conversation in appropriate and inappropriate ways and rituals and obsessive topics were still evident. He was now able to persist in his communication and use the name of the communication partner to get their attention, interrupting appropriately and using greetings and polite words spontaneously. Improvements in reciprocity and turn-taking skills were also reported. Although ability to recount events and generate narratives remained limited, N.N. showed emerging interest in stories and some rote recall of information from these stories.

3.6.3 Summary: Effect of the PECS Training on Pragmatic Skills

Pre-Training: Participant 1 presented with limited functions while Participant 2 presented with various functions, but both participants required prompting and modeling for many of these functions. Spontaneous use of language was especially limited for Participant 1. Both presented with repetitive utterances, self-talk and echolalia. While Participant 1 initiated almost no conversation and only responded to direct questioning, Participant 2 initiated conversation, but often inappropriately and ritualistically, focusing on obsessive topics and struggling with turn-taking. Both participants had limited ability to recount events and a lot of verbal utterances were used without shared context, resulting in communication breakdown. Participant 1 relied on pre-communicative behaviour (i.e. tantrums) and some use of eye contact (non-verbal communication) and drawings (difficult to interpret), while Participant 2 used eye contact and verbal statements or repetitive questioning to communicate.

Post-Training: Both participants developed in the communicative functions (instrumental, regulatory, personal/expressive and to some extent informative) of their utterances.

Noticeably, both participants developed the ability to request a variety of objects, actions and activities, ask for help, make choices, gain a person's attention, use attributes to make specific requests and both demonstrated the emerging ability to share basic feelings. Participant 2 also started to use the function of teasing. Most significantly, many of these functions were achieved with the augmentation of PECS and were used spontaneously, no longer requiring prompting. Both participants started using the names of their communication partners to get their attention, greeted spontaneously and used polite words spontaneously. Both educators reported an improvement in turn-taking and reciprocity. Participant 1 started to initiate conversation, although interaction was not sustained. His educator reported more meaningful use of language and a reduction in pre-communicative behaviour (i.e. tantrums). Participant 2 was also more persistent in his communication. He still initiated conversation in appropriate and inappropriate ways, and obsessive topics remained. Interruptions were more appropriate. Echolalia and repetitive utterances were still reported. Limited ability to recount events and generate narratives was still reported, however Participant 1 demonstrated emerging ability to recount events with augmentation and Participant 2 showed an emerging interest in stories and had started rote recall of information from these stories.

Overall this suggests that the PECS training had a positive impact on the pragmatic skills of both participants. The development of similar functions in the two participants and the use of these spontaneously with the augmentation of PECS demonstrated the positive outcomes of the PECS training. The PECS training also influenced the reciprocity and turn-taking skills of both participants. Many of the idiosyncrasies of each participant's language use remained (e.g. echolalia, repetitive utterances, self-talk, and obsessive topics) and conversation skills and narratives remained limited. A thorough search of the literature revealed no other PECS research that specifically investigated the impact of PECS training on the pragmatic skills of children with ASD. Improvements in social behaviour, eye contact, initiation, and gains in social-communicative behaviours (initiations and joint attention) have been reported (Baker, 2001; Bondy & Frost, 1998; Charlop-Christy et al., 2002). The current research study therefore adds a new dimension of investigation into the impact of the PECS.

3.7 Content Analysis of Semi-structured Interviews with Parents and Educators

The semi-structured interviews conducted with the parents and educators before and after the PECS Training generated data in *predetermined categories* based on the research questions. **Content analysis** of the data involved *data organisation* - typing out the transcripts from each interview (Appendix N & Appendix O); *immersion* - reading the transcripts numerous times to get an overall sense of the data, with notations being made regarding the content and themes that started to emerge; *categorisation* - segmented the data into units of meaning (topics), which were grouped into larger clusters to form *categories* (including the predetermined categories and adding newly discovered ones). The researcher then examined the data categories and looked for patterns of meaning amongst them and emerging *themes*. The data was represented in a *narrative* and in a *visual representation* (i.e. tables).

3.7.1 Participant 1: Parent Interviews

Table 28: Themes emerging from Parent Interviews: Participant 1

	Pre-Training (Stage 1)	Follow-up (Stage 4)
THEMES	a. Dimensions of communication b. Speech and language features c. Attitude towards Augmentative Communication	a. Communication skills b. Experience of the PECS Training Benefits Limitations & Difficulties Ideas for the way forward c. Influence of change in educator d. Attitude towards Augmentative Communication e. Family dynamics

Stage 1: Pre-Training Stage

An analysis of the data collected during the initial interview with the mother of Participant 1 (M.M.) revealed the following themes:

a. Dimensions of communication:

The following dimensions of communication emerged during the interview: *forms* of communication were described as verbal (single words or short phrases), gesture (pointing) and pre-communicative behaviour (tantrums). *Functions* of communication were to request (basic needs) and comment (this was limited and lacked content) or give information (only when prompted). *Contexts* for communication were limited to school and home settings and communicative partners were limited to primary caregivers (immediate family and educator) and other adults in the school setting. In the home setting M.M.'s communication skills were described as "*very weak*".

> *"If he can get away with one word he will do that", "he will only speak if he wants something", "I will have to give him the answers", "he knows what it is but he doesn't say it".*

He used single words and short phrases to communicate when he wanted something (i.e. to request) and to make occasional comments about his environment. M.M. although able to use short sentences would often use single words to communicate basic needs. Comments lacked information and were therefore difficult for his mother to respond to or expand on. M.M. was not able to share feelings or ask questions. He could indicate when he was hurt by saying "sore" and pointing to where he was hurt but would not verbalise this in a complete sentence. M.M.'s mother described getting information from him as:

> "*it's like pulling out pieces… I try to get him to actually converse, it's all my side to get him to tell me things*".

She reported that he had started to share small pieces of information with prompting from her, but this was limited. His mother described feeling frustrated with his limited language and communication skills.

> "*I know he knows the words, but it doesn't come out, he doesn't come out with the sentences*".

M.M.'s mother described the presence of pre-communicative behaviour (tantruming) when M.M. was upset and her needing to "*figure out*" what had upset him. M.M.'s mother reported that M.M. has limited contact with different people and different social contexts and was mostly exposed to home and school settings and his extended family. Although his communication was reportedly the same in other settings, he was described as anxious and needing time to settle in unfamiliar settings, but unable to verbalise these feelings.

b. Speech and language features

M.M.'s mother described his speech as "*he copies everything*" and "*he wants you to copy*". This 'copying' (echolalia) was used to expand his sentences during picture descriptions. His mother expressed concern over whether this would help him learn. His spontaneous utterances were often single words, until she prompted a longer response by saying *"how do you ask, M.M.?"* or by giving him '*clues*' and '*alternatives*'. His response to questions was "*yes for everything*" and his mother expressed concern over his comprehension. "*I'm not sure if I'm getting through to him*". She also hypothesized that he possibly sees "no" as negative and therefore uses "yes" to respond to all questions.

c. Attitude towards Augmentative Communication

M.M.'s mother expressed curiosity and interest in using an augmentative communication system with M.M. and expressed the hope that "*it will give him more confidence to actually put those words together, start making sentences*".

Some uncertainty and possibly concern over the impact of introducing an augmentative communication system was evident in statements such as

> "*it can't do any harm, who knows it might do a lot of good*" and "*if it doesn't do anything it isn't going to do anything bad for him, or set him back*".

Stage 4: Follow-up Stage

An analysis of the data collected during the follow-up interview with the mother of Participant 1 (M.M.) revealed the following categories:

a. Communication skills

M.M.'s mother described his communication as "*very limited*". He would make verbal requests when he needed something using speech and PECS. His requests were described as *"short"* and "*concise*". The other communication M.M. displayed with his mother was echoing things and wanting her to repeat them, although the communicative function was unclear. "*It's talking, but it's senseless*".

Conversation was only in response to direct questioning and M.M. used single word responses, when he did respond and there was almost no initiation on his part. Repetitive utterances, self-talk and echolalia characterized most of his verbal utterances. Use of eye contact (to get assistance, for confirmation or when he wanted adults to engage in his repetitive phrases), tantruming and some use of drawings (although often without shared context) resulted in a lot of communication breakdown. Interaction only occurred with adult prompting and within rituals.

Stage 3: Post-Training Profile

The following *functions* were observed and/or reported according to Naudé's (2002) profile:

- *Instrumental* (M.M. was able to request objects and actions using verbal utterances augmented by the use of PECS),
- *Regulatory* (M.M. protested by saying "no" and verbalised some information during outbursts which were rare. He was able to ask for help spontaneously using verbal utterances augmented by the PECS, however the ability to use directives, calling, teasing and denial had not emerged),
- *Personal/expressive* (M.M. could express basic feelings of happy, sad and angry, make clear choices with confidence using verbal utterances augmented by the PECS and showed emerging skills of using a person's name to get their attention before requesting and commenting on actions and events),
- *Explorative* (M.M. would label objects, but did not request information, predict or hypothesise), and
- *Informative* (M.M. would answer basic questions, use specific attributes of size and colour when requesting items using verbal utterances augmented by the PECS, and describe events through his illustrations and some labeling, but did not give detailed descriptions of events or objects, indicate possession or give reasons).

In the *rules for conversation*, M.M. was able to initiate interaction using verbal utterances augmented with the PECS or by getting paper and drawing, including written words in his illustrations, then bringing this to an adult and getting the adult to read and comment on his illustration.

M.M.'s educator reported good eye contact, pointing and looking to initiate conversation, although conversation remained limited and repetitive utterances around his obsessional interests in computers and movies were still present. M.M. displayed some reciprocity in short routines and more meaningful use of language in the classroom context.

In the *rules for interaction*, M.M. used appropriate greetings, used polite words, responded to greetings and followed instructions.

In the *rules for turn-taking*, M.M. used eye contact, and greeting and interruption using verbal utterances with the augmentation of the PECS. Although initiation of interaction had improved, M.M. still lacked social awareness and struggled to sustain conversation. Conversational breakdown was still dealt with by echolalia, looking at the adult for assistance or the occasional tantrum.

In the *rules for narratives*, although narratives were limited, M.M. could retell events (e.g. news) from memory of written sentences provided by his mother, and could use short phrases to recount an event from the day to his mother with the augmentation of PECS and written words. He responded to basic questions appropriately.

Summary

After the PECS training, M.M. displayed a greater variety of functions and many of the functions that were present during the Pre-Training Stage were now met using verbal utterances augmented by PECS without the prompting of adults. M.M. used the functions of requesting, protesting, asking for help, expressing basic feelings, making choices, and using and adult or peer's name to get their attention. Although tantrums were few, when they did occur, M.M. would verbalise some meaningful information. M.M. could use attributes in his requests and the ability to recount events was emerging, with the augmentation of written words and the PECS. Conversation was still very limited, but some reciprocity and more meaningful language use were evident in the classroom context. M.M. could greet and use polite words spontaneously and initiate interaction, although this was still not sustained.

3.6.2 Participant 2

Stage 1: Pre-Training Profile

The following *functions* were observed and/or reported according to Naudé's (2002) profile:

- *Instrumental* (N.N. was able to request objects and actions to meet his basic needs),
- *Regulatory* (N.N. used directives, could protest e.g. "don't want" and call a person, but these were often used repetitively, he could not ask for help without prompting),
- *Personal/expressive* (N.N. could comment on an action or event and used verbal utterances for self-guidance, but could not express feelings, call attention to himself or make choices),
- *Explorative* (N.N. labeled objects and used repetitive phrases taken from adults at school or home to request information or predict routine), and
- *Informative* (N.N. used verbal utterances to indicate possession e.g. "mine" and to describe objects using some attributes of shape and colour, although these were often confused and had to be prompted, he could not describe events or give reasons).

In the area of *rules for conversation* it was noted that N.N. does initiate conversation, by making eye contact and making verbal statements. These were both appropriate and inappropriate topics of conversation. Conversation tended to be ritualistic and rigid and associated with specific adults. The content of conversation often centred on obsessive interests (i.e. brands, adverts) and was not always meaningful. Most of N.N.'s verbal utterances were not self-generated and involved repetition of associated phrases in a given context, self-talk or echolalia (repetition of parts of utterances, both immediate and delayed echolalia).

In the *rules for interaction*, N.N. was able to greet appropriately, but often only in response to being greeted, used polite words only when prompted and followed basic instructions.

In the *rules for turn-taking*, N.N. made appropriate eye contact, but greetings and interruptions were often inappropriate. Conversation would either be terminated abruptly or continue repetitively. He was unable to terminate conversation or repair conversational breakdown appropriately. Breakdown of conversation was indicated when N.N. either repeated information or made no verbal response but looked at the adult for assistance with responding.

In the *rules for narratives*, N.N. displayed very limited ability to recount events and this was not done spontaneously. N.N. used single words or short phrases to describe familiar pictures used to elicit stories. This was however part of a learned routine. Echolalia and repetitive use of related questions was used to recount events, but this was often without meaning for the communicative partner, as there was no shared context.

Summary

N.N.'s verbal utterances had various functions i.e. requesting basic needs, directives, protest, call people, comment on actions or events and describe objects. These utterances often required prompting or modeling, or were either repetitive utterances or delayed echolalia. He also struggled to formulate complete verbal utterances and confused attribute use in descriptions. N.N. was able to initiate conversation using eye contact and making statements or using repetitive questions, but these were at times inappropriate, often ritualistic and focused on his obsessions. Conversation was often continued repetitively or terminated abruptly suggesting poor turn-taking skills. Interruptions during conversation were often inappropriate. N.N. could greet and use polite words only when prompted. A lot of his utterances were not self-generated and were used without shared context and therefore without meaning. He had very limited ability to recount events and this was not done spontaneously.

3.5 A Comparison of Participants' Communication Profiles: Pre- vs. Post-Training

Intentional Communicative Acts (ICAs) are defined as any event where the child directs a motoric and/or vocal act toward the adult as evidenced by eye gaze, body orientation or physical contact and awaits a response from the adult, as evidenced by looking at the adult, hesitating or persisting in the communicative act (Wetherby, Yonclas and Bryan, 1989, p.151).

The **communication profile** consisted of an analysis of ICAs along 2 dimensions, the *horizontal* (the variety of communicative acts / ***functions***) and the *vertical* (the linguistic level / ***form***) dimensions of communication (Wetherby & Rodriguez, 1992, Iacono, Waring & Chan, 1996). The ***functions*** recorded here included: *requests* (when a child makes an initiation towards an adult in order to get his/her needs met and persists in engaging the adult until he/she responds), *commenting* (when a child initiates a behaviour toward a communicative partner, that directs the partner's attention to a person, action or event), and *responses* (fulfill an obligation e.g. provide specific information requested by the adult) + *others* (protesting, rejecting, drawing attention, giving information, asking for information, communicating about feelings, and social routines). The ***forms*** recorded here included: motor, object, gesture, sign, picture, written, vocalisations, speech and combinations of these. (Appendix M - raw data tables).

3.5.1 Participant 1

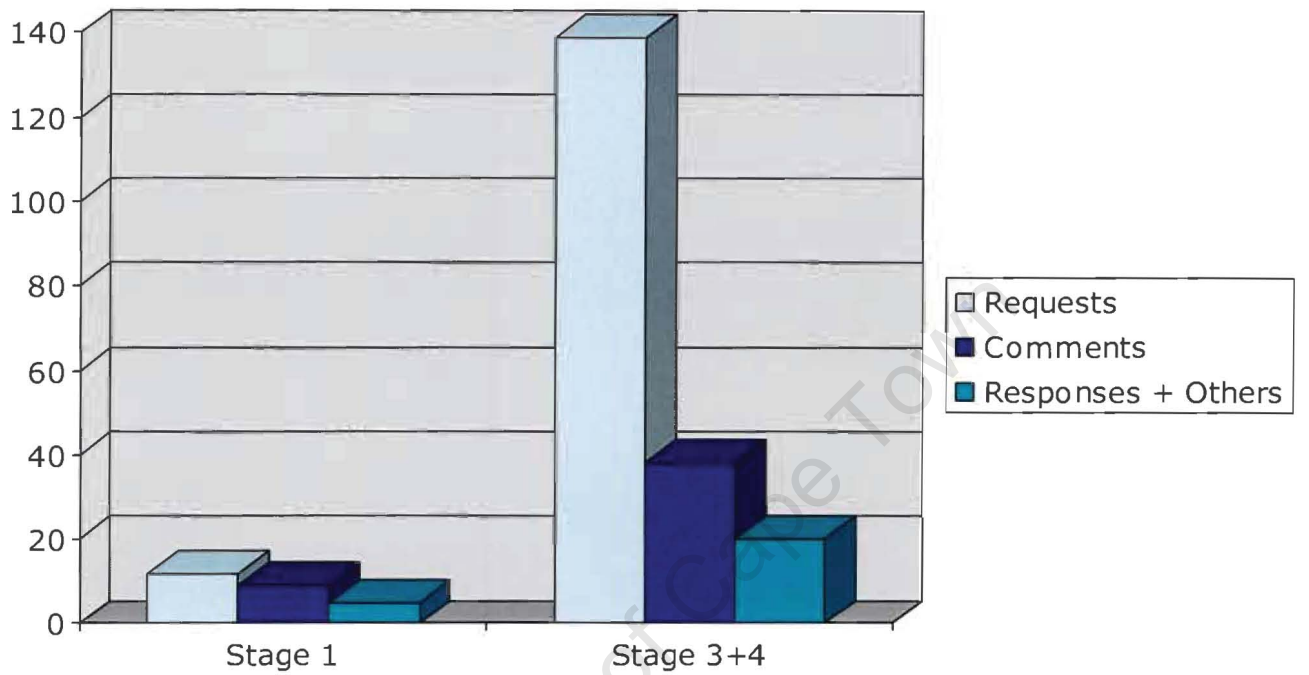
Function:

The functions of the ICAs in the categories of requests, comments and responses + others were recorded in **Stage 1** (Pre-Training) and compared to those recorded in **Stage 3+4** (Post-training and Follow-up).

From a 100 minute sample (5 structured and 5 unstructured sessions) **26** ICAs (Requests: 12, Comments: 9, Responses+ Others: 5) were recorded in Stage 1. From a 100 minute sample (5 structured and 5 unstructured sessions) **197** ICAs (Requests: 139, Comments: 38, Responses + Others: 20) were recorded in Stage 3+4 [see Figure 15 below].

This indicates a percentage increase in the number of ICAs after PECS training of 658% (Requests: 1058%, Comments: 322%, Responses + Others: 300%), with the biggest increase in requests, and a similar increase in comments and responses + others.

Figure 15: Participant 1: Communication Profile – *Function*



Form:

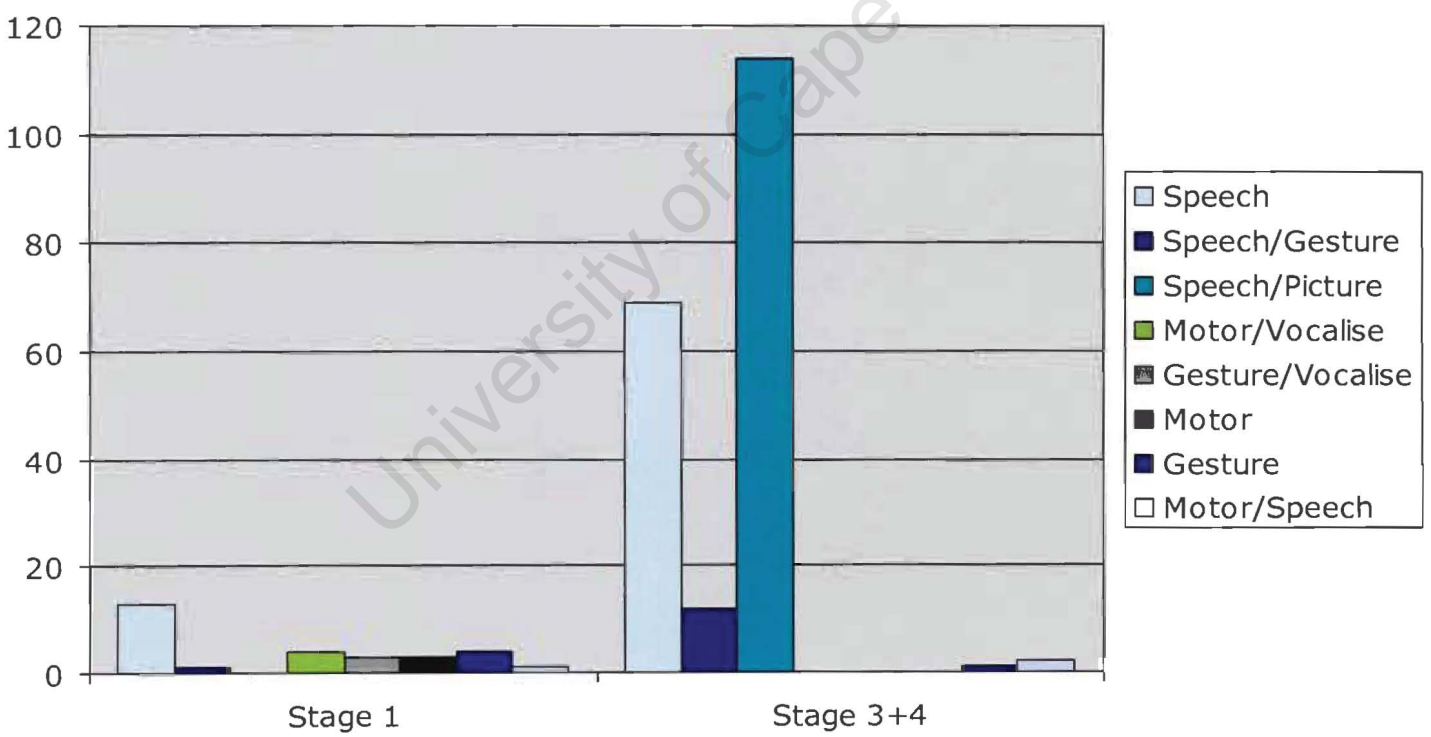
The form of each *Intentional Communicative Act* (ICA) was recorded in the categories of: speech, speech/gesture, speech/picture, motor/vocalisation, gesture/vocalisation, motor, gesture, and motor/speech. There was no use of object communication or signs by M.M. in any of the stages analysed. The form of M.M.'s communication was recorded in Stage 1 (Pre-Training) and compared to Stage 3+4 (Post-Training and Follow up).

In **Stage 1**, the form of the 26 ICAs recorded was speech (13), with some use of gesture (4), motor/vocalisation (4), motor (3), gesture/vocalisation (3), gesture/speech (1) and motor/speech (1). Use of speech/pictures was not evident during Stage 1 [see Figure 16 below].

In **Stage 3+4**, the form of the 197 ICAs recorded was speech/picture (114), speech (69), gesture/speech (12), motor/speech (2) and gesture (1) [see Figure 16]. The majority of ICAs were a combination of speech and pictures (the PECS), with the percentage of speech increasing 431% and the use of gesture combined with speech increasing 1100%. The use of motor/vocalisation, gesture/vocalisation and motor was not evident in Stage 3+4.

An emerging pattern in the post-treatment stages was the use of speech only, increased from 21 ICAs (in the 4 sessions in Stage 3) to 48 ICAs (in the 6 sessions in Stage 4), while the use of speech and pictures decreased from 58 ICAs (in 4 sessions in Stage 3) to 56 ICAs (in the 6 sessions in Stage 4).

Figure 16: Participant 1: Communication Profile – *Form*



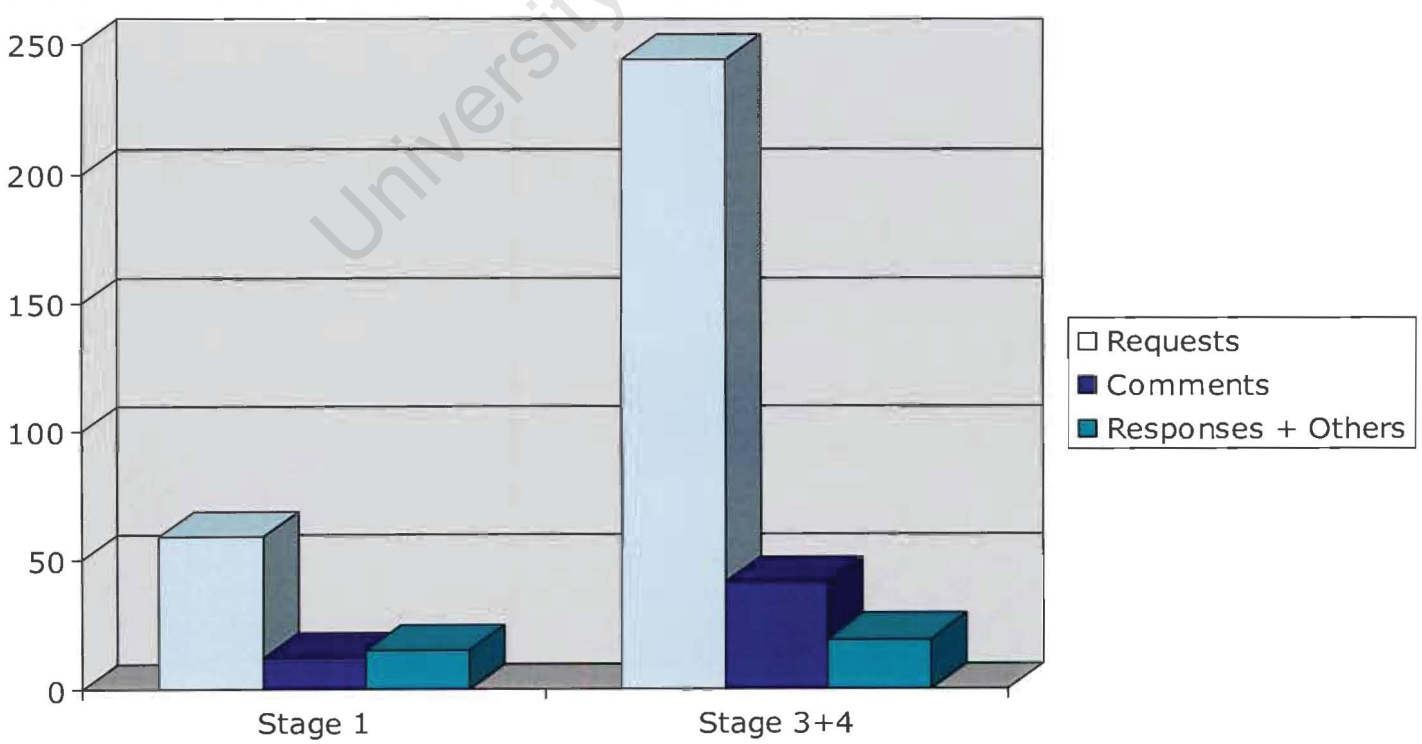
3.5.2 Participant 2

Function:

Intentional Communicative Acts (ICAs) in the categories of requests, comments and responses + others were recorded in **Stage 1** (Pre-Training) and compared to the ICAs recorded in **Stage 3+4** (Post-training and Follow-up). From a 120 minute sample (6 structured and 6 unstructured sessions) **86** ICAs (Requests: 59, Comments: 12, Responses+ Others: 15) were recorded in Stage 1. From a 120 minute sample (6 structured and 6 unstructured sessions) **304** ICAs (Requests: 244, Comments: 41, Responses + Others: 19) were recorded in Stage 3+4 [see Figure 17].

This indicates a percentage increase in the number of ICAs after PECS training of 253% (Requests: 314%, Comments: 242%, Responses + Others: 27%), the most increase occurring in the number of requests and comments. The increase in Responses + Others was limited.

Figure 17: Participant 2: Communication Profile – *Function*



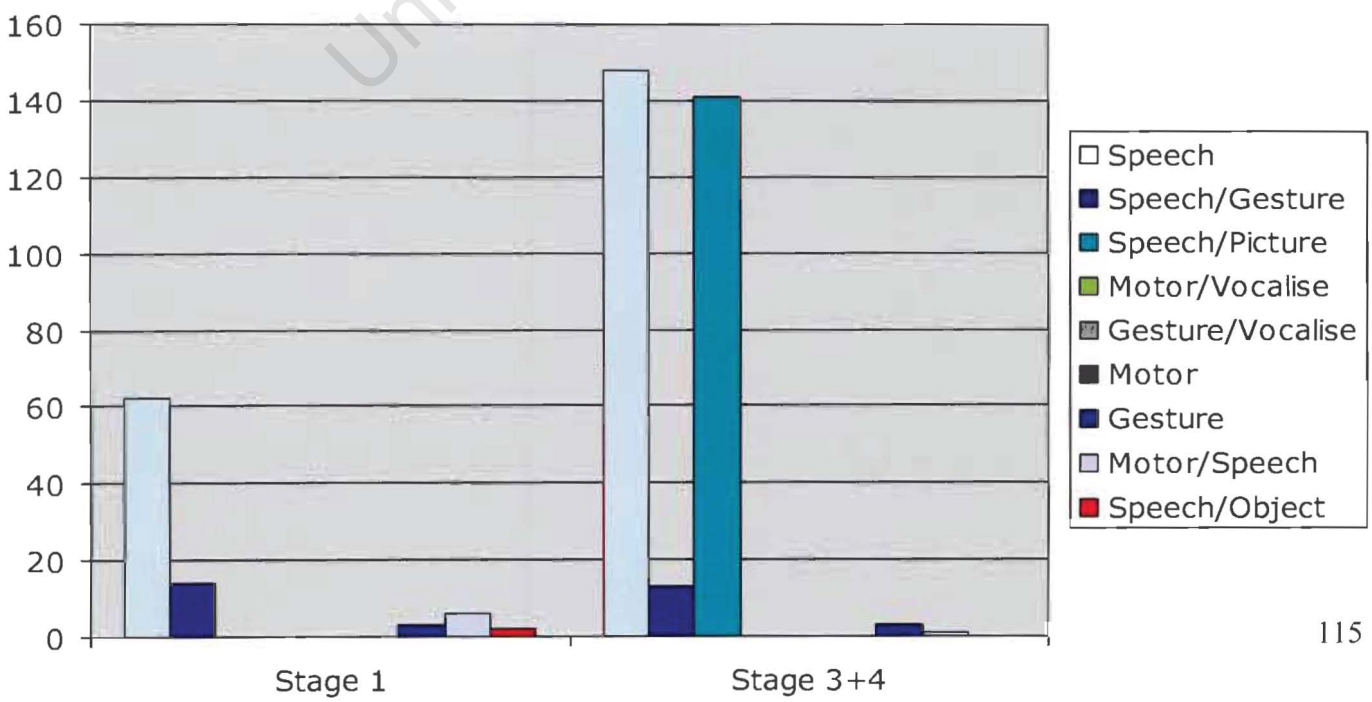
Form:

The form of each *Intentional Communicative Act* (ICA) was recorded in the categories of: speech, speech/gesture, speech/picture, motor/vocalisation, gesture/vocalisation, motor, gesture, motor/speech, and speech/object. There was no use of signs by N.N. in any of the stages analysed. The form of M.M.'s communication was recorded in Stage 1 (Pre-Training) and compared to Stage 3+4 (Post-Training and Follow up).

In **Stage 1**, the form of the 86 ICAs recorded was speech only (62), with some use of gesture/speech (14), motor/speech (6), gesture (3) and object/ speech (2). Use of speech/pictures, motor/vocalisations, gesture/vocalisations and motor was not evident during Stage 1 [see Figure 18].

In **Stage 3+4**, the form of the 304 ICAs recorded was speech (148), speech/picture (141), gesture/speech (13), gesture (3) and motor/speech (1) [see Figure 17]. The majority of ICAs were speech only or a combination of speech and pictures (the PECS), with the percentage of speech increasing 139%. The use of gesture combined with speech decreased 8%. The use of motor/vocalisation, gesture/vocalisation, motor and speech/object was not evident in Stage 3+4.

Figure 18: Participant 2: Communication Profile – *Form*



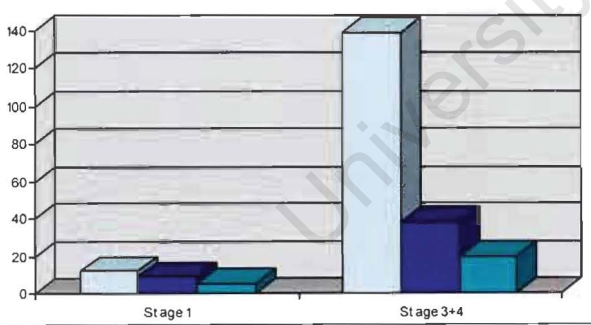
A definite pattern emerged in Participant 2's forms of ICAs in the post-treatment stages. The use of speech only, increased from 11 ICAs (in the 4 sessions in Stage 3) to 137 ICAs (in the 6 sessions in Stage 4), while the use of speech and pictures decreased from 78 ICAs (in 4 sessions in Stage 3) to 63 ICAs (in the 6 sessions in Stage 4).

3.5.3 Summary: Effect of PECS Training on Communication Profile

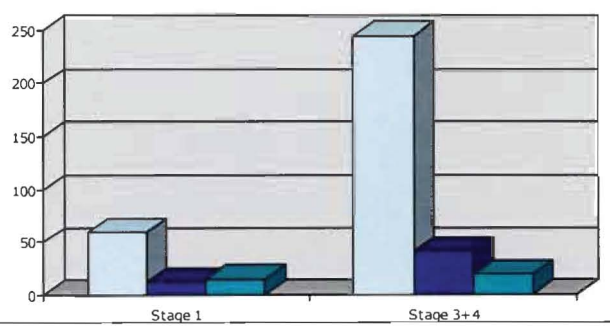
The PECS Training had a similar effect on the communication profiles of the two participants (see Figure 19). There was an overall increase in the number of ICAs recorded for both participants, especially for Participant 1 (Participant 1: increased from 26 to 197 ICAs; Participant 2: increased from 86 to 304 ICAs). An increase in the frequency of spontaneous communication has been reported in other studies (Heneker & Page, 2003; Kravits et al., 2002; Schwartz et al., 1998). *Magiati and Howlin (2003)* reported slower improvements in the overall levels of communication.

Figure: 19: Comparison of Communication Profiles of Participant 1 and Participant 2

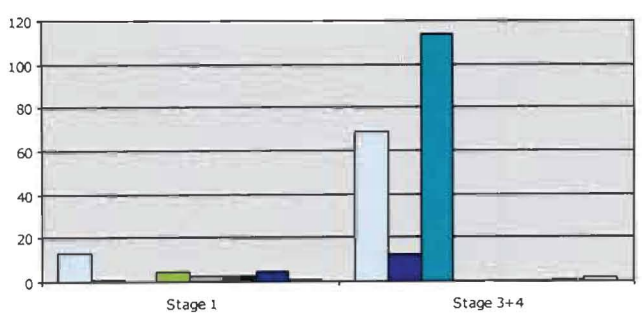
Participant 1 –Function



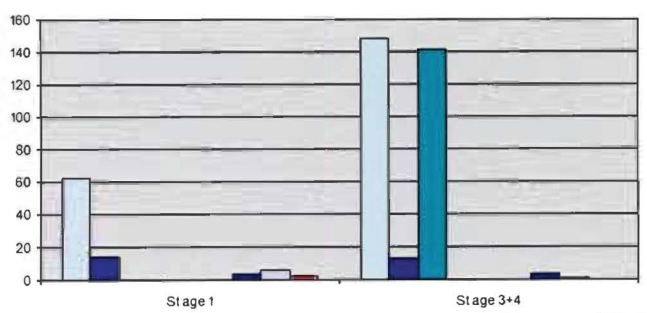
Participant 2 –Function



Participant 1 –Form



Participant 2 –Form



Heneker & Page (2003) reported similar results with the total number of communicative acts increasing for all activities (measured in 4 settings: free play, snack, swimming and structured teaching), except swimming (in the class of children aged 6-8 years) and structured teaching (in the class of children aged 9-10 years, measured when teaching commenting skills).

Function: The most increase was seen in the function of requesting for both participants. Participant 1 had similar increases in the functions of comments and responses + others. Participant 2 had an increase in comments, but only a slight increase in responses + others. This indicates that the PECS training was effective in developing the function of requesting, and to a certain degree the function of commenting (for both participants) and the function of responses + others (for Participant 1). *Heneker & Page (2003)* reported similar results with requesting being the most frequent function of communication in both the baseline and the follow-up measures.

Form: Both participants had a noticeable increase in the use of pictures with speech and speech only. *Participant 1* had some increase in the use of speech with gestures, but a decrease in the use of gestures, motor communication, and vocalisations combined with motor communication and gestures. *Participant 2* showed a steady increase in his use of speech and dramatic increase in the use of speech with pictures. There was less use of motor and object communication combined with speech after the PECS Training. These findings show that the PECS Training effectively develops the forms of pictures with speech and speech only.

It was noted that Participant 1 had a slight increase in the speech only form and a decrease in pictures with speech in Stage 4 (3 months after the PECS Training) compared to Stage 3 (directly after the PECS Training). Participant 2 had a significant increase in the use of the speech only form and a noticeable decrease in the use of speech with pictures in Stage 4 (3 months after the PECS Training) compared to Stage 3 (directly after the PECS Training). This pattern suggests that these participants may gradually replace their augmented speech with independent speech use.

3.6 A Comparison of Participants' Pragmatic Profiles: Pre- vs. Post-Training

This *Profile of Pragmatic Skills in young children* (Naudé, 2002) investigates areas such as functions of utterances, rules for conversation (topic initiation and topic maintenance), rules for interaction, turn-taking, and narratives, and ability to adapt to conversational partners. Due to the limited ability of both participants to engage in meaningful and sustained conversation and recount narratives, most of the information obtained centred on the functions of their utterances.

3.6.1 Participant 1

Stage 1: Pre-Training Profile

The following *functions* were observed and/or reported according to Naudé's (2002) profile:

- *Instrumental* (M.M. would on occasion request objects or actions, but only when prompted and this was very limited),
- *Regulatory* (M.M. protested by tantruming and often could not explain these outbursts, he could only call a person, ask for help, or use directives when prompted and modeled for him),
- *Personal/expressive* (M.M. would draw events and occasionally comment on his drawings, providing some information about his experience. This was often not a shared experience and therefore difficult to understand. He made choices by taking one of the items offered and would then look for confirmation of his choice),
- *Explorative* (M.M. would label objects on occasion), and
- *Informative* (M.M. would answer basic questions with visual cues, describe objects using single words and attributes were used only when prompted. He described events when prompted and provided with written cues).

In the area of *rules for conversation* it was noted that M.M. did not initiate conversation, although he would make eye contact or stand in the path of an adult and wait for them to recognise and respond to his needs. There was therefore no topic maintenance and most interaction was in the form of direct questioning by the adult, with limited response from M.M.

Responses were often single words with the occasional use of short phrases or echolalic responses when the question was not understood. Most of M.M.'s verbal utterances in the classroom were either repetitive utterances (repetition of scripts from movies, computer games and television), self-talk (often not intelligible and difficult to interpret) or echolalic (repetition of parts of utterances, both immediate and delayed echolalia).

In the *rules for interaction*, M.M. was able to greet, but in a routine and ritualistic manner that sometimes required prompting. He used polite words only when prompted and followed basic instructions.

In the *rules for turn-taking*, M.M. made appropriate eye contact and greeted willingly, but did not engage in reciprocal conversation. He was unable to initiate conversation, terminate conversation or repair conversational breakdown. He showed some awareness of being expected to respond, but would often use echolalia (indicating a lack of understanding) or make no verbal response but made eye contact, looking for assistance in responding.

In the *rules for narratives*, M.M. displayed very limited ability to recount events, using single or two-word utterances to describe pictures used to elicit stories. Recounts of events were only present in his drawings which he would sometimes comment on. These recounts were often without a shared context and it was therefore difficult to interpret and respond to this information. Repetition of certain phrases or other's utterances while making eye contact with the conversation partner, as if waiting for them to repeat or confirm the information, was noted.

Summary

Functions of communication were limited and only observed on a few occasions and mostly had to be prompted and/or modeled by an adult. M.M.'s spontaneous use of language for communicative functions was very limited and his educator's comments during the completion of the profile included:

> *"he does not understand the link between communication and language... he's got the vocabulary, not the language... vague... you have to interpret the meaning of his drawings... goes off on his planet".*

Difficulty communicating when he was hurt was still an issue for his mother. M.M. would still use pre-communicative behaviour (i.e. screaming) until someone helped him. Frustration over limited communication skills was still expressed. *"He's got the words, but he doesn't use it"*.

b. Experience of the PECS training

Benefits

Despite initial negative responses when describing M.M.'s current communication skills, some positive experiences were also shared during the interview. His mother explained that before the PECS training M.M. would '*get away with*' using single words and was not asking '*properly*'. During the PECS training, he used the PECS sentence structure spontaneously and '*with enthusiasm*'. However she did describe his sentences (when he started verbalising the words on the sentence strip) as "*stilted*". M.M. would only read the words on the sentence strip and omitted the '*little words*' (e.g. my) and he initially reacted negatively to any correction. This later changed and he allowed his mother to model the complete sentence and started to ask using the correct sentence structure. His mother stated this had helped in his grammar and she felt positive about this change.

M.M. then started to make requests without the augmentation of the PECS, using the same sentence structure that he used with the PECS. His mother felt it was positive that he would still come to her and ask in a '*proper sentence*' without using the sentence strip. She expressed that it was perhaps more difficult for him to run, build the sentence, remove the sentence strip and bring it to her and that perhaps his view was "*just ask in the way I'm supposed to ask when I have the sentence strip*". She reported that he uses very definite, complete sentences to request without prompting.

> *"He does it on his own, he's very good with that", "it's not one word, it's a sentence", "he remembers he's supposed to do it"*.

Other positive experiences included M.M. coming to his mother at a family member's house and spontaneously asking to do something. His mother expressed surprise and pleasure over this.

"He actually came to me and asked me... exactly how he would ask with PECS ... He's bored with himself and he can ask for what will make him happy"

Limitations & difficulties

M.M.'s mother described M.M. as initially being enthusiastic during the PECS training. She felt that he had recently *"gone back to his old ways"* and that she had to constantly motivate him to use his PECS file.

"I had to be the motivator all the time", "I'm the one that's having to run after him with it... because I've grown tired of doing it, he's picked up from that, so he's just not bothered either... unless I'm the one to give him his file... and wait for him to use it, he won't".

Although she described a time when he was using PECS spontaneously and *"with enthusiasm"*, she felt that this had recently changed and that *"after such a long period of time"* she should not have to motivate him and remind him to use his PECS file. *"If he's not going to do it, I'm not going to do it"*.

Underlying despondency and a feeling of burden over being the motivator in the use of his PECS system was evident throughout most of the interview. M.M.'s mother felt that his PECS exchanges had become a routine and that he was perhaps 'bored' with this. She repeatedly described the process of making a PECS exchange *"he's got to go through the whole thing of putting everything on the board, pulling it off, giving it to me"* suggesting it was 'tedious' and an effort for both herself and M.M.

M.M.'s mother felt that M.M.'s sentences still needed expanding. Some uncertainty around whether it was permissible to let him request without the PECS sentence strip was expressed.

"That's why I'm thinking if he can verbally ask me for it, why not? Because that's what we want at the end of the day, isn't it?" "I've accepted it that if he can ask me for the stuff and he doesn't necessarily give me the strip, why should I push the issue of actually having the strip because he's asking everything the right way, so I don't, I mean that is what you want to achieve with PECS anyway, so is it wrong to accept his asking in the proper fashion but not having a sentence strip?" "I'm not going to push the PECS anymore because he is responding correctly; he is asking properly, he is using his language properly and appropriately. And if he's not actually using the PECS, I mean that's what PECS wants to achieve anyway, so that he can verbally ask me for whatever he needs."

Ideas for the way forward

- PECS use needed to be broadened and go beyond the routine to "*the next level*". His mother hoped that this may develop his enthusiasm again.
- Using the PECS for more sentence-building (e.g. subject+ object+ verb). He was recently able to build longer sentences given written words that he had to order in a sentence.
- A smaller, portable file that would give him '*easy access*' to only those items he needed to ask for in a given situation (e.g. going to the beach). She described his file as "*like carrying the encyclopaedia wherever you are going*", suggesting the file was bulky and cumbersome.

c. Influence of change in educator

A few weeks after the PECS training had ended, M.M. had an unexpected change in educator for a 3-month period. This new educator had no experience or training in implementing PECS use. His mother felt that the influence of his original educator in terms of following through on and expanding his PECS use had been an important influence that had been lost with the new educator. M.M.'s mother felt this change had resulted in a '*loss of momentum*' and felt that his original educator would have broadened his PECS use and gone further with the development of the system.

d. Attitude towards Augmentative Communication

During the interview it became clear that M.M.'s mother was not against using an augmentative communication system, but was feeling burdened by having to motivate his use of the system and that the system had not expanded as she had hoped. She expressed a need for M.M. to be more self-motivated about using the system and that he needed further expansion of the system to develop his interest and enthusiasm again. This was expressed in statements such as:

> "*I think we're tired of what we're doing now. If we go to the next level and have a change then the enthusiasm will come back...it needs to be his thing... I don't mind being the motivator, but I need to phase myself out of the picture... it's his communicating, he's the one that's supposed to be communicating ... if we can get the change and the enthusiasm back, who knows, I don't know*".

e. Family dynamics

A theme that emerged during this interview was that M.M.'s communication at home was almost exclusively with his mother. *"His world is still his immediate family; in fact most of this world is with me".* When M.M. wanted something at home, he would go to his mother first and only asked his father or sister if his mother was busy and told him to go and ask them. The burden placed on his mother and the responsibility she felt for his communication and language development could possibly be overwhelming for her.

3.7.2 Participant 1: Educator Interviews

Table 29: Themes emerging from Educator Interviews: Participant 1

	Pre-Training (Stage 1)	Follow-up (Stage 4)
THEMES	a. Dimensions of communication b. Speech and language features c. Social interaction d. Prompt-dependency e. Ability to generalise f. Attitude towards Augmentative Communication g. Interaction style	a. Dimensions of communication b. Experience of the PECS Training Benefits Limitations & difficulties Ideas for the way forward c. Attitude towards Augmentative Communication d. Interaction style

Stage 1: Pre-Training Stage

An analysis of the data collected during the initial interview with the educator of Participant 1 (M.M.) revealed the following themes:

a. Dimensions of communication

The ***functions*** of his communication were limited to requesting (only when prompted would he repeat requests that were modeled for him), giving information (only when required of him through direct questioning) and a few social routines (greeting within a learned routine in the classroom or asking a peer to play with him when the request was modeled for him).

The ***forms*** of his communication were as follows: verbal (although this was only present when prompted or modeled for him), pre-communicative behaviour (tantruming, screaming, and shouting), gestures (very limited and vague, e.g. lowering his head towards his lunchbox to ask for permission to open it) and use of drawings (although these did not appear to serve a communicative function).

M.M.'s educator described his communication skills as "*quite bad*". She felt that although he had communicative intent, he did not use his language skills to communicate even his most basic needs.

"*He doesn't use any language*".

Typically in the classroom, M.M. would either sit waiting for an adult to initiate communication or prompt him, or he would stand in the path of an adult and wait for them to recognise his need and help him. This pattern of behaviour was described as a learned habit.

"*That's the way he goes about his communication*".

Only when he had an outburst would he show emotion and verbalise (through screaming and shouting) using some words. The use of gestures and facial expression (non-verbal forms of communication) were described as "*very limited*".

This interview was conducted during the Pre-Training baseline measures and M.M.'s educator spoke about how this process (recording him in the classroom setting during mealtimes) had made her aware of the high levels of prompting she used with him and that she had to "*supply his words*". M.M. would wait for the adult's in his environment to initiate or model a request; otherwise he would "*stand and wait forever*". She also expressed her concerns over his inability to express his feelings.

"*He's got a lot of emotional needs... that he doesn't express, doesn't verbalise needs or emotions*".

Although he preferred to draw his experiences, she described that he would "*completely disappear or emerge into his own world where he doesn't need to communicate*".

M.M.'s educator experienced the amount of communication he used as noticeably different from his peers as the other children displayed a lot of social intent and would talk and interrupt often, whereas this was "*almost absent*" in M.M.'s case.

b. Speech and language features

His educator felt that M.M. had speech and language skills that were only used with prompting and modeling. She also found that he lacked certain vocabulary. M.M. could use short sentences and answer questions correctly. She reported that he struggled to "*distinguish between ask for something and tell something*". Most of the speech used was either self-talk, learned phrases in learned routines or responses to direct questioning. M.M.'s educator described his speech volume as problematic as he would either use a very soft volume or would use a loud volume during an outburst. He would only use a "*normal tone*" when he was reading.

c. Social interaction

M.M.'s educator identified his lack of social interaction as a major difficulty for him in the school context. Although social interaction was facilitated in the classroom, M.M. would not generalise or use these skills without adult facilitation. He was unable to initiate play with peers without adult prompting and modeling.

d. Prompt-dependency

A central theme that emerged during this interview was M.M.'s high levels of prompt dependency for his communication and social skills in the classroom context. Sitting or standing and waiting for an adult to help or prompt him were his main strategies to meet his needs in the classroom. The educator described this as learned and habitual and simply "*the way he goes about his communication*".

e. Ability to generalize

The educator expressed frustration as M.M. did not carryover learned communication skills in the classroom context to any spontaneous or self-initiated interactions.

f. Attitude towards Augmentative Communication

M.M.'s educator was extremely positive about implementing an augmentative communication system for M.M. in the classroom. She stated repeatedly that she was "*very excited*" about the prospects and felt that the need was there and that M.M. had the language. She felt the PECS could make a difference for him as it was a visual system which was "*definitely his stronger one, far stronger than his auditory one*", especially in terms of his understanding. She felt the inclusion of pictures and written words in this system would help him by providing "*something to refer back to*" and make it easier for him to "*answer and use language*". She was positive that this would motivate him and stated she could not wait to start.

g. Interaction style

M.M.'s educator described her attempts to encourage communication in the classroom. She would try to establish eye contact with M.M. and would hold items that she knew he wanted or needed within his reach and then wait for him to ask.

She would then prompt him to ask for the item: "*M.M. give me your words, you can talk, tell me what do you need now*". She felt this process was '*laborious*' and she had to '*drag*' the words out of him. She felt this process quickly became a learned routine.

> "*He's not going to talk, you're going to ask him then he's going to give you two words, then you're going to ask again, then he'll give the same two words and then you're going to ask again, he'll give you three words*".

This had been established as a pattern and if she attempted to push him for more he would have an outburst. She felt he would not move beyond this pattern without intervention.

Stage 4: Follow-up Stage

An analysis of the data collected during the follow-up interview with the educator of Participant 1 (M.M.) revealed the following themes:

a. Dimensions of communication

M.M.'s educator identified the following ***forms*** of communication: drawing (she still identified this as his preferred mode), verbal communication augmented by the PECS, written, and the occasional pre-communicative behaviour (i.e. outbursts and tantrums).

The ***functions*** of his communication were to make requests and to initiate interaction with peers, with the emerging function of sharing information (telling his news) and commenting (when set up by adult, but not used spontaneously). Communication occurred in a number of different ***contexts***: in the class, at outings, peer's birthday parties and on the playground with both adults and peers.

"He's able to approach anybody and communicate his needs with them".

b. Experience of the PECS training

Benefits

M.M.'s educator expressed repeatedly in this interview that she felt one of the most important changes since the PECS training was the interaction with his classmates. Although initially quite hesitant to approach them, after a lot of practise requesting items from his peers, he was *"able to approach anybody and communicate his needs with them"* with the augmentation of the PECS. M.M. appeared more aware of his peers and began enjoying the interaction with them. His educator felt that it was *"sort of a novelty for him to have some interaction and he's learned to enjoy interaction", "he's become more part and parcel of the class", "he is not so much on his own and left to himself".* She felt that prior to the PECS training, the other children gave up interacting with him because there was *"no initiation from him"* and because there was a high level of interaction between the other children, and they did not need to engage with him.

M.M.'s educator also described the other children in the class as enjoying interacting with M.M. and doing the PECS exchanges with him. She also spoke about how many years he had to cope without interaction, despite having the language skills and the *"huge amount of catching up for him just on experiencing", "it's just a few months that he's had that option".*

She also described a growing confidence and enjoyment for communication.

> *"He's got more confidence; he knows that somehow he can communicate and I think he enjoys it... he enjoys the communication... he's tasting what it tastes like to communicate".*

> *"I think that the connection between communication and language has definitely come closer"* and that *"the link between the two has become more apparent"*, whereas before she felt he had seen them as *"two vastly different things that have got nothing to do with each other"*.

Since the introduction of the PECS the following other changes were identified by M.M.'s educator:

- M.M. could approach any communicative partner.
- He made more eye contact when he approached someone.
- He made requests using normal volume of speech.
- He used longer sentences with the augmentation of his PECS sentence strip.
- Echolalia had decreased.

> *"Echolalia definitely less, a lot less when you ask him a question he will respond to it"*

- There had been a *"huge improvement"* in his ability to respond to questions.

> *"I don't need to prompt him that I've just asked you a wh-question... he's accessing correct responses far easier... repeating questions immediately after you said it, that has decreased a lot come to think about it".*

Without the PECS sentence strip with the written words, he was *"unsure"* of himself and tended to whisper. He was able to use his communication skills in different contexts (e.g. playground, outings, and birthday parties), indicating good carryover of his skills; although she felt that he still depended on adults to ensure he had his PECS file with him. In terms of behavioural changes, M.M. displayed fewer tantrums and used words appropriately during the occasional outburst. These statements would make sense to the educator. M.M.'s educator now recognised that before the PECS Training, one of his main methods of communication was to tantrum and then the adults had to *"figure out"* why this outburst had occurred. She reported that she had hardly ever experienced an outburst since the PECS training (she recalled only 2 in this period) and felt this was a *"huge improvement"*.

Limitations & difficulties

When asked if there were any limitations to the system, she responded *"I don't think there are limitations... I think there are just possibilities of expanding it"*. Some difficulties became evident during the interview. M.M.'s educator expressed some frustration when M.M. did not have his PECS communication file at school (it was left at home a few times) and described a change in his behaviour on these days. *"He's had lots of wobbles on the two days"*. She also felt that M.M. was sometimes frustrated when he did not have the vocabulary he needed in his PECS file to communicate something.

> *"He's frustrated when he doesn't have the language on the cards"; "sometimes he wants to tell you something that he hasn't got the structure on his PECS cards".*

M.M. was the only learner in the educator's class using the PECS as the other children were all able to communicate effectively without augmentation. The educator experienced some difficulty in accommodating his PECS training and the attention it required, when all the other children needed her attention as well. She felt the pace of the class and the level of curriculum delivery was much faster than most of the classes with PECS users and it was difficult to wait for him and facilitate his PECS use when the rest of the learners had short attention spans and would therefore lose concentration.

> *"The whole class will suffer for that".*

She also expressed concern over the fact that the PECS was not used at all levels throughout the day. At times M.M. still needed to see the PECS file and this acted as a prompt for him to communicate. He was not commenting spontaneously in the classroom. His PECS use still depended on his motivation levels. Although carryover of PECS use to other contexts was *"really quite okay"*, she stated that M.M. still depended on adults to ensure that he had his PECS file with him. There was also some concern expressed over the use of his PECS file on the playground. Although she felt the use of the PECS was helping, *"he does his little bit of interaction and I think it helps a lot"* she found that he would then run around with the PECS file or a board (containing a selection of PECS pictures) and this possibly restricted his play, as he could not for example go on the slide with it. She added that *"it's not natural"*.

M.M.'s educator also commented that she was not sure if this was as much an issue for M.M. as it was for the adults.

> *"I don't know if it's really an issue for him or whether he minds it as much as we mind it, you know because I would hate to run around with a book like that".*

Some communication difficulties were still reported during the follow-up interview. Although these were less frequent, tantrums still occurred, but now included some meaningful verbalising during the tantrum. Communication still depended on M.M.'s level of motivation and the presence of the PECS file served as a prompt to communicate. His use of commenting was "*very seldom*" spontaneous. His educator felt that he still differed from his peers in the amount of communication and initiation he showed.

> *"It's not as spontaneous as the other children's communication is... It's the communication in the sense that the others are reciprocally going back and forth and he's doing one sentence and one response... So it doesn't carry on... he doesn't pedal forward from there".*

His communication remained on a single exchange level (with the PECS) and this had not developed into reciprocal exchanges. Echolalia was still evident (although "*definitely less, a lot less*") and self-talk was still an issue particularly at the beginning of the week.

> *"Self-talk Mondays are rife and towards Friday it's fine", "you can see he's been watching video the whole weekend".*

Ideas for the way forward

M.M.'s educator had clear suggestions for ways to solve some of these difficulties:

- "*Having a smaller, more user-friendlier mode*" - to address the issue of playing outside while having the PECS file.
- Using a blank sentence strip that M.M. could write a sentence on that he did not have available in his PECS file - to address the limitation of having only the PECS vocabulary available for communication.

- The possibility of a facilitator that would see to M.M.'s communication needs and make sure he gets the attention he needs, without the rest of the class losing out - to address his unique individual PECS needs in the classroom. Although she felt that this may be "*too small a job to give to somebody full time*".

c. Attitude to Augmentative Communication

M.M.'s educator was very positive about the use of augmentation with M.M. and felt this was "*absolutely necessary*". She spoke strongly about his right to use the communication system.

> "*He will be deprived if we take that away", "it's like giving him a skill and then taking it, saying no you can't have it anymore*".

Despite this strong support there was some suggestion in her interview of viewing the AAC system as only "*a stepping stone*" for M.M., suggesting she would prefer not to use the system long-term. She also expressed some concern over accommodating the use of PECS in the classroom with the other learners not using PECS and felt using the file on the playground was "*not natural*".

d. Interaction style

M.M.'s educator stated that her way of communicating with him had not changed, that she still gave verbal instructions and used written words and sentences to communicate with him when he did not understand her. However, after the PECS training she felt she now asked him questions, knowing he had the PECS to answer her and that M.M. responded to the "*expectation in my voice*".

> "*He knows I expect him to respond to that, where I'm sure before the time he could pick up the despondency in my voice when I asked him something and I knew I would be ... giving him the sentence and then he would repeat it.*"

3.7.3 Participant 1: Summary of Parent and Educator Perspectives

Pre-Training Interviews

Both the mother and educator of Participant 1 described his communication skills as very limited. The *forms* of communication at home were verbal (single words and short phrases), gesture (pointing) and pre-communicative behaviour (e.g. tantrums) and at school he used verbal (only when prompted or modeled),

drawings (without communicative function), very limited gestures and pre-communicative behaviour (e.g. tantrums, screaming). Both caregivers spoke about the need for prompting and modeling to use his language. The *functions* were limited to basic requests and comments (limited and lacking in content) at home, and requesting (when prompted), giving information (in response to direct questioning) and in learned social routines (with modeling). In the classroom he would sit and wait for an adult to prompt him to communicate his basic needs or stand in the path of the adult and wait for them to initiate.

In terms of his *speech and language skills* his educator felt that M.M. lacked vocabulary and his speech volume was problematic. Speech consisted of single words and short phrases when prompted. The presence of echolalia, self-talk and repetitive utterances (that he wanted an adult to copy) were reported in both settings. This information confirms M.M.'s communication profile, pragmatic profile and the LARSP analysis from the Pre-Training stage. He had very few intentional communicative acts (ICAs) recorded in the pre-training sessions. The *functions* were limited (a few requests, comments and responses) and *forms* included mostly speech with some gestures, motor communication and vocalisations. These sessions also contained a lot of echolalic utterances and self-talk. In the LARSP profile he used single words and the occasional 2-word combination.

Both caregivers were clearly frustrated with his lack of communication and use of language. His educator was particularly concerned with his lack of initiation, inability to communicate emotional needs and his lack of social intent. His *prompt-dependency* and the lack of carryover of the social and communication skills taught at school were also concerns for his educator. His mother expressed concern with his inability to share his feelings and share information at home. In terms of attitude towards AAC use and expectations for introducing the PECS, the educator was very positive and thought the system would make it easier to use language and motivate him because of its reliance on visual information (pictures and written words). M.M.'s mother was curious about the system and interested in whether is would give him confidence to use sentences, but at the same time looked for reassurance that this system would not 'set him back'.

The experience of the PECS training for the mother and educator were qualitatively quite different. The educator overall had a far more positive experience of the PECS training and the benefits it had for M.M. M.M.'s mother, however, was more negative as she spoke of a recent change in M.M. and a lack of motivation and enthusiasm to use his communication system. She felt that the change of educator had influenced this, as his educator had played an important role in following through with and expanding his PECS use at school and she described a loss of momentum. The researcher had not been involved in further PECS Training and support during the follow-up period and the new educator was untrained, so M.M.'s mother experienced a burden of responsibility to maintain M.M.'s PECS use. She seemed more aware of how M.M. exclusively communicates with and through her at home (*'most of his world is with me'*) and was clearly struggling with her role in the use of his augmentative communication system. She felt strongly that she should not still have to motivate and remind him to use his PECS. Her attitude towards using the AAC system was not completely negative, but she expressed uncertainty and the need to expand the system and develop self-motivation.

Post-Training Interviews

M.M.'s mother felt that his communication was still very limited and frustration was still evident *"he's got the words, but he doesn't use it"*. She again spoke of her concern with his inability to share information and his use of echolalia and need for her to repeat utterances without any communicative function. Despite this experience, she acknowledged that the PECS had resulted in M.M. using sentence structure spontaneously (with the augmentation of the PECS) and with enthusiasm during the training. She also felt that it had improved his grammar as he now used complete and correct sentence structure. He had also started to make requests without the PECS in the same sentence structure, without prompting. This had even carried over to other contexts (e.g. asking his mother for something to do at another family member's home). Her ideas for future PECS use were to expand the system, use more sentence-building activities and use a smaller, portable file. This would suggest some interest in continuing with this system.

M.M.'s educator was very positive about the impact of the PECS training on M.M.'s communication skills and especially his social interaction with peers. The *functions* of his communication had expanded to making requests, initiating interaction, sharing information and commenting was emerging (although not spontaneously). The *form* of his communication was verbal with the augmentation of PECS, written and pictures (he still preferred to draw experiences). This information supported the communication profile of M.M. after the PECS training which showed an increase in the number of ICAs, most noticeably in the requesting function and in form of speech and pictures with speech.

According to the educator, the use of pre-communicative behaviour had decreased and was only evident occasionally and involved some verbalising of what had set off the outburst. In previous research studies similar changes in social behaviour and decreases in challenging behaviour were observed. *Bondy & Frost (1994)* reported improved social behaviour and decreased problem behaviour. *Frea et al. (2001)* demonstrated how aggressive behaviour was extinguished after introducing the augmentative system of PECS. *Heneker & Page (2003)* reported that during the follow-up stage, the children using PECS were less frustrated, accepted when their requests were not always met and waited patiently for adult attention.

According to his educator, the *benefits* of the PECS training were an improvement in eye contact, the ability to approach any communicative partner, normal volume of speech and longer sentences with the PECS sentence strip, a decrease in echolalia, a big improvement in his ability to answer questions and increased confidence and enjoyment of social interaction with his peers. These benefits have been reported in other research studies and a few research studies have attempted to measure this treatment outcome. *Kravits et al. (2002)* found increased durations and frequency of peer interaction when PECS was combined with social skills training. *Charlop-Christy et al. (2002)* demonstrated increases in social-communicative behaviours (i.e. initiations and joint attention) with simultaneous decreases in challenging behaviours

In a study by *Liddle (2001)*, educators reported improvement in some of the children's ability to participate in class activities (especially group activities) and understand group rules after PECS training. The researcher (one of the clinicians) felt that PECS was a way to extend the communication skills of a group of children that had previously been unable to initiate communication with adults or peers. In *Baker (2001),* teacher questionnaires revealed that the greatest reported changes after PECS training were in communication, initiation, improved speech, vocalising and eye contact. The teachers also reported behaviour improvements in 53% of the children. Similar benefits were reported in this research study. *Webb (2000)* reported that PECS appeared to facilitate the children's understanding of effective ways to communicate their needs.

Limitations included not having the vocabulary in his PECS file that he needs to express himself, the bulky file was not user-friendly on the playground and reciprocity remained on the level of single exchanges. *Difficulties* with the PECS training were that M.M. was upset on the few days when the file was left at home, he depended on an adult to ensure he had the file with him and the file acted as a prompt to communicate (this was similar to M.M.'s mother experience). Commenting was not spontaneous (confirmed by the lack of commenting in the unstructured sessions), the PECS was not used at all levels throughout the day and M.M. was the only learner in the class using the system, making it difficult to cater for his unique needs. M.M. still displayed less initiation than his peers and some self-talk (especially after weekends). Echolalia was still evident, but reduced. His educator was very positive about the AAC system and felt it was M.M.'s 'right' to use it, however she felt that it should be a stepping stone and not for long-term use. *Ideas for future PECS use* were to introduce a smaller, user-friendly file, with a blank sentence strip for M.M. to write his own messages and possibly a facilitator to help integrate his PECS use in the classroom setting.

3.7.3 Participant 2: Parent Interviews

Table 30: Themes emerging from Parent Interviews: Participant 2

	Pre-Training (Stage 1)	Follow-up (Stage 4)
THEMES	a. Dimensions of communication b. Speech and language features c. Attitude towards Augmentative Communication d. Interaction style	a. Dimensions of communication b. Communication difficulties c. Experience of the PECS training Benefits Limitations & difficulties Ideas for the way forward d. Influence of change in educator e. Speech and language features f. Behaviour changes g. Interaction style h. Family dynamics i. Attitude towards Augmentative Communication

Stage 1: Pre-Training Stage

An analysis of the data collected during the initial interview with the father of Participant 2 (N.N.) revealed the following themes:

a. Dimensions of communication:

The following dimensions of communication emerged during the interview: ***forms*** of communication were verbal (single words or short phrases), and pre-communicative behaviour (shouting, tantrums, and aggression noted when he is frustrated or interfered with). ***Functions*** of communication were requests (basic needs), comments (this was limited to his special interests e.g. naming the brand label on his sister's clothes or naming the brands of cars he sees when on a drive) and making statements about where he is going, possibly to ask for information, comment, or seeking confirmation.

According to his father, N.N.'s communication skills were limited at home. He would only request something he wanted (object) or to do something (activity), but this would not be spontaneous.

"He'll only ask for something if he wants something, but it's not really out of his own" "it won't be spontaneous".

He made basic verbal requests and had the basic vocabulary to request these items. He would otherwise only communicate when prompted or would rather help himself to an item.

"Where he can get the stuff, he's not going to ask someone, he'll just go and fetch it and do his own thing".

The only other spontaneous communication was the repetition of brand names, makes of cars and adverts which were his special interest. Repetitions of familiar routine sequences are used at home repeatedly and he would want his father to confirm each part of this sequence. If any changes occur in this routine, N.N. needs to be told ahead of time and the new sequence has to be provided.

His father reported that there were times when N.N. did not have the specific vocabulary and he would make up his own descriptions for things, creating some confusion for his parents who would try to *"figure out what he's said"*. When N.N. did not understand an instruction he reacted by putting his hands over his ears and shouting "don't want". In terms of the context of his communication, his father reported that his communication was *"basically the same"* in all ***contexts***. He did report that N.N. was more verbal at home, although this related more to the self-stimulatory sounds he made while watching the television than to actual communication. When told to stop these sounds outside of the home setting, he would. N.N.'s father reported that N.N. communicates more with his father, as the other family members tend to say no to him, so he goes to his father when he knows his mother will say no.

b. Speech and language features

It became clear during this interview that a lot of N.N.'s speech at home consisted of repetitive speech and self-stimulatory sounds centred on his special interest in brand names and cars. Although he controlled the self-stimulatory sounds when not at home, he was louder at home and would engage in this activity in front of the television.

In the shops he would point out brand names from the television and repeat parts of related adverts, using this to interact. When he used these phrases from adverts, people sometimes "*think he's normal*", but his father knew that he had just memorised these phrases and would continually repeat them, and that this was not his own language. These phrases were sometimes used without an apparent context, but were usually triggered by visual prompts (e.g. on seeing his father's cellular phone he would "*rattle off*" the advert he associated with the cellular phone).

His father reported that there were times when N.N. did not have the specific vocabulary and he would make up his own descriptions for things. When he was not understood he would:

"*just keep on, he'll just say over and over*" "*he just goes into repetitive mode*".

He would also ask for something and keep on repeating himself. His father described the way he talks as '*different*'. In terms of receptive language, N.N.'s father identified N.N.'s difficulty understanding new instructions. He needed to repeat instructions and physically take N.N. through the steps of a task before he understood what was required of him. When N.N. did not understand an instruction he would also start shouting "don't want" and covered his ears with his hands.

c. Attitude towards Augmentative Communication

N.N.'s father expressed no concern regarding introducing the use of picture communication with N.N. – "*I don't have a problem with it*". He mentioned how using Makaton signs had helped him before (N.N. had used these for a brief period four years prior to the research, but had stopped using signs when his speech developed). N.N.'s father also mentioned that N.N.'s brother was at a stage where he was drawing everything, so it might help him interact with his brother.

d. Interaction style

Despite trying to withhold items from N.N. until he asked for what he wanted "*ask him what he wants and force him to say something*", his father talked about giving into him because N.N. would keep on until he got his way. "*So in the end, I mean more for peace that you're going to say okay*".

When asked if his father used a lots of questions or prompts with N.N., he stated that he used questions (e.g. what do you want, where do you want to go?), but he felt these were "*more questions than prompts*".

Stage 4: Follow-up Stage

An analysis of the data collected during the follow-up interview with the father and mother of Participant 2 (N.N.) revealed the following themes:

a. Dimensions of communication

The following dimensions of communication emerged during the interview: ***forms*** of communication were verbal (e.g. I want a pie please / I want juice please), and the PECS was used when they did not respond to his verbal requests or give into his demands. Some pre-communicative behaviour (i.e. lashing out, pushing his brother) still occurred when he was teased by his brother. He also made direct eye contact when communicating. *"You have to look at him, he makes direct eye contact".*

Functions of communication were requests (he asked for a variety of things), comments (he labeled things in the environment), directions (he had started to direct them in the car e.g. turn, go straight, don't turn), getting a person's attention (taps adult on the shoulder) asking for help (e.g. 'help, help, help') and making statements about certain things that he expected at certain times (e.g. we go for a walk now, we go to Canal Walk).

His father reported that N.N. had the vocabulary for the things he wanted at home and used this vocabulary directly. His parents stated that before the PECS training he would have asked using a single word over and over (e.g. "bread, bread, bread") and would not get the person's attention. N.N. would just repeat himself until someone responded. This changed and he now asked in a complete sentence and waited when told to wait.

> *"Keeps on over and over and over and over", "He wouldn't get your attention", "He will do that now" "He'd come in and he'd sit there and I would be busy in the kitchen and just stand by the door, 'bread, bread, bread, bread, bread'" "And now he'll come "I want a pie please" "Now it's a once off and then he'll wait if you tell him"*

This change seems to have carried over to other ***contexts***. At other family member's homes he used to scratch and take what he wanted without asking. He now asked them for things ("I want ___") and they liked him to ask, providing high levels of reinforcement when he did. In the shops he now would ask for what he wanted using a complete request (e.g. I want chips / Go look at the Pentel). Although N.N. was still most attached to his father, he also communicated with his mother and his two siblings verbally.

b. Communication difficulties

His parents identified a number of communication difficulties that N.N. experiences:

- He was unable to express his feelings, when he was frustrated or angry with his siblings and still lashed out instead and he did not protest (e.g. I don't want to do it now).

  "You can see he gets frustrated and you can see on his expression he is angry but then he has difficulty in saying 'leave me alone' or 'go away' or 'I want time alone' or 'I'm feeling hurt, or things like that".

- N.N. was unable to share information about his day.

  "He won't communicate with you, won't tell you what happened during the day."

- When given a verbal choice between two or more options, he would repeat the last option.

  "What he still does is you can ask him, 'What would you like, would you like a burger, McDonalds or KFC?' he would say the last thing that we asked."

- N.N. laughed at times and his parents could not work out why and he was unable to explain to them what amused him.

  "... sometimes he chuckles and he'll have seen something you know, he just can't tell you about it, but he has taken notice of it. He laughs and then we try to find out now what is it that makes him laugh."

- People outside of the family still heard him repeat adverts and did not understand the connection between his utterances as his parents could.

  "... he talks to somebody or he just rattles off the adverts and it's 'what did he say now?' ... and we will know because he's repeating an advert, but somebody else might not know where's the connection..."

- When he needed assistance he would still use "help, help, help" until they modeled a request for help.

  "If for example he puts his shoes on and he's got a problem or something, then he'll say 'help, help, help", but then obviously we shape it till he gets to a 'I want help' position"

c. Experience of the PECS training

Benefits

Although N.N.'s parents stated that he only used his PECS file at home when they did not respond to his verbal requests or give into his demands, there were positive changes that occurred during the PECS training period and they felt that the PECS had helped him. Both parents commented on how fast N.N. was when using his PECS file and that he used it almost to make sure his parents understood him and to be persistent in his requests.

> *"... if for example we do not respond the first time to him... then he'll go fetch his PECS file quick as a flash, he's very fast with it" "That's what we find now that happens quite a lot lately... it's almost as if we don't understand him now."*

His parents recognised that they now responded to N.N. by being more explicit in what they said to him. They reported that since the PECS training he now used the "I want ___ please" phrase to make spontaneous verbal requests. "

> *It comes out better now", "the 'I want' is added more now to what he wants".*

They also reported that he made direct eye contact with them when he requested things and made sure that they looked at him. He also got their attention by tapping them on the shoulder.

> *"He'll look into your face now and say 'I want __'... that is for me good, that he comes and speaks directly."*

They felt that his repeating of a single word to request the item had decreased and he now requested an item or activity once and would wait if they told him to. He also understood when they told him "later on". *"Now it's once off and then he'll wait if you tell him".* His colour concept was now established after visually representing the colours in his PECS file. He labeled things spontaneously by their colour and matched these to his clothes.

Father: *"He's got his colours now that the colours are in the PECS file he can distinguish his colours far better. I think it's more of a visual thing", "I know he prefers colours now, we will sit now and he will tell me exactly red colour, green... he will say the colours out of his own."*

Mother: *"he would match it to his clothes, red sweater or blue sweater, he would say."*

Limitations & difficulties

The following difficulties emerged during the interview:

- His father spoke about difficulties when he does not have the pictures in his file to request specific games.

  "... there are certain games that he plays... he gets up and D.D. stops him, but he cannot say what he wants. I don't think, the names of the stuff he doesn't know yet... we opened the file for him, but he couldn't match anything in the file to what he wants..."

- His parents also stated that he does *not* use his PECS pictures for 'big' and 'small' and the commenting sentence starters 'I see' and 'I hear', although both parents felt he did notice things, but did not always verbalise what he saw or heard.

- His mother felt that the phrase "I want ___ please" was unnatural when she compared this to the way that other children asked for things.

  "I don't know how natural it sounds, you know because people don't really speak like that in those proper sentences the way he can make 'I want something please' you know the other one will just say 'give me'..."

  In contrast, his father commented that other people are *"amazed that he's autistic"* because he speaks and says "I want ___".

- N.N. was previously with his grandmother in the afternoons for a few hours after school and his parents were concerned that she anticipated his needs and provided items for him before he had requested them. His grandmother had been away for 3 months and N.N. had not used his PECS with her prior to that. N.N.'s father expressed that he wanted to speak to her about that when she returned.

  "He just helps himself there and they sort of anticipate what he wants and they provide it before it's needed"

- N.N. sometimes tapped them to get their attention, but he tapped too hard.

  "He knocks you..." "...but he slaps you instead".

Ideas for the way forward

Parents ideas for ways to deal with some of these difficulties included:

- Presenting choices visually using PECS pictures so that he can understand he must choose. His father spoke about how this had helped his colour concept develop and suggested representing choices visually so that he can respond appropriately.

  "...he's first got his colours now that the colours are in the PECS file he can distinguish his colours far better. I think it's more of a visual thing. I'm now just thinking in terms of when we talk to him 'Do you want a McDonald's burger, do you want a KFC burger?' I think it doesn't register properly. But if for example, maybe if you could have had those pictures down now to say a McDonald's burger or a Kentucky burger once he can see it, he'd be able to make that choice."

- Using PECS to develop his sentence structure.

  "Using it more... to build up a sentence" "...to build so that he knows exactly, for example how to construct a sentence like "I want a big green block'."

- Representing specific games and activities on PECS pictures so that he can make specific requests.

d. Speech and language features

His father reported that N.N. has the vocabulary he needed for the items at home and he used this vocabulary directly and appropriately. He however struggled with vocabulary when making specific requests and choices. Both parents felt that his colour concept was established now that it was visually represented in his PECS file. His mother commented that she felt perhaps his vocabulary had expanded as he was repeating new adverts and his repertoire had extended. Some changes in his receptive language were also reported as he now understood when they told him to wait for something. Family friends that had been away for 3 months remarked on the improvement in N.N.'s speech since they had last seen him.

"...friends of mine they haven't been here for 3 months... they said they can see that there is an improvement... they've mentioned it to us... they can see that there is progress in what he's doing, like his speech..."

The features of N.N.'s speech that his parents felt were noticeably different from other children were that he still '*rattles off*' parts of adverts and his way of asking for things using the "I want something please" was different to other children. His father felt that the repetition of adverts needed to stop or be replaced with something else.

e. Behavioural changes

His father reported that N.N. was now more relaxed and less repetitive at home. His mother commented that they could take him to more places and not be worried that something would set him off.

> *"He's quite relaxed now, we can take him to more places, he eats more, he eats a better variety of food than he used to. You know, so its not like we have to suffer, worried around every corner what is going to set him off."*

His father stated that in the shops N.N. was less anxious because he asked for what he wanted and would then go get the item or look at the item and then come back to his parents on his own.

> *"Cause in a shop he'll say, he wants chips. He'll go down the chips isle; you know that type of thing. 'Go look at the Pentel', I know okay he's going to go look at the Pentel, but I'll just tell him, I won't go with him right down the isle, he'll go down the isle himself now, look at it and then put it back."*

f. Interaction style

His mother stated that *"we try to make him talk, especially when he wants things", "I'd want to make him ask for it or comment on it or something... cause that would probably expand his vocab or make him want to speak."*
His father stated that when N.N. used his PECS they tended to be more explicit in what they said to him.

g. Family dynamics

During the follow-up interview, both parents spoke about the interaction between N.N. and the rest of the family. N.N has a younger sister and an older brother. According to his father, N.N. has some interaction with his sister.

> *"When she comes home he will say hello to her, but he'll put his face up into her face and because she responds to him and then he will imitate her."*

N.N.'s brother *"terrorises"* him and *"doesn't understand N.N.... you know about his handicap"*. N.N. now communicated with his siblings if they took an item away from him, he would ask for the item (e.g. his teddy bear, a piece of string) or he would go and find his father and ask him to look for the item (e.g. 'look for string'). N.N. was still more attached to his father and spends more time with him, while his mother spends more time with his two siblings. They expressed concern over the fact that N.N. would spend his afternoons with his grandmother and she anticipated his needs and he did not need to communicate or use his PECS with her.

h. Attitude towards Augmentative Communication

Both parents were asked in the follow-up interview what their view on using picture communication with N.N. was. His father's response was positive in that he stated that it had helped him and mentioned again the gains in terms of his colour concept and reducing his repetitive speech. His mother had earlier in the interview stated that it helped him say what he wanted and that he requested things easier with the pictures and had learned to approach a person and request. His father mentioned that N.N. had "*some speech already*" and earlier when asked about their concerns about using the PECS, his mother mentioned that their main aim was for him to be verbal and that "*we would like him to be a bit more verbal instead of ... running for the card*" (referring to the PECS pictures). This suggested some concern about the use of the augmentative system when he was verbal and possibly concern over its long-term use.

3.7.4 Participant 2: Educator Interview

Table 31: Themes emerging from Educator Interviews: Participant 2

	Pre-Training (Stage 1)	Follow-up (Stage 4)
THEMES	a. Dimensions of communication b. Speech and language features c. Social interaction d. Behaviour issues e. Attitude towards Augmentative Communication f. Interaction style	a. Experience of the PECS training Benefits Limitations & difficulties Ideas for the way forward Effect of intensive training Continue vs. stop b. Dimensions of communication c. Social interaction d. Influence of existing speech skills and cognitive ability e. Attitude towards Augmentative Communication f. Interaction style

Stage 1: Pre-Training Stage

An analysis of the data collected during the initial interview with the educator of Participant 2 (N.N.) revealed the following themes:

a. Dimensions of communication

The following dimensions of communication emerged during the interview: ***forms*** of communication were verbal (single or short phrases, often repetitive), motor (taking you by the hand), gesture (pointing) and pre-communicative behaviour (shouting, screaming, tantrums, and lashing out). ***Functions*** of communication were requesting (basic needs), and protesting or rejecting (e.g. said "no" or "don't want"). In terms of the ***context***, N.N.'s communication was similar across the different school settings, but the severity of his pre-communicative behaviours had increased in an outing situation.

> "*He threw himself on the floor, kicked and screamed and carried on in a way that I've never seen him carry on before in class*".

His communication with peers was very limited.

When describing N.N.'s communication skills in the classroom, his educator said "*I wouldn't say he's a very good communicator*" and that he had "*quite a lot of communication difficulties*". She described N.N. as communicating on his own terms and often acting independently – doing things "*his way and on his own*". N.N. would "*try and do his own thing first and if he can't then he will try a communication of some kind, be it verbal or non-verbal*".

b. Speech and language features

According to N.N.'s educator, he used short one and two word utterances, and did not use complete sentence structures. However, she did speak about a recent improvement in his ability to construct whole sentences.

> "*He's improving quite rapidly now with the whole sentence construction, but you can say that's the last two weeks... it is quite a dramatic change*".

She spoke a few times of his use of repetitive phrases and repeating parts of adverts and how these were often triggered by associations he made. She felt he had difficulty producing complete sentences, and spoke of the interference of the echolalic, repetitive phrases he used in his communication.

> "*He doesn't have complete sentence structure.. He'll ask you something and that will spark off an association and the he'll go into repeating ... the catch phrase of the ad and then he'll forget about the whole communication that he started initially*".

Although N.N.'s speech features were different to the other learners in his class, because many of the other learners had little or no speech, the content of his speech was often echolalic and focused on obsessive topics of adverts and marketing brands.

> "*It's different to the echolalic stuff; it's kind of like an obsessive rolling out of the jargon*".

N.N.'s teacher identified a lot of his echolalic speech as "*self-correction*", where he would use phrases that were said to him in a situation (e.g. "don't touch") when about to repeat the offensive behaviour.

c. Social interaction

One of the main communication difficulties in the classroom identified by the educator was N.N.'s inability to communicate with his peers. His only communication with them was to fight with them over items he wanted in class.

d. Behaviour issues

N.N.'s educator identified a number of behavioural issues with N.N. at school. When angry, he tended to lash out at the adults or children. There were certain locations that he refused to enter or walk past. On a recent outing he had seen a fast-food restaurant that he reacted negatively to, although the reason for this was unclear. He screamed, covered his ears, threw himself to the ground kicking and screaming. She felt that he would control this behaviour better once he was better able to communicate. He displayed a "*fear of anything new*" including activities, places or food items. He also responded negatively (with "*lots of no's*") to certain work tasks in class that he did not like and would refuse to do the task. She described N.N. as very routine-bound.

e. Attitude towards Augmentative Communication

N.N.'s educator was positive that PECS would help him develop communicative intent, support the recent improvement in his sentence structure and help make him feel more part of the class, as all the other children in the class were using PECS. She mentioned that N.N. appeared interested in the PECS files of the other children and was already sometimes handing over random pictures.

f. Interaction style

N.N.'s educator stated that in the classroom "*we are incredibly aware and focused*" on getting the learners to communicate. The learners were expected to communicate before continuing with activities, even with those tasks the learners were not particularly interested in, the educator insisted on some form of communication between herself or the assistant and the children.

Stage 4: Follow-up Stage

An analysis of the data collected during the follow-up interview with the educator of Participant 2 (N.N.) revealed the following themes:

a. Dimensions of communication

The following dimensions of communication emerged during the interview: ***forms*** of communication were verbal (complete and appropriate sentences) and verbal and picture combined (using his PECS and speech together). No pre-communicative behaviours were mentioned during the follow-up interview.

> *"PECS or else just talking. Quite often he will just talk, he doesn't use the PECS which I think is okay because he's forming complete sentences and appropriately."*

Those requests that he was comfortable and familiar with were the ones that he made without using the augmentation of the PECS. In terms of the ***context***, N.N. used his communication skills (speech and PECS) across the different school settings (e.g. outings, music room for drumming lessons, vocational groups, going for walks, etc.). His educator felt that he used the PECS across these different contexts because the contexts were structured specifically for all the learners in the class to use their system.

b. Experience of the PECS training

Benefits

N.N.'s educator was clearly very positive about the effects of the PECS training with N.N. as well as her other learners. The benefits of the PECS training that were identified during the interview included:

- N.N. showed "*clear communicative intent*" and was able to "*make his wishes known*". She felt he was "*empowered to communicate*".
- There was development in his speech and language skills. He was able to form complete and appropriate sentences. She also felt that she could now assess his receptive language and this resulted in her interacting differently with him.

  "N.N.'s had quite dramatic changes. He always did have some verbal ability; he never spoke spontaneously that easily, except for his repetitive and obsessive phrases. He now, speaks more appropriately, more spontaneously, plus his sentence structure and his vocabulary and all of that has improved quite dramatically."

  "So we do interact very differently and teach him differently because we know he has the ability to understand. We can assess his receptive language far more clearly now."

- N.N. would spontaneously fetch his PECS file if he wanted something in the class (his educator often created opportunities by having concrete reinforcers e.g. food available, and waiting for the learners to initiate and request the items). N.N. could discern when the items that were available were things that he wanted, rather that just copying the other learners (as some of the other learners in the class would do). He was quick to initiate and ask for things that he liked.
- N.N. had started to communicate if something unpleasant happened to him in the class setting (e.g. when a learner hurt him).
- N.N. communicated directly with a person, which had generalised into all areas of the classroom.

Other general benefits identified by the educator were as follows:

- The learners introduced to the PECS matured, showed more self confidence and autonomy in the school setting.

"I think PECS helped enormously in giving the child self-confidence, which I think helps him mature". "It can help to give self-confidence, to give autonomy in a life that's frighteningly out of control."

- Using the PECS helped professionals interacting with the children and their families.

  "... to help not only the learner, but all the professionals that have to interact with the learner and the family, because it allows the child to communicate and so we have a much better idea of what's actually happening."

- PECS had promoted speech in all the learners she had worked with using this system.

  "... without fail every child I've worked with now in my class, they have all started talking, even those that were not verbal at all and if they can't talk they are making attempts to talk, so it's promoted speech."

Limitations & difficulties

N.N.'s educator also identified some difficulties that she had experienced using the PECS in her school setting, although these were not specific to N.N.'s PECS training:

- N.N.'s educator felt that the support of both the immediate and the extended family of the learner were very important, and this was not always evident. She also felt it was important for parents to get involved as quickly as possible.

  "My biggest concern about using PECS is that it's got to be used I think everywhere, and is important for the family to come on board. I think his immediate nuclear family are on board, whether the extended family are I don't know and that is to me a concern. I don't know how we get across the message that this is a communication system. This is how this person speaks. We need to incorporate it into our lives so that this person can speak to us ...I think we need to get parents on board more quickly."

- She expressed concern that the PECS was not always used correctly within the school setting in which she worked.

  "My other concern is that PECS is not used even correctly within our professional set-up. Where people are using PECS as a choice board or as a convenience thing or here not there and we go for a walk and we don't take the book... You know we're all guilty of it."

- She expressed concerns over the incorrect implementation of the PECS training and how this affects the brand name. When not implemented correctly, people claim that the system does not work.

"There are people that have been on PECS training courses and then they've moved into other areas where there are not many people using PECS and bad habits come in and incorrect methods and then the child's not doing it correctly and so it's not as effective and I think that's an area that effects the brand name. So 'no PECS doesn't work', actually 'no, it was done incorrectly'. So it wasn't the system that was at fault, it was the way that it was implemented. It is difficult to monitor that, but I think that is quite important."

- Training of new personnel was a concern and frustration. The educator currently had a new assistant in the class without any PECS training and many of the volunteers at the school had no PECS training but were expected to use the PECS with the learners.

  "There needs to be ongoing training. I've got a new assistant in my class now, and she doesn't know PECS, and where does one find the time to sit down and teach her the correct way to do PECS. Fortunately at the moment my children are all pretty okay, but I mean I've got at least one little boy that we want to start with PECS, she has to be trained. She's got to do it correctly."

- N.N.'s educator felt that the PECS files were unwieldy and the Velcro on the outside of the file damaged the learners' clothes.
- Times constraints – N.N.'s educator felt that individual PECS input was important for the learners but identified time constraints and logistics as a limitation.
- A difficulty keeping the PECS files in order - damage to files and loss of pictures was a frustration.

  "... and the cards you know that's a big problem just to kind of keep the files in order and so on and I don't know how you get around that, but it can be very frustrating."

Ideas for the way forward

The following ideas and possible solutions to some of the difficulties were suggested during the interview:

- Fostering a culture within the school of using PECS as a communication system that is available to the learner at all times.

  "I think all of us need to take it on as our culture, this is how we communicate. Therefore I don't wear a gag at any time of the day. If we're not going to wear gags, then we must not let our PECS users go out without their PECS cards."

- Ongoing training of new staff and volunteers – this would also mean that the staff would "brush-up" on their skills.

"Cause you know if you're going to teach someone else you're going to go back to the manual, going to check to make sure that you're teaching that person correctly."

- Setting up a mentoring system in the class, whereby educator and assistants observe each other implementing the PECS and remind each other when some part of the PECS training is incorrect.

  "I think it is quite easy to fall into bad habits so I think in a situation like a school... one needs to have checks built in that you've got somebody that perhaps mentors you to say I've just been observing you and you're doing this and this. Just so that people keep up to speed ... I've said to the people in our class we've got to monitor each other and remind each other to prevent falling into bad habits. Because it's quite easy to do, it's quite easy to over-prompt or to say 'go and fetch your PECS book' I know that's not what you're supposed to do..."

- Including individual sessions in the daily class programme for the learners to use their PECS correctly to communicate and to know what each learner's preferences are.

  "We spent 15 minutes a day with some learners who needed a lot of input, but we made sure that everybody had individual one-on-one PECS. We took out the box of goodies which was a huge amount of fun for the children. Just to make sure that they were using PECS correctly, they were asking and communicating their preferences. I think that is quite important to do, not all the time cause logistically you can't."

- Use of loop (soft) Velcro on the outside of the file and using the hook (rough) Velcro on the back of the PECS pictures (i.e. reversing the use of Velcro in the files) to prevent damage to clothing.

Effect of Intensive training

During the interview, the researcher enquired about the educator's experience of having N.N. receive more intensive PECS training than the other learners in her class and what impact this may have had on his PECS use and the rest of the class. His educator felt that this intensive training over a few months was ideal. *"In an ideal world you'll have that intense training all the time."*

The rapid development ensured that the parents and family were motivated and realised the difference in having two-way communication with their child. If there was not rapid progress with the use of the PECS, she felt the family would lose interest and revert back to the previous methods of communicating.

"It wouldn't have developed as rapidly. I think in the long term, it would have probably had the same result, but it would have been more long term and I think a quick development is actually quite good... for the family to really buy into the whole thing and to use it, I think they need to see rapid development".

She spoke about the fact that the family often do not feel they need a communication system, because they have their own way of understanding and communicating with their child.

"... most families know their child so well that the family doesn't need a communication system they are doing the thinking, the doing, the whatever-ing. And its only when you have a jump forward and you realise that it does make life easier if there's a 2 way communication happening. And if that takes too long I think they're going to lose interest and they're going to revert back to thinking for their child".

N.N.'s educator did express some concern over the amount of attention that N.N. received during the training and felt that the other learners in her class may have been "*left behind*" while the focused was on N.N. *"It is a little bit difficult the fact that mealtimes all the attention is on him and inevitably somebody gets left behind."*

Continue vs. stop

During the interview, the educator spoke about the fact that N.N. was communicating at times without his PECS file. The researcher then asked the educator what her view was on whether to stop or continue using the PECS with N.N. His educator was adamant that he needed to continue using the PECS to augment his communication. She felt that although he made requests without using the PECS file, he would only verbalise those requests that he was comfortable with. She also noted that just having the file in sight was a concrete cue as to how he needed to communicate and the structure he should use and that he may always need this. If the PECS file was removed she was concerned that N.N. may revert back to his old communication methods. N.N.'s educator felt that using the PECS was a learned behaviour and questioned if this had internalised. She felt N.N. was not unhappy with how he communicated before the PECS training and that the use of the PECS was to fit into our expectations of how he should communicate and this was not necessarily natural to him.

"No, he definitely needs it. He only verbalises the things he's very comfortable with. I have um a fairly strong sense that even if he is verbalising practically everything, I would say. I think he needs the ... concrete thing there to keep him in the structure. And I think if that was gone he could easily revert back because, I mean we know a lot of our children have learned behaviour. It's not necessarily internalising. He's doing this to fit into our expectations. I don't know that he necessarily was unhappy with the way he ran his life before. His world was okay because it ran according to N.N. We're making demands on him, so therefore this is making it easier for him to fit into our world. And I think take all that away and I think he'd be quite happy to be the N.N. he was then. For how long he would use it I don't know. But I think with most of these learners just having the file there is a reminder, 'I need to communicate with a person'. These are the skills, I've learned them, I know A,B,C, this is what I do. And I think if that's gone, slowly, slowly that skill is eroding because they'll slip back into old patterns."

c. Speech & language features

His educator stated that there had been development in N.N.'s speech and language skills. He was able to form complete and appropriate sentences.

> *"N.N.'s had quite dramatic changes. He always did have some verbal ability; he never spoke spontaneously that easily, except for his repetitive and obsessive phrases. He now, speaks more appropriately, more spontaneously, plus his sentence structure and his vocabulary and all of that has improved quite dramatically."*

She also felt that she could now assess his receptive language more clearly. When asked how N.N.'s speech and language still differed from other children his age, his educator felt that his vocabulary was still limited and he presented with echolalia, difficulties with pronoun use, repetitive thought patterns and some odd sentence structure.

d. Influence of existing speech skills and cognitive ability

When asked whether she felt that existing verbal ability played a role in the outcome of the PECS training, N.N.'s educator responded:

> *"Yes, I think ... your ability to produce sound, and your cognitive understanding of the symbolism ... I think IQ ... cognitive ability does play a role, definitely ... He did have some speech and he is quite a bright little chap, you know. And so I think it did make a difference on how quickly, how rapidly he progressed."*

e. Attitude to Augmentative Communication

N.N.'s educator had a very positive attitude towards using the PECS with the learners in her class. She identified many benefits for both N.N. and in general for all the children she had trained. She linked improvements in speech, improved maturity, self-confidence and autonomy to the PECS training. She also spoke passionately about promoting the use of PECS as a communication system for the learners and a culture in the school. N.N.'s educator also supported the continued use of the PECS with N.N.

> *"I think N.N. because he's been, you know, part of the research is a perfect example to show how it can help to give self-confidence, to give autonomy in a life that's frighteningly out of control. To help not only the learner, but all the professionals that have to interact with the learner and the family, because it allows the child to communicate and so we have a much better idea of what's actually happening."*

> *"If anybody's worried about 'my child might not learn to speak if I'm using something like PECS', no without fail every child I've worked with now in my class, you know, they have all started talking, even those that were not verbal at all and if they can't talk they are making attempts to talk, so its it's promoted speech rather than inhibits".*

f. Interaction style

N.N.'s educator recognised a change in her interaction with N.N. since the PECS training. She stated that before the PECS training, she would often 'jump in' and provide the words for N.N. to communicate, before he had communicated directly with them. She now felt that she and her assistant expected N.N. to slow down and communicate with them.

> *"... now we expect him to slow down, to speak to us, we don't accept just a one word repetition. We now are quite definite that he must communicate with a person, whereas before if he spoke into the air, we would respond. So in fact he wasn't necessarily communicating at all, he was merely saying 'biscuit, biscuit, biscuit, biscuit, biscuit' and one of us would jump in 'you want a biscuit'... We expect him to use his PECS in 90% of the situations in class..."*

She mentioned that at times they would look at the PECS file or point to it or simply not respond to him as a reminder to initiate and use his PECS file to communicate with a person. His educator also felt that she could assess his receptive language far better and therefore interact differently with him.

> *"So we do interact very differently and teach him differently because we know he has the ability to understand."*

3.7.6 Participant 2: Summary of Parent and Educator Perspectives

Pre-Training Interviews

Both N.N.'s educator and father described a similar profile for N.N.'s communication skills in the initial interview. N.N.'s communication skills were limited and the *forms* of communication included verbal (single words and short phrases, often repetitive) and pre-communicative behaviours (outbursts at home when frustrated or interfered with, and at school in response to new things, certain items and in unfamiliar settings e.g. on outings). His educator also reported the use of some gesture (pointing) and motor communication. N.N. was described as 'independent' and would help himself to what he wanted rather than ask, at school and at home. His educator felt he only communicated on his terms. *Functions* of communication were limited to requesting basic needs and protesting at school and at home he would request (not always spontaneously or appropriately), comment (only on his special interests) and used repetitive utterances related to routine sequences, possibly for confirmation. At home, N.N. would request things by repeating a word over and over, often without getting the attention of an adult and he would repeat the word until he got what he wanted. His communication and social interaction with peers at school was limited.

In terms of his *speech and language skills*, N.N. had difficulty constructing complete sentences, although his educator reported a recent improvement in his sentence structures. This could account for some of the fluctuations in the baseline measures of mean length of utterance (MLU). A lot of his speech consisted of repetitive phrases (from adverts), self-stimulatory vocalisations and echolalia that interfered with his communication. At home he used his basic vocabulary to communicate his needs, but did not always have the specific vocabulary he needed. He struggled with new instructions and would cover his ears and shout, requiring physical assistance to carry out the task.

This information confirmed N.N.'s communication profile, pragmatic profile and the LARSP analysis from the Pre-Training stage. He had some intentional communicative acts (ICAs) recorded in the pre-training sessions. The functions were mostly requests with some comments and responses, and forms included mostly speech with some gestures, motor and object communication. These sessions also contained some echolalic utterances and self-talk (repetition of parts of adverts). In the LARSP profile, most utterances were single words or 2-word combinations, with the presence of a number of 3-element utterances. Utterances were often incomplete and sometimes unintelligible

N.N.'s educator was positive about introducing the PECS to develop communicative intent, support his sentence construction and include him more in class activities, as all the other learners in the classroom were using the PECS. N.N.'s father expressed no concerns with introducing the PECS as other augmentation.

Post-Training Interviews

After the PECS training, the educator was extremely positive about the benefits of the PECS for N.N. and all her learners. N.N.'s parents described some positive changes, although he was not using the system a lot at home.

The *functions* of his communication had expanded to include: requests, comments, asking for help, giving directions, getting a person's attention and making statements for confirmation (still repetitive, around his routines). At home, the *form* of his communication was verbal and he used his PECS when they did not respond to the verbal request. Both parents also commented on N.N.'s use of direct eye contact when communicating with them. At school, the forms were verbal (for familiar requests) and verbal with pictures (i.e. PECS). No pre-communicative behaviour was mentioned by either the parents or the educator.

Requests were made in complete and appropriate sentences both at home and at school and N.N. would get the person's attention and make eye contact when requesting. His parents reported that he would now wait for the item when told to. According to his parents, the use of verbal requests had carried over into different contexts (other family member's homes, shops and more communication with his siblings). At school the PECS use had also carried over into different contexts, supported by the educator's aim to create opportunities and structure all environments for PECS use. This information supported the communication profile obtained after the PECS training which showed an increase in the number of ICAs, most noticeably in the requesting function and in the form of speech and pictures with speech (i.e. PECS).

Despite the reported developments in his *speech and language skills*, at school N.N. still had difficulty with repetitive thought patterns, odd sentence structure, pronoun use and echolalia was still present. At home, N.N. still could not express his feelings, share information about his day or explain what amuses him when he laughs to himself. He still repeats adverts that other people do not understand and will ask for assistance by repeating 'help', although he uses his PECS to ask for help at school.

According to his parents, the *benefits* of the PECS training were that he made spontaneous verbal requests in complete sentences, made sure that he was understood and was persistent in communicating his message (they in turn were more explicit with what they said to him), used his PECS quickly, got their attention, his colour concepts were now established and overall that PECS had 'helped him'. In terms of his behaviour, N.N. was more relaxed, less repetitive and less anxious in public places; lessening the burden on the family (they were not worried about unexpected outbursts). According to his educator, the *benefits* of the PECS training were: clear communicative intent, complete and appropriate sentences, the development of speech and language skills, and his ability to communicate with a person (generalised to all contexts). She stated that N.N. was "*empowered to communicate*". He would spontaneously fetch his file and could discern when he wanted an item and only asked when he did.

She also realised that before the PECS she was quick to provide the words for N.N. to communicate and since the PECS training she now allowed time and expected N.N. to slow down and communicate with her. His educator felt that in general, all her learners using PECS had become more mature, self-confident and autonomous and it had promoted speech development in all the learners. In *Baker (2001)* all teachers reported that their teaching style had changed; they allowed more initiations and reduced their verbal input.

In the school setting, *limitations* included time constraints (not enough time for individual input for all learners in the daily programme), and *difficulties* such as lack of family support, incorrect implementation of PECS, new personnel and volunteers without training, difficulty maintaining the communication files, and damage to the learners' clothing due to the hook Velcro on the cover of the file. His parents identified *limitations and difficulties* such as not having the specific vocabulary in his PECS file that he needed for specific requests, tapping too hard to get the adult's attention (the tap on the shoulder was taught during the PECS training), not using the commenting sentence starters or the size attributes, and the unnatural format of requesting (i.e. "I want ___).

N.N.'s educator had a unique perspective on the PECS training, as she had experience of PECS training with her other learners (which M.M.'s educator had not) and had a comparison for the intensity of training in this research study and the impact of this. She felt that this period of intensive training was ideal as it resulted in rapid progress and this led to the support of the family. She felt it was important that the families were motivated and experienced the difference of having 2-way communication with their child using the PECS. If progress was slow, the parents lost motivation and reverted back to previous communication methods. An interesting observation was made that families of learners with ASD often have their own way of understanding and communicating with the child and almost do not need a specific communication system.

Although his parents were positive about the benefits of the PECS, N.N.'s mother stated that there main aim was to have him more verbal, rather than 'running' for the PECS pictures. In contrast, his educator felt very positive about the results of the training and spoke passionately of promoting the communication system for the learners and the importance of continuing this system with N.N. She stated that he still needed the PECS file as a concrete reminder of how to communicate, which he may always need. He was only verbalising without the PECS pictures for those requests he was very familiar with and she feared he would revert back to his previous level of communication if the augmentation was removed.

N.N.'s educator's *ideas for future PECS implementation* in the school setting were to: foster a culture within the school of using PECS as a communication system that is available to the learner at all times, ongoing training of new staff and volunteers by staff already trained (to ensure trained staff "brush-up" on their skills), setting up a mentoring system in the class (educator and assistants observe each other implementing the PECS and remind each other when some part of the PECS training is incorrect), including individual sessions in the daily class programme (for the learners to use their PECS correctly to communicate and to know what each learner's preferences are) and reversing the use of Velcro on the files and picture (to have soft Velcro on the cover of the file that does not catch on clothing). The importance of proper training and support for staff and parents was also recommended by *Liddle (2001)*, who made recommendations for implementing PECS effectively in a school setting. Proper training and support for staff and parents, additional support in terms of material preparation and extra hours of therapy were felt to be essential. Liddle (2001) suggested that PECS should only be implemented when the educators have attended a training course and have an extra staff member in the class for the initial phases of the training.

N.N's father suggested presenting choices visually using PECS pictures to help N.N. understand he must choose, using PECS to develop his sentence structure further and representing specific games and activities on PECS pictures so that he can make specific requests. These suggestions show an understanding of the visual nature and possibilities of the PECS.

3.7.7. Conclusion

The researcher summarized the benefits, limitations and difficulties identified by the educators and parents of both participants in Table 30 below. The ideas for future PECS use and implementation were summarized in Table 31 below. It was evident from the interviews that these important stakeholders had experienced some benefits from the PECS Training and felt empowered to share ideas of moving forward with the intervention. All, except N.N.'s educator expressed a hope that the AAC system would be a progression towards more verbal communication, without augmentation. All the parents expressed concerns about their children's difficulty expressing feelings (e.g. when hurt) and sharing information about their day. These communicative functions are a challenge for any child with ASD. The expectations of parents need to influence the AAC intervention, while ensuring realistic expectations of a child and any AAC system is important.

Table 32: Benefits, Limitations, and Difficulties of PECS use

	Benefits	Limitations / Difficulties
Participant 1 – Parent	1. Uses sentence structure spontaneously (with the augmentation of the PECS) 2. Used PECS with enthusiasm during the training. 3. Improved grammar - uses complete and correct sentence structure. 4. Starts to make requests without the PECS (same sentences without prompting). 5. Carried over to other contexts.	1. Communication still very limited 2. *"he's got the words, but he doesn't use it".* 3. Inability to share information 4. Use of echolalia and need for her to repeat utterances 5. Lack of motivation – needed adult to facilitate use 6. PECS file bulky and cumbersome.
Particpant 1 - Educator	1. Improvement in eye contact, 2. Able to approach any communicative partner 3. Uses normal volume of speech 4. Uses longer sentences with the PECS sentence strip 5. Decrease in echolalia 6. Decrease in pre-communicative behaviour 7. Big improvement in his ability to answer questions 8. Increased confidence and enjoyment of social interaction with his peers.	1. Not having the vocabulary in his PECS file that he requires 2. Bulky file not user-friendly on the playground 3. Reciprocity remains on the level of single exchanges. 4. Depend on an adult to ensure he has the file with him 5. Commenting not spontaneous 6. The PECS was not used at all levels throughout the day 7. M.M. the only learner in the class using the system - difficult to cater for his unique needs.

	Benefits	Limitations / Difficulties
Participant 2 – Parent	1. Spontaneous verbal requests in complete sentences 2. Made sure that he was understood 3. Persistent in communicating his message 4. Uses his PECS quickly 5. Gets their attention 6. Colour concepts now established 7. Behaviour changes: more relaxed, less repetitive and less anxious in public places	1. Time constraints (not enough time for individual input for all learners) 2. Lack of family support 3. Incorrect implementation of PECS 4. New personnel and volunteers without training, 5. Difficulty maintaining the communication files 6. Damage to the learners' clothing due to the hook Velcro on the cover of the file.
Participant 2 – Educator	1. Clear communicative intent 2. Complete and appropriate sentences 3. The development of speech and language skills, 4. Ability to communicate with a person 5. *"empowered to communicate"* 6. Spontaneously fetch his file 7. Could discern when he wanted an item and only asked when he did. 8. General: more mature, self-confident and autonomous and it promoted speech development in all the learners.	1. Not having the specific vocabulary in his PECS file that he needs for specific requests 2. Tapping too hard to get the adult's attention 3. Not using the commenting sentence starters or the size attributes 4. Unnatural format of requesting (i.e. "I want ___).

Table 33: Ideas for Future PECS implementation and use

Participant1 – Parent	1. PECS needed to be broadened and go beyond the routine to *"the next level"* 2. Using the PECS for **more sentence-building** (e.g. subject+ object+ verb) 3. A **smaller, portable file** that would give him '*easy access*' to only those items he needed to ask for in a given situation (e.g. going to the beach).
Participant 1 - Educator	4. *"Having a **smaller, more user-friendlier mode**"* - to address the issue of playing outside while having the PECS file. 5. Using a **blank sentence strip** that M.M. could write a sentence on when he did not have vocabulary available in his PECS file. 6. A **facilitator** to address his unique individual PECS needs in the classroom. May be *"too small a job to give to somebody full time"*.
Participant 2 – Parent	7. Presenting **choices** visually using PECS pictures so that he can understand he must choose. 8. Using PECS to develop his **sentence structure**. 9. Representing specific games and activities on PECS pictures so that he can make specific requests.
Particpant 2 - Educator	10. Fostering a **culture** within the school of using PECS as a communication system that is available to the learner at all times. 11. **Ongoing training** of new staff and volunteers – this would also mean that the staff would "brush-up" on their skills. 12. Setting up a **mentoring system** in the class - educator and assistants observe each other implementing the PECS and remind each other when some part of the PECS training is incorrect. 13. Including **individual sessions in the daily class programme** for the learners to use their PECS correctly to communicate and to know what each learner's preferences are. 14. Use of loop (soft) **Velcro** on the outside of the file and using the hook (rough) Velcro on the back of the PECS pictures (i.e. reversing the use of Velcro in the files) to prevent damage to clothing.

Chapter Four

Conclusion

This research study set out to determine whether the introduction of the *Picture Exchange Communication System* (PECS) as an augmentative communication system would be effective in increasing the requesting and commenting behaviour of 2 children with autism. These communicative functions are specifically targeted in the PECS training procedure (Frost & Bondy, 2002). Both participants acquired the augmentative communication system within the 9-week period of the PECS training. The findings revealed that the PECS training was highly effective in increasing **requesting behaviour** in both *structured* and *unstructured settings* for both participants. Increases in requesting behaviour were maintained in the Follow-up Stage (3 months after the training) in both settings for Participant 2, whereas Participant 1 showed a slight increase in requesting behaviour in the structured setting and a noticeable decrease in requesting in the unstructured setting.

The PECS training was moderately effective in increasing **commenting behaviour** in the *structured setting* for Participant 2 and only mildly effective in the *structured* and *unstructured settings* for Participant 1. The PECS training was ineffective in the *unstructured setting* for Participant 2. The changes in levels of commenting were maintained in the Post-Training and Follow-up Stages for both participants. Visual analysis revealed that commenting behaviour increased during Phase VI of the training (when commenting was targeted) for both participants in the *structured setting* only. In the *unstructured setting*, commenting behaviour was only recorded occasionally and there were almost no gains in this behaviour. This possibly related to limited opportunities created during mealtime to comment, limited experience of the researcher and educators in implementing Phase VI of the PECS training, the relatively short period of time spent on this phase of the PECS training and the innate difficulty that children with autism experience with commenting.

An investigation of the effect of the PECS training on length of verbal utterances revealed that the PECS training was highly effective in increasing **mean length of utterance** in both *structured* and *unstructured settings* for Participant 1. According to the PND scores, the PECS Training was ineffective treatment for increasing the MLU of Participant 2. These ineffective PND scores were accounted for by a few outliers in the data points. Participant 2 had longer utterances in a few of the baseline measures and a smaller increase in the length of utterances in the PECS Training and Post-Training Stages. A pattern of gradually increasing MLU with the onset of Phase IV of the PECS Training was evident from the visual analysis. The levels of MLU were maintained for Participant 2, however Participant 1 had limited maintenance of MLU in the Post-Training Stage (structured was mildly effective and the unstructured was effective) and Follow-up stages (structured was ineffective and unstructured was mildly effective).

In the visual analysis of data, the increases in requesting were visible from Phase I, the increases in commenting from Phase VI and the increase in mean length of utterance from Phase IV (except for the outliers in Participant 2's baseline measures). These findings confirm that these phases of the PECS Training have the desired effect on the targeted behaviours in the sequence in which they are introduced.

A comparison of the verbal utterances from the Pre-Training Stage with the Post-Training Stage revealed that the PECS training resulted in a shift from a majority of 1- and 2-element utterances to 3-element utterances involving expansion on the phrase level in both participants. Participant 1 gained 18 months in his level of spontaneous expressive language, while Participant 2 gained 12 months. There was a noticeable increase in the number of spontaneous, meaningful verbal utterances for both participants in the Post-Training sample. The PECS Training had a specific effect on the structure of both participants' expressive language with mostly 3-element utterances (subject + verb + object) with expansion of the object phrase and a noticeable increase in the use of determiners, adjectives and pronouns. This possibly suggests some limitations on the structures that PECS develops, however limited time was spent with sentence-building using other sentence structures in the later phases of PECS Training.

Dramatic increases in *intentional communicative acts* (ICAs) were recorded in the **communication profiles** of both participants. The impact of the PECS Training on *functions* of communication was the most marked increase in requests, with smaller increases in comments for both participants and responses + others for Participant 1. After the PECS Training, *forms* of communication were primarily pictures with speech and speech only, with a shift from augmentation of speech with pictures to speech only utterances in the Follow-up Stage, especially for Participant 2.

The PECS training had a positive impact on the **pragmatic skills** of both participants. The development of similar functions in the two participants and the use of these spontaneously with the augmentation of PECS demonstrated the positive outcomes of the PECS training. The PECS training also influenced the reciprocity and turn-taking skills of both participants. Many of the idiosyncrasies of each participant's language use remained (e.g. echolalia, repetitive utterances, self-talk, and obsessive topics) and conversation skills and narratives remained limited.

The **parent** and **educator perspectives** provided important additional and invaluable information regarding the impact of the PECS Training (the benefits, limitations and difficulties) and ideas for the way forward with each participant and possibly other learners with ASD.

These findings indicate that these children, with some speech, but limited use of this in communicative exchanges, benefited from the introduction of an augmentative communication system. The results also showed that the introduction of the PECS effected improvements in speech (length and complexity of utterances), communication (function and form) and pragmatic skills for these participants.

4.1 Limitations

The limitations of this study included:

- Small *sample size* and *purposive sampling*: the small number of participants selected through purposive sampling meant that results could not be generalised to a wider population of individuals with Autism Spectrum Disorders (ASD), limiting the external validity of these results.
- *Design limitations*: The use of the multiple baseline design means that the measures were repeated many times during the research process. Individuals with ASD often develop routines and rituals and relate specific behaviours to these. Although this was controlled for by introducing the unstructured setting, this setting became more 'structured' with the introduction of the PECS training and developed into a 'mealtime' routine.
- *Limited time frame*: the research study was conducted over an 8-month period to minimise maturation effect, however the time spent on Phase VI of the PECS training was limited. It is possible that with a longer time period spent on this phase of training, the results in terms of the commenting behaviours of the participants may have been more conclusive.
- *Limited intervention in the home environment*: this environment is an important context in which an intervention involving developing a child's communication system should be implemented. This was not a focus of this research due to time limitations and limited access to home environments. Participant 1 had 3 weeks of structured sessions in the home setting, but continuous measures of carryover to the home setting were not conducted for either participant.
- *School holidays*: interruptions to training and data collection were unavoidable during school holidays. For Participant 1, it was only possible to continue with individual training sessions and structured sessions during this 3-week period. This resulted in a break in the data collection for unstructured sessions (this could not be duplicated in the home setting) and there was no classroom input during this period as there was in other weeks of the training. For Participant 2, there was a break in the baseline measures over this 3-week period.

- *Change of educator for Participant 1*: an unexpected change in educator occurred after the PECS training for Participant 1, which may have influenced the maintenance of the effects of treatment for this participant.
- *Setting:* The *unstructured sessions* conducted in the classroom setting were subject to changes in the environment (e.g. entering and exiting of staff and learners, staff changes and substitutions, disruptions, background noise, etc.) which may have threatened the internal validity of results. The *structured sessions* were subject to changes in time of day due to varying classroom schedules.

  For individuals with ASD, changes in people, place or time may impact their performance.
- *Hawthorne & Novelty effects*: these effects were controlled for as far as possible, but the participants received a substantial amount of additional personal attention and high levels of reinforcement which could have influenced the dependent variables.
- *Instrument limitations:* a large part of the *Profile of Pragmatic skills in young children* (Naudé, 2004) (Appendix I) focussed on conversational skills which were above the level of both participants. This may not be an appropriate tool for determining change in pragmatic skills during an intervention for learners with limited conversation level speech.

4.2 Implications

4.2.1 Clinical and Educational Implications

Numerous clinical and educational implications emerged from this study. The study demonstrated that PECS can be used effectively to increase *requesting behaviour* in learners with autism spectrum disorders (ASD) with some verbal language, but limited use of this language in communicative exchanges. These increases in requesting behaviour can be *maintained* in a school setting when trained educators are involved. In a structured setting, the PECS can increase *commenting behaviour*, although more time may be required in training commenting and specific opportunities created to encourage carryover into unstructured settings.

As a clinician working with this challenging population, the finding of some increase in commenting, even if only in a structured setting, is a promising finding that supports using this intervention in an attempt to develop this very important communicative function. More focus and effort may however be required to generalise these effects to the naturalistic setting (i.e. classroom and home). Although findings in effectiveness for commenting and speech were not conclusive, the positive changes in the communication profile and LARSP profiles of both participants suggest positive effects in both these areas.

PECS therefore has specific application as an *augmentative communication system* (not only as an alternative system for non-verbal children with ASD). Augmentation of speech did not reduce *speech output*, but increased both length and complexity of utterances, particularly for one of the participants. Results also suggested that PECS may be introduced to develop verbal complexity and increase length of verbal utterances as well as develop the number of intentional communicative acts of some children with ASD (functions: requests and comments; forms: pictures with speech and speech only). These important findings together with other research results should encourage clinicians and educators to consider the PECS intervention for similar children.

These findings, together with previous research can help inform clinician's decision-making processes regarding recommendations for AAC systems in the ASD population. This subgroup of children with ASD (with some verbal language and adequate visual discrimination skills) can be trained in a relatively short *period of time* to use this communication system. There is sometimes a clinical debate over whether a child with some language should be introduced to an augmentative system and parental concern over 'loss of speech' when using pictures to augment is common. The findings of this study show that there was no loss of speech and speech complexity and length of verbal utterances was enhanced by the introduction of the PECS. The importance of individualised approaches to working with children with ASD cannot be overemphasised.

The results of this study have *ecological validity* as data collection and training occurred in functional settings that would be considered appropriate settings in which requesting and commenting behaviours would be expected of these children. This study involved 2 individual training sessions a week (total 1 hour input) with the researcher (a trained speech therapist) and further implementation in the classroom under the guidance of the researcher. This was successful in teaching both participants the communication system. Both educators were concerned about the amount of time and focus that was needed during the training stage. This has implications for *implementing the PECS in the classroom setting*. The importance of educators with adequate training and motivation to implement the PECS was evident, with reduction in requesting behaviours in unstructured settings with untrained educators. Other variables that may have influenced this include: lack of motivation from parent, lack of motivation of the participant, and limited carryover of skills to a new context (new classroom and educator).

It is important to note that these participants quickly learned independent exchanges and had no difficulty with the picture discrimination phase. This resulted in limited need for a physical prompter (a second adult available during Phase I and II of the training to prompt the picture exchange) and a relatively short timeframe for developing the 6 phases of the PECS. This may not be the case with many children with ASDs and limited functional speech and considerably more time and resources may be necessary for PECS Training with other children. Educators need to be aware of the amount of time and effort necessary for effective implementation of this communication system as well as the possible benefits and areas in which this approach is effective. It is also important to develop other interventions that focus on developing additional communication functions that are not addressed in the PECS training protocol.

These educational and clinical implications should also be considered in future PECS implementation, and future PECS workshops, and undergraduate training of interventions for ASD.

4.2.2 Research Implications

The findings of this study suggest the need for further research in this area. A bigger sample size would allow researchers to generalise findings to specific groups of children with ASD. Research is still required into the effectiveness of the PECS with other disorders and disabilities, with varying age groups and varying spoken language abilities. Hopefully further research will lead to the development of specific profiles of children that benefit from each type of AAC system and a new decision-making protocol will emerge. The need for thorough participant descriptions in research is vitally important in order to build towards this goal.

Further investigation of the impact of Phase VI of the PECS training on commenting behaviour is required with studies including a longer training period spent on this phase. Research into the impact of the PECS training in the home environment is also important. This is the first South African study into the effectiveness of the PECS, and will hopefully lead to future research into the use of aided AAC systems in children with ASD in this country.

From the results of this study the researcher identified the following future areas of research:

- Implementation and generalisation to the home setting
- Impact of PECS on echolalia and repetitive utterances
- Decreases in pre-communicative behaviour
- Changes in social interaction and use of PECS to develop peer interaction
- Measure number of verbal utterances or words per session (not only the MLU)
- The link (if any) between cognitive level, speech skills and success of an intervention
- Gains in other language areas (e.g. vocabulary, receptive language) with the implementation of PECS
- The development of profiles (with regards to diagnosis, age, speech and language skills, motor dexterity, imitation skills, visual perceptual skills, cognitive level, etc.) for the selection of specific AAC interventions (or combinations of these).
- To vary the unstructured settings (from mealtimes to other settings)

The adaptability of the PECS to teach other functions of communication (e.g. protesting, rejecting, drawing attention, giving information, asking for information, communicating about feelings, and social routines) and possibly language structures should be investigated. Comparison studies are needed to compare effectiveness of various aided and unaided AAC systems in the ASD population and subgroups of this population. Intervention research typically progresses from evaluating the efficacy of one intervention to comparing the efficacy of multiple interventions (Schlosser, 2003). Adkins & Axelrod (2002) and Tincani (2004) have started this efficiency research by comparing the effect of sign language and the PECS on ease of acquisition, spontaneous use and generalisation of mands, and acquisitions of mands (requests) and effect on word vocalisations respectively. Further comparison studies are required.

4.3 Recommendations

The following recommendations emerged from this research study and the experience of the researcher over the past two years of PECS implementation in a special school setting:

Synthesising and Evaluating Research findings: It is recommended that a different approach to synthesising results of AAC research be considered. Although effectiveness measures (e.g. percentage of non-overlapping data) are useful in quantifying how effective a treatment is, the use of medians in determining overall effectiveness of a treatment is problematic when the variables measured in different research studies vary so widely (from independent mands, word vocalisations, use of PECS icons and verbalisations to spontaneous speech and verbal imitations). Interestingly, many of the variables measured related to speech gains, which is not a primary objective of PECS intervention. The researcher would suggest revisiting this process to have separate overall effectiveness data for various treatment outcomes (e.g. requests, comments, speech, etc.). At present there are limited empirical studies to combine in such a meta-analysis, but hopefully in future this will be possible. Gains in areas such as commenting and speech, even in only a percentage of individuals with ASD, is a promising outcome that needs to be evaluated beyond an effectiveness measure.

Treatment Outcomes: When evaluating AAC interventions in the ASD population, treatment outcomes should focus on the primary deficits targeted by the intervention (i.e. difficulties in the use of language for communicative functions) as well as the other gains that are of interest. This shift in focus is important for AAC intervention in this population, as the research findings need to prove the effectiveness of an intervention in the areas for which the intervention is developed.

Individual Approach to AAC Intervention: As with all interventions in the ASD population, individual characteristics and responses to interventions need to be considered and only an individualistic approach will ensure that the unique needs of each individual with AAC are met. Educators and clinicians needs to be flexible in their approach and determine the effectiveness of an approach based on the outcomes with each individual. Selection of an approach needs to be informed by the research and one's own experience for informed decision-making. In the South African context, specialised interventions like PECS, TEACCH and Makaton are only available in a small number of specialised schools and facilities. It is hoped that with successful implementation of these interventions and further research, there will be a growing interest in these approaches and future specialised training of educators and clinicians in their application.

Developers of PECS: For the developers of PECS, some useful practical suggestions emerged from the parent and educator interviews. It is not known which of these suggestions have been considered by the developers. PECS files are already available in smaller, more portable versions, and expansion on sentence building is suggested in the training course, however a possible follow up to the manual may be considered (with suggestions for higher level users). Consideration of the application of PECS for other communicative functions (e.g. protest, rejection, giving information, answering questions, social routines, etc.) is recommended. The training of a PECS facilitator in a class with one or two learners using PECS, may be a concept for special school and mainstream settings. The reversal of Velcro use on the file to prevent damage to clothes is a practical idea that may or may not have been considered by the developers.

Level of Training and Support: The need for parent and family support when implementing AAC interventions and the proper training and implementation of approaches is vitally important to the success of the intervention. The training of the entire staff at a school or facility before implementing an approach is highly recommended to ensure correct implementation and to shift the emphasis of implementing the communication system from individualised training with a clinician in a clinical setting, to classroom-based implementation with all caregivers (educators, assistants and parents). This study demonstrated that a combination of individual training and classroom implementation is effective in teaching the Picture Exchange Communication System to learners with ASD in a special school setting. Availability of extra staff members and the support and guidance of a PECS consultant is the ideal situation for implementing the system. However, the lack of available services in South Africa poses a challenge to speech therapists and educators when implementing this communication system.

In conclusion, the researcher aimed to add to the growing body of research in the field of AAC, ASD and more specifically PECS efficacy research. This study has demonstrated the effectiveness of the *Picture Exchange Communication System* (PECS) in 2 children with some verbal skills but limited use of these skills for communicative exchanges. The findings indicated highly effective treatment of requesting and some improvement in commenting (mixed results) and speech output. The study provided various sources of data and qualitative information regarding the impact of PECS on structure and complexity of verbal utterances, communicative forms and functions and pragmatic skills. The important stakeholders (parents and educators) were involved in the implementation of the system and provided important perspectives on the effect of the PECS training.

Chapter Five

References

Abramson, J.H. & Abramson, Z.H. (1999). Survey Methods in Community Medicine: Epidemiological research programme evaluation clinical trials. 5th Ed. Churchill Livingstone, Edinburgh.

Adkins, T. & Axelrod, S. (2002). Topography- versus Selection-based Responding: Comparison of mand acquisition in each modality. The Behavior Analyst Today, 2, 259-266.

Baker, S. (2000). Learning through Pictures. Communication, Spring 2000. UK: National Autistic Society Publications: 15-17.

Baker, S. (2001). The Alice Project: The first UK pilot project to evaluate the Picture Exchange Communication System (PECS). Paper presented at the International Association for Behaviour Analysis Conference, Venice, Italy.

Bedrosian, J.L. (2003) Chapter 5: On the Subject of Subject Selection in AAC. In R.W. Schlosser (Ed). The efficacy of augmentative and alternative communication: Toward evidence–based practice. New York: Academic Press.

Beukelman, D. & Mirenda, P. (1998). Augmentative and Alternative Communication: Management of Severe Communication Disorders in Children and Adults (2nd Ed.). Baltimore, MD: Paul H. Brookes Publishing Co.

Bondy, A. (2001). PECS: Potential benefits and risks. The Behaviour Analyst Today, 2, 127 – 132.

Bondy, A. & Frost, L. (1994). The Picture Exchange Communication System. Focus on Autistic Behaviour, 9 (3), 1-9.

Bondy, A. & Frost, L. (1998a). The Picture Exchange Communication System. Seminars in Speech and Language. 19, 373-389.

Bondy, A. & Frost, L. (1998b). An Introduction to PECS. Newark, DE: Pyramid Educational Products, Inc.

Bondy, A. & Frost, L. (2002). A Picture's Worth. Newark, DE: Pyramid Educational Products, Inc.

Charlop-Christy, M.H., Carpenter, M, Le, L., LeBlanc, L.A. & Kellet, K. (2002). Using the Picture Exchange Communication System (PECS) with children with autism: assessment of PECS acquisition, speech, social-communicative behaviour and problem behaviour. Journal of Applied Behavior Analysis, 35, 213-231.

Christensen, L.B. (2001). Experimental Methodology. Boston, USA: Allyn and Bacon.

Clicker Version 4. (2002-2003). Crick Software, Ltd.

Creswell, J.W. (1998). Data Analysis and Representations in Qualitative Inquiry and Research Design: Choosing among 5 Traditions. Thousand Oaks: California: SAGE publications.

Crystal, D., Fletcher, P. & Garman. M. (1981). Language Assessment Remediation Screening Procedure Profile. Universty of Reading.

Diagnostic and Statistical Manual of Mental Disorders (2000) (4th Edition Text Revision). DSM-IV-TR. Washington DC: American Psychiatric Association; 2000:75.

Durrheim, K. & Wassenaar, D. (1999). Putting design into practice: writing and evaluating research proposals. In M. Terre Blanche and K. Durrheim (Eds.), Research in Practice: Applied methods for the social sciences. Cape Town, SA: University of Cape Town Press: 54 – 71.

Frost, L. & Bondy, A. (2002a). The Picture Exchange Communication System Training Manual. 2nd Edition. Newark, DE: Pyramid Educational Products, Inc.

Frost, L. & Bondy, A. (2002b). Vocabulary Selection Worksheet. Newark, DE: Pyramid Educational Products, Inc.

Frost, L. & Bondy, A. (2005). Pics for PECS CD. Newark, DE: Pyramid Educational Products, Inc.

Ganz, J.B., Cook, K.E., Corbin-Newsome, J., Bourgeois, B., & Flores, M. (2005). Variations on the use of a pictorial alternative communication system with a child with autism and developmental delays. TEACHING Exceptional Children Plus, 1(6) Article 3. Retrieved: 2006.08.26. http://escholarship.bc.edu/education/tecplus/vol1/iss6/3

Ganz, J.B. & Simpson, R.L. (2004). Effects on Communicative Requesting and Speech Development of the Picture Exchange Communication System in Children with Characteristics of Autism. Journal of Autism and Developmental Disorders, 34 (4): 395 – 409.

MRC (2004). Guidelines for Ethics for Medical Research: General Principles (2004). Medical Research Council of South Africa: Cape Town.

Howlin, P. & Magiati, I. (2001). The Alice Project: A pilot study evaluating PECS training and implementation for children with autism. Department of Pscyhology, St. George's Hospital Medical School, University of London.

Howlin, P. & Rutter, M. (1987). The Treatment of Autistic Children. Chichester: Wiley.

Iacono, T.A., Waring, R.E. and Chan, J.B. (1996). Sampling communicative behaviours in children with intellectual disability in structured and unstructured situations. European Journal of Disorders of Communication, 31: 106-120.

IJsselmuiden, C. B. (1997). General philosophical issues in epidemiology. In J.M. Katzenellenbogen; G. Joubert and S.S. Abdool Karim (eds.). Epidemiology: A Manual for South Africa. Cape Town: Oxford University Press: 25-34.

International Classification of Diseases (10th Edition), ICD-10 (1994). World Health Organisation.

Jones, P.J. (2004). Single Case Statistical Analysis. University of Nevada, Las Vegas.

Joubert, G. & Katzenellenbogen (1997). Sampling. In J.M. Katzenellenbogen; G. Joubert and S.S. Abdool Karim (eds.). Epidemiology: A Manual for South Africa. Cape Town: Oxford University Press: 25-34.

Kazdin, A.E. (1982). Single-case Research Designs: Methods for clinical and applied settings. New York: Oxford University Press.

Koegel, L.K. (2000). Interventions to facilitate communication in autism. Jounral of Autism and Developmental Disorders, 30, 383-391.

Kravits, T.R., Kamps, D.M., Kemmerer, K. & Potucek, J. (2002). Brief Report: Increasing communication skills for elementary-aged students with Autism using the Picture Exchange Communication System. Journal of Autism and Developmental Disorders, 32 (3): 225 – 230.

Liddle, K. (2001). Implementing the picture exchange communication system (PECS). International Journal of Language & Communication Disorders, 36 (Suppl), 391-395.

Light, J.C., Dattilo, J., English, J., Gutierrez, L. & Hartz, J. (1992) Instructing facilitators to support the communication of people who use augmentative communication. Journal of Speech and Hearing Research, 35: 865 - 875.

Light, J.C., Roberts, B., Dimarco, R. & Greiner, N. (1998). Augmentative and alternative communication to support receptive and expressive communication for people with autism. Journal of Communication Disorders, 31: 153-180.

Lindegger, G. (1999). Research methods in clinical research. In M. Terre Blanche and K. Durrheim (eds), Research in Practice: Applied methods for the social sciences. Cape Town, SA: University of Cape Town Press. 54 – 71.

Lloyd, L.L., Fuller, D.R. & Arvidson, H.H. (1997). Glossary. In L.L. Lloyd, D.R. Fuller & H.H. Arvidson (Eds.). Augmentative and Alternative Communication: A handbook of principles and practice. Boston, USA: Allyn and Bacon

Locke, P.A. & Mirenda, P. (1988). A computer-supported communication approach for a nonspeaking child with severe visual and cognitive impairments. Augmentative and Alternative Communication, 4: 15 – 22.

Lord, C. & McGee, J.P. (2001). Educating Children with Autism. Committee on Educational Interventions for Children with Autism. Washington DC: National Academy Press.

Lord, C. & Paul, R. (1997). Language and Communication in Autism. In D.J. Cohen & F.R. Volkmar. (eds.). Handbook of Autism and Pervasive Developmental Disorders (2nd Edition). New York. NY: Wiley: 195-219.

Luiz, D.M.; Barnard, A.; Collier, P.T.; Kortas, N. & Stewart, R. (2000). The Revised Griffiths Extended Scales of Mental Development (3rd Edition). Department of Psychology, University of Port Elizabeth.

Madge, E.M. (1981). Junior South African Intelligence Scale (JSAIS). Human Sciences Research Council, Pretoria.

Magiati, I. & Howlin, P. (2003). A pilot evaluation study of the Picture Exchange Communication System (PECS) for children with autistic spectrum disorders. The International Journal of Autism, 7(3): 297-320.

Mayer-Johnson (2004). Picture Communication Symbols. Solana Beach, CA: Mayer-Johnson, Inc.

McMillan, J.H. & Schumacher, S. (2001). Research in Education: A conceptual introduction. (5th Ed). Addison Wesley Longman, Inc. US.

McReynolds, L.V. & Kearns, K.P. (1983). Single-Subject Experimental Designs in Communicative Disorders. Baltimore: University Park Press.

Medical Research Council (2004). Guidelines for Ethics for Medical Research: General Principles. Medical Research Council (MRC) of South Africa: Cape Town.

Mirenda, P. (2002) Augmentative and Alternative Communication Systems. In A. Bondy & L. Frost (Eds). A Picture's Worth. Newark, DE: Pyramid Educational Products, Inc.

Mirenda, P. (2003). Toward functional augmentative and alternative communication for students with autism: Manual signs, graphic symbols, and voice output communication aids. Language, Speech, and Hearing Services in Schools, 34, 203-216.

Mirenda, P. & Dattilo, J. (1987). Instructional techniques in alternative communication for students with severe intellectual handicaps. Augmentative and Alternative Communication, 3(3): 143-152.

Mirenda, P. and Mathy-Laikko, P. (1989). Augmentative and Alternative Communication Applications for Persons with Severe Congenital Communication Disorders: An introduction. Augmentative and Alternative Communication, 5(1): 3-13.

Mirenda, P. & Santogrossi, J. (1985). A prompt-free strategy to teach pictorial communication system use. Augmentative and Alternative Communication, 1:143 –150.

Mirenda, P. & Schuler, A.L. (1988) Augmenting communication for persons with autism: Issues and strategies. Topics in Language Disorders, 9(1): 24 – 43.

Naudé, E. (2002). A Profile of pragmatic skills in young children. Clinica: Applications in Clinical Practice of Communication Pathology. Monograph 6, Research Committee, University of Pretoria.

Owens, R.E. (2005) Language Development (6th Edition/International Edition). Boston; Pearson Education Inc.

Paris, B.A. (2000). Chapter 1: What is Autism? How is it diagnosed? Chapter 2: Characteristics of Autism. In C. Murray-Slutsky & B.A. Paris (Eds). Exploring the Spectrum of Autism and Pervasive Developmental Disorders. USA: The Psychological Corporation. 1-6, 7-23.

Peeters, T. & Gillberg, C. (1999). Autsim: Medical and educational aspects. London: Whurr.

Peterson, S.L., Bondy, A.S., Vincent, Y. & Finnegan, C.S. (1995). Effects of altering communicative input for students with autism and no speech: Two case studies. Augmentative and Alternative Communication, 11(2): 93-100.

Reichle, J., York, J. & Sigafoos, J. (1991). Implementing Augmentative and Alternative Communication Strategies for Learners with Severe Disabilities. Baltimore: Paul H. Brookes Publishing co.

Salzberg, C. L., Strain, P. S. & Baer, D. M. (1987). Meta-analysis for single-subject research: When does it clarify, when does it obscure? Remedial and Special Education, 8, 43 – 48.

Schlosser, R.W. (2003a) Chapter 1: Introduction. In R.W. Schlosser (Ed). The efficacy of augmentative and alternative communication: Toward evidence–based practice. New York: Academic Press.

Schlosser, R.W. (2003b) Chapter 2: Efficacy and Outcomes Measurement in Augmentative and Alternative Communication. In R.W. Schlosser (Ed). The efficacy of augmentative and alternative communication: Toward evidence–based practice. New York: Academic Press.

Schlosser, R.W. (2003c) Chapter 3: Validity. In R.W. Schlosser (Ed). The efficacy of augmentative and alternative communication: Toward evidence–based practice. New York: Academic Press.

Schlosser, R.W. (2003d) Chapter 6: Single-Subject Experimental Designs. In R.W. Schlosser (Ed). The efficacy of augmentative and alternative communication: Toward evidence–based practice. New York: Academic Press.

Schlosser, R.W. (2003e) Chapter 9: Determining the Treatment Integrity of AAC Interventions. In R.W. Schlosser (Ed). The efficacy of augmentative and alternative communication: Toward evidence–based practice. New York: Academic Press.

Schlosser, R.W. (2003f) Chapter 10: Determining the Social Validity of AAC Interventions. In R.W. Schlosser (Ed). The efficacy of augmentative and alternative communication: Toward evidence–based practice. New York: Academic Press.

Schlosser, R.W. (2003g) Chapter 11: Synthesizing Efficacy Research in AAC. In R.W. Schlosser (Ed). The efficacy of augmentative and alternative communication: Toward evidence–based practice. New York: Academic Press.

Schopler, E., Reichler, R.J. & Renner, B.R. (1988). The Childhood Autism Rating Scale (CARS). Los Angeles, CA: Western Psychological Services.

Schwartz, I., Garfinkle, A. & Bauer, J. (1998). The Picture Exchange Communication System: Communicative Outcomes for Young Children with Disabilities. Topics in Early Childhood Special Education, 18(3): 144 - 159.

Scruggs, T.E., Mastropieri, M.A. & Casto, G. (1987). The quantitative synthesis of single-subject research: Methodology and validation. Remedial and Special Education, 8, 24-33.

Scruggs, T.E. & Mastropieri, M.A. (1994). The utility of the PND statistic: a reply to Allison and Gorman. Behaviour Research Therapy, 32(8), 879-83; discussion 885-90. Department of Educational Studies, LAEB, Purdue University, West Lafayette, IN 47907.

Scruggs, T.E. & Mastropieri, M.A. (2001). How to Summarize Single-Participant Research: Ideas and Applications. Graduate School of Education, George Mason University. Online publication date: 01.12.2001

Siegel, B. (1996). The World of the Autistic Child: Understanding and Treating Autistic Spectrum Disorders. New York: Oxford University Press, Inc.

Skinner, B.F. (1957). Verbal Behaviour. Englewood Cliffs, N J: Prentice Hall, Inc.

Tincani, M. (2004). Comparing the Picture Exchange Communication System and sign language training for children with autism. Focus on Autism and Other Developmental Disabilities, 19(3): 152 – 163.

Towbin, K.E.; Mauk, J.E. & Batshaw, M.L. (2002). Pervasive Developmental Disorders. In M.L Batshaw (Ed). Children with Disabilities (5th Edition). Baltimore: Paul H. Brookes Publishing Co.

Ulin, P.R.; Robinson, E.T.; Tolley, E.E. and McNeill, E.T. (2002). Qualitative Methods: A field guide for applied research in sexual and reproductive health. Family Health International, North Carolina.

van Eeden, R. (1992). Senior South African Intelligence Scale. Human Sciences Research Council, Pretoria.

Webb, T. (2000). Can children with Autism be taught to communicate using PECS? Good Autism Practice (GAP) May 2000, 1(1): 29-43. G. Jones and H. Morgan, (Eds.) Bild publications.

Wendt, O.; Schlosser, R.W. & Lloyd, L.L. (2004). Augmentative and Alternative Communication for Children with Autism: Preliminary results of a meta-analysis. Paper presented at the AAMR, Philadelphia, USA – June 2004.

Wetherby, A.M. & Prizant, B.M. (1989). The expression of communicative intent: assessment guidelines. Seminars in Speech and Language, 10: 77-91.

Wetherby, A.M. & Rodriguez, G. (1992). Measurement of communicative intentions in normally developing children during structured and unstructured contexts. Journal of Speech and Hearing Research, 31, 240 – 252.

Wetherby, A., Yonclas, D. & Bryan, S. (1989). Communicative profiles for preschool children with handicaps: implications for early identification. Journal of Speech and Hearing Disorders, 54, 148-158.

Wing, L. & Atwood, A. (1987). Syndromes of autism and atypical development. In D.J. Cohen & F.R. Volkmar. (Eds.). Handbook of Autism and Pervasive Developmental Disorders (2nd Edition). New York. NY: Wiley: 3 – 19.

Appendix A: Western Cape Education Department Permission

Navrae
Enquiries
IMibuzo
Dr RS Cornelissen

Telefoon
Telephone
IFoni
(021) 467-2286

Faks
Fax
IFeksi
(021) 425-7445

Verwysing
Reference
ISalathiso
20050421-0017

Wes-Kaap Onderwysdepartement

Western Cape Education Department

ISebe leMfundo leNtshona Koloni

Ms Julia Travis
7 Doordrift Gardens
Wicklow Road
PLUMSTEAD
7800

Dear Ms J. Travis

RESEARCH PROPOSAL: THE EFFECTIVENESS OF THE PICTURE EXCHANGE COMMUNICATION SYSTEM AS AN AUGMENTATIVE COMMUNICATION SYSTEM IN CHILDREN ON THE AUTISTIC SPECTRUM: A SOUTH AFRICAN PILOT STUDY.

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **25th April 2005 to 23rd September 2005.**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December 2005).
7. Should you wish to extend the period of your survey, please contact Dr R. Cornelissen at the contact numbers above quoting the reference number.
8. A photocopy of this letter is submitted to the Principal where the intended research is to be conducted.
9. Your research will be limited to the following school: **Vera School.**
10. A brief summary of the content, findings and recommendations is provided to the Director: Education Research.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

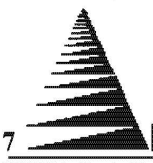
    The Director: Education Research
    Western Cape Education Department
    Private Bag X9114
    CAPE TOWN
    8000

We wish you success in your research.

Kind regards.

Signed: Ronald S. Cornelissen
for: **HEAD: EDUCATION**
DATE: 21st April 2005

Appendix B: Permission from Pyramid Educational Products



7 Pyramid Educational Consultants, Inc.
226 W. Park Place, Suite 1, Newark, DE 19711
(302) 368 2515 www.pecs.com

May 9, 2005

Julia Travis
B.Sc. Speech Language Pathology and Audiology
Division of Communication Science and Disorders
School of Health and Rehabilitation Sciences
Faculty of Health Sciences
F46 Old Main Building. Groote Schuur Hospital
Observatory 7925

Dear Ms. Travis

I understand from material that you have sent that you will be conducting a research project involving the Picture Exchange Communication System (PECS), an approach developed by Lori Frost and me. I herein grant you permission to conduct the study using our published materials regarding PECS (The PECS Training Manual, 2nd Edition, 2002) as a guide for how to properly implement the system. I would appreciate information regarding the outcome upon completion of the project.

Good luck with your study!

Andrew Bondy, PhD
President, Pyramid Educational Consultants, Inc.

Appendix C: Principal and School Governing Body Permission Form

UNIVERSITY OF CAPE TOWN

Division of Communication Science and Disorders

School of Health and Rehabilitation Sciences
Faculty of Health Sciences
F46 Old Main Building. Groote Schuur Hospital
Observatory 7925
Telephone: 406-6313
Fax: 406 6323

To the Principal and Governing Body:

I am currently completing my Master's degree in Speech Language Pathology through the University of Cape Town. In order to meet the requirements of my course, I need to conduct a research study.

My recent experience with the implementation of PECS with children with Autism Spectrum Disorders has prompted my interest in conducting this pilot South African study. I have chosen to research the area of the use of alternative and augmentative communication (AAC) systems in children with Autism, looking specifically at the use of the Picture Exchange Communication System (PECS) in these children.

Attached you will find my research proposal outlining an initial literature review, rationale, methodology, implications and limitations of the study, ethical considerations and references. I request your permission to conduct this study at your school and allow me to approach parents to request their child's participation in this study.

If you could provide a written response to this request, I would be very grateful.
Should you require any further information, please do not hesitate to contact me on (021) 797 4803 or 084 776 3593.

Thank you
Yours Sincerely

Julia Travis (B.Sc. Speech Language Pathology and Audiology)

SUMMARY INFORMATION SHEET

Title:
The effectiveness of the *Picture Exchange Communication System* (PECS) as an *augmentative* communication system in children with Autism Spectrum Disorder: a South African pilot study

Purpose:
The purpose of this study is to evaluate the effectiveness of the PECS system and provide evidence of the effects on the development of communicative intent, and specifically on the requesting and commenting behaviours of children with Autistic Spectrum Disorder (ASD).

A central characteristic of children with Autism is deviant or delayed speech, language and communication skills. More than 50% of children with Autism remain mute or without functional verbal communication. It is therefore important that researchers focus on investigating and evaluating the efficacy of various alternative and augmentative communication (AAC) systems for this unique population.

Methods:
The participants in this study will be observed and videotaped in a variety of natural settings (in class during unstructured activities i.e. free play and mealtimes) before, during and after the PECS training. The presence and frequency of various communicative functions and speech will be recorded and analysed. The children's progress through the phases of the training will also be monitored and recorded, as well as a follow-up investigation to determine long-term effects and maintenance. PECS training with the children will take place on the school premises as part of the curriculum and the staff have already received training in the implementation of PECS.

Risks:
There are no risks involved with participation in this study.

Benefits:
The results of this study will determine the effectiveness of this intervention and help educators and therapists in the selection of appropriate AAC systems for the many children with ASD with limited communication abilities.

Confidentiality:
All documentation bearing the name of the school, the parents, children and personal details of the parents and children will be kept confidential. Should this research be published, the school will not be mentioned without prior consent.
Video footage will only be used during presentations with consent from the parents and staff involved in the footage.

The Rights of the School:
Participation in this study is voluntary and the school may withdraw from the study at any point. The school may also ask any questions about the research at any point in time.

Permission Slip

I, the undersigned _____, have read the above information and hereby grant permission for this study to proceed within the school and for parents of learners at this school to be approached to participate in this study.

_____ _____

Signature of Principal Date

I, the undersigned _____, have read the above information and hereby grant permission for this study to proceed within the school and for parents of learners at this school to be approached to participate in this study.

_____ _____

Signature of Chairperson of Governing Body Date

Appendix D: Parental Consent Form

UNIVERSITY OF CAPE TOWN

Division of Communication Science and Disorders

School of Health and Rehabilitation Sciences
Faculty of Health Sciences
F46 Old Main Building. Groote Schuur Hospital
Observatory 7925
Telephone: 406-6313
Fax: 406 6323

Dear Parents

I am currently completing my Master's degree in Speech Language Pathology through the University of Cape Town. In order to meet the requirements of my course, I need to conduct a research study.

I have chosen to research the area of the use of alternative and augmentative communication (AAC) systems in children with Autism, looking specifically at the use of the Picture Exchange Communication System (PECS) in these children. I aim to gather information through observations of the children in various settings (e.g. in class during meal times and free play and during training). This will be done before, during and after the PECS training to look at whether the children benefit from using this system.

The principal and the school's Governing Body have granted permission for me to approach parents to request the participation of their children in this study. Attached you will find a consent form outlining the details of my study.

Should you require any further information, please do not hesitate to contact me at (021) 797 4803 or 084 776 3593.

Thank you
Yours Sincerely

Julia Travis (B.Sc. Speech Language Pathology and Audiology)

SUMMARY INFORMATION SHEET

Title:
The effectiveness of the *Picture Exchange Communication System* (PECS) as an *augmentative* communication system in children with Autism Spectrum Disorder: a South African pilot study

Purpose:
Many children with Autistic Spectrum Disorders (ASD) experience problems with the development of their speech, language and communication skills. Many of the children, despite developing some speech are still unable to communicate their basic needs, experiences and feelings. It is important that research looks at other forms of communication to help these children to develop functional communication and encourage speech development. This study aims to look at how effective the use of PECS is in children with ASD and whether they benefit in the areas of functional communication skills (initiating communication, making requests, answering questions and commenting), and in other areas of development (e.g. speech) .

Methods:
The children who take part in this study will be observed and videotaped in a variety of natural settings (in class during meal times and free play, in structured sessions with the researcher and during PECS training) before, during and after the PECS training. The child's progress through the phases of the training will also be monitored and recorded, and a 3-month follow-up to look at long-term effects and progress will also be done. PECS training with the children will take place on the school premises as part of the child's daily classroom activities with staff that have received training in how to teach PECS. Parents will also be involved in the research as they will be required to complete information forms and participate in a 30 minute interview both before and after the PECS training. Parents will also be required to attend a 3-hour information session to develop an understanding of the use of PECS and will be included as far as possible in the PECS training.

Risks:
There are no risks involved with participation in this study.

Benefits:
Your child may not benefit from participation in this research. The results of this study will show whether PECS training is effective or not and help educators and therapists to select appropriate ways to help children with ASD with limited ability to communicate their needs, experiences and feelings.

Confidentiality:
All documentation bearing your name or the name of your child and personal details will be kept confidential. The video footage will only be seen by the researcher and a second observer (to verify the findings). It will then be stored safely until 2 years after submission of the research and then destroyed. Video footage will only be used for presentations with your written consent.

Rights of the Participants:
Participation in this study is voluntary and you can decide if you want your child to be part of the study and you can withdraw your child from the study at any point in time. You also have the right to ask any questions at any time.

Permission Slip

I, the undersigned _____, have read the above consent form and I hereby allow my child _____ to participate in this study.

_____ _____

Signature of Guardian Date

Appendix E: Communication Temptations

Description	*Materials*
Desired food eaten in front of child	Chips, sweets, chocolates
Wind up toy activated, then once deactivated – given to the child	Wind-up toy
Blocks in the box – give 4 blocks to drop in the box, then small figurine	Blocks, box, little people/animal figurines
Book – child given a book and encouraged to look through it	Book
Bubbles – open a jar, blow some then close tightly and give to child	Bubbles
Social games – initiate familiar and unfamiliar game, when child shows pleasure, stop the game / wait and then prompt: "what do you want?" - pay less attention to the child, back away, or turn back on game (wait for attempt to get your attention)	Game
Balloon – blow up balloon, slowly deflate, hand it to the child	Balloon
Container with tight lid – put in desired food item or toy. Give to child & wait.	Jar with lid Toy and food reinforcers
Slime – put child's hand in cold, wet or sticky substance	Slime
Ball – roll a ball to the child. After several rolls, substitute a car	Ball, car
Noisemaker in bag – put a toy that makes a noise in an opaque bag. Shake the bag and hold it up to the child.	Opaque bag Noisemaker
New toy or unusual event – bring new toy or initiate silly event, wait for child to respond, then put into words their reaction	New toy

Adapted from: Wetherby & Prizant (1989, p.86)

Appendix F: *Language Assessment Remediation Screening Procedure* (LARSP) Profile

(Crystal, Fletcher & Garman, 1981).

Name Age Sample date Type

A	**Unanalysed**					**Problematic**							
	1 Unintelligible	2 Symbolic Noise	3 Deviant			1 Incomplete	2 Ambiguous	3 Stereotypes					
B	**Responses**			Normal Response						Abnormal			
				Repetitions	Major Elliptical 1	Major Elliptical 2	Major Elliptical 3+	Major Reduced	Major Full	Minor	Structural	∅	Problems
	Stimulus Type	Totals											
	Questions												
	Others												
C	**Spontaneous**												
D	**Reactions**			General	Structural	∅	Other	Problems					

Stage I (0;9–1;6)

Minor	*Responses*			*Vocatives*	*Other*	*Problems*
Major	*Comm.*	*Quest.*	*Statement*			
	'V'	'Q'	'V' 'N'		Other	Problems

Stage II (1;6–2;0)

Conn.	Clause				Phrase		Word
	V*X*	Q*X*	SV	A*X*	DN	VV	-ing
			SO	VO	Adj N	V part	pl
			SC	VC	NN	Int *X*	
			Neg *X*	Other	PrN	Other	-ed

Stage III (2;0–2;6)

X + S:NP	*X* + V:VP	*X* + C:NP	*X* + O:NP	*X* + A:AP	
V *X Y*	Q *X Y*	SVC	VCA	D Adj N	Cop
let X Y		SVO	VOA	Adj Adj N	Aux_0^M
	VS(A')	SVA	VO_dO_i	Pr DN	
do X Y		Neg *X Y*	Other	$Pron_0^p$	Other

-en 3s gen

Stage IV (2;6–3;0)

X Y + S:NP	*X Y* + V:VP	*X Y* + C:NP	*X Y* + O:NP	*X Y* + A:AP	
+ S	QVS	SVOA	AA *X Y*	NP Pr NP	Neg V
	Q *X Y* +	SVCA	Other	Pr D Adj N	Neg *X*
V *X Y* +	VS(V+)	SVO_dO_i		c *X*	2 Aux
	tag	SVOC		*X* c *X*	Other

n't 'cop 'aux

Stage V (3;0–3;6)

and	Coord.	Coord.	Coord.	1	1 +	Postmod. clause 1	1 +
c	Other	Other	Subord. A	1	1 +		
s			S C O				
Other			Comparative			Postmod. phrase 1 +	

-est -er -ly

(+) (−)

Stage VI (3;6–4;6)

NP	VP	Clause	Conn.	Clause	Phrase						Word	
				Element	NP			VP			N	V
Initiator	Complex	Passive	*and*	∅	D	Pr	$Pron^P$	Aux^M	Aux^O	Cop	*irreg*	
Coord.		Complement.	c	⇀	D∅	Pr∅					*reg*	
		how *what*	s	Concord	D ⇀	Pr ⇀		∅				
Other											Ambiguous	

Stage VII (4;6+)

Discourse		*Syntactic Comprehension*
A Connectivity	*it*	
Comment Clause	*there*	*Style*
Emphatic Order	Other	

Total No. Sentences	Mean No. Sentences Per Turn	Mean Sentence Length

© D. Crystal, P. Fletcher, M. Garman, 1981 revision, University of Reading

Appendix G: The *Vocabulary Selection Worksheet*

(Pyramid Educational Products)

Vocabulary Selection Worksheet©

Student/Child:	
Person completing form:	
Date:	

Instructions: List up to 5-10 items for each category. Include only those items that your student or child currently enjoys (or dislikes for final category).

Things your student/child likes to eat	
Things your student/child likes to drink	
Activities your student/child likes (watching television, spinning, sitting in a special chair, squeezes)	
Social games your student/child likes (Peek-a-boo, chase, tickles, etc.)	
Places your student/child likes to visit	
What your student/child chooses to do during free time	
People your student/child recognizes and enjoys being with	
Items, activities your student/child DOES NOT like	

Appendix H: *Daily Record Sheets*

Name: **Date:** **Total no. of Pics in file:**

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Phase					
Reinforcers used today					
No. of Exchanges					
Location: Tea					
Location: Lunch					
Location: Free play					
Location: Classroom					
Location: PLayground					
Location: Structured session					
Location: Home					
Location: Hostel					
General progress e.g. Approaching adults/ peers Vocalisations Any firsts? Changes in Behaviour					
Difficulties e.g. Errors made, behaviours that interfere with PECS use					
Materials needed: e.g. pictures, pages, files, toys, sentence strips, etc.					

Day	Phase	Attributes in use			Sentence Starters used	PECS Sentence Starters		Speech without PECS
		List of Attributes	Requests	Comments		No. of pics on SS	List sentences used Underline the words spoken by child	
Monday								
Tuesday								
Wednesday								
Thursday								
Friday								

Appendix I: The *Profile of Pragmatic skills in young children*

(Naudé, 2002)

PROFILE OF PRAGMATIC SKILLS IN YOUNG CHILDREN

PART ONE CONVERSATIONS WITH DIFFERENT PARTNERS

PART TWO CONVERSATIONS IN DIFFERENT CONTEXTS

PART ONE

WHERE INDICATING THE PRESENCE OF A SPECIFIC SKILL ON THE PROFILE, FILL IN THE NUMBER OF THE CONVERSATIONAL PARTNER WITH WHOM THE SKILL WAS OBSERVED

Specify partner/s:	**1.**	**2.**	**3.**

1.1 EMPLOYING A VARIETY OF FUNCTIONS

NB 1 Utterances may be multifunctional
2 Intonation and other paralinguistics may be the determinant indicating function

Indicate functions employed and examples observed by underlining or adding:

FUNCTION	EXAMPLES	FUNCTION	EXAMPLES
Instrumental	requesting objects requesting actions other	Explorative	labelling objects requesting information predicting hypothesizing other
Regulatory	protesting denial using directives calling teasing asking for help other	Imaginative	Pretending Other
		Informative	describing objects describing events indicating possession giving reasons other
Personal/expressive	expressing feelings calling attention to self comment on action comment on event making choices accompany play self-guidance other	Linguistic	practising metalinguistic forms other

1.2 KEEPING TO THE RULES

1.2.1 Rules for conversations

Rules for Topic management	
Topic Initiation Indicate: - if skills were observed (underline) - appropriate/ inappropriate (note)	*Method of initiation*: Pointing Looking Stating verbally
Topic maintenance **Indicate if skills were observed: (underline)** ***Adhering to principles*:**	*Truthful* *Brief* *Relevant* *Providing adequate information*

Staying on topic:	*On topic* *Not on topic* *(Indicate frequency - number of times behaviour occurred)* *Latency (time elapsing between cue and response - Appropriate/inappropriate)*
Initiating new topic - type of topic:	*New* *Related* *Reintroduced* *Consecutive*
Initiating new topic - manner of initiation:	*Coherent change* *Noncoherent change* *Shifting* *Shading*
Appropriateness of topic:	*Appropriate* *Non-appropriate*
Rules for interaction	
Indicate appropriate/inappropriate: Using polite words Greeting Responding to greetings Following instructions	
Rules for Turn taking	
Conversational initiation Indicate appropriate/ inappropriate	***Method:*** Eye contact Greeting Interruption Stereotype Calling Other
Termination of conversation Indicate nature of termination	Shaded Abrupt
Conversational breakdown Underline if observed; indicate frequency	
Request for repair:	Form/strategy employed: - Seek clarification - Indicating non-understanding - Indicating inability to answer
Conversational repair:	Spontaneous Listener initiated
1.2.2 Rules for narratives	
Types of narratives observed: underline if observed; add notes as required	
Recounts	
Eventcasts	
Accounts	
Stories	

Organization of narratives: Indicate if observed; add notes as required		
Centering	**Chaining**	Story grammar - including: Setting statement Initiating event Internal response Internal plan Attempt Direct consequence Reaction
1.3 *ADAPTING TO CONVERSATIONAL PARTNERS* Underline if observed and indicate identifying number/s of conversational partner/s		
Stylistic variations	Register	Politeness: Polite words/expressions used Indirect requests Vocabulary Topic
	Interlanguage (code mixing)	Situational (with speaker of other language)
	Code switching	Situational Related to topic
Referential communication	Presupposition skills	Content adapted Method adapted (e.g. adding gestures) Role playing Linguistic devices (deictics) - specify: Articles Demonstratives Pronouns Verbs
Cohesive devices	Ellipsis	Appropriate Inappropriate

PART TWO CONVERSATIONS IN DIFFERENT CONTEXTS

INDICATE WHETHER BEHAVIOUR WAS
a = APPROPRIATE (ADAPTED TO CONTEXT) OR
i = INAPPROPRIATE (NOT ADAPTED TO CONTEXT)

Specify context	1.	2.	3.	4.
SITUATIONS ENCOUNTERED AND ACTIVITIES OBSERVED (Indicate for each context)				
Channel restricted : Auditory only (e.g. telephone, barrier games) *Visual only*				
Nonsocial speech: Monologue Individual narrative Rhymes, songs etc.				
Informal communicative situation (Specify nature)				
Formal communicative situation (Specify nature)				

Appendix J: Topic Guide for Semi-Structured Interviews

Questions for Pre-training and Follow-up Stage:
Current Communication Skills
How would you describe the child's communication skills at present?
What methods of communication does he/she use?
Communication Difficulties
Does the child experience any communication difficulties? Describe these.
Attitudes towards Augmentative Communication
What is your view on using an augmented communication system (such as picture exchange) for this child?
Pragmatic skills
How does the child use his/her communication skills and language in different social contexts?
What features of the child's speech and communication make him/her noticeably different from other children his/her age?
Interaction style
How do you interact with the child in order to get him/her to communicate more?
Follow-up Stage (only)
Effects of the Picture Exchange Communication System **(PECS)**
What changes (if any) have you noticed since the PECS training?
Has the PECS training affected the way you interact with / teach this child?
Limitations of PECS
What concerns do you have about the use of the Picture Exchange Communication System (PECS)?

Appendix K: Raw Data for Requests, Comments and Mean Length of Utterance (MLU)

Participant 1: M.M.

Stage 1: Pre-Training

UNSTRUCTURED					STRUCTURED				
#	Requests	Comments	Other	MLU	#	Requests	Comments	Other	MLU
1	0	0	0	0	1	2	0	0	0
2	0	0	2	2.0	2	3	1	1	1.5
3	0	0	1	0	3	1	2	1	1.0
4	0	0	0	0	4	3	3	0	1.5
5	0	0	0	0	5	3	3	0	1.3

Stage 2: PECS Training

UNSTRUCTURED					STRUCTURED				
Session	Requests	Comments	Response + Others	MLU	Session	Requests	Comments	Response+ Others	MLU
1	11	0	0	1.0	1	18	2	0	1.2
2	21	0	0	0	2	11	2	0	2.2
3	17	0	1	1.0	3	14	2	1	1.1
. 4	17	0	0	0	4	13	2	1	1.2
Phase III									
5	17	0	0	2.9	5	16	3	1	2.0
Phase IV									
6					6	20	1	0	3.6
7					7	16	2	1	3.7
8					8	12	2	2	3.7
9					9	14	1	0	3.8
10					10	15	0	2	4.1
11					11	17	0	1	4.2
Phase V-VI									
12	11	0	2	3.9	12	15	1	1	4.2
13	8	2	1	4.1	13	16	0	1	3.7
14	12	1	0	3.9	14	18	10	2	3.7
15	11	0	1	4.4	15	15	5	0	4.3

Stage 3: Post-Training

UNSTRUCTURED					STRUCTURED				
#	Requests	Comments	Other	MLU	#	Requests	Comments	Other	MLU
1	12	1	2	4.2	1	15	10	3	3.1
2	15	0	1	5.4	2	16	8	2	3.8

Stage 4: Follow-up

STRUCTURED					UNSTRUCTURED				
#	Requests	Comments	Other	MLU	#	Requests	Comments	Other	MLU
1	21	10	2	3.5	1	6	0	2	3.5
2	23	2	0	4.0	2	8	0	3	4.1
3	17	7	2	3.4	3	6	0	3	3.5
4	21	8	4	3.0	4	6	0	0	4.0

PARTICIPANT 2: N.N.

Stage 1: Pre-Training

STRUCTURED					UNSTRUCTURED				
#	Requests	Comments	Other	MLU	#	Requests	Comments	Other	MLU
1	5	3	2	1.9	1	1	0	1	1.0
2	8	0	1	2.2	2	1	0	1	1.7
3	7	1	1	2.0	3	1	0	1	2.7
4	6	5	0	1.5	4	4	0	1	2.0
5	8	3	0	2.0	5	1	0	4	3.5
6	9	0	2	3.3	6	8	0	1	1.9

Stage 2: PECS Training

STRUCTURED					UNSTRUCTURED				
Session	Requests	Comments	Response + Others	MLU	Session	Requests	Comments	Response+ Others	MLU
Phase I									
1	21	2	1	2.2	1	15	0	1	2.1
2	24	4	1	1.8	2	16	0	1	1.9
Phase II									
3	30	1	2	2.2	3	17	0	0	2.1
4	26	2	1	2.0	4	17	0	0	2.1
Phase III									
5	25	4	2	2.2	5	18	0	0	2.3
Phase IV									
6	24	4	1	3.4	6	12	0	0	2.4
7	23	3	0	2.9	7	16	0	0	3.1
8	22	1	0	2.7	8	17	0	0	2.8
9	27	3	1	2.8	9	14	0	0	3.4
10	28	0	0	3.4	10	13	0	0	3.6
11	26	1	0	3.2	11	19	0	1	3.5
Phase V-VI									
12	26	6	0	3.0	12	18	0	0	3.5
13	23	5	0	3.0	13	14	0	0	3.2
14	24	9	2	2.5	14	17	1	0	2.8
15	25	12	1	3.2	15	26	0	2	3.6

Stage 3: Post-Training

STRUCTURED					UNSTRUCTURED				
#	Requests	Comments	Other	MLU	#	Requests	Comments	Other	MLU
1	17	9	3	3.2		15	0	1	4.0
2	22	7	0	3.9		18	0	1	4.1

Stage 4: Follow-up

STRUCTURED					UNSTRUCTURED				
#	Requests	Comments	Other	MLU	#	Requests	Comments	Other	MLU
1	24	7	1	2.9	1	16	0	1	3.3
2	27	6	0	3.2	2	19	0	2	3.4
3	26	6	7	3.0	3	17	0	3	3.2
4	29	6	0	3.2	4	14	0	0	2.5

Appendix L: Sample of *Language Assessment Remediation Screening Procedure* (LARSP) Profile (Crystal, Fletcher & Garman, 1981).

Pre-Training - STAGE 1 (Structured + unstructured

Name M.M. Age 9.10 yrs. Sample date May - June '05 Type Spontaneous sample

A	**Unanalysed** 1 Unintelligible ✓	2 Symbolic Noise ✓ Woo Yuck	3 Deviant ✓	**Problematic** 1 Incomplete 2 Ambiguous 3 Stereotypes ✓

B **Responses**		Repetitions	Normal Response: Major: Elliptical 1	2	3+	Reduced	Full	Minor	Abnormal: Structural	Ø	Problems
Stimulus type	Totals										
	Questions							(5)				Yes
	Others											Yes
C **Spontaneous**											Oh no.

D **Reactions**		General	Structural	Ø	Other	Problems

Stage							
Stage I (0;9-1;6)	Minor	Responses		Vocatives	Other	Problems	
	Major	Comm. 'V' I (1)	Quest. 'Q'	Statement 'V'	'N' ЖН I (6)	Other I (1)	Problems
Stage II (1;6-2;0)	Conn.	Clause: VX	QX	SV, SO, SC, Neg X; AX I (1), VO, VC, Other	Phrase: DN II (2), Adj N, NN, PrN; VV, V part, Int X, Other		Word: -ing, pl ✓ III (3)
Stage III (2;0-2;6)		X + S:NP: VXY, let XY, do XY	X + V:VP: QXY, VS (X)	SVC, SVO, SVA I (1), Neg XY; X + C:NP: VCA, VOA, VO_dO_i, Other	X + O:NP: D Adj N, Adj Adj N, Pr DN, $Pron^P_O$	X + A:AP: Cop, Aux^M_O, Other	-ed, -en, 3s
Stage IV (2;6-3;0)		XY + S:NP: + S, VXY +	XY + V:VP: QVS, QXY +, VS(X+), tag	SVOA, SVCA, SVO_dO_i, SVOC; XY + C:NP: AAXY, Other	XY + O:NP: NP Pr NP, Pr D Adj N, c X, Xc X	XY + A:AP: Neg V, Neg X, 2 Aux, Other	gen, n't, 'cop (1) 'm
Stage V (3;0-3;6)	and, c, s, Other	Coord. Other	Coord. Other	Coord. 1 1+; Subord. A 1 1+; S C O; Comparative	Postmod. clause 1 1+; Postmod. phrase 1 +		'aux, -est, -er, -ly

Stage VI (3;6-4;6)	(+) NP	VP	Clause	Conn.	(-) Clause	Phrase NP	VP	Word N V
	Initiator, Coord., Other	Complex	Passive, Complement., *how*, *what*	*and*, c, s	Element Ø, ⟷, Concord	D Pr $Pron^P$, DØ Pr Ø, D⇆Pr⇆	$Aux^M Aux^O Cop$, Ø, Ambiguous	*irreg*, *reg*

Stage VII (4;6+)	*Discourse*		*Syntactic Comprehension*
	A Connectivity	*it*	
	Comment Clause	*there*	*Style*
	Emphatic Order	other	

	Total No. Sentences (17)	Mean No. Sentences Per Turn 1.0	Mean Sentence Length 24/17 = (1.4)

10 sessions x 10 mins = 100 mins

Stage 3 : Post-TRAINING (Structured + Unstructured sessions)

Name M.M. Age 10.1 years Sample date August 2005 Type Spontaneous

A	**Unanalysed** 1 Unintelligible	2 Symbolic Noise	3 Deviant	**Problematic** 1 Incomplete	2 Ambiguous	3 Stereotypes						
B	**Responses** Stimulus type / Totals	Repetitions	Normal Response: Major: Elliptical 1	Elliptical 2	Elliptical 3+	Reduced	Full	Minor	Abnormal: Structural	Ø	Problems	
	Questions							(1) Yes				
	Others											
C	**Spontaneous**											

D	**Reactions**		General	Structural	Ø	Other	Problems

Stage I (0,9-1,6)

Minor	*Responses*			*Vocatives*	*Other*	*Problems*
	Comm.	Quest.	Statement			
Major	'V'	'Q' (1) With! V	'V' (1)	'N' (1)	Other (2) Adj.	Problems

Stage II (1,6-2,0)

Conn.	Clause				Phrase		Word
	VX (3)	QX	SV (1)	AX	DN (3)	VV	-ing
			SO	VO (1)	Adj N (3)	V part	pl ✓ 20
			SC	VC	NN (7)	Int X	
			Neg X	Other	PrN (1)	Other	-ed ✓ i

Stage III (2,0-2,6)

X + S:NP	X + V:VP (1)		X + C:NP	X + O:NP	X + A:AP	
V X Y	Q X Y	SVC (1)	VCA	D Adj N	Cop (2)	-en
let X Y (1)	VS (X)	SVO (54)	VOA	Adj Adj N	Aux^M_O	3s
do X Y		SVA	VO_dO_i	Pr DN (2)		
		Neg X Y	Other	$Pron^P_O$ I (54) it 2 vis i	Other	gen

Stage IV (2,6-3,0)

X Y + S: NP	X Y + V:VP (2)		X Y + C:NP	X Y + O:NP (13)	X Y + A:AP	
+ S	QVS	SVOA (4)	AAXY	NP Pr NP (4)	Neg V	n't
	QXY +	SVCA	Other	Pr D Adj N	Neg X	
VXY +	VS(X+)	SVO_dO_i		c X	2 Aux	'cop ✓ 2
	tag	SVOC		Xc X (1)	Other	'aux

Stage V (3,0-3,6)

and	Coord.	Coord.	Coord.	1	1 +	Postmod. 1	1 +	-est
c	Other	Other	Subord. A	1	1 +	clause		
s			S	C	O			-er
						Postmod. 1 +		
Other			Comparative			phrase		-ly

Stage VI (3,6-4,6)

	(+)				(-)			
NP	VP	Clause	Conn.	Clause	Phrase		Word	
Initiator	Complex	Passive	*and*	Element	NP	VP	N	V
Coord.		Complement.	c	Ø	D Pr $Pron^P$	$Aux^M Aux^O Cop$	*irreg*	
		how	s	⟵	DØ Pr Ø			
		what		⟶ Concord	D≤ Pr≤	Ø	*reg*	
Other						Ambiguous		

Stage VII (4,6+)

Discourse		*Syntactic Comprehension*
A Connectivity	*it*	
Comment Clause	*there*	*Style*
Emphatic Order	other	

Total No. Sentences (81)	Mean No. Sentences Per Turn	Mean Sentence Length 329/81 = 4.1

4 sessions X 10 mins. = 40 mins.

PARTICIPANT 2 — Analysis of Grammar - STAGE 1 (Structured + Unstructured)

Name N.N. Age 9.6yrs. Sample date June-July '05 Type Spontaneous

A	**Unanalysed**				**Problematic**							
	1 Unintelligible	2 Symbolic Noise	3 Deviant ✓		1 Incomplete	2 Ambiguous	3 Stereotypes ✓					
B	**Responses**		Normal Response						Abnormal			
			Repetitions	Major: Elliptical 1	2	3+	Reduced	Full	Minor	Structural	Ø	Problems
	Stimulus type: Questions	Totals										
	Others											
C	**Spontaneous**											
D	**Reactions**		General		Structural		Ø	Other		Problems		

Stage I (0,9-1,6)

Minor	*Responses*			*Vocatives*	*Other*	*Problems*
	Comm.	Quest.	Statement			
Major	'V' (18)	'Q'	'V'	'N' (31)	Other (1)	Problems (49)

Stage II (1,6-2,0)

Conn.	Clause				Phrase		Word
	VX (1)	QX	SV III (3)	AX I (1)	DN IIII (4)	VV	-ing ✓ (2)
			SO	VO IIII III (9)	Adj N	V part	pl ✓ (10)
			SC	VC I (1)	NN off	Int X	
			Neg X III (6)	Other (20)	PrN (0)	Other	

Stage III (2,0-2,6)

X + S:NP	X + V:VP (1)	X + C:NP	X + O:NP	X + A:AP	
	Q X Y	SVC	VCA	D Adj N	Cop (1)
V X Y		SVO (19)	VOA	Adj Adj N	Aux^M_O (1)
let X Y	VS (X) II (2)	SVA IIII (4)	VO_dO_i	Pr DN	
do X Y		Neg X Y	Other (23)	$Pron^P_O$ I (1) you (2) he (1) it (1)	Other

Stage IV (2,6-3,0)

XY + S: NP	XY + V:VP IIII (5)	XY + C:NP	XY + O:NP	XY + A:AP	
+ S	QVS	SVOA	AAXY	NP Pr NP	Neg V
	QXY +	SVCA	Other	Pr D Adj N	Neg X
VXY +	VS(X+)	SVO_dO_i		c X	2 Aux
	tag	SVOC		Xc X	Other

Stage V (3,0-3,6)

and	Coord.	Coord.	Coord.	1	1 +	Postmod. 1	1 +	-est
c	Other	Other	Subord. A	1	1 +	clause		
s			S	C	O			-er
Other			Comparative			Postmod. 1 + phrase		-ly

Stage VI (3,6-4,6)

	(+)				(-)			
NP	VP	Clause	Conn.	Clause	Phrase			Word
Initiator	Complex	Passive	*and*	Element	NP	VP		N V
Coord.		Complement.	c	Ø	D Pr $Pron^P$	$Aux^M Aux^O Cop$		*irreg*
		how	s	⟷	DØ Pr Ø			
		what		Concord	D⇄Pr⇄	Ø		*reg*
Other						Ambiguous		

Stage VII (4,6+)

Discourse		*Syntactic Comprehension*
A Connectivity	*it*	
Comment Clause	*there*	*Style*
Emphatic Order	other	

Total No. Sentences (99)	Mean No. Sentences Per Turn	Mean Sentence Length 223/99 = (2.3)

PARTICIPANT 2 — STAGE 3: POST-TRAINING (Structured + Unstructured)

Name N. N. — Age 9.10 years — Sample date October 2005 — Type Spontaneous

A	**Unanalysed** 1 Unintelligible	2 Symbolic Noise	3 Deviant	**Problematic** 1 Incomplete	2 Ambiguous	3 Stereotypes

B Responses		Repetitions	Normal Response: Major, Elliptical 1	2	3+	Reduced	Full	Minor	Abnormal: Structural	Ø	Problems
Stimulus type	Totals										
Questions											
Others											
C Spontaneous											

D Reactions		General	Structural	Ø	Other	Problems

Stage I (0,9-1,6)
Minor: *Responses* — *Vocatives* — *Other* — *Problems*
Major: Comm. 'V' (2) — Quest. 'Q' — Statement 'V' — 'N' (5) — Other — Problems

Stage II (1,6-2,0)
Conn.
Clause: VX (1) — QX — SV, SO, SC, Neg X — AX (1), VO (3)+, VC, Other
Phrase: DN (5)+(26), Adj N (15), NN (1)+(2), PrN ( ) — VV, V part, Int X, Other
Word: -ing; pl (16) ✓

Stage III (2,0-2,6)
X + S:NP — X + V:VP — X + C:NP — X + O:NP (3) — X + A:AP
Clause: V X Y (2), let X Y (1), do X Y — Q X Y, VS (X) — SVC (2), SVO (13)+(59), SVA, Neg X Y — VCA, VOA (1), VO_dO_i, Other
Phrase: D Adj N, Adj Adj N (2), Pr DN (1), $Pron^P$ Σ(72) us(1) it (1) we(2), $Pron^O$ me(2) — Cop (2), Aux^M, Aux^O, Other
Word: -ed (1) ✓; -en; 3s

Stage IV (2,6-3,0)
X Y + S: NP — X Y + V:VP (1) — X Y + C:NP — X Y + O:NP (58) — X Y + A:AP
Clause: + S, VXY + — QVS, QXY +, VS(X+), tag (2) (when then) — SVOA, SVCA, SVO_dO_i (1), SVOC — AAXY, Other
Phrase: NP Pr NP, Pr D Adj N, c X, Xc X — Neg V, Neg X, 2 Aux, Other
Word: gen; n't; 'cop (2) ✓; 'aux

Stage V (3,0-3,6)
Conn.: and, c, s, Other
Clause: Coord. Other — Coord. Other — Coord. 1, 1+; Subord. A 1, 1+; S, C, O; Comparative
Phrase: Postmod. 1 clause, 1+; Postmod. 1+ phrase
Word: -est; -er; -ly

Stage VI (3,6-4,6)
(+): NP — Initiator, Coord.; VP — Complex; Clause — Passive, Complement., *how*, *what*; Other
(-): Conn. — *and*, c, s; Clause — Element Ø, ⟷, Concord; Phrase — NP: D Pr $Pron^P$, DØ PrØ, D⇄Pr⇄; VP: $Aux^M Aux^O$ Cop, Ø; Ambiguous; Word — N *irreg*, *reg*; V

Stage VII (4,6+)
Discourse: A Connectivity, Comment Clause, Emphatic Order — *it*, *there*, other
Syntactic Comprehension
Style

Total No. Sentences	99	Mean No. Sentences Per Turn		Mean Sentence Length	380/99 = 3.8

4 Sessions X 10 mins. = 40 mins.

Appendix M: Data for Form and Function - Communication Profile

Participant 1: FORM

Totals: Form - Stage 1 vs. Stage 3+4

Stage	Speech	Gest/Speech	Picture/Sp	Motor/Voc
Stage 1: Pre-Training (10)	**13**	**1**	**0**	**4**
Stage 3: Post-Training (4)	21	6	58	0
Stage 4: Follow-up (6)	48	6	56	0
Stage 3 + 4: (10)	**69**	**12**	**114**	**0**

Stage	Gest/vocal	Motor	Gesture	Motor/sp
Stage 1: Pre-Training (10)	**3**	**3**	**4**	**1**
Stage 3: Post-Training (4)	0	0	0	1
Stage 4: Follow-up (6)	0	0	1	1
Stage 3 + 4: (10)	**0**	**0**	**1**	**2**

Subtotals for Structured sessions

Stage	Speech	Gest/Speech	Picture/Sp	Motor/Voc
Stage 1: Pre-Training (5)	10	1	0	4
Stage 3: Post-Training (2)	18	6	29	0
Stage 4: Follow-up (3)	41	5	37	0
Stage 3 + 4: (5)	59	11	66	0

Stage	Gest/vocal	Motor	Gesture	Motor/sp
Stage 1: Pre-Training (5)	3	2	4	1
Stage 3: Post-Training (2)	0	0	0	1
Stage 4: Follow-up (3)	0	0	0	1
Stage 3 + 4: (5)	0	0	0	2

Subtotals for Unstructured sessions

Stage	Speech	Gest/Sp	Picture/Sp	Motor/Voc
Stage 1: Pre-Training (5)	3	0	0	0
Stage 3: Post-Training (2)	3	0	29	0
Stage 4: Follow-up (3)	7	1	19	0
Stage 3 + 4: (5)	10	1	48	0

Stage	Gest/vocal	Motor	Gesture	Motor/sp
Stage 1: Pre-Training (5)	0	1	0	0
Stage 3: Post-Training (2)	0	0	0	0
Stage 4: Follow-up (3)	0	0	1	0
Stage 3 + 4: (5)	0	0	1	0

Participant 1: FUNCTION

Totals: Function - Stage 1 vs. Stage 3+4

Stage	Requests	Comments	Responses + Others
Stage 1: Pre-Training (10)	**12**	**9**	**5**
Stage 3: Post-Training (4)	58	19	8
Stage 4: Follow-up (6)	81	19	12
Stage 3 + 4: (10)	**139**	**38**	**20**

Subtotals for Structured sessions

Stage	Requests	Comments	Responses + Others
Stage 1: Pre-Training (5)	12	9	2
Stage 3: Post-Training (2)	31	18	5
Stage 4: Follow-up (3)	61	19	4
Stage 3 + 4: (5)	92	37	9

Subtotals for Unstructured sessions

Stage	Requests	Comments	Responses + Others
Stage 1: Pre-Training (5)	0	0	3
Stage 3: Post-Training (2)	27	1	3
Stage 4: Follow-up (3)	20	0	8
Stage 3 + 4: (5)	47	1	11

Participant 2: FORM

Totals: Form - Stage 1 vs. Stage 3+4

Stage	Speech	Gest/Speech	Picture/Sp	Motor/Voc
Stage 1: Pre-Training (12)	**62**	**14**	**0**	**0**
Stage 3: Post-Training (4)	11	3	78	0
Stage 4: Follow-up (8)	137	10	63	0
Stage 3 + 4: (12)	**148**	**13**	**141**	**0**

Stage	Gest/vocal	Motor	Gesture	Motor/sp	Obj/sp
Stage 1: Pre-Training	**0**	**0**	**3**	**6**	**2**
Stage 3: Post-Training	0	0	2	0	0
Stage 4: Follow-up (8)	0	0	1	1	0
Stage 3 + 4: (12)	**0**	**0**	**3**	**1**	**0**

Subtotals for Structured sessions

Stage	Speech	Gest/Speech	Picture/Sp	Motor/Voc
Stage 1: Pre-Training (6)	43	8	0	0
Stage 3: Post-Training (2)	9	3	45	0
Stage 4: Follow-up (4)	92	10	36	0
Stage 3 + 4: (6)	101	13	81	0

Stage	Gest/vocal	Motor	Gesture	Motor/sp	Obj/sp
Stage 1: Pre-Training	0	0	3	6	2
Stage 3: Post-Training	0	0	0	0	0
Stage 4: Follow-up (4)	0	0	0	1	0
Stage 3 + 4: (6)	0	0	0	1	0

Subtotals for Unstructured sessions

Stage	Speech	Gest/Speech	Picture/Sp	Motor/Voc
Stage 1: Pre-Training (6)	19	6	0	0
Stage 3: Post-Training (2)	2	0	33	0
Stage 4: Follow-up (4)	45	0	27	0
Stage 3 + 4: (6)	47	0	60	0

Stage	Gest/vocal	Motor	Gesture	Motor/sp	Obj/sp
Stage 1: Pre-Training	0	0	0	0	0
Stage 3: Post-Training	0	0	2	0	0
Stage 4: Follow-up (4)	0	0	1	0	0
Stage 3 + 4: (6)	0	0	3	0	0

Participant 2: FUNCTION

Totals: Function - Stage 1 vs. Stage 3+4

Stage	Requests	Comments	Responses + Others
Stage 1: Pre-Training (12)	**59**	**12**	**15**
Stage 3: Post-Training (4)	72	16	5
Stage 4: Follow-up (8)	172	25	14
Stage 3 + 4: (12)	**244**	**41**	**19**

Subtotals for Structured sessions

Stage	Requests	Comments	Responses + Others
Stage 1: Pre-Training (6)	43	12	6
Stage 3: Post-Training (2)	39	16	3
Stage 4: Follow-up (4)	106	25	8
Stage 3 + 4: (6)	145	41	11

Subtotals for Unstructured sessions

Stage	Requests	Comments	Responses + Others
Stage 1: Pre-Training (6)	16	0	9
Stage 3: Post-Training (2)	33	0	2
Stage 4: Follow-up (4)	66	0	6
Stage 3 + 4: (6)	99	0	8

Appendix N: Semi-Structured Interview Transcriptions – Participant 1: M.M.

Participant 1: M.M. **Parent Interview (mother)** **30.05.2005**
How would you describe M.M.'s communication skills at home at the moment? I'd say very weak, very basic. Um, to the point where as I told you be before, he will use; if he can get away with one word he will do that. And he will only speak if he wants something. Sometimes in the car he will mention the weather, if its raining or there's a dog, but he won't say, he'll just say 'dog' or 'black dog', and I'll say "M you must say look mommy there's a black dog" you know or "look mommy in the house there's a black dog" because 'dog', I mean 'dog'? he doesn't put anything else with dog, so um that, that would be nice if he could actually just give me more info on what he wants me to look at. So, ja, that and um what I would really like is his feelings, I know it's very abstract, and questions I'd feel so good if my child said what, where, why, how you know answering those. That is so, like if he gets sore and hurts himself. And he'll say 'sore' and I'll say, 'what is sore?' and I will have to give him the answers because I can know where he's indicating and he knows what it is, but he doesn't say it. So, ja that can be very frustrating. I know he knows the words, but it doesn't come out, he doesn't come out with the sentences. *Are there times when he's communicating something and you don't know what it is? Or does he manage his basic needs?* Basic needs, ja, um 'come here', if I say where, he won't say you know come to the computer or come to the room or something like that, he'll just say, he'll just say 'come'. Um. Not much. He wants you to copy, he copies everything, but I don't know if you can actually learn from, from copying, we do it sometimes in R's sessions to get him to expand on his sentence, we'll give him a picture and help him in that way.
What kind of methods would you say of communication is he using? Tantrums. Like um, on Friday I did something different and I didn't think about it, I didn't think like M.M. you know how's he going to react to this 'cause I came a little bit earlier I thought ag you know, he'll come down, no problem, and so on but I didn't realize that he would be coming on his own 'cause I haven't really done that, that's not normal and he just threw like a major tantrum and I couldn't get him to tell me now why are you so upset, you know I just had to sort of put the pieces together and, and, and, and figure out what was actually upsetting this child so much. If he said 'why did you come early?' 'I don't like you to come early, I like you to come on time' something like that. Like I say when he gets sore, he hurts himself he then points. Anything else he's actually just saying what he needs, um when he wants something to eat or to drink, or if he wants me to give him a hug. He can say "I want" whatever and "Give me" it's really basic. Sometimes he will use one word, sometimes he will use a sentence, um but like I say a lot of times he will try to get away with a single word.
What is your view on using things like the PECS, an augmentative system with M.M.? I'm very curious. It can't do any harm, who knows it might do a lot of good for him, it might give him a lot more confidence. You know, I know he knows the words, maybe it will give him more confidence to actually put those words together, start making sentences. I'm absolutely curious in, in finding out whether it would do anything. If it doesn't do anything it isn't going to do anything bad for him, or set him back or anything like that. So it's fine.
How does M.M. use his communication in different social contexts? You mean different environments? Um, environments that he hasn't been in before? *Different places. Is there a change between home and going out somewhere else, going to other family, public places?* Yes, definitely. You can see it in his behaviour mostly. He takes a while to get used to it and then he's OK. I think its just things that he's unfamiliar with that maybe can make him a little anxious and then his behaviour will settle. He won't say to me, you know, what any other normal person would say, you know, I feel strange in this environment or I'm not sure how, what to do. *Does he communicate more with you or less?* No, it doesn't change.

When he's with different people?
The different people, he hasn't really had that much contact for long periods of time with different people. The only people he comes into contact with is his school environment and his home environment and my family and ja that's about it, his only social environments.
And from what you've observed is his communication similar across those contexts?
Yes, the way he treats me is the way he treats my mother and sisters and friends.
You don't feel he communicate more in those different environments?
Similar across all.

What features of M.M.'s speech and language make him noticeably different from other children?
Meaning other children as in your average child, his peer?
What's noticeably different for you to how his sister communicated at his age?
How his sister communicated, well… she could be babbling on about what all she did in the day and her friends and so on, which M.M. it's like pulling out pieces. Like L's (educator) got a new thing in class which I actually prefer and I try to do that every day with him and I try to get him to actually converse Its all my side to get him to tell me things, he's actually starting to tell me things, with me giving him little clues. A little bit, not much, but a little bit, which is good.
And other things you feel are different?
With his peers? So much especially the feelings, what's upsetting you. They would be able to tell you in very descriptive language who upset them where it happened, how it happened the whole thing, that that would be very nice to have.

How do you adapt how you interact with M.M. to try get him to communicate more?
What I used to do in the past and what I still do with is, is, is, if he uses a single word I'm not going to react, I want him to give me a sentence. And I mean I'll say to him, how do you ask M.M. you know, and then he will give me the sentence. Other than that, with Lynette's thingy, giving him clues, giving alternatives, choice and then he will give me what's on his level.
A lot of questions?
Yes, sometimes I'm not sure if I'm getting through to him. Is a yes a yes. Sometimes it always seems to be yes. I don't know if it's just to keep him out of trouble that 'no' means, 'no' is bad and therefore he says yes for everything.

Participant 1: M.M. Educator Interview 01.06.2005

How would you describe M.M.'s communication skills in class at the moment?
Well, I think M's communication is quite bad. Uh, he's got no, he's got communicative intent, but he doesn't use any language. He very much relies on you initiating, um. To meet his needs he would stand and wait forever. So it's it was quite revealing when you came to video him to realize to which extent it is because then I only realized how much I do the prompting and I supply his words, although I'm very aware of the fact, I try not to do it, but it was revealing to me that, that he couldn't do that, he couldn't do the basic things. So I think his communication needs to be boosted a lot. I think he's got a lot of emotional needs, he__, that he doesn't express, doesn't verbalise needs or his emotions. Um. He prefers to make a drawing and then he would completely disappear or emerge into his own world where he doesn't need to communicate.

What kind of methods would you say of communication is he using?
At the moment he uses gestures and he just places himself in position where somebody that comes along and that can sort of make ___ that this child must, most probably need something or try and draw it out of him. Um. And then I think that way his needs are met. And how, so he would just either sit and wait or go to a different location and stand and wait until somebody else intervenes. And um, I think that's what, that's a habit that his learned by now and that's the way he goes about his communication and sometimes in learned situations he'll come up to me, like in morning ring he'll greet and he knows he has to come and greet me he will go and he'll greet me, look up and he'll say "hello L (educator)" and "how are you?" and so, but then he'll wait for that and when Loretta comes in he'll do exactly the same, but that's, he won't do that for anybody else, um so he knows that's what he does in the morning

would say hello to me, say hello to H. (assistant), um but that's it.
And the gestures he uses?
The gestures are, no, very limited, the gestures are very, very limited. He hardly lifts his arms, his facial expression is also very limited, in the sense that um he doesn't use his face to communicate any of his feelings um except if he's got a tantrum then he will scream and shout and throw a wobbly and then he will use words. I think when he's probably more motivated to express his needs, um but he doesn't use any Makaton signs, um. No, gestures are limited. Makaton signs are not used, although he knows them.
And any motor communication where he pulls you to anything, pushes you?
Ah, that's also limited. He, sometimes he would, when he, when he places himself to a different location he would stand there and wait for you and then if nothing would happen and then sometimes he would have some self-talk, he would revert to self-talk, which then is actually aimed at you. He can't distinguish between ask for something, tell something. You know the difference between the 2 is difficult for him. He doesn't grasp them at all. I think according to him there's no difference between asking and telling. Um, but then sometimes he would lower his head, almost with his head he would be touching his lunchbox, gesturing that this is what I'm going to take out of here. But that's ah, that's all.
And verbally? He initiates using words rather, if at all?
Verbally he doesn't initiate, he would sometimes he would, it's terribly limited if it's requested and if it's required from him to tell me something "M.M. where are you going" then he can answer me. The initiating, verbal initiating never takes place. There's hardly any signs of any verbal initiating.

And any other communication difficulties, things where you feel he's having difficulty communicating other that the basic needs?
I think the social interaction. There's no social interaction. There's no inviting a friend to come with him or we try, we teach that from the outside. I, I would prompt him "M.M. go ask C (peer) to come to the playground with you" and then he would do that. He, he'll take her hand and say C (peer) can come and play with, but he won't repeat that and he won't use that. He won't generalize that to know that oh, this is what I do when, when I want to have a friend to play with me on the playground.

And what is your view on using an augmentative communication system for M.M.?
I'm very, very excited about it. Because I think he's got a lot of language, he definitely has. When I ask him questions he can answer me correctly. Um, his sentences are short, sometimes his vocabulary is lacking but he's got the language and I think he's definitely got the need, so I am very excited about using PECS with him. I think especially since his visual system is definitely his stronger one, far stronger than he's auditory one and specifically when it comes to perception and understanding, um I think it's going to make a lot of difference. It helps him a lot if he has the written word and then if I ask a question, sometimes if he's got something to refer back then it's also easier for him to answer and to use language. So I think the PECS has got the words for him, they've got pictures for him. Um, it's going to excite him. I think it's definitely going to, we're going to have some ___ because he'll be motivated to use it. So I can't wait to start.

How does the child use his/her communication skills and language in different social contexts?
And would you say there's a difference, a change in his communication skills in different contexts, or would he be pretty similar, if you see him out of the classroom context (outings or with different people)?
No, I think it's um, with different, inside the classroom, playground, outings, exactly the same, equally limited. Um, just as I said it is communication that occurs during learned situations. Like when his mom comes in, in the afternoons, he's got very associated, um movements, verbal expressions that he does then. And it's basically his ritual. She comes in, he gets onto the bench, he says "hello mommy how are you" and then he starts pulling her cheeks and that's a way of playing with her or interaction or just something that he's learned a habit, a habit that he's learned and that he's performing every single day as part of his routine. *So there's no communicative situation, no changing in the way he communicates?*
m-m

What features of M.M.'s speech and language make him noticeably different from other children?
What makes his communication noticeably different from the other children?
Well, the volume, definitely ah and the amount of communication. The rest of the children will talk and

talk and talk and they would interrupt me and um. With them they've got a a lack of impulse control, but they've got the social intent, the got the communicative intent to tell me something, but with M.M. that's almost absent. If M.M., it will be interesting to see, if nobody would talk to M.M. during the day, what would happen to him.

And with the volume?

Volume, I think, it all depends. Um, very often when you're near him he whispers and he can have a very soft volume. Um, but he can, when he has a wobbly, he can turn on volume, but when he reads he is able to have a normal tone.

How do you adapt how you interact with M.M. to try get him to communicate more? What kind of interaction style do you have with him?

I would, I'll try and establish eye contact with him. I would hold within his reach, something that I know that he needs or that he needs to do and then I wait and then I tell him, M.M. give me your words. You can talk, tell me what do you need now. So it's a lot of prompting, a lot of very laborious dragging the words out of him. Trying to do it in as positive a way as possible. But I think in that sense to, because he tends to make a ritual and a habit out of everything we won't move beyond that without something else intervening, without a different approach, because anything like that is, just becomes his habit, then that's his way of communicating, which you're just establishing. That he's not going to talk, you're going to ask him, then he's going to give you two words, then you're going to ask again, then he'll give you the same two words and then you're going to ask again, he'll give you three words. And so he is actually establishing a pattern, um and a pattern that you get stuck with and also if you push him to much he throws a terrible wobbly.

And has that changed much since you started working with him?

No. No. No, I think there's been less wobblies, less wobblies because I've just ignored the wobbles and went onto the next activity, or, without paying attention and trying not to feed into it.

Participant 1: M.M. Educator Interview 09.09.2005

What changes (if any) have you noticed since the PECS training?

Ok, well, M.M. uses, there is more communication between his, the learners in the class um and he, he's he seems to be more aware of them. In the beginning he was quite hesitant to, to hand over a PECS card, a sentence strip to them because I think he just wasn't used to communicating with them. But then um, he's had lots and lots of practice asking the children for his bread and his juice or um and and he's able to approach anybody and communicate his needs with them since his been, but with the PECS card, with the PECS card. Definitely I think he's become um quite used to them and he, it's difficult for him to cope if his, if his PECS file isn't here. He's had lots of wobbles on the 2 days, or specifically Mondays when his mom, when they forgot to take his cards. Um, so that's been quite a frustration.

Any other changes, with the adults in the classroom?

With the adults there's more, more eye contact when he when he approaches you, and definitely, um I thinks there's been less tantrums um. He's been, he's frustrated when he hasn't got the language on the cards. Because the other days we were looking at a video of the the print out, not the printout um the powerpoint on the computer and we were all sitting together and then I'd made a mistake with the sequence of the Creation song. And then he, he was frustrated because he wanted to say something about it and, but he didn't have the words on his cards. So I think perhaps the next would be, if he could have sentence strips that he could write on and then hand the written, his own written one not specifically ones that he's that he has to compile, because so that he's not confined to that vocabulary. Because sometimes he wants to tell us something that's, that he hasn't got the structure on his PEC cards and he will be able to write the sentence down and hand it. Yes, um he's been, if we use it, when we used the we PECS cards, uh, last week Monday for the first time for him to build his news, um and the children had to ask him, call him "M___" and he had to answer "yes, D____" and we made words for that and he put it down, um, and then they asked him: "What did you do this weekend" and made a sentence "I watched the Incredibles again". So he did it and he enjoyed doing that with all those, he wanted the others to ask him to. I think its, its sort of a novelty for him to have some interaction and he's, he's learned to enjoy interaction, I think and that's a very nice thing.

Has the PECS training changed the way you interact with / teach M.M.?
Well, no not in the sense that, because I still give him instructions, I don't use, ja. I, sometimes when he battles with something I'll write it on the board. I'll give him written sentence to communicate with him to give him instructions and that. But then he doesn't always use the PECS to answer me back. It's, one thing when I thought about M.M. and PECS and in the classroom too, is that it's it's, actually he would benefit from having a facilitator full time, because the pace of the class is going on. I can't I can't give him, wait for him to write out, to help him to write out a sentence, to give a sentence. If, whatever he has we use that, and, and for the situations, but the rest of the class with the short attention span that they have and I want them to pay attention, I'll just, I'll have to, the whole class will suffer for that. So I don't think, um it's it's no.
It doesn't change the way you are teaching him? No, no.
And the way you interact with him or your expectations of him in the classroom, has the PECS changed any of that?
Ja, from a communication side I think when, when he has that, it's. What I've enjoyed is that he's definitely become more part of the class. There… his ___ is not so much on his own and left to himself, because the children give up on interacting with him because there's no initiation from him and because they've got a high level of interacting with each other and they don't need to, but I think they've enjoyed doing the PECS uh, interacting with him with the PECS, but its still something that, to get, it's definitely not on all the levels and no_ and throughout the day, and but he has, ja. I think the fact that M.M. ha- has got ability to draw when he's upset or whatever, that's still his preferred mode of communication, so he's always had that and he's still using that lot. Uh, when he's sad or when this happened or when that happens it's easier for him to draw on a piece of paper than to build a sentence.
Do you think this is a preferred mode or lack of information in his file?
I think that's his preferred mode. I think that's so, its far quicker for him to draw that picture because he'll he'll do that in 30 seconds. And I also think before, if PECS can be adapted so that he can write out sentence strips, perhaps even if, just pieces of paper, can be cut out. And so that he can't draw on it, um and but has to write it, those are sentence strips. And we must really limit him, limit him to that, because just yesterday I thought, actually I should remove all pieces of paper in the classroom, um he's reverted to going into my office, getting important papers out of my basket, and I found them and he'd drawn these pictures on the back of them and I thought it was scrap paper. And then I thought oh no, guts these are reports from children.

What concerns do you have about the use of the Picture Exchange Communication System (PECS)? What limitations do you think there are?
I don't think there are limitations. I think there are just possibilities of expanding it as I've just said. And, um I think he might very well, you know, use that as a stepping stone that's still what I'm hoping for, that that it will be a stepping stone for him, um because just to see how much he enjoys the interaction um, he's going to enjoy interacting. Cause if you think how many years he's coped without interacting although he's had language. Now it's just a few months that he's had that option. So I think there's huge amount of catching up for him just on experiencing, I guess we don't even realise how much interacting we experience in a day or the other children experience.

How would you describe M.M.'s communication skills in class at the moment?
Well, his communication skills… um he's got longer sentences that he can use and his volume that he uses it's much better. If he uses a PECS strip there's a normal volume. If he hasn't got a sentence strip or he hasn't got the written word, then he tends to whisper because he's very unsure. But if he has the sentence strips and the words give him confidence.

What kind of methods would you say of communication is he using? Predominantly the PECS? Mmm. And then that would be just, ah his drawings and then the wr__ and then his words. *Is his verbal more spontaneous without the PECS?*
It, that is, it depends a lot on his motivation and at times when he's stressed to do something then he will communicate, but that was the same, but before PECS, but except that there is just a difference in the sense that he's got less tantrums. Previously it was just tantrum, tantrum, tantrum, tantrum. And then we had to figure out first this and then that and then this and then that.

Would you say that was one of his main methods of communication?
Yup, I think so definitely.
And not so much anymore?
Uh-uh. No. No definitely if I think you know I hardly ever report him being put out of the classroom or asked, he never asked to go out. Because usually if he got so distressed he usually said he wanted to go and sit outside in the passage. And I think this happened about twice this term which is a huge improvement.

Would you say he experiences communication difficulties at school?
I think it's still, mmm, you know if, just having his PECS book there, there's still that prompting because a PECS book, ja acts as a prompt for him. Otherwise he will never just comment on something, um spontaneously. Rarely at times he would, but it's just very very seldom.
And as you said earlier about the tantruming, are there times when he still can't tell you what?
Yes. But then I think what will happen now is that in the tantrum he will use some words. *And will those make sense?*
Yes they do. Yes, they will, they will definitely make sense. *What sort of things will he say?* Ja, like he will say the wrong words and he will say the right sentence. This must be this right sentence or he'll say, he'll refer to himself in third person, you know and say "M____ da da da da dum wants da da dum".

What is your view on augmenting his communication?
Ja, it's absolutely necessary. Absolutely necessary. I don't think there's ah I think he will be, it will be a big, he will be deprived if we take that away. It's like giving him a skill and then taking it, saying no you can't have it anymore. It would be… No I wouldn't even consider that.

How does the child use his/her communication skills and language in different social contexts?
Ja, I think his carryover is o- is really quite okay. But that is, you know he depends on us to see that um he has his PECS with him when we go on an outing or to use that when we are on a outing. He used it a lot when it was K___'s birthday party which is very, very nice. It made a huge difference, um but its just the fact that really, its almost too big a job, too li—too small a job to give to somebody full time, but if he could just have somebody else with him, because it's it's too big a job to take care of the whole group, um and to keep them safe and to see to there needs and to see that they notice this and to do that and, to… and in that sense M.M. can give that amount of attention, but then still to stand still and now ok its only just M.M. for this. To cater it for him, is is almost just that little bit, it's, it's, ah, that you would want to do…
Do you think that limits the use in the classroom because he's the only child in the class using it? Would you say that's a limitation?
Yes I think, ja. Definitely if if the whole class was just doing it then I think it's easier, because then you'd know that's your pace, but he he slows, the use of that is a complete catering for that in itself um and it slows down everything, but I guess in the same way that you'd have to slow down if you've got somebody in a wheelchair, or you know to get them, then you have to wait for them to get them in the bus and in the same way I guess... He gets that bit of attention. He gets his fair share, but he needs more than a fair share. I think that's what the difference is.
Would you say that's changed over the period that he's been using the PECS in terms of the intensity of input it takes?
I think what's happened now, is it, it still needs, the amount of attention that he needs is the same, but um the context, the content is different. In the beginning it was just certain situations, now because we're doing such a lot of stuff in the classroom, he needs to have those words for all those different sentences and that's why I think it will be easier if he has got sentence strips and he can write out a sentence strip and he can give that, because that will enable him. Because now he's got his vocabulary and he can choose from that, um but if it's out of that vocabulary and for situations per situation it's it's not going to work. But I think if he's able to have it and, because that will be, he writes fast and quick and it will be easy for him to do that. Um, so I think…
Yes I think so, because you see in the other classes where the children use PECS there curriculum is quite smaller than what we do, and then it's even, I guess it would be easier for them, him, for him in a class like that where there's only a limited… but ja it's because we've got such a variety of activities

that we do.

What features of M.M.'s speech and language make him noticeably different from other children?
It's that it's not as spontaneous as the other children's communication is. Um, that, well, it's basically it's initiating, it's initiating and it's also the amount of communication.
It's the communication, uh in the sense that the others are reciprocally going back and forth and he's doing one sentence and one response. So it doesn't carry on, you know. It's not, he doesn't pedal forward from there.

How do you interact with M.M. to try get him to communicate more as opposed to before the training?
Well I think what happens is that if I ask him a questions and I I know he's got PECS that he can use to answer me, I'm sure he can pick up the expectation in my voice just in the way that I put the question to him. That he knows I expect him to respond to that, where I'm sure before the time he could pick up the despondency in my voice when I asked him something and I, I knew I would be going to motor him through that, giving him the sentence and then he would repeat it and um…
Has there been any change in that aspect of this speech? The echolalia and self-talk?
Ja, self-talk… um ja, some, self-talk depends very much on what his aft--- it's in the week. Self-talk Mondays are rife and towards Friday it's fine. But you can see he's been watching video the whole weekend. Mondays the worst day for self-talk and then by Friday he's fine. And then we start again on Monday with lots of self-talk and then it sort of peters down towards Friday.
And echolalia?
Echol--- the delayed echolalia, lots of well… echolalia definitely less, a lot less when you ask him a question he will respond to it. Uh, what has improved a lot is that he's able answer correctly to the wh-questions. If I ask him a 'who' question, he'll give me a person, if I ask him where, he'll give me a place. And I don't need to prompt him that I've just asked you a wh- question of a 'who' question, um, so or or the time for when, and so on, so that's so that's been huge improvement in that development. So he's accessing correct responses easier, far easier.
Has that been from the time he's been doing the PECS?
Mmm, definitely, definitely ja. I think there's ja, ___ perhaps the fact that… ja. He's using delayed echolalia when he goes into the self-talk, that's different one, that's seker maar nou net… but just the repeating question immediately after you said it, that's that has decreased a lot come to think about it.
Any other comments?
I think, ja, the main important thing is that I think he's become more part and parcel of the class. Uh… I think that he looks happier, much less tantrums which is a huge thing to have, um and… I think he knows he's got more confidence to, um he knows that somehow he can communicate and I think he enjoys, he enjoys interaction and he enjoys the communication, he's he's he's tasting he's tasting what it tastes like to communicate. It's not something completely different from language. I think that the the connection between communication and language uh… has definitely come closer. Not two vastly different things that have got nothing to do with each other. The link between the two has become more apparent to him.

Extra comments (after interview)
When we send him out on the playground, it's, he does his little bit of interaction and I think it helps a lot, but then he runs around with this piece of paper and then that's become this piece of paper is now his… friend. It's difficult, where does he put it down and or if he runs on the playground with the book around his… if its its not natural.
Would you say the book is an issue?
You know for him, I, uh, I don't know if it's really an issue for him or whether he minds it as much as we mind it, you know because I would hate to run around with a book like that. But then I don't know if its theory of mind from my side that, perhaps he he doesn't mind running around with his book, but ---'ve got, its not something that he can go on a slide with or… so I think if, if it, if there's a possibility of having a smaller more user-friendlier mode, I think perhaps that will help a lot ___.

Participant 1: M.M. Parent Interview (mother) 28.11.2005

How would you describe M.M.'s communication skills at home at the moment?
Um… very limited. Um… only when he needs something. He will … talk. I think that's the most times that he'd communicate. The other things are when he wants me to repeat something. Um, it's, it's talking, but it's senseless. Um, that's about it.

What kind of methods would you say of communication is he using at home?
Um, besides the PECS? *Including.* Including PECS, um he would talk… short concise *Using the PECS as well?* Yes. Yes as well, with, with that. Um, nothing except that.

Would you say he experiences communication difficulties at home?
Difficulties is still when he, if he… for instance. If he gets hurt, it's still screaming until somebody comes to him, he won't run to you "ooh I hurt my finger", you know. He will shout and scream until he gets ___ that's, I think that's like a baby.
Um, s… ja. And I mean, he's he's got the words but he doesn't use it. So… still.
Have there been any changes since the PECS training?
You read the, the questionnaire, the answers that I wrote to the … M.M. worked well with it in the beginning, but as I said to you, as it got longer he wasn't that, the enthusiasm wasn't there anymore, and I had to motivate him to do it. Um, so he's still gone back to his old way, ja.
And initially when we started what differences did you see then?
It's, it's, it's like something new, I, I feel it is like something new, he was enthusiastic about it and then the enthusiasm wore, it's like getting something new, the novelty wore off and um… he started you know doing things and I had to be the motivator all the time, you know, show him - use this. And, and then I got tired of it as well, because it means I'm I'm the one that's having to run after him with with it with it to.
Are there times when he uses it at home?
Ja, because I've grown tired of doing it, he's picked up from that, so he's just not bothered either, ja. So the enthusiasm was there and then it dwindled.
So at the moment what he's primarily doing is just talking?
Yeah, yeah unless I'm the one to give him his file, with them all and, and wait for him to use it. He won't. He was, there was a time when he was doing it on his own, that's with enthusiasm, but as the enthusiasm dwindled, you know, I'll I'll be the one having to, you know, say 'here', give it to him and motivate him to to use it.

Would you say the PECS training changed in the way you interact with M.M.?
Um, like I say the enthusiasm and the ___ things. I don't think it's also because of new teacher down there, I think maybe that was a factor as well.
When would you say it lost momentum?
I would say… the last 2 or 3 weeks.
So that's quite recent?
Ja. I would say the last 2 or 3 weeks.
And prior to that?
Um, because I had to be the motivating factor in in in the PECS, um, I thought it was time that I shouldn't be the motivator any more. After such a long period of time, I shouldn't be telling him, 'here's your file' you know. He should be, he should be doing it on his own, after a, after a long period of time. So I thought you know if he's not going to do it, I'm not going to do it.
And those things that he was using his PECS for before, now when he asks for them, how is he asking for it?
You know what he's done, because he knows the drill so well with the PECS, he actually will come to me without the PECS and say exactly like the PECS, as he would say if he had PECS, if he had that sentence strip in his hand. That's what he's been doing.
Does he do that spontaneously?
Yes, yes, quite often. And I thought, you know if, I don't if that's a, if that's a positive or a negative thing.

But he's still, I think it is a positive thing, because he's still got the PECS in mind thinking, you know, I remember that and that's how I should ask. So I I I think that is that is a positive thing. So, he does, he will still come to me, he will ask and he will ask in a proper sentence, but he doesn't have the sentence strip with him. But he knows, you know ag, difficult going running. Have difficulty pulling the thing off, because it's quite tough. I'll just ask in the way I'm supposed to ask when I have the sentence strip, so, ja.

Would you say that is different from before he had the PECS training, or would he do that before?

I, I, I think, before he wasn't asking properly. He would try and get away with that one word business. You know, so and and you know what's also good. I don't know if I mentioned it in that questionnaire. Um, remember when I said to you it's it's it's the the communication thing is very stilted. You know like it doesn't have those those 'my' and those little words that make a sentence sound correct. And in the beginning he didn't want me to correct him, but then later he accepted that and he would give the sentence strip without having, without being, with you know the missing words not being there and actually asking for it correctly. So that that that was something good for him that, that's helping in his in in his grammar.

Is he still doing that now, even though he's not fetching the sentence strip?

He's got such a a memory, that he's he will he will still do without it. So that's also a a positive that has come out of the PECS.

Would you say he is still within what he was using his PECS for before or has he spread it to other things? Or is it the same routine?

The same routine, ja he basically kept to the same routine. Um, there was a time when you did do the other things, but I thinks it was because L.L.'s [teacher] was also there, and of course you were working together with her I think that was then, and I think after that without that extra influence, it just goes … 100

What has been your experience of having a different teacher that isn't PECS trained involved? Do you think it's had an impact?

I think it has. I think that um, I think um… L.L. [teacher] was a good motivating factor. And, and, and, and, and you've got to follow through, in, in, in something new, it's got to follow through. And I think that if it's not followed through it loses momentum and I, I definitely think that it lost that momentum. So, I, I think M.M. would, it would have, it would have been broadened, would have gone further that just the routine.

And your feelings about picking it up again?

I think we should take it to the next level. I think I think he's also bored with, with doing it as, and I think maybe that's also an influencing factor, where he's got bored of doing it the way he's we've always been doing it. I think he actually needs to got to the next level where it is sentences, because with Roshne [speech therapist] we have been doing long sentences and he has been putting you know like the subject and the object, and the verb and he's been making long sentences with with the mix of the words and he would put them together, fantastically in the right order you know so, that is better. I just think maybe if we go to the next level, the enthusiasm will come back.

What is your view on using PECS with M.M. at the moment?

I think we're tired of what we're doing now, ja, I I I, think definitely if we go to the next level and have a change then the enthusiasm will come back into it.

So you're not against using it with him?

Ja, it, it needs to be, it needs to his thing, I I I don't, I don't mind being the motivator, but I need to phase myself out of the picture and its his its his his communicating, he's the one that's supposed to be communicating. So if we can get the change and the enthusiasm back, who knows, I don't know.

At the moment if he wants something that he would have used the PECS for, will he always use a sentence or will he sometimes leave it or has some other way of communicating?

No, he's he's he's he's he's very definite. His his sentences are, are, are very definite as he remembers he's supposed to do it. It's not it's not one word, it's a sentence but still I I think the sentences need to expand.

Do you need to prompt those requests?
No, no, I don't he, he, ja, he does it on his own, he's very good with that.

What concerns do you have about the use of the Picture Exchange Communication System (PECS)?
Um, like I explained in the in the questionnaire, sometimes it does become tedious that he's got to go through the whole thing of putting everything on the board, pulling it off, giving it to me. It does become tedious. Um, that's why I'm thinking if he can verbally ask me for it, why not? Because that's what we want at the end of the day, isn't it. So I've, I've accepted it that if he can ask me for the stuff and he doesn't necessarily give me the strip, why should I why should I push the issue of actually having the strip because he's asking everything the right way, so I don't, I mean that is what you want to achieve with PECS anyway, so is it wrong to accept his, his, his asking in the proper fashion but not having a sentence strip?
[explained criteria for stopping PECS] *As long as he's at the same level and it's not being prompted.*
Yes, yes, that's that's yes that's that was what I was thinking, um I'm not going to push the PECS anymore because he is responding correctly, he is asking properly, he is using his language properly and appropriately. And if he's not actually using the PECS, I mean that's what PECS wants to achieve anyway, so that he can verbally ask me for whatever he needs. Um, expanding would be would be something nice, ja, ja.

And any other aspect of the PECS system that are problematic? Your issue with the PECS file, your reason for wanting a smaller one?
Ja, you didn't get back to me on that little porty porta-thingy [refer to small communication file]. Um, I can still use that, but um, my families better with the portable. I'd like to try it, I've tried it once, I think I've tried it once.
What are the difficulties with the normal size file?
The normal file? Um, it's fine, um it's just… um easily, more easily accessible. I I don't know. I just think it's such a lot to carry around with you. If he knows he's going to the beach, let's put things that you would need I think help with would definitely go there [laughs] and all the other things, ja. Um, but you don't need all of that stuff, that's like carrying the encyclopaedia wherever you going I mean, and you know if if if if he has got here already stuff that is not in the PECS but he's using it, why not…

How does M.M. use his communication in different social contexts?
Um… you know what, I was just thinking about yesterday … look as a mother you don't really see that progress so in your, unless of course you actually just think back a little bit and you really look at where M.M. is then maybe you can actually see it. Um, and yesterday I was thinking, we were at my sister's place and he asked because there place is not really the kind of environment for M.M., M.M. friends are not talking to people. My, my, his cousins are older than him so, and he doesn't talk anyway, he's not going to play with, with people.

Um, so the only other thing is the computer, if there's a computer in the house or if he can draw and he actually came to me and asked me um how, exactly how he would ask with PECS; "I want to play pinball". So I had to ask him 'on the computer?' you know and he said 'yes'... He actually knew that was the game that he was playing on it last time he was at my sister's place. And then I said to him go ask your cousin. So that was nice, that was nice, you know that he, he's bored with himself and he can ask for what will make him happy. So ,that is that is something, something different he's not just feeling bored and just running around outside, you know.
But he'll choose to come to you and ask?
He will come to me, he will come to me. You see, his his world is still his immediate family, in fact most of his world is with me, I mean if, if he, if he wants something he won't really go to R [father] or, or M [sister]. He'll come to me and if I'm busy I'll say to him 'go to your daddy' or go ask M [sister] and then he will proceed to ask them.

Appendix O: Semi-Structured Interview Transcripts – Participant 2: N.N.

Participant 2: N.N. **Parent Interview (father)** **14.06.2005**
How would you describe N.N's communication skills at home at the moment? He'll only ask you for something if he wants something, but it's not really out of his own, it won't be spontaneous. If for example he'll ask you to do something with him, uh… other than that he will not communicate on his own, unless for example when Z.[sister] comes in and he sees Z.[sister] coming in and then … um … then its more or less spontaneous because he'll go up to her because she's got these little emblems always on, on, on, on her, vests or on her tops and all that say "Speedy Cat" and he'll go, go to her along along those and that's the only time basically that he will interact is when he wants something. *And with his basic needs at home? Would he be able to …* He will say "go to toilet", "open the door" because we've put a latch on the top. So he will say "open the door", um… "I want…" like the stuff that he needs he will say, and he's clear on it, so it's not as if we're not really confused about it. What I've noticed is he makes up sometimes his own, um, descriptions for stuff. For example, we've got at home a medal, with a cricket medallion on it and one day he lost it and he said "Where's cricket band?" and we couldn't figure out what, what was he looking for. And actually it was, 'cause cricket on a band. So… but I mean so then you have to really now think now at times what is he saying. But I mean in the end when you figure out what he's said, once you see what it was, I mean you figure it out, along those lines.
What kind of methods would you say of communication is he using? If for example he's frustrated or M.[brother] interferes with him, he then, he doesn't verbalise he'll shout and then later on he will react, by he'll give M.[brother] a knock, but he won't just, if for example Z.[sister] sits too close to his stuff, he won't say go away or anything , he'll just react immediately and push, so. *And if he has something like for example with the cricket medallion where he knows you're not understanding him, would he use some other ways to communicate?* No, no, no, he'll just keep on, he'll just say over and over, he just goes into repetitive mode. *And he doesn't use things like pointing to things or pulling you to things?* No, I haven't picked it up. He will say basically what he wants, I mean he's got his basic vocabulary, in terms of "I want bread", um, "I want dinner" you know. He will say "popcorn, chicken", he knows like he wants coke. So he knows what he wants, basically that's what interests him.
Would you say he experiences communication difficulties at home? If it's something new you ask him to do, um… if you tell him once or twice to do it, afterwards he'll pick up. You ask him to go fetch the brush, um go fetch the shoes where it's not normally. I think if you take him the first or second time, then afterwards he'll know what you're talking about. If I ask for example go get the butter out the fridge. The first he will refuse to do it at all. I'd have to take him by his hand, take him to the fridge, show him what is the butter, then I think once he understands what you want, then its not a problem. *What is his reaction if you give him an instruction and he doesn't understand?* Puts his hands on his ears and he starts shouting, "don't want". And that's the time when he doesn't understand. Then he starts shouting. *And other things where you feel if he had the ability to communicate he would, but he's unable to?* I think it's basically when they start interfering with his stuff, like um he'll just start shouting. If for example, Z. [sister] goes in the TV room and starts changing the channels if he's watching, and then he'll just start shouting.

He will easily say, on Saturday he knows where we go, so it's like a routine, he'll come to you in the morning, he'll say "brush teeth, get dressed, get in the RunX, go to the post office, go to Tokai", and he knows that's the sequence, um but I mean he'll come to you in the morning and he'll tell you and he'll want you to confirm it by keeping his hand on your mouth cause he'll wants you you to say yes now to each of those things. Um… in the end you just said yes you know, just to, otherwise he keeps on.

And if you have to change that?
Uh, we've learned now we change the routine we communicate it ahead of time. You see, if we go shopping, we normally go… he wants his ice-cream, uh so if we go in the opposite direction now, then he starts making a scene, so what we do is before the time we'll tell him like… "first go to Ackermans, then we go to Foschini, and then we go and buy ice-cream". So long as he knows, and you've communicated ahead of time, then you're covered.

What is your view on using things like picture communication with N.N.?
Um, I don't have a problem with it. I think actually at the time um when he was using the hands it actually helps you at times, especially you don't have to shout at him or anything, you just say like 'sit' [demonstrated Makaton sign] and that type of thing and the minute he sees it he picks it up. So I don't see a problem using it. I think if you look at it, M.[brother] is now at the stage where he wants to draw everything, so actually it might actually help also him in the sense 'cause M.[brother] might also interact along those lines.

Would you say that N.N.'s communication varies in different contexts? (E.g. Home, going out, public places, family, friends)
I'd say it's basically the same. In a sense that, when he's out and when he's seeing something he won't comment, he'll say the cars names as we drive along, or something along those lines. I'd say that's spontaneous because he likes names of cars. Or he'll say… he won't ask you where you're going, he will say, he will try to give you the answer. He will say oh, we're going here… we're going to Aba [grandfather], going to F.'s [mother] father so he tends to, to, to , to give you the answer of where we're going, not asking where are we going.

He doesn't communicate more in one situation versus another?
No, he might be more verbal at home in a sense, but not making, like he tends to when he's in the room watching TV you know he tends to make sounds, but I think its more like an internal pacifying thing and when we go out, it might, he tends to flap but not make those sounds, if he makes those sounds we can tell him to stop and then he will stop, but at home he, ah… he tends to be louder.
And differences between yourself, and F. [mother] and the siblings? Does he communicate more with certain family members?

I think … I'd say more with me at times because, uhm, most probably got more of a soft spot, because they will like say 'no' to him and then I'll say okay what do you want. Along those lines. So he'll tend to come to me for something when he knows he's not going to get it right by F. So he's got those options because F. might tell him no you're not going to get. Like when I come home he knows when I come home that it's time for him to eat. So if for example I, I come home at 4 o'clock, where I'm early for example then he would expect its eating time now. Um, so, and he'll know when I come in, he'll ask me, he isn't going to ask F., 'cause he knows F.'s going to tell him it's light, it's still too early. Along those lines.

What features of N.N.'s speech and language make him noticeably different from other children?
He's definitely different. If he wants something he'll keep on asking, keep on repeating, he'll start. Like if we see stuff he will close his ears. Like he sees the Wimpy sign, he doesn't like the Wimpy sign, doesn't like, um Spur. So if we come passed it, he will either start shouting and then we'll pick it up immediately. And then he, I suppose the way he talks also like that, you'll pick it up, it's different.

How do you adapt how you interact with N.N. to try get him to communicate more?
At times its not to give him exactly what he wants, its to… uh ask him what he wants and force him to

say something. I think at times we also tend to give in because he'll you know keep, if he doesn't get his way he keeps on, keeps on, so in the end I mean more for peace that you're going to say "OK". So, it's a balance at times.

Do you use a lot of questions or prompts with him?
Its more questions, like what do you want? Where do you want to go to? Along those lines. More questions than prompts.

Would he tend to help himself rather than ask?
I think at times he might, he prefers to come to you to ask, he expects you to give it to him rather, along those lines. If he wants anything from the fridge, like he'll go get something on his own. I mean he'll help himself in the house, where he can get the stuff he's not going to ask someone he'll just go and fetch it and do his own thing. Um. If for example… we're out shopping in terms of brand names, he'll for example point out and tell you in the shop, OMO or RDL and whatever's on TV, the advert section he will tell you when you go passed there he'll use that to interact with you. And ,and, and sometimes people think he's normal in a sense because he will repeat, but actually if you're listening he actually keeps repeating the advert or phrases that, that he memorises, uh. So in the situation it comes out spontaneous, it's not, he doesn't think, it just drops, I mean someone might think its normal but not knowing that if you listen carefully it might be an advert that he might be rattling off or something.

Would you say it's usually brought up in an appropriate context or is it sometimes without a context?
Sometimes without. It's sometimes little things that you only pick up afterwards that might have triggered it. And you might think, um, you might have for example like with my phone my company Nokia something that he says something inappropriate, but its when he sees the Nokia lying when he walks passed and he sees it then he'll rattle it off. So I think it's more the visual prompt that causes him to rattle certain things off.

Participant 2: N.N. Educator Interview 23.06.2005
How would you describe N.N.'s communication skills in class at present? N.N. communicates very much on his own terms and he will communicate if there's something in it for him, otherwise he tends to be pretty independent do things his way and on his own, and so on. Um, its, I wouldn't say he's a very good communicator. He has improved in fact in the last little while.
What methods of communication does he use? Uh, he, he does… vo- vocalise but very often just one or two words. He's improving quite rapidly now with whole sentence construction, but you can say that's the last two weeks. It is quite a dramatic change. Um, he very often repeats things, a word and he uses his adverts. He's got this whole thing about adverts… uh, marketing, marketing is very big with N.N. so he will repeat things like that. And it's very often association of words. He'll start, he'll ask you something and that will spark off an association and then he'll go into repeating the jingle of the ad which is the catch phrase of the ad and then he'll forget about the whole communication that he started initially. *And other non-verbal communication?* He does quite a lot of non verbal. He will quite often take your hand to ------- *And any inappropriate behaviour as communication?* Yes, if he's cross, he will try and hurt you, physically. Um what he does do which is quite interesting, he does a lot of self correction, but you don't say anything it's stuff that's been said to him and very often before he actually does something you can know that he's thinking about doing something because he'll self correct like his famous "don't touch boobies, don't touch" or "press the boobies, press the boobies" and I've been responding with "breasts are private don't touch" and now when he's cross with me he looks and me and points and says "breasts, breasts private rude" (laughs).

Would you say he experiences communication difficulties in class?
Uh, yes, I would say he has quite a lot of communication difficulties. He doesn't communicate very well with the children, if, they fight quite a bit, he and various children, um, but apparently he was taught to fight, so he might also be experimenting with that behaviour because he was taught shortly before he had his class move and I think sometimes he's going a bit far with it but then ja it will be his turn to they fight over things like who wants the ball um otherwise he doesn't really communicate much with the children but um if I'm out of the class he repeats my name constantly and the class assistant or the GAP student or whoever has to try and he will communicate with them, but most of the time he will try and do his own thing first and if he can't then he will try a communication of some kind, be it verbal or non-verbal.

What is your view on using augmentative communication things like picture communication with N.T.?
I think it would help him, N.N. enormously. I think it would help on many levels. I think he does have, s—I wouldn't know, you'd know being a speech therapist. I don't know what the condition would be, but I think it is difficult for him. And the echolalic, repetitive stuff obviously of the jingles and the ads obviously gets in the way. Um, the other thing is that there are other children in the class using PECS and quite often he wants to take their files so I think he would feel more part of it when he's he's also got his own book and he's obviously picked up already on the whole system because sometimes he'll just hand us a picture randomly of something he wants. So I think it will help him, first of all to develop communicative intent and secondly his sentence structure is improving quite rapidly now and I think that will go a long way to supporting that.

Would you say his communication and language is different in different social contexts?
Um, I don't know him well enough to really say because I don't know all his funny little foibles. We had an outing recently and we walked passed a Wimpy and he went crazy, and screamed and covered his ears and when I looked up and said to B (assistant) "do you think it's the Wimpy?" he threw himself on the floor, kicked and screamed and carried on in a way that I've never seen him carry on before um in class. But, otherwise his communication I wouldn't say is particularly different, but at home I don't know. I haven't a clue. But between the class and other venues in, in the school building, no, pretty much the same sort of thing. The repetitive stuff when he knows it, the sort of self-correction or self-stimulation when he knows. Like for instance this morning, when C (educator) was taking a bit long to get to the school song he kept saying "school song, sing school song, school song". He's very routine-bound.

What features of his speech and language make him noticeably different from other peers?
In my class, probably that he can speak at all is different. Um ja, it's the it's the echolalic um, the … I'm not quite sure what the correct jargon, the obsession with the ads and the marketing, what do you call that? hmm whatever. Now it's different to the echolalic stuff, it's, it's kind of like an obsessive rolling out of the jargon and I mean the fact that he doesn't have complete um sentence structure.

How do you interact with N.N. to try get him to communicate more?
We um, we are incredibly aware and focused on that in my class so just about everything we do anyway they've got to communicate before we continue with the activity. Um, obviously we try and make most of the things more attractive, but even things they don't necessarily particularly want to do, we still kind of insist on some sort of communication between ourselves and the children. So… *Does he need to be prompted with that?* Depends on, when there's things that he likes, like um threading or things that might vaguely lead to flapping, or just a piece of string to flap, he's there like a shot. With the stuff he doesn't like then there's lots of 'no's and … about. Um, but by and large I would say he quite enjoys, he quite enjoys being part of the group, but he'll work for a minute and then he's done. He can be a little bit lazy with some tasks. And then some things quite frankly he's just not interested in doing, he just doesn't want to go there. N.N.'s biggest thing, I think with the communication is um his fear of anything new, be it an activity or a place or a food or a whatever, um and things like this Wimpy fear, um so we've been working through that quite a bit and I think the be- better able he is to communicate the better able he'll be of controlling that. With Wimpy we've desensitized the whole thing so that now you can actually say Wimpy without him falling to pieces and you can talk about the fact that he doesn't like sliced potatoes for chips and fish which for some reason he communicates with Wimpy, he says

"Wimpy" and then he says "sliced potato for chips" and then the fish comes after that. So somehow there's a link, and he doesn't, doesn't like them, he doesn't like them. But talking it through has certainly helped to desensitize the whole issue. Quickly to.

Participant 2: N.N. Educator Interview 01.02.2006

What changes (if any) have you noticed since the PECS training?

Um, N.N.'s had quite dramatic changes. He always did have some verbal ability; he never spoke spontaneously that easily, except for his um repetitive and obsessive phrases. He now, um speaks more appropriately, more spontaneously, plus his sentence structure and his vocabulary and all of that has improved quite dramatically.

Has the PECS training affected the way you teach him, interact with him in any way?

Um, yes, I think so because now we expect him to slow down, to speak to us, um we don't accept just a one word repetition. We… um now are quite definite that he must communicate with a person, whereas before if he spoke into the air, we would respond. So in fact he wasn't necessarily communicating at all he was merely saying "biscuit, biscuit, biscuit, biscuit, biscuit" and one of us would jump in "you want a biscuit". Now we, and in fact most of the time we can actually might of just with the verbal… ah-um visual cue with our eyes onto the book or pointing and then he remembers ah, I must as_speak to a person. And so that's generalized, I must say into all areas of, of the classroom. So we do interact very differently and teach him differently because we know he has the ability to understand, you know. We can assess his receptive language far more clearly now.

What concerns do you have about using PECS?

My biggest concern about using PECS is that um it's got to be used I think everywhere, um and is important for the family to come on board. I think his immediate nuclear family are on board, whether the extended family are I don't know and that is to me a concern. Um, I don't know how we get across the message that this is a communication system. This is how this person speaks. We need to incorporate it into our lives so that this person can speak to us. So that's my one concern. My other concern is that PE-PECS is not used even correctly within our professional set-up. Where people are using PECS as a … choice board or as a convenience thing or here not there and we go for a walk and we don't take the book or, ah... You know we're all guilty of it, we'll go up to the OT room and unless we have a book and not have um PECS cards available. And you know I think all of us need to take it on as our, as our culture, this is how we communicate. Therefore I don't wear a gag at any time of the day, although some people may wish. If we're not going to wear gags, then we must not let our PECS users go out without their PECS cards.

So that's a concern for me, and I do find the books a little bit unwieldy, I also find that the books have the hook on the book part is damaging to clothing. It could have perhaps been better to have done it the other way with the soft stuffs on the book, 'cause then it doesn't catch, particularly in Winter with Polar fleece it damages it quite badly and, and knitted jerseys. You, you know it's a little bit inconvenient.

How would you describe N.N.'s communication skills in class at present?

He's got clear communicative intent. He can make his wishes known. He can um, he's now starting to communicate if something um unpleasant happens with one of the other learners, with one of his peers. We've got a new child that likes to pinch. Whereas in the past, Na-eem would not necessarily react or not let us know he might kick out, back at the child. He is now starting, and this is after 2 weeks really, to tell us. Because I initially noticed he would just sort of rub a sore place or do a little retaliative, but using the PECS you know we did the little quick sketched Social Story. Ah, so you know just tell me or tell one of the other grown ups so that we can help Tommy learn not to do it and you don't need to suffer, you know, basically. And today in fact for the first time twice spontaneously he did try communicate that Tommy was pinching. So I think it has helped you know generally where, where he does feel I think empowered to communicate.

What kind of methods would you say of communication is he using?

PECS or else just talking. Quite often he will just talk, he doesn't use the PECS which I think, I think is okay because he's forming complete sentences and appropriately, you know ---

Would you say he experiences communication difficulties at school?

Mm, even though it's --- I think he does still have a limited vocabulary. Um, his own you know, looping into his repetitive thought pattern still happens and that does tend to block because um ch-ch, ch-ch (noise of tape playing over and over). However, I am finding he is, um, I suppose its all part of the maturing process, I think PECS helped enormously in um giving the child self-confidence, which I think helps him mature. He um, always has his repetitive things. Now he's in the hostel, so its "wait for daddy, wait for daddy, wait for daddy" yesterday the whole day. And I said that's not what we do, it's silly, we don't have to say it all the time. Yes daddy will come and --- and today he said it once and I sat down and I said, ok what did we discuss yesterday and he said "no more, daddy coming" and he didn't feel the need to keep repeating it all day.
You know, it's it's early days, it's his first week in the hostel.

What is your view on using an augmentative system like PECS with N.N.?
Well, I think, um N.N., because he's been you know part of the research is a perfect example to show how it can help to give self-confidence, to to give autonomy in a life that's frighteningly out of control. Um to help not only the learner, but all the professionals that have to interact with the learner and the family, because it allows the child to communicate and so we have a much better idea of what's actually happening. I would, I would, you know, if anybody's worried about 'my child might not learn to speak if I'm using something like PECS', no without fail every child I've worked with now in my class, you know, they have all started talking, even those that were not verbal at all and if they can't talk they are making attempts to talk, so its it's promoted speech rather than inhibits.

And at this stage, with him verbalising sometimes without the PECS file, would you say that he still needs it or would you say its time to stop?
No, he definitely needs it. He only verbalises the things he's very comfortable with. Um, but I would, have um a fairly strong sense that even if he is verbalising practically everything, I would say. I think he needs the concrete, you know 'Lionel's blanket' of the, of the file. I think he needs a concrete thing there to keep him in the structure. And I think if that was gone um he could easily revert back because, I mean we know a lot of our children have learned behaviour. It's not necessarily internalizing. He's doing this to fit into our expectations. I don't know that he necessarily was unhappy with the way he ran his life before. His world was okay because it ran according to N.N. We're making demands on him, so therefore this is making it easier for him to fit into our world. And I think take all that away and I think he'd be quite happy to be the N.N. he was then, um for how long he would use it I don't know. But um, I think with most of these learners just having the file there is a reminder, 'I need to communicate with a person'. These are the skills, I've learned them, I know A,B,C, this is what I do. And I think if that's gone, slowly, slowly um that skill is eroding because they'll slip back into old patterns. I might be wrong, that's just my feeling.

How does N.N. use his communication skills and language in different social contexts?
Well, for us he uses them you know, with, within our structured set-up and we are quite good at taking the PECS books with us if we go up to um, music room for drumming, we go to vocational room, if we know that the place we're going to hasn't got picture cards, we take our books. If we go on an outing, books always come. If we walk to the shop, you know they go with us. Um… what happens outside of school structure I really don't know.
And from your observations in those different contexts is he using the system effectively in those contexts? Yes he is. But I mean that's because there's structure, we've, you know nearly everyone's using PECS so we're structuring things, its very easy to just pick up what's happening and follow suit.

What features of his speech and language make him noticeably different from other children?
Um, pronoun use, he still um… switches that. He still does quite a lot of echoing, um… ___ somes of odd sentence structures, he'll put together a sentence in quite an odd manner, especially if its new stuff that he doesn't know. He's got quite a good memory for when he has had correction ---, but if it's new stuff he still tends to put words into odd places. But I'd say the biggest influences for him are are repeating what you're saying---. And then his repetitive thing, when he repeats something that's worrying him or exciting, exciting him and then he kind of just gets into that speech and he doesn't necessarily communicate with us um… about what's wrong.

How do you adapt how you interact with N.N. to try get him to communicate more?
Um… I, I guess we just um, we expect him to use his PECS in 90% of the situations in class and... you know we'll we'll point to where the books are generally. He specifically is actually quite good at doing that. And if you don't answer him, you don't even have to point, look, anything he'll pick up on that as a cue, if you don't answer him he'll pick up on that cue and he'll get his book. [Um... K.D.'s actually the first one always if I come out, 'cause I do this quite often, I come out with a bowl of sweetie or something because I want them to spontaneously come and my assistants know not to prompt the children. Um K.D.'s always the first one to notice there's sweeties and run for the PECS book], but if it's something N.N. wants, he's a little bit more of a fussy eater, so it's not always something he wants, but if it's something he enjoys, he'll very quickly pick up on that cue. He'll go and get his PECS book and strip and come and, and ask for whatever--. But he's discerning, you know if it's something he doesn't particularly like, he doesn't. So he is thinking about it, you know it's not, not just a pure copy. Not because he sees the others do it. He will first look and see if it's something I'm interested in or not. Some of them just copy and then we give them whatever it is and they don't want it, you know. So they haven't actually done it because they're thinking, they've done it because they've seen somebody else do it.

Any other comments about your experiences of the training?
No, the only thing is I think we need to get parents on board more quickly, um, it would, there needs to be ongoing training. I've got a new assistant in my class now, and she doesn't know PECS, and where does one find the time to sit down and teach her the correct way to do PECS. Fortunately at the moment my children are all pretty okay, but I mean I've got at least one little boy that we want to start with PECS, she has to be trained. She's got to do it correctly. Um, I think it is quite easy to fall into bad habits so I think, I, you know in a situation like a school or, or a therapy centre, whatever, I think one needs to have checks built in that um, you've got somebody that perhaps mentors you to say I've just been observing you and you're doing this and this, you know. Just so that people keep up to speed and and also I, I know that um, um there are people that have been on PECS training courses and then they've moved into other areas where there are not many people using PECS and bad habits come in and incorrect methods and then the child's not doing it correctly and so its not as effective and I think that's an area that effects the branding, you know the brand name. So no PECS doesn't work, actually no, it was done incorrectly, you know. So it wasn't the system that was at fault, it was the way that it was implemented. Um, and it is difficult to monitor that, but I think that is quite important. I mean, ourselves, we quite often kind of remind each other, by the way earlier you did this and you shouldn't have. You know, but um that's because I've said to the people in our class we've got to monitor each other and remind each other to prevent falling into bad habits. Because it's quite easy to do, its quite easy to over-prompt or to say "go and fetch your PECS book" I know that's not what you're supposed to do, but you know. And for the GAPS, they need to know. I'm lucky because my GAP student this year's worked with PECS in the UK so she knows what she's doing, but some GAP students don't know what they're doing and they come into the class and we expect them to know and then they don't do it correctly and I think that, that's a problem. That the training is not really train and now it's done, no it's ongoing. Um, I have thought about this because of the various visitors and people coming in, students doing their rotation and so on, um.

Part of the staff training, I think that perhaps we need to train, like for instance the GAPS because that makes you brush up on your use. Cause you know if you're going to teach someone else you're going to go back to the manual, going to check to make sure that you're teaching that person correctly. So perhaps that's a way of doing it. Um, at the moment we've got what, 5 GAPS, so perhaps 2 teachers per GAP.
So you've got a group of 3, which makes it very doable. You know, perhaps on a Wednesday afternoon that's what happens is we do some PECS training, which means we'll brush up on our skills as well. But I think it is important.

In terms of logistics, you've got an interesting set-up in terms of you've got a class of children using PECS and then you've taken a child that's in that class that hasn't been using PECS and done the full training, quite intensively in comparison to what is normally done.
Well look, populations are going to change all the time. You know, we're going to have people at different levels all the time, that's, but what we did last year was the pressure of some children leaving and we wanted to make sure their skills were you know right up there. Um we spent 15 minutes a day with some learners um who needed a lot of input, but we made sure that everybody had individual one-on-one PECS. We took out the box of goodies which was a huge amount of fun for the children. Um, just to make sure that they were using PECS correctly, they were asking and communicating their their um you know preferences, that we knew what they, and um I think that is quite important to do, not all the time cause logistically you can't. Um, but I think every now and then to spend your time --- and the, the cards you know that's a big problem just to kind of keep the files um in order and so on and I don't know what, how you get around that, having spares up on the cupboard doors{laughs} But it can be very frustrating.
And in terms of the difference with N.N. doing a lot of individual training compared to the other children, do you think it would have developed as effectively in the general class input?
No, it wouldn't have happened as effectively, no 'cause he had the intense input. And it is a little bit difficult the fact that mealtimes all the the attention is on him and inevitably somebody gets left behind, you know. No it wouldn't have um developed as rapidly, I think in the long term, it would have probably had the same result, but it would have been more long term, um and I think a quick development is actually quite good because if you're going to, agh you know for the family to really buy into the whole thing and to use it, I think they need to see rapid development. It's got to become a lot easier, because let's face it, most families know their child so well that the family doesn't need a communication system they doing the thinking, the doing, the whatever-ing. And its only when you have a jump forward and you realise that it does make life easier if there's a 2 way communication happening. And if that takes too long I think they're going to lose interest and they're going to revert back to thinking for their child. But you know, in an ideal world you'll have that intense training all the time.
Do you think that some of the results are related to N.N.'s existing verbal ability before the PECS training started?
Yes, I think so. Yes, and I think your ability and you know your ability to produce sound, and your cognitive understanding of the symbolism of -- and all of that, ja, I think IQ, cognitive whatever you want to call it, cognitive ability does have, play a role, definitely. And he's obviously, he did have some speech and he is quite a bright little chap, you know. And so I think it did make a difference on how quickly, how rapidly he progressed.

Participant 2: N.N. Parent Interview (father & mother) 06.02.2006
What changes (if any) have you noticed since the PECS training?
I know from, from my side in terms of at home, most of the stuff he he knows all the words at home. But what you tend to find is that if for example we do not respond the first time to him. Let's say for example he comes and says "I want a pie" and we don't, and we don't give him that pie immediately, then he'll go fetch his PECS file. Quick as a flash. [laughs] Quick as a flash, he's very fast with it. Then he'll show you now, you know I want a pie. That's what we've find now that what happens quite a lot now lately. That if we do not respond to him, it's almost as if we don't understand him now. And then he'll bring his PECS file. Those are one of the things. Also, I mean like friends of mine they haven't been here for 3 months, they've been away. And they said they can see that there is an improvement, um, I mean they've mentioned it to us. Because we go to them occasionally now and they said they've picked up they can see, ah... that there is progress in what he's doing. Like his speech and that type of thing. I don't know from your side... Ja, he just uses it when we don't respond but he won't come with it first, he will first ask ah-hah and then he will use that if we don't respond and I don't give into his demands you know. But other than that he doesn't really use that big and small adjectives that he

doesn't uh-uh, got his files and we're busy now with Deborah asked um Deborah to work that in now, because the colours he can work out. What we do with him is um Deborah give him the --- side of the blocks and says you must now ask "I want a green block" you know, type of thing. That's that's what she's busy with now, on that side.

And any new things he's started to ask for or are things the same as before?

I think he's got a vocab for what he wants in this house, put it that way. Um, like he'll say TV 2 story um he uses those words directly so I mean. He does, he did use new words remember I'm sure when he watched things and things like he noticed around him. Like there was a few, I think new Verimark adverts on TV, now that he will he will talk about or he will remember. But there's something new, he doesn't like the normal old things that he kept on repeating all the time. There was a few new ones. So, maybe his vocab has expanded a bit.

Has the PECS training changed the way you interact with him in terms of trying to get him to communicate?

I think if he uses his PECS we tend to, to either be more explicit in what we say because we, if for example if he wants something we normally try to delay it for example, in terms of like when we like eat, we want to all eat together. So we will say now "later on" and that and he will tend to understand, but I'm, it's like the first time, um either he did not understand me now, now let me tell you, but we're actually acutally more explicit in what we are saying to him, along those lines, at the moment. What else…

What would he have done before PECS?

Keeps on over and over and over and over. He wouldn't, he wouldn't get your attention. He will do that now, but... He'd do that all the time. He'll keep on. He'd come in and he'll sit there and I would be busy in the kitchen and he'd just stand by the door, "bread, bread, bread, bread, bread. Or pie, pie, pie, pie, pie, pie, pie. He wouldn't and now he'll come "I want __" I want a pie. I want a pie please. You know, I want, he'll do all the, the expressions, but it will be "I want a pie please" you know you have to look at him he makes direct eye contact. And even if I say "later on" he'll understand. He'll come back 10 minutes later and say "I want a pie please". He won't just stand there and say "Pie, pie, pie, pie, pie" like he used to or "bread, bread, bread, bread, bread". He'd ask "I want cooldrink please" or "I want juice please". You know it comes out better now than, the "I want" is added more now to what he wants instead of just --- That repeating has now tend to gone, to go down now, when he keeps on the whole time um "sweets, sweets, sweets, sweets" you know he keeps up till you give it to him, but now its once off and then he'll wait if you tell him, along those lines.

And the getting your attention?

It gets quite painful at times. [laughs] especially in the morning he'll come and he'll [demonstrate]. He'll come right into your face when you're still asleep or whatever, right in your face. But he used to --- he used to touch, not anymore he'll look into your face now and say I want ___, so, that, that, that for me is good, that he comes and speaks directly. He doesn't need to do that anymore. But he does it to me still when I, when I brush his teeth…when I. Oh the teeth yes. Now you know what he did this morning I brushed his teeth and he didn't do that. He went --- He comes and he knocks you, you know like, but he slaps you instead [laughs].

What concerns do you have about the use of the Picture Exchange Communication System (PECS)?

I just hope that… you know our main aim is for him to become, because he can talk. So, we would like him to be a bit more verbal instead of you know running for the card, but I think it helps. It helps... as we mentioned. He can say what he wants and for that…

The only thing is possibly of of using it more, you know, you don't want to use it as sentence structure. *You can.* Of using that and to say, you know to build up a sentence, along those lines, possibly um using it in that way. Cause I think to build so that he knows exactly for example how to construct a sentence like "I want a big green block", you know that type of ... The only thing is, by Deborah [speech therapist] we picked up for example, but she's also making the list now, ah, in terms of there are certain games that he plays that he plays by by by Deborah. What happens is he gets up and Deborah stops him but he cannot say what he wants. So Deborah's starting to make a list and she said she'll communicate with you as well in connection with that. Because, uh I don't think the names of the stuff he doesn't

know yet. Normally by Deborah he goes and he collects, from the shelf what he wants, so um Deborah's trying to stop him now and he needs to try to say what he wants now. And then he, we opened the file for him, but he couldn't match anything in the file to see to what he wants, so those type of things.

How would you describe his communication skills at home at the moment?
Um, you see to me, but also not now, how can I say, not now, he's more relaxed in a sense. He's not, uh, repetitive you know, how can I say now, that. It's only his little things you know that he will come and say to me, like um… he won't really... He won't communicate with you. Won't tell you what happened during the day. With, with her he will do, for example when she comes home he will say hello to her [refer to sister], but he'll put his face up into her face and because she, she responds to him and then he will imitate her. That's what I've picked up. Um, he [refer to brother] terrorizes uh… ja, he teases him, terribly takes stuff and then runs, and that type of thing. So um… He doesn't understand N.N. um… you know about N.N.'s handicap… he's he's more attached to his dad. He prefers him to me… at certain times he doesn't like me to do anything… and, I think it's just because he saw me busy with him, you know, then his sister and he saw I wasn't paying attention to him and so. He can get hold of dad, and they go on walks and the children take a walk to the shop. Um, what, what I noticed about him in the shop now, he's less um, he's less anxious in the shop, because what he, I know for example he wants to go look now, she wants to, he wants to for example the, the Pentel. I will let him run in the shop now, because I know he's going to look at the Pentel, but he'll just look at it on the shelf and he'll put it back again and he'll come back to me, stuff like that I've noticed that ah… I can leave him walking around the shop. And he'll --- to a certain shop. And there's certain isles. Certain isles and certain shopping centres, he just won't, he doesn't like KC, he just won't go in. He shouts and … so… but as F [father] said, he's quite relaxed now, we can take him to more places, he eats more, he eats a a better variety of food than he used to. You know, so its not like we have to suffer, worried around every corner what is going to set him off.
Cause in a shop he'll say, what um, he wants chips, he'll go down the chips isle, you know that type of thing. 'Go look at the Pentel', you know I know okay he's going to go look at the Pentel, but I'll just tell him, I I won't go with him right down the isle, he'll go down the isle himself now, look at it and then put it back. What he still does is you can ask him what would you like, would you like a burger, McDonald's or KFC, he would say the last thing that we asked, you know he will still say 'KFC'. Then we still try to ask again 'what would you like?' you know until he understands it and then he'll choose which one he wants. But it's still not that 'I want' you know specific things. The choice is there, he'll just repeat the last one. But there are times when he does say 'I want a McDonald's burger'.
But it's, he's first got his colours now, and that the colours are in the PECS file he can distinguish his colours far better. I think it's more of a visual thing. I'm now just thinking in terms of when we talk to him "do you want a McDonald's burger, do you want a KFC burger?" I think it doesn't register properly. But if for example, maybe if you could have had those pictures down now to say a McDonald's burger or a Kentucky burger once he can see it, he'd be able to make that choice. Cause I know he prefers colours now, as you said, he's very visual. His colours is much more uh, I mean if, we will sit now and he will tell me exactly red colour, green. If he, if we sit now, we do something, he will say the colours out of his own and he would match it to his clothes, red sweater or blue sweater, he would say.

What kind of methods would you say of communication is he using?
He's mostly asking and then I think the PECS comes second now, if for example he doesn't get what he wants. But he'll first do it on his own. Only if he sees we not there. He'll go the fridge and go help himself, get things for himself, and then if he can't then he'll ask. He's got to say 'I ___' that help *Is he using that?* Um for example, if for example he puts his shoes in and he's he's got a problem or something, then he'll say um… "Help, help, help", but then obviously we shape it till he gets to a "I want help" position.

Would you say he experiences communication difficulties at home?
He has difficulties saying how he feels. Hey? He gets angry, and then when M.[brother] teases him you can see he gets frustrated and you can see on his expression he is angry, but then he has difficulty in

saying 'leave me alone' or 'go away' or 'I want time alone' or 'I'm feeling hurt' or things like that. And then he acts out by pushing him, pushing him or whatever. Or if I try and force him to eat something that he doesn't want you to, you know, but he has to, he'll also act out, he can't say what he feels, 'I don't want to do it now', or 'later on' perhaps. He'll do something … by how he reacts.
Might be like moods or something… or 'go h-- go away', 'push', 'shut up'. He'd understand that because he tells N.N. that, you know he'd say 'leave me alone' or 'I don't want you around'. But N.N. can't say that…

What is your view on using things like picture communication with N.N.?
Um, I said it has helped him, it's just that most, most probably that he had some of the speech already, so I mean other than that, I think I'd say that has helped him. Like I said, with the colours, we can see he picks up quite quickly, the 'I want', uh, we've reduced the, the, that repetitive thing of his now, remember we decided with Des to use the 'I want' we had to say it all the time. But it became easier when he had the card, when he builds up that with the 'I want' you know, he knew that had to come first and then whatever he wanted afterwards, and then it was a verbal thing… He doesn't use the 'I see' and the 'I hear' uh-uh he doesn't use that much he doesn't use th--, not at all, he doesn't use it at all.
But he can identify those stuff quickly, he doesn't have problems with identifying, for example cat and dog when we walk. Oh, he does hear and he does see things, but sometimes he chuckles and he'll have seen something you know, he just can't tell you about it, but he has taken notice of it. He laughs and then we try to find out now what is it that makes him laugh.

Would you say that N.N.'s communication varies in different contexts? (E.g. Home, going out, public places, family, friends)
He doesn't use PECS by Ma's and them [grandmother], which is troubling. He just helps himself there he just helps himself and they sort of anticipate what he wants and they provide it before it's needed there, because my mother's not back yet, my mother's coming back next week so she's been away for 3 months now, so hopefully uh, we'll speak to her about that now. On that… ah. In terms with them [referring to siblings] like I mean if they take stuff from hi--, ja like he'll say I want something and they'll take it off from him so he communicates with them, and he communicates with Z. [sister] now, with M.N. [brother] also. For example at night when he wants his uh teddy, he says 'I want the teddy bear' that he sleeps with a teddy bear.

He'll ask me for the string, he'll come and find me, he will ask me. Ja he will ask, 'look for string'. He won't always howl, but he does ask where is ____?. N.N.'s string …
It's usually the same when he goes to his gran, he will ask my sister "I want ___", "I want drinks please". --- but he goes there about once every week. He will ask hey? 'I want ice-cream' or 'I want chips' or 'I want sweets'. *And is that new, or has he always been able to ask?* No, he used to just go to scratch and take out take out what he wants or he would just…, now you see because he sees that they tend to give it quicker to him, so at, now, its become a, um cause they like him now to say 'I want __' uh… 'I want sweets' now. You know, then they, they would give him sweets, samoosas, and then they'd give him a bowlful of ... So he goes there everytime, and says "I want samoosas" expecting the bowl.

What features of N.N.'s speech and language make him noticeably different from other children?
Lack of --- and I think also he's, like I said he mumbles, like adverts. Some people do not know exactly … because he he can pick up things. And its sort of a a, I don't know how natural it sounds, you know because people don't really speak like that in those proper sentences the way he can make "I want something please" you know the other one will just say "give me" or something else, you see. But he would use proper sentences you know "I want ___". So that's a bit different from them. Mm mm.
And then the adverts you'd say?
Ja, like he tends to now, he he tends to rattle longer pieces of the advert off now than before. He will now give you the whole thing about… if you phone now you will get… you get a, what was it discount or something, ja you get a discount, free something, you get the stuff free now. I think let's stop that that that… or replace it with something else.
You were saying, other people think...?
No, they're amazed that he's autistic because he can, cause he speaks at times, he says 'I want' um and

its only when you pick up they'll pick up something's wrong is when he flaps or… when he says that adverts and or he's and or he's he talks to somebody or he just rattles off the adverts and it's 'what did he say now?' [laughs] so now they go 'what is it' and we will know because he's repeating an advert, but somebody else might not know where's the connection, where does it come from.

How do you adapt how you interact with N.N. to try get him to communicate more?
We do try all the time, we try to make him talk, especially when he wants things, because he's, you know how he is, if the need if the need is there then he'll say something. So all the time he wants something, I'd want to make him ask for it or comment on it or something, cause that would probably, uh, expand his vocab. or make him want to speak. So …
Um… like just say we go for a walk now, I mean on his own, um, if M. [brother] starts getting his bike ready then he says 'we go for a walk now' you know that type of thing. Before I even say it to him, um. But I think its also more in terms of his expecting certain things at certain times. 'Go to Tokai', 'Go to Tokai', he wants to go there on a Saturday. 'Go to Canal Walk' he'll say. Canal Walk - he loves walking there. Yes. What else has he started, you see like we go to Seven-Eleven, uh and then he'll say he wants more change. Ooh you know what, what, he wants to tell you where to drive. Ja, that's a new thing now, 'turn' he wants… 'turn, turn here, turn' 'turn here' 'go straight' 'go straight', 'turn right'. That he, that he… no he doesn't say ____ he just says 'turn' and 'go straight'. 'Turn' and 'go straight', yes, 'don't turn', 'don't turn'. 'Don't turn'. But but that that only came up now recently, recently ja he's taking us on a drive. *And he knows where?* He knows his way he knows his directions, so if we take a different route, that's the time that he objects and he says 'turn here' 'go straight', so that is not according to what he's used to. Mm-hm, but I mean that is a new thing that is coming up, directions now that he's he'll tell you 'go straight' turn' or what he does when you drive now he'll tap you on your shoulder and he says 'turn' or 'go straight'.

Appendix P: Sample of *Profile of Pragmatic Skills in Young Children* (Naudé, 2002)

PROFILE OF PRAGMATIC SKILLS IN YOUNG CHILDREN

PART ONE CONVERSATIONS WITH DIFFERENT PARTNERS

PART TWO CONVERSATIONS IN DIFFERENT CONTEXTS

PART ONE

WHERE INDICATING THE PRESENCE OF A SPECIFIC SKILL ON THE PROFILE, FILL IN THE NUMBER OF THE CONVERSATIONAL PARTNER WITH WHOM THE SKILL WAS OBSERVED

Specify partner/s:	1.	2.	3.

1.1 EMPLOYING A VARIETY OF FUNCTIONS

NB 1 Utterances may be multifunctional
2 Intonation and other paralinguistics may be the determinant indicating function

Indicate functions employed and examples observed by underlining or adding:

FUNCTION	EXAMPLES	FUNCTION	EXAMPLES
Instrumental	requesting objects requesting actions (limited) other eventually	Explorative	labelling objects can answer questions who what where requesting information predicting hypothesizing other
Regulatory	protesting (tantrums, can't explain why upset) denial using directives calling teasing asking for help other doesn't (with lots of prompting)	Imaginative	Pretending Other (not spont.)
		Informative	describing objects (attributes – only prompted describing events - only with with cue. indicating possession giving reasons other
Personal/expressive - take item + look at you. - alternatives (verbal choice)	expressing feelings calling attention to self comment on action comment on event (once making choices drawing – commented accompany play self-guidance other	Linguistic on) – use to get information ... (elephant sad)	practising metalinguistic forms other (Enjoys absurdities) – sense of humour

1.2 KEEPING TO THE RULES

1.2.1 Rules for conversations

Rules for Topic management	
Topic Initiation (no) Indicate: - if skills were observed (underline) - appropriate/ inappropriate (note)	*Method of initiation:* Pointing Looking + eye contact Stating verbally
Topic maintenance (no) **Indicate if skills were observed: (underline)** ***Adhering to principles:***	*Truthful* *Brief* *Relevant* *Providing adequate information*

Goes off on his planet" "got the vocab. not the lang" [Enjoys success + being able to share 46]

does not understand the link betw. comm. + lang." Vague drawings ~ have to interpret what this means.

Organization of narratives: Indicate if observed; add notes as required		
Centering	**Chaining**	Story grammar - including: Setting statement Initiating event Internal response Internal plan Attempt Direct consequence Reaction

1.3 ***ADAPTING TO CONVERSATIONAL PARTNERS*** (no) Conversation is too limited.

Underline if observed and indicate identifying number/s of conversational partner/s

Stylistic variations	Register	Politeness: Polite words/expressions used Indirect requests Vocabulary Topic
	Interlanguage (code mixing)	Situational (with speaker of other language)
	Code switching	Situational Related to topic
Referential communication	Presupposition skills	Content adapted Method adapted (e.g. adding gestures) Role playing Linguistic devices (deictics) - specify: Articles Demonstratives Pronouns Verbs
Cohesive devices	Ellipsis	Appropriate Inappropriate

Appendix Q: Participant 2: Verbal utterance during Session 6 (structured session), Session 3 and 5 (unstructured sessios), Session 16 (structured) and Session 17 and 20 (unstructured)

Session 6 (structured)

Participant	N.N.	Session 6	MLU
Date	29.07.2005	Pre-Training	49/15 = 3.3 words

Words	Type of ICA
Sweets please. Sweets please. 2	Request
I want to go back to class. Go back to class. 7	Request
A Toyota ___	Echolalia / self-talk
I want the keys please. Blow bubbles please. 5/3	Request
I want sweets. I want sweets. I want sweets. I want sweets. 3	Request
First wait [hand on my chin, PP]	Echolalia / self-talk
I want sweets please.	Self-talk
You wait for sweets. Roly poly.	Echolalia / self-talk
Open, open. 1	Request
I want tots please. I want tots please. Please tots. I want a tots please [point to toy]. I want tots please.4/2/5/4	Request
Harpic. Green harpic. Green harpic.	Echolalia / self-talk
Go back to class. No go back.	Echolalia / self-talk
[give toy] please 1	?
I want the toys. 4	Request
Go back to class, first we finish then go back to class.	Echolalia / self-talk
Put Harpic. Harpic. Green ___ the toilet. First toys. First toys.	Echolalia / self-talk
Don't want. Don't want. 3	Reject
We go back to class.	Echolalia / self-talk
We go, go back to class.	Echolalia / self-talk
Roll the ball. 3	Request
Put Harpic toilet.	Echolalia / self-talk
Roly Poly, Roly Poly, Roly Poly [demonstrate] 2	Request
Go play, back to class. Go back to class. Go back to class.	Echolalia / self-talk
Clap, clap, clap [demonstrate] 1	Routine

[Shaded areas indicate meaningful utterances]

Session 3 (unstructured)

Participant	N.N.	Session 3	MLU
Date	01.06.2005	Pre-Training	8/3 = 2.7

Words	Type of ICA
--- back	Self-talk
I want tea. (prompt) please 3	Request
(What do you say?) Tea please. Thank you Berenice. 2/3	Response to question
Smell, smell, smell, smell. Take off your socks.	Echolalia
…? [tap arm]	Self-talk
We going to play outside. We going to play out__	Repetitive phrase
Play. Slide, slide, slide, slide. Slide and swing. Swing, swing, swing, swing. And a swing.	Repetitive phrase
Off the swing, then you …?	Repetitive phrase
Nicky yes. Hey Nicholas. Nicholas, Nicholas, Nicholas.	Imitation
Bad slide ..? [pull off peers SS, no exchange]	Self-talk
[mouth on tea jug] --- for jam. Margarine, ___ margarine.	Self-talk
[drink out tea jug]	-
[empty plate crumbs in jug]	-
Go to the ___. Go to the playground. Playground…	Repetitive phrase
When the clock. Playing __ crawl, climb. Climb at the slide. Climb.	Repetitive phrase
Cat, a cat. And when the blue cat, cat. Then it's time for playground. [flap hands]	Repetitive phrase
[drink out of tea jug]	-
…?	Self-talk
Climb, climb, climb [drink out of jug]	Self-talk
[laughs to self]	-
Go get in the bus. A bus, a bus [uses sign for bus] bus. A bus. Go to play outside.	Repetitive phrase
Spend. Spend. Spend. Lets ___. Spend. You get to spend. 5 more minutes. 5 more minutes.	Echolalia
Kwaku please …	Echolalia
[tapping self on head]	-
[finger in corner of eye]	-
Come ----?	Self-talk
We going to play outside. Play outside.	Repetitive phrase
[scratch arms, look out window. Look down side of bench]	-

[repetitive, echolalic, does not make direct requests – uses associated phrase – response he wants to get information or confirmation, helps himself to tea by drinking out jug]

[Shaded areas indicate meaningful utterances]

Session 5 (unstructured)

Participant	**N.N.**	**Session 5**	**MLU**
Date	09.06.2005	**Pre-Training**	9/3 = 3 words

Words	**Type of ICA**
[point – not directed at CP]	
We go to play outside. [point outside]	Ask for info
What do you say? Bere- thank you please [withheld chips] 3	Response to question
[push hand of peer who tries to take his chips] L—Give ?	Protest
[dropped juice on jacket, lick off juice]	
[flap hands and vocalise]	
Say hello. … go play on the playground…?	Self-talk
[get up, stand on trampoline and look out window]	
[sits down on instruction, flaps hands and vocalises]	
Press the …[flaps hands and vocalises]	Self-talk
Want tea please 3	Request
What do you say? Thank you please 3	Response to Question
Thank you Berenice.	Imitation

[

Shaded areas indicate meaningful utterances]

Session 17 (unstructured)

Participant	N.T.	Sample no. 11	MLU
Date	13.09.2005	Phase IV	3.5

Words	Type of ICA
I want sandwich	Request
I want big please.	Request
Big sandwich	Request
I want big sandwich. I want.	Request
I want little sandwich.	Request
We go to the bus.	
I want big little sandwich.	Request
I want little sandwich.	Request
I want little sandwich please	Request
Don't want. Don't want.	Reject / Protest
I want I want yoghurt please.	Request
I want I want spoon please.	Request
I want banana big.	Request
I want banana. I want banana. I want banana.	Request
We go to the bus	
I want banana please. Big banana.	Request
I want little banana.	Request
I want banana please. I want banana. I want big banana.	Request
I want big banana.	Request
Big , big.	Echolalia
I want little banana.	Request
I want little ba	Request
I want bus.	Request

[Shaded areas indicate meaningful utterances]

Session 20 (unstructured)

Participant	**N.N.**	**Sample no. 14**	**MLU**
Date	07.10.2005	**Phase VI**	101 / 36 = 2.8

Words	**Type of ICA**
I want sandwich please.	Request
I want sandwich please.	Request
I want sandwich please.	Request
I want sandwich please.	Request
I want toast. I want toast please.	Request
Toast	Self talk
I want butter please. Butter.	Request
Try, try, try, try.	Echolalia
Help. Help with my butter. Help with my butter.	Request
Cup, cups.	Self-talk
Help, help. I want help. Help, help, help.	Request
I want [tap arm to get attention] I want help. I want. Help with marmite.	Request
I want toast.	Request
Tuckshop [point to door]	Ask for information?
Tuckshop, tuckshop, tuckshop.	
I want.	Request
Plate. Fetch a plate. Plate, plate.	
Hilary. Hilary in the mee. Hilary's by the tuckshop.	Comment
I want butter please	Request
I want, I want, I want butter please. [tap arm to get attention]	Request
I want marmite please.	Request
I want toast please. I want I will give you Staysoft. I want toast please.	Request
I want toast please.	Request
I want toast.	Request

[Shaded areas indicate meaningful utterances]