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A student self-management strategy for reducing inattentiveness, disruptiveness and teacher intervention

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A STUDENT SELF-MANAGEMENT STRATEGY FOR REDUCING INATTENTIVENESS, DISRUPTIVENESS AND TEACHER INTERVENTION

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A student self-management strategy for reducing inattentiveness, disruptiveness and teacher intervention

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ABSTRACT

A large body of evidence suggests that the use of self-management procedures can reduce significantly the occurrence of disruptive behaviours and teacher dependency for task completion. The present study used a single subject design with two students with developmental disabilities to test the effectiveness of a TEACCH (Treatment and Education of Autistic and related Communication Handicapped Children) self-management system. The system employed a visual schedule work routine coupled with a token economy and self-selection of reinforcers.

The findings of this study showed that both students were able to utilise a TEACCH style self-management system to engage in on-task behaviour and to reduce disruptive behaviours and teacher dependency without external prompting. In addition, performance accuracy was maintained by both students during the course of the investigation following the introduction of treatment. One student demonstrated improved work productivity during the course of the study.

This investigation demonstrated the effectiveness of the TEACCH procedures. A key feature of the procedure was the use of a highly visual schedule-following chained task sequencing work system. The results suggest that aspects of the procedure might work well for other individuals who have a moderate or severe developmental disability. Success was also demonstrated by one student whose performance improved even after the physical components of the work system were removed during a probe phase.

Declaration

I certify that this thesis does not, to the best of my knowledge and belief:

(i) incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education;

(ii) contain any material previously published or written by another person except where due reference is made in the text; or

(iii) contain any defamatory material.

Signature:_

Date: 20.12.99

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Finally, and foremost, I thank God the Father of our Lord Jesus Christ for His grace and mercies in granting me strength and ability to do this work. I pray that if any persons with learning disabilities benefit from the procedures described in this material it may be to His glory.

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Chapter 1

Introduction

This chapter commences with a statement of the problems associated with inattentiveness to task and disruptiveness in two students. One student has a moderate developmental disability. The other student has a severe developmental disability. Attention will be given to how this problem has been addressed by researchers using a variety of behaviour contingencies. A description will be given of procedures used to modify behaviour in individuals with autism and moderate and severe developmental disabilities.

A review of some of the variables that could affect attentiveness, dependency and appropriate behaviour will be given. Following this, a description of the dependent and independent variables with which this paper is dealing will be set forth. Statements on the aim of the study, significance of the study and an overview of the thesis will conclude this first chapter.

Attentiveness to task, ability to work independently and the display of socially appropriate behaviours are valued component factors which enable individuals to function acceptably in a variety of contexts within society. Self-regulation is of particular concern for individuals with learning difficulties and various other cognitive disabilities. Inattentiveness, distractability, disruptiveness, off-task behaviour and dependence are some of the problems displayed by this widely defined group (Wiederholt, 1974; Licht, 1983).

Token Economies

Studies have shown the effectiveness of different behaviour management programs in modifying behaviour of individuals with special needs. One method has been the use of the token economy. A token economy denotes a reinforcement system that involves

the use of tokens in the form of money, points, stars or stickers. Tokens are earned by participants for displaying appropriate pre-specified behaviours. Tokens earned may be exchanged for desired tangibles or leisure activities (Accardo, Whitman, Laszewski, Haake & Morrow, 1996).

Differential Reinforcement

Another method of behaviour modification that has been successful in changing behaviour is differential reinforcement. Differential reinforcement can take different forms. Differential reinforcement of other behaviours (DRO) is the rewarding of behaviour which is different to that behaviour which is being modified. Differential reinforcement of alternative or incompatible behaviours (DRA, DRI) involves rewarding behaviours that are alternate to or incompatible with the behaviour being modified. Differential reinforcement of low rates (DRL) involves rewarding low rates of target behaviour (Wolery, Bailey & Sugai, 1988).

Other Behaviour Management Techniques

Other effective behaviour modification techniques include positive reinforcement, negative reinforcement, response cost, shaping, extinction, punishment, overcorrection and vicarious reinforcement (Alberto & Troutman, 1982; Wolery, Bailey and Sugai, 1988). Each of these concepts will now be defined. Positive reinforcement is the rewarding of desired responses with a consequence which increases continued similar responses. Negative reinforcement is the removal of a consequence contingent on a response the result of which an increase in the response is observed. Response cost is the removal of a consequence upon the occurrence of a behaviour which results in a reduction in the target behaviour. Shaping is the process of rewarding successive approximations of a desired response. Extinction is a behaviour reduction technique whereby once available stimuli that are reinforcing a target behaviour are removed. Punishment is the presenting of an aversive contingent upon the occurrence of a target

behaviour. Overcorrection takes two forms; restitutional overcorrection and positive practice. Restitutional overcorrection involves restoring the environment to its original state, contingent upon the occurrence of an undesirable behaviour. Positive practice involves repetitions of incompatible behaviour contingent upon the occurrence of a target behaviour. Vicarious reinforcement involves the positive reinforcement of other individual's behaviour in the presence of an observer whose behaviour is the target for modification. (Wolery, Bailey & Sugai, 1988; Alberto & Troutman, 1982).

All of these techniques have involved an external control agent. We turn now to techniques and procedures which do not require input from an external authority for continued performance of target behaviour.

Self-monitoring, Self-management and Self-selection of Reinforcers

Self-monitoring, self-management and self-selection of reinforcers are procedures which do not require the involvement of external supervision. The key distinguishing element of these interventions is the self-control and self-rewarding of the individual contingent upon the occurrence of target behaviours. Self-monitoring involves recording one's own behaviour in some prescribed form (Accardo, Whitman, Laszewski, Haake & Morrow, 1996). The process results in a reduced external reinforcement and a reduction in target behaviours (Reid & Harris, 1993; Webber, Scheurermann, McCall & Coleman, 1993). Self-management is a self-monitoring procedure that may or may not involve self-recording of behaviour (Ball, 1998; Carter, 1993; Chris Ninness, Fuerst, Rutherford, & Glenn, 1991). Self-selection of reinforcers involves the individual's selection of a preferred consequence that is received contingent upon a target behaviour (Gomez, 1994).

The provision of opportunities for self-selection of reinforcers with individuals with attention deficit disorder (ADD), autism, developmental disorders and seriously disruptive behaviours has seen a reduction in problem behaviours and an increase in

attentiveness to task (Graff & Libby, 1999; Dunlap, DePerczel, Clarke, Wilson, Wright, White & Gomez, 1994; Mesibov, Schopler & Hersey, 1994; Dyer, Dunlap & Winterling, 1990).

ADD is a neurobiological disorder that results in levels of inattention, impulsivity and hyperactivity that are developmentally inappropriate (Ball, 1998). Autism is a neurobiological disorder that is characterised by extreme aberrant behaviour, social maladaptive functioning, language delay, hyperactivity, stereotypies (repetitive, compulsive behaviours), an extreme desire for the maintenance of routines and tactile defensiveness. In 85% of cases there is some mental disability associated with the condition (Accardo, Whitman, Laszewski, Haake & Morrow, 1996; Prizant & Wetherby, 1993). The treatment for autism is through highly structured learning routines, structured non-stimulating environments, non-stimulating environments and heavy reliance upon visual stimuli (Accardo et al., 1993)

A developmental disability is a condition where substantial limitations to three or more areas of human functioning have occurred (Accardo, Whitman, Laszewski, Haake, & Morrow, J.D. 1996). Onset is from birth to 12 months or birth up to 22 years of age and the disability may be moderate, severe or profound. Depending upon the degree of disability limitations occur in the areas of intellectual function and in adaptive skill areas of self-care, self-regulation, learning, receptive and expressive communication, gross and fine motor functions and capacity for independent living and economic self-sufficiency (Accardo et al., 1996).

Traditionally, performance on intelligence tests has been used to classify individuals with moderate and severe developmental disabilities. The intelligence test is used to determine the intelligence quotient (IQ). According to this diagnosis and classification persons with a score between 35-55 IQ are classified as having a moderate developmental disability (Westling & Fox, 1995). Individuals with such a classification

are generally quite capable of self-regulation in daily living skills, receptive and expressive communication and basic functional reading. Many adults are able to engage in functional academics, vocational skills and independent social and community functioning skills.

According to the traditional classification individuals with an IQ score between 20-40 are considered to have a severe developmental disability. Adults with a severe developmental disability are able to perform many independent self-care skills and communicate with a functional communication system. They may or may not be able to read some basic words and common symbols. They usually require substantially more support in vocational, social and other skills than that which is necessary for individuals with a moderate developmental disability (Westling & Fox, 1995). Individuals with a profound developmental disability score at 25 or below on IQ tests. A person with a profound developmental disability requires substantial assistance in most daily living functions and activities (Westling et al., 1995; Schalock, Stark, Snell, Coulter, Polloway, Luckasson, Reiss, & Spitalnick, 1994).

More recent views on individuals with disabilities have moved away from the traditional classification based on scores obtained from IQ tests. Disability is defined more in terms of limitations in present functioning (Brown & Snell, 1993). Limitations in cognitive functioning and in selected adaptive skills areas form the basis of classification. Adaptive skills are skills in the areas of communication, self-care, functional academics, self-regulation, daily living skills, work and leisure (Brown & Snell, 1993). Both the degree of functioning which the individual is capable of and, more importantly, the level of support required for functioning in community settings determines whether a person's condition is classed as a moderate or a severe developmental disability. Teaching individuals with a moderate or a severe developmental disability involves training mainly in the adaptive skills areas of

language skills, social skills, recreational/leisure skills, daily living skills and community and vocational skills (Westling & Fox (1995).

Researchers in the area of autism have found that highly visual teaching sequences of chained tasks and pictorial representations of objects, activities and concepts are particularly effective in teaching individuals with the two conditions (Swaggart, Gagnon, Jones Bock, Earles, Quinn, Smith Myles & Simpson, 1995; MacDuff, Krantz & McClannahan, 1993; Pierce & Schreibman, 1994; Bondy & Frost 1994).

Pictorial Self-management

The use of pictorial self-management in teaching and in behaviour modification has also had much success in the literature. Pictorial self-management involves the use of pictures, photos or symbol cues which are used by the individual to prompt performance of pre-determined target behaviours (Groden & LeVasseur, 1995). Picture prompt self-management strategies have been shown to be effective in behaviour modification in the research. Visual cue cards have been used successfully to assist individuals with moderate to severe disabilities to profound disabilities to function in many routine home and work environments (MacDuff, Krantz & McClannahan, 1993; Robinson-Wilson, 1977; Lagomarcino, Hughes & Rusch; 1989; Wilson, Schepis, & Mason-Main, 1987, Roberson, Gravel, Valcante & Maurer, 1992).

MacDuff, Krantz and McClannahan (1993) added to the literature by using photographic activity schedules to enable individuals with severe developmental disabilities to engage in on-task and on-schedule behaviours. While engaged in scheduled activity the level of aberrant behaviour decreased. The data indicate that photographic schedules enabled the lengthy display of chains of previously mastered functional behaviour.

Pierce and Schreibman (1994) also taught three low functioning children with autism to use picture prompts that enabled self-management of behaviour in the absence

of a treatment provider. Prior to the treatment, participants were reliant upon their parents to perform all the target behaviours. After the introduction of the pictorial self-management system participants were able to perform and maintain all desired adaptive behaviours independently across tasks and settings in the complete absence of supervision. In addition, engagement in the desired behaviours increased while inappropriate behaviours decreased.

Pictorial Self-management and the TEACCH Approach to Self-management

The TEACCH (Treatment and Education of Autistic and related Communication Handicapped CHildren) has utilised a combination of procedures that, together, address the particular deficits of individuals with autism. Mesibov, Schopler and Hearsey (1994) are major proponents of the TEACCH approach. Mesibov et al. (1994) found that highly structured teaching which included schedules and work systems combining visual structure, clarity and routines was producing significant results in the on-task behaviour of participants. In addition, a reduction in aberrant behaviours was observed. Structured teaching is a procedure where the teacher determines the material to be used by the student, how long the work session will last, and how the child will work. In unstructured settings, it is the student who determines these aspects of work (Mesibov, 1997). Following training in how to use a work routine, individuals are able to function independently, self-managing their work and demonstrating reduced aberrant behaviours.

The TEACCH approach to a work routine involves the use of a work system (see Appendix C, Figure C1.) A work system is a strip of card to which is attached a series of Velcro© dots. Attached to each Velcro© dot is a detachable prompt in the form of a numbered label or picture label for individuals who are not able to differentiate numbers. A series of 3-6 dots indicates clearly where the work begins, the amount of work to be done and the consequence for the completion of work. The consequence is

signalled by the presence of a prompt token card indicating time to play. Each prompt label corresponds to a task that is to be completed in the sequence. Work involves removing the first label from the work system, and attaching it to a corresponding label located on one of the work boxes. The task contained in the box is completed, pushed to the side, and the procedure begins again, now being prompted by the next label situated in the work sequence to begin work on the task located in the next box.

Upon completion of the series of tasks, the participant takes possession of the reward token card that has been placed at the end of the prompt labels. The token card indicates time to play/relax (Mesibov, Schopler & Hearsey, 1994, Van Bourgondien, 1993).

The Present Study

Studies in the literature to date have focused on the use of pictorial self-management work strategies, specifically work systems and schedules for individuals with autism and moderate and severe disabilities. Some of the functional assessment procedures and techniques once developed for use with people with severe disabilities are now being increasingly demonstrated as efficient for use in general as well as special education contexts. The use of specific prompting techniques and reliance upon choice-making as a behavioural support component is increasingly being recognised in areas other than in cases for those with severe disabilities (Dunlap, Dunlap, Koegel, & Koegel, 1991; Dunlap, DePerczel, Clarke, Wilson, Wright, White & Gomez, 1994).

The present study seeks to extend the research by assessing the effectiveness of a TEACCH-style self-management work system coupled with a self-selection of reinforcers component. The primary dependent variable is the on-task behaviour of two students. One student has a moderate developmental disability. The other student has a severe developmental disability. The participants in the present study do not have autism.

The work system employed in the present study (see Appendix C, Figure C1) is based extensively on the model found in the TEACCH program. The effects of introducing the work system and regimen used in the TEACCH approach to structured teaching will be examined.

Variables that Could Affect Attentiveness, Dependency and Appropriate Behaviour

There are many variables that could affect on-task performance in the participants of this study. From a family systems perspective different factors can come into play; family characteristics, family interaction patterns, family functions and family life cycle factors (Turnbull & Morningstar, 1993). Family characteristics such as family size, form, socioeconomic status, geographic location of the home, health of family members and ethnicity can have an influence on the behaviour and responsiveness of individuals.

Family interaction patterns in terms of acceptance of the individual with disabilities, the sensitivity to and support of the individual, adjustment problems and marital/sibling strain can influence how the individual views himself and views the research project and research team members. Family functions include such matters as daily care routines, recreational options/choices, socialisation agents, affection, self-definition and educational and vocational options, including the presence or absence of a work ethic which have a bearing on the individual's attitude to work. Realistic goals and ideals are different from family to family and individual to individual. Researchers can only recognise these variables as contributive features affecting how an individual will respond to participation in a study.

The family life cycle contemplates the element of change that each family experiences. Developmental and non-developmental changes alter the way the family interacts and views each individual within the family. These, again, are variables over which researchers have no control. Sensitivity to and awareness of these features can, however, assist researchers in avoiding design features that would be blind to the true

reason for an individual participant's responses. For example, if a participant's cultural milieu does not value the work ethic and concept of time that is shared by the researchers, this may have a bearing on how the participant responds and how the resulting data is interpreted. If a family or culture considers that an individual with disability has less worth economically and is a drain in valuable and limited resources, the self-image of the individual with a disability will be different from the individual whose family does not consider him and his disability to be a liability. Further, the participant who prizes independent functioning and who questions of the parameters of the system of social rules will more likely be less compliant than the participant who is dependent and who does not question rules, mores and societal expectations.

The present study may also be influenced by other factors that only a careful functional assessment can uncover. Precision in the operational description of behaviour is necessary to ascertain when a behaviour is occurring. Accuracy in the thorough identification of all of the variables that occasion the occurrence or non-occurrence of problem behaviours (time, setting, physical and medical variables, activities) prevents inaccurate and arbitrary assignation of responses to the treatment variable. Clear hypotheses about which consequences are maintaining behaviour is necessary to avoid hazy conclusions when the behaviours occur. Verification of setting events and consequences through direct observation allowing replication can help reduce threats to external validity (Horner, O'Neill & Flannery, 1993; Wolery, Bailey & Sugai, 1988).

Ecological factors including changes in physical settings, changes in medical (medication, prosthetics) and health supports, sleep and diet, daily activity patterns, daily schedules and curriculum changes can all have a bearing on the results of data. In addition, other variables which researchers can have some control over simply by being aware of them are modifications in instructional methods, the consistency of delivery of

consequences and the predictability of the consistency between research team members in data collection and response to behaviours that are exhibited during the course of a study (Horner, O'Neill & Flannery, 1993). Further to these variables, the changing conditions multiple baseline across subjects design can present difficulties in terms of accuracy of measurement. It is difficult to obtain reliable measurement where, as in the present study, more than one dependent variable is being measured (Wolery, Bailey & Sugai, 1988). The treatment work system selection of reinforcers in the reward array, nature of and difficulty of tasks, degree of disability and the length of the study are also extraneous variables that can exert an influence on participants' performances. The presence of a relief teacher, changing both the social topography and routines of the class, as happened at one stage in the study, was also an uncontrolled variable. Disruptions within the class itself are also an extraneous variable that could affect the results. Sensitivity to and awareness of selected variables mentioned above was exercised in an attempt to avoid a confounding of the variables and resulting corrupt inaccurate data. We turn now to the focus of the study.

Focus of the Study

The aim of this study was to examine the the particular effect of introducing a TEACCH-style work system procedure on the on-task performance of two participants. The procedure included the provision of a choice of rewards following task completion. The dependent variables being measured were the number of tasks completed accurately within a 10-minute period, the time taken to complete tasks in a session, number of disruptive behaviours, number of teacher-dependent behaviours and the number of teacher interventions.

Significance of the Study

The present study sought to ascertain the degree of effectiveness of a self-management strategy on two students. One student has a moderate developmental

disability. The other student has a severe developmental disability. The procedure was designed for and, in the literature, is used for individuals with autism and communication deficits.

For self-monitoring to be meaningful students require the process skills upon which self-monitoring is based. The focus of this study was to see if the provision of a self-management work procedure could reduce inattentiveness, disruptiveness and the need for teacher intervention in two students with a developmental disability.

Overview of the Thesis

Chapter two will address the literature in relation to behaviour contingency procedures that have been used to modify attending behaviours and reduce disruptive and dependent behaviours. This will be followed by chapter three, describing the method employed in the present study. In chapter four the results will be presented for Art and Henk (pseudonyms for the names of the two subjects in the present study). Chapter five will present a discussion of the major features of the data and their interpretation. This chapter will include limitations in the present study and implications for practice. The final two sections of the paper will be devoted to the references used and the appendices respectively.

Chapter 2

Literature Review

This chapter commences with a brief introduction followed by an overview of some of the procedures that have been implemented in the treatment of attentional and behavioural deficits displayed by students with intellectual disabilities and severe developmental disorders. Studies that have used a token economy system for behaviour modification will then be examined. The paper will move on to examine some of the literature on the efficacy of self-selection of tasks and reinforcers as an effective modifier of behaviour.

A summary of the research on self-regulating of behaviour will be given followed by an examination of the distinction between the self-monitoring of attention (SMA) and the self-monitoring of performance (SMP). Following this, the distinction between self-monitoring and self-management will be addressed. This discussion will set the stage for a review of select studies in the literature dealing with the self-management of work and other behaviours through the use of picture cue systems.

The topic of iconicity will be explored and then the TEACCH approach to pictorial self-management will be examined. This section will include the history of TEACCH and a brief examination of its central beliefs. An examination also of the components of structured teaching (functional communication, schedules and work systems) will follow. Reference will be made to some literature supporting the TEACCH methodology. Finally, this chapter will conclude with a statement of the nature of the present study as to its several aims and foci.

Responsiveness to instruction and attentiveness to task are important skills for appropriate social functioning and for personal effectiveness and acceptance by peers. Reid and Harris (1993) have pointed out that self-regulation is, historically, a valued skill for individual and group survival. It has been posited that self-regulation has

particular relevance to students with learning difficulties who are often labelled as inattentive, easily distracted, disruptive to themselves and others, and off-task during tasks expected of them in a classroom-based environment (Licht, 1983; Wiederholt, 1974).

Pierce and Schreibman (1994) note that a lack of autonomy and subsequent burden of care are primary concerns of parents of children with disabilities. The employment market is one area of social functioning where such skills are critical for those with learning and behavioural disabilities. Foss and Peterson (1981) conducted a questionnaire designed to assess which social and interpersonal skills were considered critical for individuals with moderate and severe developmental disabilities. Job placement personnel in sheltered workshops indicated that high on their list of requirements for prospective workers were such skills as following supervisor instructions, responding appropriately to supervisor criticism, working independently of direct supervision, refraining from exhibiting bizarre or irritating behaviour, controlling aggressive behaviour, and working without disrupting others (Foss & Peterson, 1981).

Responsiveness and attentiveness to task are important to the general social acceptability of individuals with disabilities. Margalit (1995) studied the effects of social skills training for students with an intellectual disability. Social difficulties, distress, dissatisfaction with social life, peer rejection, and loneliness were posited as several of the factors that make the acceptance of the disabled more difficult. These factors, compounded by the additional problem of varying degrees of dependency experienced by those with disabilities, have prompted the need for programs that foster independence and increased social adaptability. In particular need are strategies designed to address high attentional and behavioural difficulties and dependency upon others for task performance.

Procedures for Attentional/Behavioural Difficulties and Dependency upon Others for Task Performance

Wheeler and Wheeler (1995) found that challenging behaviour could be reduced through a modification of instructional antecedents. Others have utilised video feedback to influence peer interactions of children with serious behavioural and emotional difficulties (Dunlap, Dunlap, Clarke, Childs, White & Stewart, 1992).

Fisher, Chris Ninness, Piazza and Owen-DeSchryver (1996) showed that the content of verbal attention had a reinforcing effect on behaviour. In a similar vein, Kennedy, Itkonen and Lindquist (1995) found that the interspersing of requests with unrelated social comments ("It's a lovely day, I like your new t-shirt. Please sit down at your desk") had a positive effect on the compliance of students. Similarly, other work has demonstrated that non-compliance and excessive latency in task responsiveness could be reduced by the use of the chaining of several high probability requests with a low probability request (Mace, Hock, Lalli, West, Belfiore, Pinter, Brown, & Kirby, 1988). Peer modeling of chain responses has been of particularly significant impact upon the performance of observational learning by students with disabilities (Gessler Werts, Caldwell & Wolery, 1996).

Schreibman (1994) describes a number of methods that can be used to manipulate antecedents (discriminative stimuli) or consequences in a training context. Effective techniques include positive reinforcement, negative reinforcement, prompting, shaping, chaining, extinction, punishment, overcorrection, punishment by withdrawal, and time-out procedures. Wolery, Bailey and Sugai (1988) include schedules of reinforcement, response cost, vicarious reinforcement and differential reinforcement of other behaviour (DRO), of low rates (DRL), of incompatible (DRI) and of alternative behaviours (DRA).

While the techniques described above rely predominantly on external control for compliance, others involve the teaching of self-control. Carter (1993) notes that since

the enactment in the United States of America of Public Law 94-142 (the Education for All Handicapped Children Act of 1975), efforts have been made by educators to provide education in the least restrictive environment. Over time this has evolved into the least intrusive intervention, a strategy considered as effective in reducing problem behaviours and increasing positive behaviours (Carter, 1993)

Studies have also been conducted to assess the effects of self-management training and reinforcement on the improved conduct of individuals with autism and disruptive behaviours in the absence of supervision by an authority. Chris Ninness, Fuerst, Rutherford and Glenn (1991) found that improved on-task behaviour and socially appropriate behaviour resulted after the implementation of a treatment package. Groden and LeVasseur (1995) used cognitive picture rehearsal effectively to teach self-control while Koegel, Koegel, Hurley, and Frea (1992) used self-management to improve social skills and disruptive behaviour in children with autism.

Use of Token Economies The token economy is one effective strategy pursuant toward the goal of increasing self-responsiveness to instruction, attentiveness to task and a reduction of disruptive behaviours. The literature attests to the effectiveness of token economies as a useful tool in behaviour management programs. Inkster and McLaughlin (1993) and Naughton and McLaughlin (1995) have built well upon the earlier work of Kazdin (1982), employing principles of the token economy to reduce tardiness in socially disadvantaged children and in treating various behavioural disorders. Other studies found similarly that the implementation of a token economy served to reduce significantly unwanted behaviours at the same time as increasing self-motivation in desired task performance (O'Leary, Becker, Evans & Saudergas, 1969; Shook, La Brie, & Vallies, 1990; Anderson and Katsiyannis, 1997; Fisher, Thompson, Piazza, Crosland, & Gotjen, 1997; Horner & Carr, 1997; and Ball; 1998).

Self-selection of Tasks and Reinforcers Provision of opportunities for self-selection of tasks and reinforcers has had a powerful and pervasive effect on the behaviour modification of individuals with disabilities (Dunlap, DePerczel, Clarke, Wilson, Wright, White & Gomez, 1994; Dunlap, Robbins & Kern, 1994; Mesibov, Schopler & Hearsey, 1994; Dyer, Dunlap & Winterling, 1990; Piazza, Fischer, Hagopian, Bowman, Lynn, & Toole, 1996). Dyer, et al. (1990) studied the impact of choice-making on three seriously disruptive students with autism. Before the study, students exhibited aggression, tantrums and self-injurious behaviour. When the students were given opportunity to make choices of instructional task and of reinforcers, reduced levels of aggressive behaviours were exhibited. Further, rates of correct responding to tasks across conditions were approximately equal. Finally, students varied the selections of reward item upon completion of work sessions.

Dunlap, DePerczel, Clarke, Wilson, Wright, White and Gomez (1994) provided choices in menus that consisted of academic tasks to two elementary students with emotional and behavioural disorders. During the choice condition both participants showed increased task engagement and reduced disruptive behaviour. Similar choice-making studies have demonstrated improved social relating (Koegel, Dyer, & Bell, 1987) and increases in task performance (Mithaug & Maur, 1980; Parsons, Reid, Reynolds, & Baumgarner, 1990).

Graff and Libby (1999) offered two individuals with developmental disabilities and one individual with attention deficit disorder a selection of reinforcers before the commencement of each session of work. One of three highly preferred stimuli was to be accessible upon completion of work. In a within-session condition, participants were provided access, via a selection button, to one of two highly preferred stimuli that could be received contingent upon task completion. Data showed that within-session choice produced substantially more responding to the button in the within-session choice

condition than the pre-session choice condition. Several potential explanations were offered by the researchers. It is possible that stimulus variation rather than choice-making per se was responsible for the higher response rates exhibited during the within-session condition. Another explanation was that the greater variety of reinforcers available in the within-session condition relative to the pre-session condition could account for the data. This result would appear compatible to that found by Dyer, Dunlap and Winterling (1990). It suggests that a selection of reinforcers might be responsible for reduced aberrant behaviour with certain individuals with autism and other developmental disabilities. Bowman, Piazza, Fisher, Hagopian and Kogan (1997) noted that some individuals with developmental disabilities showed improved results when a selection of reinforcers of a lower quality was provided in contrast to a condition where highly preferred stimuli were constantly available.

Fisher, Thompson, Piazza, Crossland and Gotjen (1997) showed that therapist choice (no-choice condition) of reinforcer was preferred by participants to operant choice of reinforcers (choice condition) where the former condition involved higher quality reinforcers as compared with lower quality reinforcers in the operant condition. However, where the quality of reinforcers was the same in both conditions, the choice condition was preferred by participants. Fisher et al. (1997) concluded that, for some individuals with developmental disabilities, the provision of an array of reinforcers best permitted the delivery of reinforcer that was most effective at a given point in time. For them, this technique offers the best reinforcement schedule where the goal is an increase in appropriate behaviour or a decrease inappropriate behaviour. It would appear that stimuli do not retain a value that remains constant over time but a value that fluctuates. Reinforcer efficacy is not constant; stimuli do not retain highly preferred or low preferred status over time. For this reason, the maintenance of stimulus control amongst reinforcers might best be assured through the provision of a broad selection of stimuli.

In another study the effects of choice-making on six individuals with severe to profound disabilities offered contradictory findings (Lerman, Iwata, Rainville, Adelinis, Crosland, & Kogan 1997). Participants were offered a choice of two highly preferred stimuli contingent on-task performance. In the latter study participants exhibited no variation in task performance upon implementation of the choice condition relative to a no choice condition. One explanation offered by the researchers for these results was that highly preferred items were already an element within the instructional programs. Had the instructional programs not contained highly preferred content this might have resulted in a different outcome. Lerman et al. (1997) noted that their results conflicted with other studies. In other studies choice of task or reinforcer had either no influence on responses or produced inconsistent outcomes. The fact that a control for preference was contained in the no-choice condition in their own study led Lerman et al. (1997) to conclude that access to preferred reinforcers, rather than choice-making opportunities themselves, may be decisive in producing high rates of task performance in some individuals with severe to profound disabilities.

Self-regulating of Behaviour It has been suggested that students with learning difficulties frequently lack self-regulation and task strategies (Reid & Harris, 1993, p. 29). High teacher-dependence for task completion, disruptive behaviour and difficulty remaining on-task, resulting in poor productivity in relation to objectives and indicators of performance, are characteristic descriptors of this broadly defined group. One remedy for this complex of presenting problems is the provision of strategy instruction (Harris, 1986). Strategy instruction involves the provision of some form of self-management that, once learned, assists students with perseverative and behavioural difficulties to remain on-task independently while showing a greatly reduced incidence of inappropriate behaviours.

Lagomarcino, Hughes and Rusch (1989) distinguish four self-management procedures that have proven particularly effective in treatments for children with developmental disabilities. These are picture prompts, self-instruction, self-monitoring and self-reinforcement. Picture prompts are visual cues, which prompt a desired behaviour or set of behaviours. Self-instruction involves verbal self-prompting to guide behaviour. Self-monitoring involves self-observation and reporting or recording of performance, and self-reinforcement involves self- administration of rewards contingent upon successful task completion (Lagomarcino et al., 1989).

Schloss (1987), and Johnson and Johnson (1999) are amongst those who advocate behaviour change plans, self-monitoring reports, and self-management contracts while Dunlap, Dunlap, Koegel and Koegel (1991) have recommended the use of self-monitoring devices. All of these methods are designed to modify disruptive behaviours while fostering independence free from external controls.

Self-monitoring of attention (SMA) and self-monitoring of performance (SMP). In the literature, strategy instruction has traditionally taken either the form of self-monitoring of attention (SMA) or self-monitoring of performance (SMP). Reid and Harris (1993) note that self-monitoring was first utilised as an assessment tool with which to study patients in relation to perceived behaviours, feelings and thoughts. It has also been used as a means to study the effectiveness of particular interventions. Nelson and Hayes (1981) noted that a causative correlation existed between participants' recording of behaviours and the frequency of those behaviours. The literature indicates that self-monitoring has been used to improve on-task behaviour and academic skills of students with mild disabilities in across special and regular education settings (Reid & Harris, 1989, Prater, Hogan, & Miller, 1992; Prater, Joy, Chilman, Temple, & Miller, 1991; Dixon, Hayes, Binder, Manthey, Sigman, & Zdanowski, 1998; Reid, 1993; Reid, 1996; Reid & Harris, 1993) as well as in special education classrooms (Webber,

Scheurermann, McCall & Coleman, 1993). Dunlap, Dunlap, Koegel and Koegel (1991) and Frith and Armstrong (1986) found that self-monitoring techniques helped to increase independence and reduce behaviourally-disordered students.

SMA versus SMP? Self-monitoring of attention (SMA) is a procedure in which students are taught to record self-perceived changes in attentiveness to tasks. This is distinguished from self-monitoring of performance (SMP) in which students are taught to record their academic performance according to frequency, quality and accuracy indices (Reid & Harris, 1993). This distinction has important consequences for educational research.

SMA and SMP rely on and reflect different schematic paradigms. Implicit to a SMA approach is the assumption that an increase in attentional behaviour will result in a corresponding increase in academic productivity. Proponents of the SMP approach argue that increased academic performance will result in the occurrence of increased on-task behaviour.

A few studies have indicated that the implementation of both SMA and SMP interventions has resulted in increased time on-task (Harris, Graham, Reid, McElroy & Hamby, 1994). It has also been shown that a higher degree of accuracy in academic performance in terms of practice of known skills has been yielded through the use of SMP interventions than that produced through the implementation of SMP interventions (Reid & Harris, 1993; Harris Graham, Reid, McElroy & Hamby, 1994).

The literature is unclear as to whether one procedure or the other is superior for all participants in all situations (Maag, Reid, & DiGangi, 1993). In one experiment Harris, Graham, Reid, McElroy and Hamby (1994) showed that performance monitoring was more effective than attention monitoring for students with learning difficulties when the task involved learning spelling words. However, the results of a second experiment on writing behaviour indicated no clearly superior advantage in the use of either SMA or

SMP, supporting Reid and Harris' earlier work (1993) that neither procedure can be relied upon to produce better effects under all conditions (Harris et al. 1994). Harris and others (1994) concluded that until a firmer database exists to indicate which self-monitoring approach is the more effective, individual needs, abilities and goals should guide the selection of a self-monitoring procedure. If a student's self-monitoring of attention is the critical issue, then SMA would appear to be the more appropriate procedure. If, however, performance were the issue, then the more appropriate approach would be SMP. This is not to rule out the possibility of utilising both approaches in tandem. Whatever decision is made, Harris et al. (1994) cautioned that the SMA procedure might produce increases in on-task behaviour without increases in performance. Achievement, accuracy, productivity and quality of work are not necessary corollaries of on-task behaviour (1994).

Self-monitoring and self-management. The theoretical literature recommends a distinction between self-monitoring and self-management. Self-monitoring is a form of self-management, but self-management is also any form of independent task performance without reference to self-recording. Self-monitoring involves the regular monitoring of progress according to a variable or ratio schedule through self-awarding of a series of ticks or other indicators on a chart during the process of work. (Ball, 1998).

Carter lists several criteria for applying self-management systems. Reliance on an external change agent to modify behaviour risks inconsistent contingency management. In addition, external change agents (teachers, supervisors) cannot always be present in every environment. Consistency across external change agents in different settings is difficult to achieve, rendering contingency management less than precise in such situations (Carter, 1993; Alberto & Troutman, 1982; Wolery, Bailey & Sugai, 1988). Self-management offsets these difficulties.

Studies have demonstrated the effectiveness of self-management as an intervention. Self-management has been utilised successfully by individuals with moderate and severe developmental disabilities in the achievement of production targets in employment contexts; in independent task changes; in independent attentiveness to task; and in improvement in social behaviours. (Moore, Agran & Fodor-Davis, 1989; Mesibov, Schopler & Hearsey, 1994; Koegel, Koegel, Hurley & Frea, 1992; Lagomarcino, Hughes & Rusch, 1989; Chris Ninness, Fuerst, Rutherford & Glenn, 1991; Pierce & Schreibman, 1994; Roe & Plummer, 1985; Carter, 1993; and Ball, 1998).

Shapiro, Browder and D'Huyvetters (1984) implemented an externally-controlled token economy to increase the paper-and pencil-task productivity of four individuals with severe multiple disabilities. Self-management of the token economy was then initiated. Two of the participants self-managed the token economy successfully while all maintained productivity levels and generalised across time and tasks. A reduction in severe behaviour also occurred in two out of the four participants while one participant displayed highly variable performance of productivity from day to day. Other studies have reported the successful shifting of reinforcement contingencies from an external agent to a self-managed control through self-management approaches (Glynn, Thomas, & Shee, 1973; Rhode, Morgan, & Young, 1983; Turkewitz, O'Leary, & Ironsmith, 1975; and Shapiro, Browder, & D'Huyvetters, (1984).

Pictorial Self-management Picture prompt self-management strategies have been shown to be effective in behaviour modification in the research. MacDuff, Krantz and McClannahan (1993) have utilised visual cues (pictures, photographs and line drawings) to assist individuals with moderate and severe developmental disabilities to cook meals, perform laundry, clerical and complex assembly tasks and independent movement between activities. Robinson-Wilson (1977) used recipe cards to teach cooking skills to adults with severe and profound disabilities. Self-management strategies have been

implemented using pre-arranged picture cues to prompt performance of desired behaviours (Lagomarcino, Hughes, & Rusch, 1989). A study by Wilson, Schepis, and Mason-Main (1987) involved the use of picture prompts to increase the independent productivity of adults with severe intellectual disabilities working in a family-owned restaurant. Roberson, Gravel, Valcante and Maurer (1992) used picture task analyses as an effective tool for teaching students with multiple disabilities. Rowland and Schweigert (1990) note that not all individuals are able to read or distinguish COMPIC or even photographs. In such cases, they advocate the use of three-dimensional tangible symbols which serve the same purpose as photos, COMPIC or written words, but at a more tangible level that can be comprehended by individuals with more severe disabilities. Through the progressive association of a nominated tangible item with an activity or object, the individual is able to gain an awareness of the item's communicative intent. For example, a toothbrush attached to a stiff card could be used to represent the message, "Time to brush your teeth."

Iconicity. Kozleski (1991) found the use of visual symbol systems to be an effective technique for increasing the communication response rates of students with autism. Kozleski suggested that systems employing visual cues might best facilitate communication amongst those with deficits in this area. It was speculated that effective harnessing of iconicity could yield improved performances by individuals who had learned to retain some representation of the environment in long-term memory (1991).

Other studies using picture-prompts in a self-management package have demonstrated that participants have learned considerably from this intervention procedure. MacDuff, Krantz and McClannahan (1993) added to the literature by using photographic activity schedules to enable individuals with severe developmental disabilities to engage in on-task and on-schedule behaviours. Prior to the study the four participants were unable to engage in appropriate activities without verbal prompts.

During training phase students were initially unable, without prompts, to meet criterion but subsequently began to engage in on-task and on-schedule behaviour without prompts. Generalisation to new sequences and activities was accomplished without additional training. While engaged in scheduled activity the level of aberrant behaviour decreased. The data indicate that photographic schedules enabled the lengthy display of chains of previously mastered functional behaviour. Unlike other studies where participants ceased utilising their schedule cues, finding sufficient prompting in the first photograph of a series to complete a whole required sequence of behaviour, the participants in this study continued to demonstrate adherence to the prompt material. A most-to-to least sequence of guidance at the training phase prevented errors entering in and confusing the task completion requirements; the authors recognised the powerful effects inherent in a "schedule-following response chain" (MacDuff, Krantz & McClannahan; 1993 p. 97). A rigid adherence to schedule and task regimen at the training phase helps account not only for the high performance level of all participants, but also their continued use of the schedule prompt. This schedule-following skill was found to generalise to new sequences of different activities. In addition, aberrant behaviours diminished when participants were following their schedules. By the end of the study participants were able to change activities independently in a variety of settings, and display engagement in lengthy response chains of behaviour in complex home-living activities and leisure repertoires for up to an hour without immediate intervention by supervisors. MacDuff et al. (1993) observed in their study that photographic photo schedules became discriminative stimuli for participants who continued to sustain engagement after graduated guidance training had ceased.

Pierce and Schreibman (1994) also taught three low functioning children with autism to use picture prompts that enabled self-management of behaviour in the absence of a treatment provider. Prior to the treatment, participants were reliant upon their

parents to perform all the target behaviours. After the introduction of the pictorial self-management system participants were able to perform and maintain all desired adaptive behaviours independently across tasks and settings in the complete absence of supervision. In addition, engagement in the desired behaviours increased while inappropriate behaviours decreased. Pierce and Schreibman (1994) indicated uncertainty as to whether or not picture prompts were necessary for task completion or whether, instead, these served as discriminative stimuli, reinforcing task completion. It was postulated that this question could be addressed by the implementation of a post-training probe in which only a cover photo was presented to participants followed by a cue for task completion.

The researchers noted that one participant was reliant upon the picture management system at post-treatment and at follow-up while two others missed occasional steps in the activities. However, all children were able to dispense with the picture prompts once behaviours became routine, performing two out of three tasks without the use of the picture prompts. This finding was positive, indicating, as was demonstrated in the study by MacDuff, Krantz and McClannahan (1993) that stimulus control can be transferred from self-management materials themselves to other environments.

Pierce and Schreibman (1994) outlined a number of practical advantages that are inherent in the use of pictorial self-management systems. Picture prompts can be placed in a small booklet format enabling its implementation in other settings. Pictorial self-management is easily faded. Attainment of criterion for new tasks may be reduced by up to 25% of original training time once familiarity with the routine involved in pictures is established. The burden of direct supervision for mundane tasks by parents/caregivers can be reduced dramatically through the implementation of the pictorial self-management system. Finally, self-management, in the literature, has been shown to bring the added benefit of a significant reduction in inappropriate behaviours.

Swaggart, Gagnon, Jones Bock, Earles, Quinn, Smith Myles and Simpson (1995) used a combination of social-story with photographs to teach appropriate social and behavioural skills to three children with autism. A book format was given to the participants containing pages with between one to two sentences per page and a photograph or a verb icon depicting a desired behaviour. Swaggart et al. (1995) found that the combined intervention increased participants' appropriate behaviour and reduced disruptive behaviours. The results of their study supported previous work (MacDuff, Krantz, & McClannahan. 1993; Pierce & Schreibman, 1994), which had demonstrated that students with autism and severe developmental disabilities respond particularly well to behavioural expectations that are visually presented.

Further support for visual-pictorial communication aids is found in the work done by Bondy and Frost (1994), researchers aligned with the Delaware Autistic Program (Olley, Robbins & Morelli-Robbins, 1993). The Delaware Autistic Program employs behavioural techniques and regular data collection in discrete one on one incidental and trial teaching (Olley et al., 1993). Two emphases are found in the Delaware program. Firstly, in the Picture Exchange Communication System (PECS) participants are taught to communicate expressively with the exchange of pictures. Through this medium desired items are obtained and messages are conveyed. Long-term group and individual data indicate that the use of the picture exchange system has resulted in non-speaking children acquiring speech after commencing with the system as preschoolers (Bondy & Frost, 1994). Secondly, students are taught alternative behaviours resulting in reduced disruptive behaviours (Olley, Robbins & Morelli-Robbins, 1993). Several studies concur that the provision of alternative behaviours can yield a reduction in disruptive behaviours. For many individuals with disabilities, disruptive behaviours have a communicative function. These studies noted that the teaching of socially acceptable methods of communication resulted in a reduction in disruptive behaviour (Mirenda,

1985; Mirenda & Schuler, 1988; Foster-Johnson & Dunlap, 1993; Horner & Carr, 1997; Durand & Carr, 1991; Sigafoos & Meickle, 1996; Carr & Durand, 1985; Durand, 1993; Dunlap et al., 1994; and Sigafoos & Meikle, 1996).

Connis (1979) used a self-recording procedure that employs sequentially ordered picture cues to enable four adults with an intellectual disability to perform independent task changes. A small blank piece of paper was taped to each of four photographs representing component tasks in the work sequence. The four participants were trained to place a tick on the paper immediately a task was to be commenced. This signalled their intention to commence work on that task. A limit of 40 seconds was then permitted for work to begin before a verbal prompt was issued. The blank paper under each photo served as a visual prompt that remaining work needed to be completed.

During the training phase participants were taught the procedure involved in the work sequence. Instruction included role-play, modelling, and the provision of long-term and short-term explanations as to why the work should be completed (e.g. to learn independent work skills, to help maintain employment). Following successful completion of a sequence participants were praised for their work.

Connis (1979) found that participants were able to initiate task changes independently during the training phase. Over the course of self-recording, increased independence in following the work regimen was demonstrated. During training initiation of task changes and independent task changes reached levels between 90% and 100%. Levels for all participants did not drop below 77% during the training phase. During the training phase if a procedural error occurred participants were prompted to go back and complete whatever work that had not been done. They were not required to place ticks on the blank papers if work was being completed in sequence.

The participants exhibited mean performance scores between 87% and 100%

following the withdrawal of the training phase and reinforcement component. Independent task-changes continued for more than 10 weeks. Instructional feedback was given if a participant neglected to complete any task in the post-training phase. During this phase the frequency of picture-cue marking diminished while participants continued to exhibit high levels of task performance. On the last day of the study percentages of picture-cue marking were 0%, 21%, 31% and 78% for the four participants (Connis, 1979).

Connis (1979) found that the withdrawal of the training and reinforcement components made little or no difference to levels of independent task changes. It was concluded that the design, incorporating self-recording as an essential element, was an effective procedure for teaching adults with an intellectual disability to perform independent work sequences. The combination of all components in the design (picture cues, training procedures and provision of rationales during work and praise following work) was seen to be accountable for the improvement in performance following the introduction of treatment. The fact that performance did not fall despite the removal of reinforcement, and despite a fall in self-recording behaviour, made it apparent that reinforcement and self-recording were not solely responsible for increased performance at the post-training phase (Connis, 1979). A positive benefit in the sequencing effect might be suggested by the results and the circumstances that existed at the post-training phase.

Pictorial Self-management and the TEACCH Approach to Self-management

TEACCH history. Autism was first named by Kanner in 1943. Autism was initially viewed from a Freudian theoretical perspective. However, in time, and by contrast, Schopler and other researchers working with a small number of children and their parents in 1971, chose a client-centred approach where parents and family

members were seen as coworkers in rehabilitation rather than the cause of the problem (Schopler, 1994).

The name TEACCH is now associated with the work of Eric Schopler, Gary Mesibov and others. It has its base at the University of North Carolina at Chapel Hill, Division TEACCH, Department of Psychiatry, School of Medicine.

Central TEACCH beliefs. The TEACCH approach promotes the view that unique deficits and behaviours characterise autism. Cox and Schopler (1993) have shown that autism is characterised by a wide range of aberrant, disruptive and, sometimes, destructive behaviours, poor communication skills, and difficulties in social, emotional and cognitive development:

> Persons with autism lack social judgment and are not aware of the feelings of others. They often have poor organization skills, making it hard for them to make sense out of complexity unless there is a clear visually apparent pattern to organize stimuli. They have problems with time sequencing, often apparently struggling with sequenced events. They have problems with the concept of finished, sometimes doing and then undoing tasks because of this problem. They have difficulty with transitions, such as moving from one activity to another or one location to another. (p.187)

Prizant and Wetherby (1993) note that there are three major areas where deficits are looked for when diagnosis of an autistic type disorder is contemplated. Symptoms must occur in the areas of social-affective competency, in language-related abilities, and in verbal and nonverbal communication. Prizant et al. (1993) observed that these three critical areas are closely related to the three major dimensions of development of a sense

of self and emotional development in children, "the sharing of attention, or interattentionality, the sharing of intention or inter-intentionality, and the sharing of affect, or interaffectivity" (Prizant & Wetherby, 1993, p.67).

Structured teaching. The distinctiveness of the TEACCH approach lies in the precision involved in the application of various components of a system of "structured teaching". Structured teaching is a combination of procedures and methods designed to address the areas of deficit experienced by individuals with autism. The elements in structured teaching include the provision of a visual functional communication system, the use of schedules and the employment of "work systems" (Mesibov, Schopler, & Hearsey, 1994). The use of schedules, individual work systems, physical organisation and routine has assisted children with autism to feel comfortable and secure in the knowledge of what is expected of them and what they can expect from their environment (Groden, Cautela, Prince, & Berryman, 1994; Strickland, Marcus, Mesibov, & Hogan, 1996).

Functional communication system. Central to the TEACCH approach is the employment of a functional communication system at whatever level is necessary (see above on iconicity, Kozleski, 1991, and Rowland & Schweigert, 1990) for the individual to engage in receptive and expressive communication. A concomitant of this is the structuring and labelling of environments with a communicative medium (tangible symbols, photographs, pictures, COMPIC, words).

Schedules. Individuals with autism have difficulty with the organisation of time and sequential memory. Visually clear schedules assist comprehension of the activities that will occur and in what sequence during a day or week. The use of coherent and consistent schedules in the classroom, home and work environments creates order and consistency in expectations. These clearly defined routines enable individuals to engage in anticipation and prediction. The implementing of consistent schedules has been

found to reduce anxiety and disruptive behaviour in individuals with autism (Van Bourgondien, 1993). Mesibov, Schopler and Hearsey (1994) found that a program of teaching utilising schedules, work system, visual prompts, structure, clarity and routines, produced positive results in their work with persons with autism. They found that the provision of structure assisted individuals with autism to understand and self-manage where previously dependence on support and direction was a constant feature of their lives.

Work systems. The TEACCH approach also uses a routinised work system. A work system has a clearly marked beginning, a progression of task expectations, and a clearly indicated consequence that is available contingent upon task completion (Mesibov, Schopler and Hearsey 1994; Van Bourgondien, 1993). Visual information is provided for each of these elements in the system. In a typical scenario, work materials will be located on a table. In the centre of the table is a strip of cardboard (the work system) to which is attached a series of number labels. At the end of the series of number labels a final reward icon label indicating "finished, time for reward" is located. Also on the table, to the left of the strip of cardboard are a series of boxes. Each is labelled with a number corresponding to the number labels on the cardboard strip.

The sequence of work involves the removal of the first of the number labels (labelled "1") from the strip and attaching it to a boxed work task that has the corresponding number "1" label. The contents in the box are removed, and the work material is worked on until completed. Once completed, the material is placed back into its box and the box is slid to the right of the work area. Label number "2" is removed from the cardboard strip, box "2" is labelled and work is commenced on the items contained in box "2". The work procedure is followed until no number labels remain on the work strip and the only remaining item is the reward icon. Recognising this to be the "reward card", the participant removes it and proceeds to the reward area in the

classroom. Here, he will find a board to which is attached an array of representational picture cards or photographs of highly preferred stimuli. Access to these reinforcers is achieved by simply "posting" the reward card at the side of the board and removing the desired icon. Retrieval of the reward is accomplished by approaching the appropriate location where the reward is stored. The picture card is posted and the reward itself is taken, the card having been exchanged for the item of choice. Once an item has been claimed, that particular item remains inaccessible to other participants while the reward card icon is missing from the array board.

The work system labels are attached to the boxes and the task equipment contained in the boxes can be adjusted for lower or higher functioning participants. Coloured dots, letters, or words can be used for the work strip labels. Manilla folders into which work tasks are stapled or inserted in plastic sleeves can replace the boxes themselves.

Once participants have learned and internalised the procedure involved in the work system, the routine can be adapted to settings other than the classroom. The potential is not limited to academic type activities but can be generalised to other skill areas where a sequence/response chain is called for.

When applied in the designated manner structured teaching creates meaningful environments for individuals with autism. Structured teaching compensates for the deficits in the areas of organisation, time sequencing and other areas of difficulty experienced by those with these disorders. Mesibov, Schopler and Hearsey (1994) note that behaviour is also improved proactively through structured teaching. Structured teaching creates meaningful environments that prevent the frustration and anxiety that triggers much of the disruptive behaviour displayed by people with autism.

Schopler, Mesibov and Baker (1982) conducted an evaluation of the TEACCH approach for autistic children as viewed by their parents, centre therapists, teachers and other carers. This study involved questionnaires assessing effectiveness both in the

short-term (less than a year after treatment) and long-term outcomes. An assessment of parental attitudes toward the effectiveness of the TEACCH approach found that parental ratings were high when asked about improvement in the problem areas of social relationships, motor skills, self-help skills, language and communication, and difficult and aberrant behaviours. Table 3.1 contains data from the questionnaire.

Long-term findings were similarly positive. Most follow-up studies show an increase in institutionalisation as autistic individuals grow older. The rate of institutionalisation for autistic persons not under the TEACCH approach ranges from between 39%-74%. In a report citing long-term outcomes when assessing the rate of institutionalisation for TEACCH children, only 7% were found to be living in institutions. Schopler, Mesibov and Baker (1982) concluded that this low rate of institutionalisation demonstrates the program's high rate of effectiveness in enabling families of autistic individuals to keep their children home. Mesibov (1997) cites two studies that have implemented outcomes-based research to evaluate the effectiveness of structured teaching. The Department of Health and Social Services in conjunction with other agencies in Northern Ireland conducted a pilot project study in 1995 with a sample of 72 parents and professionals. An evaluation of the progress of 26 students involved in five different TEACCH programs was carried out. Over 86 % of respondents indicated that the quality of life for children and adults with autism was enhanced through the TEACCH methodology's emphasis on structured teaching. Improvements in self-help skills, communication, social skills, concentration and independence were noted along with a reduction in disruptive behaviours.

A study sponsored by the Swedish National Autism Society corroborated the effectiveness of the TEACCH approach. Almost all of respondents noted that the systematic nature of the structured teaching techniques in the program improved performance in social skills, communication enhancement and independence in persons

with autism (Mesibov, 1997). Through other formal and informal measures, Mesibov (1997) concluded that, from its start in the mid 60s as a research project, the TEACCH approach has grown internationally in terms of its exemplary service and empirically-based practices, a development that has also been matched by spontaneous support by parents and families of those with autism.

Individual studies attest to the effectiveness of the approach. Cox and Schopler, (1993) employed a work system procedure for 16-year-old male who had been displaying severe aggressive and destructive behaviours. Prior to intervention the participant was intermittent in task completion, sometimes completing all of his work, and at other times, engaging in desk-throwing and other acts of property destruction. The student's work was altered and work tasks were reduced in both length of task and complexity. Easier, previously mastered tasks were assigned with frequent breaks. Work sessions were shortened to 50% of previous levels. Within two weeks all disruptive behaviour ceased. Over time an increased work load and complexity of task were introduced with no recurrence of disruptive behaviour. The student was able to work at 80% of his previous level while maintaining positive work behaviours and self-control.

Present Study Studies in the literature to date have focused on the use of pictorial self-management work strategies, specifically "work systems" and "schedules" for individuals with autism and moderate and severe developmental disabilities. Some of the functional assessment procedures and techniques once developed for use with people with severe disabilities are now being increasingly demonstrated as efficient for use in general as well as special education circumstances. The use of specific prompting techniques and reliance upon choice-making as a behavioural support component is increasingly being recognised in areas other than in cases for those with severe

Table 3.1

Parent ratings of changes in child problems as a result of their contact with the TEACCH program

Parent ratings of changes in child problems as a result of their contact with the TEACCH program

Child Problem Area	M rating
Social relationships	4.48
Motor skills	4.44
Self-help skills	4.37
Language and communication	4.36
Difficult and aberrant behaviours	4.08

Note: Higher numbers indicate greater improvement. Maximum = 5.00

disabilities (Dunlap, Dunlap, Koegel, & Koegel, 1991, Dunlap, DePerczel, Clarke, Wilson, Wright, White, & Gomez, 1994).

The present study seeks to extend the research by assessing the effectiveness of a TEACCH-style self-management "work system" coupled with a self-selection of reinforcers component. The dependent variable will be the on-task behaviour of two students. One student has a moderate developmental disability. The other student has a severe developmental disability.

The work system employed in the present study (see Appendix C, Figure C1) is based extensively on the model found in the TEACCH program. The effects of introducing the work system and regimen used in the TEACCH approach to structured teaching will be examined.

The current study is consistent with the research of Bambara (1997) and Horner and Carr (1997) who advocated a comprehensive support system for students with disabilities, the desirability of providing multiple layers of interventions designed to assist in building environments facilitating prosocial behaviours, the maintenance of newly learned skills and the prevention of problem situations.

The focus of this study is in keeping with the perspective of Harris, Graham, Reid, McElroy and Hamby (1994). For self-monitoring to be meaningful students require the process skills upon which self-monitoring is based. The focus of this study is to see if the provision of a self-management work procedure can reduce inattentiveness, disruptiveness and the need for teacher intervention in two students with developmental disabilities.

Chapter 3

Method

This chapter contains details on the participants, setting, selection of tasks and reinforcers, and dependent and independent variables. Following this, a description of data collection procedures employed will be given. This will be followed by a description of the design and experimental conditions, including an explanation of the experimental phases involved in the study.

Participants

Two students from a composite Year 3-4 class in an education support centre were the participants in this study. One boy, Art (pseudonym) was eight years-old at the time of the study and was classified as having a moderate developmental disability according to the school district's criteria. Art had low-level expressive communication skills and was able to write sentences with basic CVC words. Reading and spelling tests (Schonell) placed Art's achievements at around six years of age. Henk (pseudonym) was nine years-old at the time of the study and had been classified as having a severe developmental disability according to the school district's criteria. Henk's expressive communication skills were limited to one-word utterances. He did not register on reading and spelling tests (Schonell) and was not capable of any reading or writing. Both boys were members of the main researcher's class. Both students demonstrated high levels of teacher dependency for task engagement and task completion. Neither student demonstrated ability to perform work without one-one direct teacher intervention. Art had a documented history of extremely violent, destructive behaviour. Antecedents for such behaviour ranged from the assignment of work tasks where he was required to work independently to the awarding of reinforcers to other students who had finished their work. Henk demonstrated noncompliant behaviour when asked to do

work and reluctance even during one on one teaching. Disruptive and objectionable language and physical gestures were displayed when direct teacher intervention was not being provided. The use of positive reinforcement, a token economy (sticker book and rewards), and differential reinforcement of alternate, incompatible and low rates of behaviour were used in the classroom. In addition, contracts were used for the whole class and these contingencies functioned also for both boys with varying degrees of success. Both boys had been involved in integration for art and music in the mainstream but this had to cease due to high rates of disruptive behaviour. Both participants were chosen because of their high incidence of noncompliant and disruptive behaviours. Convenience sampling was the basis of selection.

Setting

All sessions were conducted in the classroom at a table set to the side of the teacher's desk (Appendix A, Figure A1). All task materials were present on the table and students were issued a prompt card, signalling "time for work" while they were sitting at their own seats. Upon receipt of the prompt card, students were taught to leave their own seats and go to the work table where the work was set up awaiting engagement. Following completion of work students were taught to remove a reward icon label from the work system and walk to an array board where COMPIC © and other line drawing icons representing reinforcers were affixed (Appendix A, Figure A2). Students were taught to "post" the reward icon, select an icon label representing the reinforcer they desired, and walk to that part of the classroom where the rewards were stored. Upon posting of the reinforcer icon label at that location, students had access to the item of leisure.

All sessions were conducted in the morning between 9:00 a.m. and 11:30 a.m. during the school week. The other seven students in the class were involved in their own literacy and numeracy work during this time and the two participants were aware of

each other and that they were being called respectively to come and work at the table with their own individual set of tasks. Both students expressed eagerness to be at the table and engaged in their tasks during the course of the investigation.

Selection of Tasks and Reinforcers

There were six tasks each chosen by the homeroom teacher for the study. The tasks were chosen on the basis of the students' demonstrated ability during previous educational activities to perform these tasks autonomously and without error in a time of approximately two minutes each. The tasks ranged from prevocational and pre-academic to vocational and academic skills (see Appendix A, Figures A3-A14 for Art's and Henk's tasks respectively). Work activities ranged in complexity from matching pictures with words, correctly labelling letters on a letter chart, matching upper to lower case letters, matching numbered cards to corresponding array of dots, copying of lists of spelling words, tracing over of letter forms on a sheet, matching of sentences to corresponding pictures. and the writing of missing letters or words in a sentence cloze procedure.

Six stimuli were selected on the basis that they were reported by the homeroom teacher to be functional reinforcers of high preference by both students. These stimuli were accessible contingent upon successful completion of tasks in each work session. Immediate access to the reinforcers was available upon task completion.

Dependent and Independent Variables

The primary dependent variable in this experiment was time spent to complete tasks. Additional dependent variables included the number of tasks that could be completed within a ten minute period in a session, the number of disruptive behaviours displayed, the number of teacher-dependent behaviours and the number of times the teacher intervened. In addition, as a component of the number of tasks that were successfully completed, errors in a session were also a focus.

Number of tasks completed was defined as the number of manilla folders and boxes of tasks completed in a session. A session was determined by the number of tasks that were placed on the work table. Individual work tasks were contained either in a manilla folder or in a cardboard box.

Time taken to complete tasks was defined as the amount of time that students took to finish working on individual work assignments. Time was recorded in seconds with a stopwatch. Recording started when a box or manilla folder was emptied of its contents. A task was considered finished when all of the items involved in a task were completed. Tasks were only considered as "completed" if the contents of each task were completed with 100% accuracy. Mistakes in any of the contents of a task disqualified a task and resulted in an "error" being recorded.

Disruptive behaviours were considered to have occurred where there were audible non-task related noises, whistling, crying, self-stimulation, protests and calling to other children and vocalising and gesturing. Throwing or destroying work tools and materials was also recorded as a disruptive behaviour. Behaviours had to occur for at least 3 seconds to be recorded as a disruptive behaviour.

Teacher-dependent behaviours were considered to have occurred where there was calling to the teacher for assistance, raising of a hand for help and looking to the teacher to provide visual prompts to continue working. Behaviours had to occur for at least 3 seconds to be recorded as a "teacher-dependent behaviour".

Teacher intervention was operationally defined. A teacher intervention was considered as having occurred whenever the teacher issued any verbal or physical prompts to keep the student on-task. Teacher interventions were provided where any 3-second duration of disruptive or teacher-dependent behaviour was displayed. All teacher interventions were recorded. The nature and duration of an intervention was not recorded.

The primary independent variable was the provision of a self-management strategy incorporating a reward system. Tasks included in the regimen also constituted an independent variable.

Data Collection and Reliability

A research team of three, headed by the homeroom teacher, utilised a stopwatch and a recording sheet (see Appendix B). Reliability measures were obtained during each phase of the study. The procedure involved two independent observers meeting at the end of a session and noting the degree of their concurrence over the number of recorded dependent variables. Percentage agreement was between 90-100% for both students' data.

Experimental Design

The study followed an ABCDEFGH changing conditions multiple-baseline-across-subjects design. This is a single subject design study (Wolery, Bailey & Sugai, 1982). An initial pretest before Phase A was implemented. The pretest involved the establishing of a baseline for the performance of the six tasks that were being used in the investigation. An additional baseline probe, Phase A, for one task only, followed. Phase B was a training phase, introducing the self-management strategy. This phase involved graduated guidance in the use of the work system using one task only. Phase C through to Phase G were independent task performances phases. Each phase involved the addition of one new task to the routine. Phase C involved two tasks; Phase D, three tasks; Phase E, four tasks, Phase F, five tasks; Phase G, six tasks; and Phase H (probe) six tasks. The Phase H probe consisted of the removal of the tangible components of the work system by the researchers and the recording of participants' task performances without the physical props in place.

Experimental Phases

Pretest. This phase of the investigation involved the invitation to each participant to complete a series of six tasks. Six boxes or manilla envelopes, depending on the nature of the task, were sitting on a work table. In each box or folder was one work task. Each student was simply assigned the tasks and left to perform the work with no further instructions or information.

Phase A-baseline condition. Phase A was an additional test of students' performance for one task only. This phase differed from the pretest in that, in the former, six tasks were involved. In Phase A only one task was assigned.

Phase B-Experimenter controlled teaching of the self-management system. One participant was taken through the training phase at a time. Upon the completion of the procedure with one student the second student was taken through the self-management teaching phase. The participant was handed a work prompt card. The student was guided to the work table. On the table was a cardboard strip work system (approximately 60 cm x 15 cm). To the left of the work system was a cardboard box. Affixed to the work system was a manilla envelope, a numbered Label I and a reward icon label at the end of the card. The teacher sat opposite to and facing the student. The student was guided to insert the prompt card into the manilla envelope and was told "Time to do some work. Afterwards you can take the reward card (pointing to reward card) and go choose something to play with. First work, then play".

The teacher demonstrated the removal of the first numbered label I. The teacher affixed the Velcro©-backed numbered label to its corresponding identical number on the box containing a work task. The teacher placed the participant's hand, one hand on each side of the box and guided the participant's hands, sweeping the box from the left side of the table to the right (from the student's perspective). At the same time the student was instructed, "Slide it from the left to the right".

The teacher told the participant to "Take everything out of the box". The teacher emptied the contents of the box onto the table and placed it in a pile in front of the student, replacing the empty box to the right of the student. The teacher instructed, "It is time to work. I want to see how quickly you can finish this work. When you are finished you can go and find something to play with" (pointing again to the reward card).

Repetitions of the training procedure during Phase B progressed from a hand-over-hand prompt to graduated guidance. This was followed by no prompts as the participant became fluent with the steps in the routine. Teacher-dependent behaviours, disruptive behaviours and non-procedural errors were recorded if these occurred for 3 seconds or more. Teacher interventions were specifically phrased, "Do you need help? What do you need help with?" Assistance was provided where this was necessary. For disruptive behaviours occurring for more than 3 seconds, teacher response was standard, "You are not doing your work, you know how to finish your work and get a reward."

Once the task was completed, the teacher told the student to "Put the work away". The teacher demonstrated how to place the completed work task into its box that had been sitting on the table to the participant's right. The teacher then instructed, "Work is finished, time to play", at the same time as pointing to the reward card and then removing it from its Velcro© backing on the right side (from the participant's perspective) where it had been affixed to the work system.

The teacher guided the participant to the reward board saying "Time to go find something to play with". The participant was directed to "post" the Velcroed © reward card to the side of the board. He was then instructed, "Now you can choose something to play with; what would you like to choose?" Upon pointing to the icon label card representing the desired item, the participant was directed to that part of the room where

the desired leisure item was located. Students were taught to exchange the reward icon label for the item it represented. The item itself was retrieved by the participant.

During the course of the training sessions the child was told, "I want to see how quickly you can finish your work and go play". Participants were also reminded that they must not just work quickly, but "work carefully", doing correct and neat work. During the training phase the participants' work was monitored and incorrect or messy work was addressed to show that completion included the qualities of correctness and neatness. After the training phase had ceased and independent work had commenced (Phases C-H) no comment on correctness and neatness was issued. Throughout Phases C-H no checking of work occurred until the participant had left the work table.

Progress from Phase B to Phase C did not commence until participants demonstrated 100% autonomy in following the procedure taught in Phase B. Progression into each new phase (progress through Phases B-G) did not occur unless the level of task attainment had been demonstrated at least once in the relevant phase. For example, Phase C was not introduced until accurate performance of one task had been demonstrated within 10 minutes at least once in Phase B. Phase D was not introduced until accurate performance of two tasks had been demonstrated within 10 minutes at least once in Phase C. Depending on the nature of the task, some tasks were housed in cardboard boxes while others were secured inside a manilla folder. This procedure occurred for both participants.

Phase C through to Phase G: Monitoring of the self-management procedure.

In Phases C-G one additional task was introduced into the work routine. At the commencement of Phase C the prompt labels for two tasks were located on the work system. At the commencement of Phase D the prompt labels for three tasks were located on the work system. At the commencement of Phases E, F, and G the prompt labels for four tasks, five tasks and six tasks were located respectively on the work system.

The instruction was given at the beginning of each work session, "You are doing very well. This is great. Now I want to see if you can complete two (or three, four, five, or six according to the phase) tasks before you play." During Phases C-G reminders about the procedure itself were not issued. Only requests for help or disruptive behaviours were responded to by the teacher and recorded. Over the course of Phases B-G the tasks that each participant was cumulatively given did not vary. The same six tasks 1-6 tested at the pretest phase were progressively issued to each respective participant as the investigation progressed. By Phase G students had a series of 6 boxes/manilla folders sitting to the left of the work system prior to commencement of work in a session (See Appendix C, Figure C1).

Phase H (Probe). Participants were given the tasks involved in Phases B-G. The physical/tangible elements (the work system card and all of its component parts) of the self-management system were removed during Phase H. Participants were given an instruction to complete the tasks at the work table at which they had been accustomed to working. Participants were issued with the instruction, "Remember, work first, then play. When you are finished with your work you can go to the reward board to choose what you want to play with in free time". The purpose of Phase H was to ascertain, as proposed by Pierce and Schreibman (1994), whether or not picture prompts (props) are necessary for task completion or whether, once taught, the routines of a self-management strategy work system can be recalled with a simple verbal cue for task completion.

Teachers and Observers

The research team consisted of the homeroom teacher and two teacher assistants. All were either trained or familiar with the TEACCH structured teaching methodology. Each observer was trained to record the occurrence of the dependent variables and, when functioning in the role of 'teacher', trained in the procedures and responses that were required for disruptive behaviours and teacher-dependent behaviours. Each observer

spent time observing the recording process and was not engaged in the role of observer until interobserver agreement reached at least 80 % for three consecutive sessions.

Hypotheses

It is postulated that the provision of a self-management strategy, incorporating self-selection of reinforcers, will result in a change in the trend lines for data measuring on-task behaviour, task completion and maintenance of performance accuracy. In addition, it is postulated that there will be a corresponding change in the trend lines for data measuring disruptive behaviours and teacher dependency for task completion.

There were 5 specific hypotheses:

Hypothesis 1. That there will be a positive change in slope and *an* increase in level in the number of tasks completed correctly within 10 minutes in a session between the pretest phase and Phase G, the last phase of treatment. There will be a negative change in slope and a decrease in level in the data during Phase H (probe) relative to Phase G.

Hypothesis 2. That there will be a negative change in slope and a decrease in level in data representing the amount of time taken to complete tasks in a session between the pretest phases and phase G, the last phase of treatment. There will be a positive change in slope and an increase in level in the data during Phase H (probe) relative to Phase G.

Hypothesis 3. That there will be a negative change in slope and decrease in level in the data representing the number of disruptive behaviours in a session between the pretest phase and Phase G, the last phase of treatment. There will be a positive change in slope and an increase in level in the data at Phase H (probe) relative to Phase G.

Hypothesis 4. That there will be a negative change in slope and a decrease in level in the data representing the number of teacher-dependent behaviours in a session between the pretest phase and Phase G, the last phase of treatment. There will be a positive change in slope and an increase in level in the data during Phase H (probe) relative to Phase G.

5. Hypothesis 5. That there will be a negative change in slope and a decrease in level in the data representing the number of times the teacher intervenes in a session between the pretest phases and Phase G, the last phase of treatment. There will be a positive change in slope and an increase in level in the data during Phase II (probe) relative to Phase G.

Chapter 4

Results

This chapter presents the results for Art and Henk. Data in relation to task performance over the treatment phases of the study will be presented, followed by data in relation to the probe following treatment. The data will be laid out also in graphical and tabular form.

Student: Art

Table 4.1 shows that Art was engaged in work for a total of 53 sessions consisting of one additional task per phase reaching six tasks per phase in Phases G and H. This resulted in a total of 162 task performances across the nine phases of the study.

A pretest baseline was conducted over three sessions. Six tasks were performed during this baseline over 18 task performances. A separate baseline was also introduced for Task 1 only. Phase A was introduced as a further baseline for Task 1 only.

Phase B, a training stage, using Task 1 only, contained the introduction of a self-management strategy in the form of a tangible work system and pattern of work completion. Upon the completion of a session, a reward card permitted access to the choice of a leisure item from an array board displaying reward options.

Phases C-G consisted of several tasks introduced progressively. The same six tasks first introduced in the pretest baseline were progressively added to the work regimen of one task per phase. The maximum of six tasks per phase was reached during Phase G. Phase H indicated the removal of the tangible elements of the self-management strategy and the continued requirement of 6 task performances per session.

It was initially hypothesised that the provision of a self-management strategy incorporating self-selection of reinforcers would see a change in the trend lines for data measuring on-task behaviour, task completion and maintenance of performance

Table 4.1

Student: Art. Mean times for each task from pretest to Phase H, mean time/ task/ phase, standard deviation (SD) total time taken to complete phases, number of sessions in each phase, and total number of tasks in each phase

	Pretest	Phase A	Phase B	Phase C	Phase D	Phase E	Phase F	Phase G	Phase H
Task 1	96.33	80.83	96.56	114.20	94.40	84.16	84.75	86.75	88.50
Task 2	129.66			167.20	168.40	98.16	93.00	152.50	143.75
Task 3	106.33				188.20	81.50	74.25	98.25	63.50
Task 4	223.33					196.00	204.50	270.50	193.25
Task 5	160.66						124.50	104.50	114.50
Task 6	132.00							88.00	75.00
Mean time/ task/ phase	848.33/6= 141.38s= 2.35 m	80.83/1= 80.83s= 1.34 m	96.56/1= 96.56s= 1.60 m	281.40/2= 140.70s= 2.34 m	451.00/3= 150.33s= 2.50 m	459.82/4= 114.95s= 1.91 m	581.00/5= 116.20s= 1.93 m	800.50/6= 133.41s= 2.22 m	678.50/6= 113.80s= 1.88 m
SD (seconds)	66.72	38.76	17.40	36.58	149.83	68.20	100.42	166.71	101.75
Total time to complete phase	2545s= 42.41 m	485s= 8.08 m	1545s= 25.75 m	1407s= 23.45 m	2255s= 37.58 m	2759s= 45.98 m	2324s= 38.73 m	3150s= 52.50 m	2714s= 45.23 m
Number of sessions in each phase	3	6	16	5	5	6	4	4	4
Number of tasks completed in phase	18	6	16	10	15	24	25	24	24

accuracy of known skills. In addition, it was postulated that there would be a change in the trend lines for data measuring disruptive behaviours and teacher-dependency for task completion.

Data in Relation to Hypothesis 1

Changes in slope and level from pretest-Phase G. The full data for task performance across pretest through to phase H are located in Appendix D (Tables D1a - D9c). Table 4.2 presents data for pretest, Phase G and Phase H. The data in Table 4.2 show that in Phases G and H two sessions were conducted in under 10 minutes. The average time for task completion in Phase C (2 tasks) was between 3.9 and 5.4 minutes. The average time for task completion in Phase D (3 tasks) was between 3.0 and 9.1 minutes. An average time for task completion in Phase E (4 tasks) was between 5.7 and 8.6 minutes (Appendix D, Tables D4a, D5a, D6a). This suggests support for the view that as Art progressed through the phases of the study he was able to perform more tasks in less time. Table 4.2 shows that the mean time for the performance of six tasks during Phase H was 11.37 minutes. This is 2.73 minutes faster than the mean time for the same 6 tasks during the pretest phase ($\underline{M}$ = 14.1 minutes). There was a positive change in slope and an increase in level in relation to the number of tasks that were able to be completed within 10 minutes. More tasks were able to be completed in less time as each phase was introduced. During pretest the total time taken per session fell between the range of 13.3 and 15.3 minutes (See Table D1a - D9a, Appendix D). As the number of tasks increased from Phase B through Phase H, the sum total time taken per session remained below the 10-minute mark for all tasks (a total of 45 sessions) with the exception of one session in Phase F (12 minutes). Phases G and H saw the commencement of data entries above 10 minutes with a range between 9.9 minutes and 15.8 minutes.

Table 4.2

Student: Art. Time taken to complete six tasks during pretest, Phase G and Phase H (time in minutes)

Total time taken/session		Pretest (6 tasks)	Phase G (6 tasks)	Phase H (6 tasks)
Session	1	15.3	12.2	11.7
	2	13.1	15.3	11.5
	3	13.9	15.8	13.2
	4		9.9	9.1
M		14.1	13.30	11.37

Changes in level and slope between Phase G and H. A positive change in slope and an increase in level in the number of tasks that were able to be completed within 10 minutes between Phase G and H are demonstrated in the data in Table 4.1. The mean for the completion of six tasks during the pretest phase was 2.35 minutes. The same six tasks took between 9.9 and 15.8 minutes at Phase G (M = 2.22 minutes). During Phase H the tasks took between 9.1 and 13.2 minutes to complete (M = 1.88 minutes). These data show that the removal of the tangible elements in the self-management strategy did not have an adverse effect on performance as had been expected. A comparison of the means during Phase G and H in Table 4.1 show a difference of 20.4 seconds. This indicates that an improvement in task performance has occurred during Phase H.

Data in Relation to Hypothesis 2.

Change in slope and level from pretest to Phase G. Figure 4.1 offers a visual comparison of task performance for Tasks 1 to 6 from pretest to Phase H. While a high degree of variability appears apparent in the data in Figure 4.1, there is some visual evidence to suggest that a change in slope and level has occurred for some tasks. The data for Task 1 show a considerable change in slope and level within Phases A and B. These changes were also evident within Phases D, E and F but not between these phases.

Task 2 records dramatic changes in slope and level within Phases D and G relative to the other phases. The data path for Task 3 shows considerable variability in Phase D but a negative change in level and slope between Phase D and E. Between Phases E to H less variability is shown in the data for Task 3 while a negative change in level and slope between Phases G and H is also demonstrated. Task 4 shows no change in slope and level between Phases E and F while a dramatic upward trend between Phases F and G is seen, peaking during Phase G. Several disruptions to the classroom, self-stimulatory behaviour, and agitation due to interference by peers with Art's leisure items help to account for this extreme data path. The data for Task 4 shows a decline in level and change in slope between Phases G and H. Task 5 displays no change in slope and level between Phases F and G and a slight upward trend in the data between Phases G and H. Task 6 shows no change in slope or level between Phase G and H. Considerable variability in the data within phases is evident in Figure 4.1, particularly in the latter phases. Table 4.1 shows that Phases D (SD = 149.83 seconds) and G (SD = 166.71 seconds) demonstrate more than double the standard deviation of 66.72 recorded during the pretest phase. Phase B records the lowest standard deviation (SD = 17.40 seconds). The research team observed toward the final phases that Art began to scrutinise closely

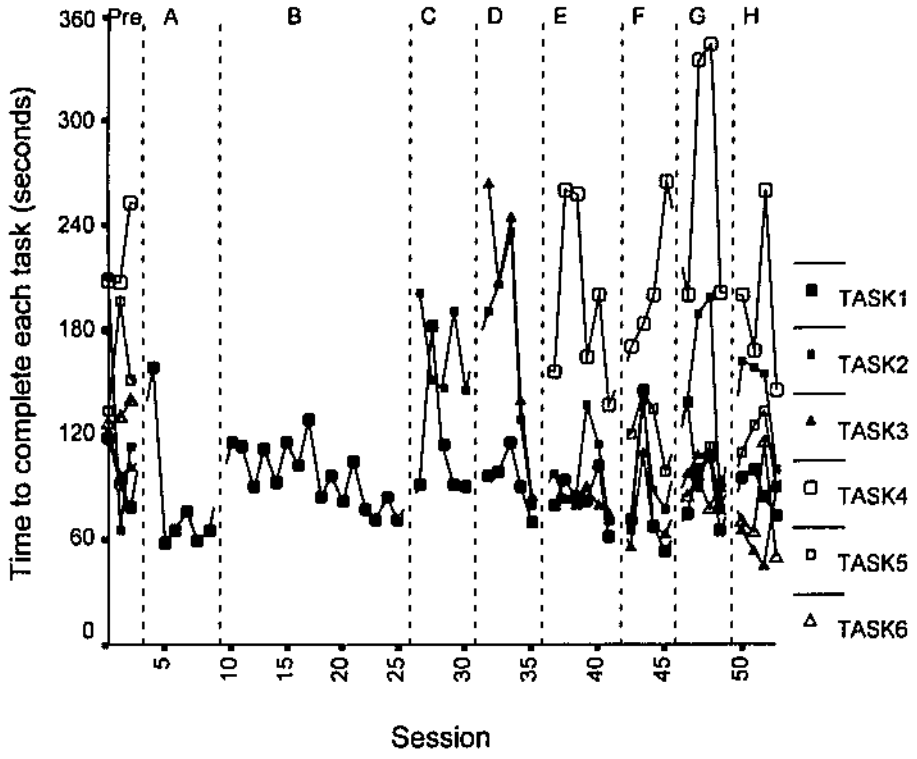

Figure 4.1. Student: Art. Time taken to complete tasks 1-6 during pretest (baseline, 6 tasks), Phase A (baseline, 1 task), Phase B (training phase, 1 task), Phase C (2 tasks), Phase D (3 tasks), Phase E (4 tasks), Phase F (5 tasks), Phase G (6 tasks), Phase H (probe, 6 tasks).

the details of the work materials. This close attention to the task may help to account for the high variability in the data. Art also engaged in self-stimulatory behaviour, daydreaming at times, and chewing his nails.

A consideration of mean time per task (Table 4.1) shows that a substantial degree of variability also existed in the data between the phases from the pretest trial to Phase H. For example, during pretest and Phases C and D the mean time per task is roughly two and one half minutes. In Phases A, B, E, F and H the mean time per task averages at 1.73 minutes. A comparison in Table 4.1 of the differences in mean time per task per

phase between the pretest trials phase (M = 2.35 minutes) and Phases G (M = 2.22 minutes) shows little change in level of performance between these two phases.

Table 4.3 shows that the lowest data entry points for task performances are situated roughly in the latter phases while the highest data entry points are weighted more at the beginning and middle phases. These data for pretest to Phase H indicate an overall data path that has a negative change in slope and a slight decrease in level as its main feature. In this connection Table 4.4 displays the highest and lowest times for task completion from the pretest trials phase through to Phase H. For Tasks 1,3,4,5 and 6, the lowest performance times are recorded in Phases G and H. Only for Task 2 is there seen a lower score during pretest as opposed to Phase G or H. This also lends weight to the view that Art's time on-task reduced over time. Table 4.5 displays the mean times for Tasks 1-6 during pretest phase, Phase G and Phase H. Table 4.5 shows that Tasks 2 and 4 saw a positive change in slope and an increase in level in the data between the pretest phase and Phase G (increase of 22.80 and 46.80 seconds respectively). Tasks 1, 3, 5 and 6 saw a negative change in slope and a decrease in level in the data between the pretest phase and Phase G. Tasks 5 and 6 saw considerable changes in mean time (55.80 and 44.40 seconds respectively). Table 4.5 shows that, apart from Task 1 and 5 (18.00 and 9.60 seconds), all tasks saw a negative change in slope and a decrease in level in the data between Phase G and Phase H. Task 3 and Task 4 saw substantial changes in mean time (34.80 and 76.80 seconds respectively).

Change in level and slope in the data between Phase G and Phase H (probe).

A time of 45.23 minutes was needed to complete work in Phase H for 24 tasks and 52.50 minutes for Phase G for 24 tasks (Table 4.1). This is a difference of 7.27 minutes, indicating a negative change in slope and decrease in level. This shows an improvement and not the deterioration in performance between Phase G and H that had been

Table 4.3.

Student: Art. Highest and lowest task performance times for tasks 1-6 from pretest to Phase H (time in seconds)

	Highest times	Phase	Lowest times	Phase
Task 1	182	C	54	F
Task 2	236	D	65	Pretest
Task 3	264	D	45	H
Task 4	345	G	137	E
Task 5	197	Pretest	77	G
Task 6	140	Pretest	50	H

anticipated in the hypothesis. Table 4.1 also shows a difference of 21seconds between the mean of Phase G (M = 2.22 minutes) and the mean of Phase H (M = 1.88 minutes). A difference of 21 seconds is 24 seconds short of the lowest data entry of 45 seconds for task completion (see Table 4.3) and indicates a negative change in slope and a decrease in level in the data between Phases G and H. These data indicate that the presence of the tangible elements of the self-management system introduced in Phase B were no longer required in Phase H by the student to maintain and exceed previous task performance attainment.

Table 4.1 indicates that during pretest the total time to complete the phase was 42.41 minutes for 18 tasks. This is a difference of 2.82 minutes compared with the 45.23 minutes taken to complete 24 tasks in Phase H. While at first it appears that there has been a deterioration in task performance from the pretest to Phase H, this is found not to be so on further examination. Consideration must be given to the additional tasks performed during Phase H. In effect the extra six tasks performed during Phase H took only 2.82 minutes to complete. On average that would mean that each of the six

Table 4.4

Student: Art. Highest (H) and lowest (L) times for task completion from pretest trial to Phase H (time in seconds)

	Task 1		Task 2		Task 3		Task 4		Task 5		Task 6	
	H	L	H	L	H	L	H	L	H	L	H	L
Pretest	118	79	211	65	122	96	253	208	197	134	140	126
Phase A	159	59										
Phase B	129	72										
Phase C	182	90	202	145								
Phase D	116	70	236	80	264	85						
Phase E	102	62	137	70	90	75	260	137				
Phase F	145	54	140	66	110	56	265	170	144	99		
Phase G	107	65	199	81	100	77	345	202	138	77	96	78
Phase H	100	74	1	100	89	45	260	145	133	90	116	50

Table 4.5

Student: Art. Mean times for Tasks 1-6 during pretest phase, Phase G and Phase H (time in minutes)

	Pretest	Phase G	Phase H
Task 1	1.60	1.44	1.74
Task 2	2.16	2.54	2.39
Task 3	1.77	1.63	1.05
Task 4	3.72	4.50	3.22
Task 5	2.67	1.74	1.90
Task 6	2.20	1.46	1.25

additional tasks in Phase H was being completed in 28.16 seconds. A comparison of mean time per task per phase for the pretest phase ($\underline{M}$ = 2.35 minutes) and Phase H ($\underline{M}$ = 1.88 minutes) supports the view that work was being completed more quickly during Phase H relative to Phase G.

Data in Relation to Hypotheses 3, 4 and 5.

The data in Table 4.6 show that the number of disruptive behaviours, teacher-dependent behaviours, teacher interventions and errors increased during Phase B. This data can be explained from the fact that this was the training phase where the self-management procedure was being introduced. In addition, Table 4.6 shows that Phase B involved 16 sessions. The pretest trial and Phase A involved only 3 and 6 sessions respectively. It could be anticipated that with the additional sessions in Phase B there was increased opportunity for Art and the teacher to display the behaviours that are recorded in Table 4.6. Table 4.6 shows that after Phase C, over the next 112 task

Table 4.6.

Student: Art. Occurrences of errors (E), teacher-dependent behaviours (TDB), teacher interventions (TI) and disruptive behaviours (DB), from pretest phase to Phase H

			E	TDB	TI	DB	Number of tasks	Number of sessions
Pretest trial tasks	baseline:	6	0	0	0	0	18	3
Phase A task	baseline:	1	0	0	0	0	6	6
Phase B task	training phase:	1	3	1	6	3	16	16
Phase C tasks		2	1	1	3	2	10	5
Phase D tasks		3	0	0	0	0	15	5
Phase E tasks		4	0	0	0	0	24	6
Phase F tasks		5	0	1	1	0	25	4
Phase G tasks		6	0	2	2	0	24	4
Phase H tasks	probe:	6	0	0	0	0	24	4
Total			4	5	12	5	162	53

performances, no incidents were recorded for any of the dependent variables apart from the six that are recorded during Phases F and G. These results support the view that the introduction of the independent variable was successful in preventing the types of behaviour contemplated in the dependent variables.

Three teacher-dependent behaviours and three teacher interventions were observed during Phases F and G. The three teacher-dependent behaviours were concerned with

items that were missing in the work materials and Art's agitation over his peers interfering with a leisure item he had constructed and his concern that they were going to modify it. Prior to the study such situations ordinarily occasioned violent disruptive behaviours. In the incidents recorded Art simply called out for teacher assistance. This modified socially acceptable behaviour might be attributable to treatment effect.

Table 4.6 shows that for Phases G and H no errors in task completion were recorded. This supports the view that the removal of the tangible elements of the self-management strategy did not have an adverse effect upon task performance in relation to the hypotheses under consideration.

Overall, the data in Table 4.6 fail to support the hypothesis that the introduction of the treatment would bring about a substantial change in the dependent variables. Already during pretest and during Phase A, over 24 task performances, there were no recorded occurrences of any of the 4 dependent variables. Upon introduction of the treatment 20 occurrences of the dependent variables are recorded.

However, the data in Table 4.6 support the view that the tangible elements of the self-management strategy were not required for the maintenance of work performance. Table 4.6 shows that during Phase H Art engaged in 24 task performances without any recorded occurrences of the 4 dependent variables. This performance was conducted without a work system in place. Art would appear to have internalised the routines of the self-management strategy. His work performance during Phase H was not contingent upon the use of the physical props in the system. The second half of Hypotheses 3 to 5 appears not to have been supported by the data in this regard. An improvement in performance occurred during Phase H relative to Phase G. No incidence of any of the four dependent variables was recorded during the 24 task performances that constituted Phase H.

Student: Henk

Table 4.7 shows that Henk was engaged in work for a total of 75 sessions consisting of one additional task per phase reaching six tasks per phase in Phase G and H. This resulted in a total of 208 task performances across a 10 phase study.

A pretest baseline was conducted over four sessions. Six tasks were performed during this baseline over 24 task performances. A separate baseline was also introduced for Task 1 only. Phase A was introduced as a further baseline for Task 1 only.

Phases A-H were scheduled for Henk in the same way as they had been for Art. The only difference was the number of sessions per phase as well as the implementation of two C Phases (Phase C1 and Phase C2). Both phases involved two task performances per session. A retraining module was inserted between Phases C1 and C2 due to repeated system procedural errors being performed by Henk in Phase C1. As with the previous subject, it was initially hypothesised that the provision of a self-management strategy incorporating self selection of reinforcers would see a change in the trend lines for data measuring on-task behaviour, task completion and maintenance of performance accuracy of known skills. In addition, it was postulated that there would be a change in the trend lines for data measuring disruptive behaviours and teacher-dependency for task completion.

Data in Relation to Hypothesis 1.

Changes in slope and level from pretest-Phase G.

The full data for task performance across pretest through to Phase H are contained in Appendix E (Tables E1a - E10c). Table 4.8 presents performance data for Tasks 1-6 during pretest, Phase G and Phase H. The data in Table 4.8 show that only in Phase G during Session 2 (10.5 minutes), Session 4 (11.9 minutes) and Session 5 (11.9 minutes) did Henk complete the 6 tasks in a time, specified by Hypothesis 1, which was close to 10 minutes.

Appendix E (Tables E6a - E10b) provides specific details showing that Hypothesis 1 was not supported. During Phase D (three tasks) the total time taken for a session ranged from between 4.88 and 5.61 minutes. From Phases E, F, G and H average times ranged between 5.9 and 11.8 minutes for four tasks (Phase E), between 7.5 and 58.0 minutes for five tasks (Phase F), between 10.5 and 40.3 minutes for six tasks (Phase G) and between 29.8 and 51.3 minutes for the six tasks of the probe (Phase H). As progression through the phases occurred and more tasks were added to each session, a negative change in slope and a decrease in level in the amount of tasks performed resulted. The goal of performing six tasks in a session within 10 minutes was not achieved by Henk.

Change in slope and level between Phase G and H. A substantial negative change in slope and a decrease in level in the numbers of tasks completed within 10 minutes are demonstrated between Phases G and H (Table 4.7). As Table 4.7 shows, the mean for the completion of six tasks during the pretest phase was 7.17 minutes. The same six tasks took between 0.6 and 4.15 minutes during Phase G ($\underline{M}$ = 2.27 minutes), indicating a decrease in level between pretest and Phase G. Table 4.7 shows that during Phase H the tasks took between 0.9 minutes and 30.7 minutes to complete ($\underline{M}$ =6.95).
A comparison of the means for Phases G and H suggests that the removal of the tangible elements of the self-management strategy during Phase H had an adverse effect upon performance as had been anticipated by Hypothesis 1. A difference of 4.68 minutes between the mean times for task performance between Phase G and Phase H demonstrates that a substantial deterioration in task performance has occurred during Phase H.

Data in Relation to Hypothesis 2.

Change in slope and level from pretest to Phase G. Figure 4.2 offers a visual comparison of task performance for Tasks 1 to 6 from pretest to Phase H. A main

Table 4.7

Student: Henk. Mean times for each task from pretest to Phase G, mean time/ task/ phase, standard deviation (SD),

total time taken to complete phases, number of sessions per phase, and total number of tasks completed in each phase

	Pretest	Phase A	Phase B	Phase C1	Phase C2	Phase D	Phase E	Phase F	Phase G	Phase H
Task 1	339.50	103.66	147.66	132.80	84.25	105.00	103.80	667.14	203.20	1843.00
Task 2	90.25			75.70	61.00	77.23	47.00	60.85	41.20	58.00
Task 3	842.25					128.83	193.00	460.42	249.00	240.33
Task 4	129.50						113.40	142.85	150.20	151.33
Task 5	1039.25							91.57	89.40	107.33
Task 6	141.00								85.20	104.66
Mean time/ task/ phase	2581.29/6 = 430.29s= 7.17 m	103.66/1= 103.66s= 1.72 m	147.66/1= 147.66s= 2.46 m	208.50/2= 104.25s= 1.73 m	145.25/2= 72.65s= 1.21 m	311.16/3= 103.72s= 1.72 m	457.20/4= 113.30s= 1.90 m	1422.83/5 = 284.57s= 4.74 m	818.20/6= 136.36s= 2.27 m	2504.65/6 = 417.44= 6.95 m
SD (seconds)	342.31	21.60	30.78	22.63	18.27	7.86	36.61	260.68	47.74	109.58
Total time to complete phase	10327s= 172.11 m	622s= 10.36 m	3544s= 59.06 m	2085s= 34.75 m	581s= 9.68 m	1703s= 28.38 m	2286s= 38.10 m	9960s= 166.00 m	6601s= 110.01 m	7514s= 125.23 m
Number of sessions in each phase	4	6	24	10	4	6	5	7	5	3
Number of tasks completed in phase	24	6	24	20	8	18	24	35	35	18

Table 4.8

Student: Henk. Time taken to complete six tasks during pretest, Phase G and Phase H (time in minutes)

Total time taken/session	Pretest (6 tasks)	Phase G (6 tasks)	Phase H (6 tasks)
Session 1	36.4	12.5	51.3
2	92.7	10.5	29.8
3	15.5	22.1	44.1
4	27.4	11.9	
5		11.9	
6		40.3	
M	43.00	18.20	41.73

feature of the data in Figure 4.2 is the presence of prominent peaks in the data during pretest and during Phases F and H. Table 4.7 demonstrates the extent of this variability both within and between phases.

The more extreme variability levels are found during the pretest phase (SD = 342.21 seconds), Phase F (SD = 260.68 seconds) and Phase H (SD = 109.58 seconds). In Table 4.7, Phases A to G show standard deviations ranging from 21.60 seconds to 47.74 seconds, with the lowest standard deviation being during Phase D (SD = 7.86 seconds). The extreme nature of the variability in the data raises suspicions about the possible

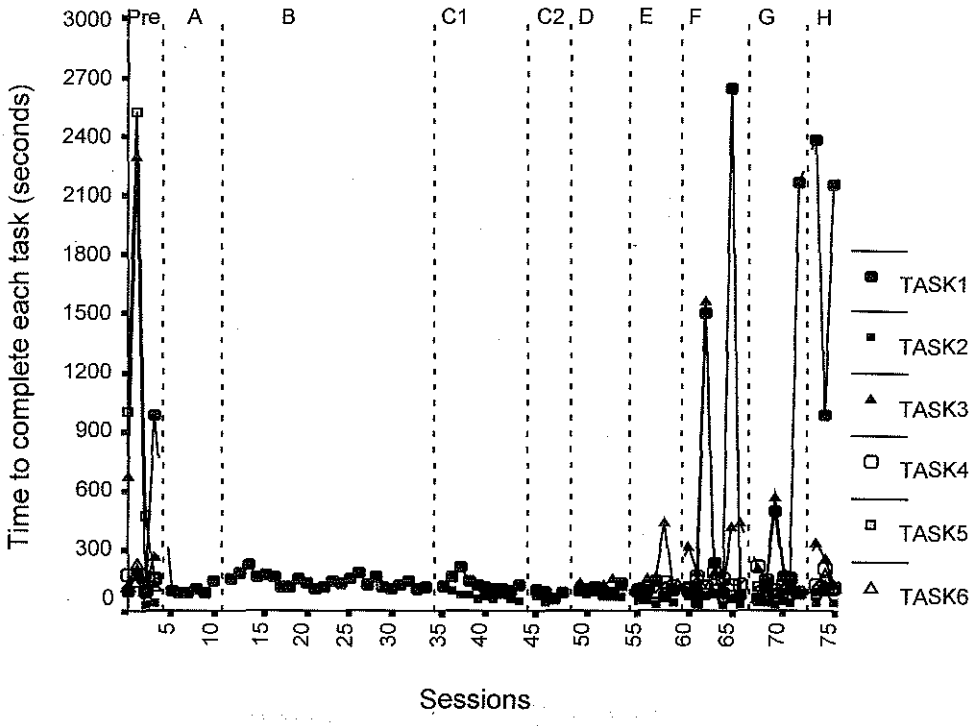

Figure 4.2. Student: Henk. Time taken to complete tasks 1-6 during pretest (baseline, 6 tasks), Phase A (baseline, 1 task), Phase B (training phase, 1 task), Phase C1 (2 tasks), Phase C2 (2 tasks), Phase D (3 tasks), Phase E (4 tasks), Phase F (5 tasks), Phase G (6 tasks), and Phase H (probe, 6 tasks).

presence of control variables other than the experimental variable under study. Interobserver agreement was 100 % throughout all of the sessions. One possible explanation for the extreme variability found in the data during the pretest phase, during Phase F and during Phase H is that different researcher staff members were active in the role of teacher during these phases. From Phases A to E and during Phase G the homeroom teacher was functioning in the interactive teacher role and acted, according to the design of the study, wherever this became necessary. Other staff involved in the study acted as observers.

During these phases the lower levels of variability are noted. During the pretest phase, Phase F and Phase H, Henk's homeroom teacher was replaced by other staff whose role became that of teacher. In Table 4.7 it is observed that the highest standard deviations in the data are found during pretest, Phase F and Phase H. One observer also noted during anecdotal recordings that when the classroom teacher left the room for a period of time during Phase H this had an adverse effect on Henk's work performance. From these data it is arguable that the presence of the homeroom teacher, both in the role as 'teacher' and, alternatively, simply as an observer, had a bearing on the profile of the data.

In Figure 4.2 the data for Task 1 in the pretest phase show an outlier data entry in an otherwise relatively variable data profile. Figure 4.2 shows that during Phases E, F, G and H there is substantial variability for Task 1 while Phases A, B, C and D there is little change in level and slope. Figure 4.2 shows the data for Task 2 to have a relatively stable profile for all phases. The data path for Task 3 shows peaks during Phases E, F, G, H and most substantially during the pretest phase and Phase F. Figure 4.2 shows that Task 4 presents some minor peaks in data during Phases F, G and H. Task 5 displays a major outlier and some additional instability during pretest phase. During Phases F, G and H Task 5 presents a profile that is stable in level and slope relative to the other phases. In Figure 4.2 the data for Task 6 show a stable slope and level with no outliers in the data.

Table 4.9 displays the mean times for Tasks 1-6 during pretest phase, Phase G and Phase H. The data in Table 4.9 show that Tasks 1,2 and 6 indicate an appreciable negative change in level between pretest and Phase G. Task 4 shows a moderate increase in level while a substantial negative change in slope and a decrease in level are seen for Tasks 3 (14.03 to 4.15 minutes) and Task 5 (17.32 to 1.49 minutes) between pretest and Phase G.

Table 4.9

Student: Henk. Mean times for Tasks 1-6 during pretest phase, Phase G and Phase H (time in minutes)

	Pretest	Phase G	Phase H
Task 1	5.65	3.38	30.71
Task 2	1.50	0.68	0.96
Task 3	14.03	4.15	4.00
Task 4	2.15	2.50	2.52
Task 5	17.32	1.49	1.78
Task 6	2.35	1.42	1.74

A consideration of mean time per task in Table 4.7 shows that a considerable degree of variability exists in the data between the phases from the pretest trial to Phase H. For example, during pretest the mean time per task is 7.17 minutes while during Phases A, B, C1, C2, D and E the mean time per task remains at less that half of that which was recorded during pretest. Table 4.7 records that the lowest mean time per task occurred during Phase C2 ($\underline{M}$ =1.21minutes). Only during Phase H does the mean time per task approach that which was recorded during the pretest phase (Phase H, $\underline{M}$ = 6.95 minutes).

The difference in mean time per task between the pretest trials phase and Phase G was 4.9 minutes (Table 4.7). A figure of this size argues support for the view that the treatment variable was effective in bringing about a change in Henk's task performance between the pretest phase and Phase G. Table 4.10 shows that, with the exception of Tasks 1 and 4, the highest data entry points for task performances are situated during the

Table 4.10

Student: Henk. Highest and lowest task performance times for Tasks 1-6 from pretest to Phase H (time in seconds)

	Highest times	Phase	Lowest times	Phase
Task 1	2640	F	37	F
Task 2	186	Pretest	28	G
Task 3	2290	Pretest	88	E
Task 4	185	F	78	G
Task 5	2520	Pretest	63	F
Task 6	224	Pretest	63	G

pretest phase. The lowest data entry points are weighted more in Phases E to G. The data addressed above appear to indicate an overall change in slope in a negative direction and a decrease in level for Henk's task performance from pretest to Phase G. Table 4.11 corroborates that, with the exceptions of Task 1 and 4, the longest times for task completion are located during the pretest phase for Tasks 2, 3, 5,and 6. Table 4.11 also records that the lowest task performance scores occurred without exception in the later phases, E to G. These data would appear to offer weight in support of Hypothesis 2. Henk's time on-task is seen to be reduced at Phase G relative to the pretest phase. Table 4.7 shows further that a difference of 62.10 minutes existed between the total time to complete tasks during the pretest phase (172.11 minutes) and Phase G (110.01 minutes). This demonstrates that a considerable difference in task performance has

occurred between the pretest phase and Phase G. This is all the more impressive in that Henk performed 11 more tasks during Phase G relative to the pretest phase. However, the impression that this difference is attributable to the treatment would be misleading. Due recognition must be given to the extreme variability in the data as noted previously. Further, as has already been noted, the presence or absence and active and non-active role of the homeroom teacher as 'teacher' during various phases appears to have functioned as a control variable independent of the experimental variable, confounding the results. A treatment effect cannot be concluded due to the combination of these two factors.

Change in level and slope in the data between Phase G and Phase H. Table 4.7 shows a total time of 125.23 minutes to complete work in Phase H (for 18 tasks) and 110.01 minutes in Phase G (for 35 tasks). This is a difference of 15.22 minutes indicating that a positive change in slope and an increase in level have occurred during Phase H. These results support Hypothesis 2 where such a data pattern was anticipated.

In Table 4.7 it is also noted that in Phase G Henk performed an extra 17 tasks and did this despite the lesser total time (15 minutes) taken to complete Phase G relative to Phase H. These data indicate that the removal in Phase H of the tangible elements of the self-management system introduced during Phase B had an adverse effect upon Henk's task performance.

Table 4.7 also shows a difference of 4.68 minutes between the mean time per task of Phase G ($\underline{M}$ = 2.27 minutes) and Phase H ($\underline{M}$ = 6.95). A time of 4.68 minutes indicates a considerable change in slope and increase in level. A difference this substantial between the two data points further suggests that the removal of the independent variable impacted upon Henk's task performance. Hypothesis 2 finds additional support in these data.

Table 4.11

Student: Henk. Highest (H) and lowest (L) times for task completion from pretest trial to Phase H (time in seconds)

	Task 1		Task 2		Task 3		Task 4		Task 5		Task 6	
	H	L	H	L	H	L	H	H	H	L	H	L
Pretest	979	87	186	34	2290	135	183	86	2520	157	224	102
Phase A	145	88										
Phase B	192	111										
Phase C1	215	96	109	48								
Phase C2	93	58	94	40								
Phase D	138	82	93	69	157	108						
Phase E	145	69	59	31	441	88	144	89				
Phase F	2640	37	91	34	1560	185	185	113	113	63		
Phase G	2167	56	90	28	568	133	101	78	115	64	114	63
Phase H	2384	985	96	35	333	133	130	113	146	76	114	95

A difference of 4.68 minutes between the mean time per task per phase for Phase G (M =2.27 minutes) and Phase H (M = 6.95 minutes) supports the view that work was being completed more quickly during Phase G relative to Phase H.

Data in Relation to Hypothesis 3, 4 and 5.

The data in Table 4.12 show that the most number of errors, teacher-dependent behaviours, teacher interventions and disruptive behaviours occurred during the pretest phase. After the pretest phase no other phase matched the level that was recorded during the pretest level.

Table 4.12 indicates that Phase B contains higher levels of occurrences of all the dependent variables (apart from errors) relative to the phases that were to follow. This high level can be explained by the fact that Phase B was the training phase in which the independent variable was being introduced. During Phase C1 a substantial number of teacher interventions occurred (Table 4.12). This was due to a high number of procedural errors being performed by Henk. These were not classed as errors in Table 4.12. Only errors in task performances were so recorded. The high number of procedural errors prompted the need for a retraining module to be inserted.

Following the training module, conditions that applied during Phase C1 (a requirement of 2 tasks per session) were resumed during Phase C2. The data for Phase C2 suggest that the training module was effective (Table 4.12). During Phases C2, D and E, no occurrences of the four dependent variables were recorded, apart from two errors during Phase E, over 46 task performances. The data path demonstrates a negative change in slope and a decrease in level for the four dependent variables from pretest to Phase E. These data offer support for Hypotheses 3, 4 and 5. The anticipated negative change in slope and a decrease in level occurred in the data between the pretest phase and Phase G. The introduction of the treatment was successful in producing

Table 4.12

Student H: Occurrences of errors (E), teacher-dependent behaviours (TDB), teacher interventions (TI) and disruptive behaviours (DB) from pretest phase through to Phase H

		E	TDB	TI	DB	Number of tasks	Number of sessions
Pretest trial 6 tasks	baseline:	3	4	49	67	24	4
Phase A 1 task	baseline:	0	0	0	0	6	6
Phase B 1 task	training phase:	0	3	32	7	24	24
Phase C1 2 tasks		0	1	11	1	20	10
Phase C2 2 tasks		0	0	0	0	8	4
Phase D 3 tasks		0	0	0	0	18	6
Phase E 4 tasks		2	0	0	0	20	5
Phase F 5 tasks		0	0	4	1	35	7
Phase G 6 tasks		1	0	0	4	35	6
Phase H 6 tasks	probe:	0	3	9	6	18	3
Total		6	11	105	86	208	75

a reduction in errors, teacher-dependent behaviours, disruptive behaviour, disruptive behaviours and teacher interventions.

Table 4.12 records that during Phases F and G an increase in teacher intervention and disruptive behaviour occurred. It has been noted above that during Phase F a different staff member took the role of teacher. This helps to account for the increase in

teacher intervention. Of these four occurrences in Phase F, one was a procedural error correction; another was a response to a disruptive behaviour and the remaining two were a call for the end of the session by the teacher due to timetabled class changes.

Four disruptive behaviours occurred during Phase G (Table 4.12). During these, no interventions were offered by the teacher. Despite Henk's substantial disruption to other members of the class and an expression of anger and desk hitting the teacher did not intervene. After considerable disruptive behaviour, Henk ceased the behaviour and returned to work without teacher intervention. Henk self-managed and returned to his work, completing all but one task due to unavailable time. This offers further support for Hypotheses 3, 4 and 5. While disruptive behaviour did occur, it was self-managed. Work was resumed apart from external control.

During Phase H, nine occurrences of teacher intervention, six occurrences of disruptive behaviour and three occurrences of teacher-dependent behaviour were observed. During this phase the homeroom teacher was out of the room, a different staff member was engaged in the role of 'teacher' and a new relief teacher was in the room for the first time. Hypotheses 3, 4 and 5 had anticipated that there would be a positive change in the slope and an increase in the data for Phase H. This data profile did occur as anticipated. However, because of the complicating factors mentioned it is not possible to determine that the removal of the independent variable was accountable alone for the data that were recorded during Phase H.

Overall, the data in Table 4.12 support the view that, with this subject, the introduction of the treatment brought about a substantial change in the four dependent variables from the pretest phase to Phase G. These results are supportive of Hypotheses 3, 4 and 5 as they speak to this part of the study. However, the lack of control of extraneous variables during Phase H makes it difficult to comment on the effect that the removal of the tangible elements of the self-management system had on the data. It

remains unclear as to whether and how far the absence of these elements contributed to the increase seen in disruptive behaviour, teacher-dependent behaviour and teacher interventions during Phase H.

Chapter 5

Discussion

The aim of this study was to see if the provision of a self-management work procedure to two students could increase work productivity and reduce disruptiveness and teacher dependency for task completion. One student had a moderate developmental disability. The other student had a severe developmental disability.

The present study sought to extend the research by assessing the effectiveness of a TEACCH-style self-management work system coupled with a self-selection of reinforcers component. In this chapter the efficacy of that intervention will be discussed. It will be shown that the self-management system effectively reduced time-on-task for one student. Because of high variability in the data and occasional control attributable to another variable in addition to the experimental variable, a treatment effect could not be established for the time-on-task dependent variable for the second student. The data did not provide substantial evidence to suggest that a treatment effect was demonstrated in reduced disruptiveness and teacher dependency in the first student. A dramatic reduction in level for these variables was demonstrated by the second participant, suggesting a treatment effect.

Single subject designs do not encourage averaging and comparing commonalities from the results of different subjects. Rather, the logic of the design allows only for the recognition and comparison of changes in individual patterns of behaviour under various treatments. However, some common features and patterns in the data were observed for the two participants. Attention will be given briefly to these and how they might possibly be expected in studies with other students under similar sets of circumstances and control of variables. The chapter will conclude with a presentation of

selected limitations of the present study, recommendations for further research and implications for practice.

Art

The data on Art show a positive change in slope and an increase in level in the number of tasks that Art was able to complete within 10 minutes in a session between pretest and the final phase of the study before the probe phase. As Art progressed through the phases he showed that he was able to perform more tasks in less time. An improvement in performance was demonstrated. Overall, these results show that the introduction of the TEACCH-style self-management work system coupled with a self-selection of reinforcers component were effective in producing an increase in the amount of tasks that Art performed without the intervention of a treatment provider. These findings are consistent with previous research (Horner & Carr, 1997; Anderson & Katsiyannis, 1997; Ball, 1998) where the use of a token economy self-management system was found to be successful in increasing self-motivation in desired task performance. The successful provision of an array of reinforcers to motivate task-completion and achieve increased task engagement was also reported in earlier studies (Fisher, Thompson, Piazza, Crosland & Gotjen, 1997; Dyer, Dunlap & Winterling, 1990; Graff & Libby, 1999; Mithaug & Maur, 1980; Dunlap, DePerczel, Clarke, Wilson, Wright, White & Gomez, 1994). Other studies reported similar increases in task performance following the use of picture prompts for self-monitoring, resulting in subsequent self-reinforcement upon completion of work (Lagomarcino, Hughes & Rusch, 1989; Wilson, Schepis & Mason-Main, 1987; Roberson, Gravel, Valcante & Maurer, 1992). The present findings are also consistent with studies corroborating the successful use of schedule-following response chains in increasing on-task and on-schedule behaviour (MacDuff, Krantz & McClannahan, 1993; Pierce & Schreibman,

1994; Swaggart, Gagnon, Jones Bock, Earles, Quinn, Smith Myles & Simpson; 1995; Connis, 1979). The sequentially ordered visual cue systems in all of these studies parallel the method that was implemented in the present study. One reason for the success of this procedure could be the positive benefit in sequencing effect that, once established, yields an automatic prompting toward task performance by virtue of the process of habituation. The TEACCH structured teaching approach relies upon this same systematic and routinised work system (Mesibov, Schopler & Hearsey, 1994; Van Bourgondien, 1993), demonstrating success in individual case studies and longitudinal outcome studies (Mesibov, 1997, Cox & Schopler, 1993).

Upon the implementation of the probe phase (where the physical props of the work system were removed), Art demonstrated an improvement and not a deterioration in the number of tasks he completed within 10 minutes. This improvement was not anticipated according to the second part of Hypothesis 1. These results show that the removal of the tangible elements in the self-management strategy did not have an adverse effect on performance during the probe phase.

There was substantial variability evident in the data between the pretest phase and the final phase of the treatment and also within phases. The first part of Hypothesis 2 was supported by the results overall. A negative change in slope and a decrease in level in data representing the amount of time taken to complete tasks in a session occurred between the pretest phase and final treatment phase. However, the variability that is evident in the data was not attributable to external control by the researchers. No efforts were made to call the participant back on-task. Self-management, and not external control, prompted re-engagement. Self-regulation and independence are major aims in much of the research (Harris, 1986; Chris Ninness, Fuerst, Rutherford, Glenn, 1991; Dunlap, Dunlap, Koegel, Koegel, 1991; Hughes, Ruhl & Peterson, 1988; Johnson & Johnson, 1999; Moore, Agran, Fodor-Davis, 1989). Though variable in his performance

between pretest phase and the last phase of treatment, Art demonstrated successful self-regulation following the introduction of the treatment.

It had been anticipated that the removal of the tangible elements of the work system during the probe would result in an increase in the amount of time that Art would take to complete work. This second part of Hypothesis 2 was not supported. Art completed work more quickly during the probe phase relative to the last phase of treatment, showing an improvement in time taken to complete tasks. These findings are consistent with those of an earlier study where participants were found to rely less and less upon cue prompts for task performance once a routine was learned (Connis, 1979). Pierce & Schreibman (1994) had advocated a post-treatment probe to assess the effect that removal of discriminative stimuli might have on successful task completion. Kozleski (1991) had indicated that visual symbol systems could be used to enhance communication response rates in individuals with autism. Kozleski had speculated that the imprinting on the long-term memory of some representational code might yield improved performances by such individuals. MacDuff, Krantz and McClannahan (1993), in a similar vein, had reported on the powerful effects of schedule-following. They had argued that graduated guidance of response chains could be used to promote sustained engagement after training had ceased. The results of the probe in the present study offer support for the view that, with Art, the removal of the label system did not affect adversely his task performance. These results suggest that Art did not need to rely on the tangible work system props to demonstrate a continued maintenance of task performance. The results suggest that Art may have learned the response patterns involved in the work system routine, enabling schedule-following task engagement free of external agency for work completion.

Connis (1979) suggests that a sequencing effect alone might not be accountable for successful maintenance of task performance once training has ceased and other

reinforcers and stimuli are no longer present. The combination of all the components in his study (picture cues, training procedures, and provision of rationales during work and praise following work) would appear to have contributed to participants' high rates of task maintenance once these components were no longer being employed. From the present study, contributing to Connis' list of factors, might be added the elements of choice of reward (Graff & Libby, 1999; Dyer, Dunlap & Winterling. 1990; Fisher, Thompson, Piazza, Crosland & Gotjen, 1997) and the strong reinforcing effect that the token economy has been demonstrated to have on participants in behavioural modification programs (Inkster & McLaughlin, 1993; Horner & Carr, 1997; and Ball, 1998).

An initial positive change in slope and increase in level in the data for all four dependent variables was indicated by Art during the third and fourth phase of the study. However, during the fifth to ninth phases no occurrences of the dependent variables were recorded over 112 task performances apart from six incidents during the seventh and eighth phases. These incidents involved three teacher-dependent behaviours and three teacher interventions. It is noteworthy that in all of these instances Art displayed acceptable behaviours when addressing the teacher. Prior to the study, the kinds of occasions that prompted teacher-dependence would have resulted in extreme violent behaviours and destruction of property. The fact that the teacher was consulted by Art in the present circumstances is a major advance.

Verification that this behaviour was attributable to a treatment effect cannot be established through empirical means in the present study due to the anecdotal nature of these observations. Further studies would be needed to show a causal relation between the self-management strategy and the display of socially acceptable behaviour in addressing a felt-problem by this participant. No occurrences of disruptive behaviour and no errors in task completion are recorded over 112 task performances after the fifth

phase. While the latter of these data results could be attributable to the effects of maturation (Wolery, Bailey & Sugai, 1988) the former is less easily dismissed as a problem of internal validity within the study design. The reduction of disruptive behaviours seen in the present study is consistent with the findings of other studies where the implementation of a self-management strategy yielded similar results (Reid & Harris, 1989; Prater, Hogan & Miller, 1992; Reid & Harris, 1993; Webber, Scheuremann, McCall & Coleman, 1993; Mesibov, Schopler & Hearsey, 1994).

A negative change in slope and a decrease in level were recorded in the data for teacher-dependent behaviours and teacher interventions for Art during the probe. No disruptive behaviours were recorded during the 24 task performances that were recorded during the probe. In addition, performance accuracy did not change between the last treatment phase and the probe phase. These results indicate that the removal of the tangible elements of the self-management system did not adversely affect Art's performance in relation to the dependent variables during the probe phase relative to the last treatment phase. This performance occurred without a work system in place. This suggests that Art had internalised the routines of the self-management strategy. His work performance during the probe phase was not contingent upon the use of the physical props in the system.

Generalisations cannot be made on the basis of these findings due to the fact that a single subject design has been used in the present study. However, findings consistent with those in the present study are reported by other studies using token economies, self-selection of choice of reinforcer, strategy instruction, and variations of schedule-following sequence training. Substantial reductions in dependency, aberrant and disruptive type behaviour were produced (Fisher, Thompson, Piazza, Crosland & Gotjen, 1997; Anderson & Katsiyannis, 1997; Horner & Carr, 1997; Dunlap, De Perczel, Clarke, Wilson, Wright, White & Gomez, 1994; Graff & Libby, 1999; Harris,

1986; Lagomarcino, Hughes & Rusch, 1989; MacDuff, Krantz & McClannahan, 1993; Connis, 1979). The self-management strategy employed in the present study, combining many of these contingencies, was effective in controlling the four dependent variables. The fact that performance levels for all variables did not decrease during the probe phase suggests that the work system routine appears to have been learned by Art as a response pattern as a result of a sequencing effect. This sequencing effect was achieved through the constant repetitions of the schedule-following responses required by the work system. The chaining of one task after another was continuously practised by Art from the third phase of the study until the final phase of treatment. The routines in the work system became habit. Art self-managed without external controls in the form of work system props and without prompts issued from an external agency.

Henk

It is difficult to establish a treatment effect for Henk from the data for the first two hypotheses. It had been anticipated that there would be a positive change in slope and an increase in level in relation to the amount of tasks that were completed within 10 minutes in a session, and a corresponding negative change in slope and a decrease in level in the amount of time taken to complete tasks from the beginning phases of the study to the final treatment phase.

Henk recorded task performances in times greater than 10 minutes per session as more tasks were added throughout the phases. This result is not consistent with the findings of the literature. Studies where self-management strategies, picture task prompts and schedule-following work systems have been implemented have reported reduced time for task completion (Fisher, Thompson, Piazza, Crosland & Gotjen, 1997; Dyer, Dunlap & Winterling, 1990; Roberson, Gravel, Valcante & Maurer, 1992; Graff & Libby, 1999; MacDuff, Krantz & McClannahan, 1993; Pierce & Schreibman, 1994;

Swaggart, Gagnon, Jones Bock, Earles, Quinn, Smith Myles & Simpson; 1995; Connis, 1979).

A marked feature of the data for Henk was the pronounced variability seen in the data particularly during the initial pretest phase, the eighth treatment phase and the probe phase. As noted in the results section the extreme nature of the variability raises concerns about the presence of control variables other than the experimental variable under study. The high variability evident during the pretest phase, the eighth treatment phase and the probe phase might suggest a compliance problem (Wolery, Bailey & Sugai, 1988). Lower variability levels were recorded during the second through to the seventh phases and during the final treatment phase. It was during this time that the homeroom teacher was active in the role of 'teacher'. During the pretest phase, the eighth phase and the probe phase, where the highest variability is seen, other staff replaced the homeroom teacher in the role of 'teacher'. It was also observed that when the homeroom teacher left the room for a period of time during the probe phase this had an adverse effect on Henk's work performance.

From the trends in the data and these additional observations it appears that the presence of the homeroom teacher, both in the role of 'teacher' and simply as an observer had a substantial bearing on the profile of the data. Treatment effect is difficult to establish when a threat to internal validity in the form of an experimental effect appears likely in the present data (Wolery, Bailey & Sugai, 1988; Kratochwill, 1978). Factors other than the treatment effect were controlling Henk's behaviour.

The indication of an overall negative change in slope and a decrease in level in task performance between pretest phase and the final treatment phase is misleading given the high variability demonstrated during these phases. This is so notwithstanding the apparent improvement also evident in the difference of more than sixty minutes shown to exist between the total time taken to complete tasks during the pretest phase and the

final treatment phase. A treatment effect cannot be assumed when variability levels are as high as they were in this part of the study and where the presence of control can be attributed to variables other than or in addition to the experimental variable. Tasks 1 and 5 display outlier data entries during the pretest phase. These outliers illustrate the extreme nature of the variability in the data. The fact that the outliers cease to occur once the homeroom teacher was again acting as 'teacher' during the second phase of the study suggests problems with control of variables and cautions against firm conclusions regarding the efficacy of the treatment.

Overall, the results of the present study are not consistent with previous research on self-management strategies, provision of choice, picture cue prompt systems and schedule systems for task completion (Dunlap, DePerczel, Clarke, Wilson, Wright, White & Gomez, 1994; Graff & Libby, 1999; Koegel, Koegel, Hurley & Frea, 1992; Chris Ninness, Fuerst, Rutherford & Glenn, 1991; Carter, 1993; Ball, 1998; Mesibov, Schopler & Hearsey, 1994). The introduction of the self-management strategy during the third phase of the study did not effect an improvement in rate of task performance throughout the course of the remaining phases. The highly variable set of data which developed over time suggests a compliance problem, weakness of reinforcer, reactive inhibition, or a problem with saturation (Wolery, Bailey & Sugai, 1988; Parsonson & Baer, 1978).

It has been noted in one study that sumuli do not retain a value that remains constant over time, but a value which fluctuates (Fisher, Thompson, Piazza, Crosland & Gotjen, 1997). It is uncertain to what extent the reinforcers in the present study retained their value for Henk. Further research might include an occasional probe component to test the continuing viability of selected reinforcers. Lerman, Iwata, Rainville, Adelinis, Crosland and Kogan (1997) found in some participants that choice of task or reinforcer had either no influence on responses of participants or produced inconsistent outcomes.

Parsonson and Baer (1978) comment that instability of response rates can result from a loss of reinforcer effectiveness due to satiation (1978). It is also possible that the internal validity of the design itself in the present study was undermined through maturation. Fatigue and habituation (Wolery, Bailey & Sugai, 1988) may have been a factor in this particular student. Where Art performed over one hundred and sixty task performances, Henk performed not many more than two hundred over the course of the study. Continued repetition may have induced reactive inhibition and could account for the variability in the data displayed. Future studies might consider reducing the number of task performances required, or, the presentation of like tasks instead of same tasks during the course of the study to alleviate this possible threat to validity.

Henk's data for this part of the study replicate the results of one study (Shapiro, Browder & D'Huyvetters, 1984). The results from this study indicated that, while the implementation of an externally controlled token economy resulted in two out of four participants with severe multiple disabilities maintaining productivity, generalisation and reduction in severe behaviour, for one participant highly variable performance of productivity from day to day was recorded. In another study it was found that access to preferred reinforcers rather than choice-making opportunities themselves was decisive in producing high rates of task performance in some participants with severe to profound disabilities (Lerman, Iwata, Rainville, Adelinis, Crosland, & Kogan, 1997). In the present study, the researchers chose the reinforcers that were to be displayed as available to participants upon completion of work. Participants were not consulted as to whether or not the stimuli were highly preferred items. Further research studying the impact of access to preferred reinforcers compared to the provision of choice-making opportunities on-task performance might help to distinguish which of these contingencies is the more effective for individuals undergoing treatment efficacy studies.

During the probe phase Henk's task performance declined, as had been anticipated. A difference of almost five minutes between the mean times for task performance between the last treatment phase and the probe phase demonstrates that a substantial deterioration in task performance occurred during the probe phase. This dramatic drop in performance could be attributable to the removal of the tangible elements of the work system. Other studies found that prompt dependence ceased over time to the point that individuals with severe disabilities could complete tasks and independent task changes without reliance on prompt material (Connis, 1979; Pierce & Schreibman, 1994).

Henk's results are more consistent with the findings of MacDuff, Krantz and McClannahan (1993). Individuals with severe developmental disabilities were trained to use photographic schedules to increase autonomous engagement in on-task and on-schedule behaviours. The participants in this study demonstrated successful task completion through the use of photographic schedules. However, the participants in this study demonstrated continued dependence upon the prompt material for task engagement and completion. These results suggest that some individuals with severe disabilities may continue to require the use of physical props in a work system to complete work. In this view, the removal of the tangible elements of the self-management system during the probe phase was detrimental to Henk's task performance. Wacker (1997) suggests that removal of physical props need not always be a goal in some instances. Some individuals with developmental disabilities demonstrate success through the use of physical props and their removal would serve no fruitful purpose.

One possibility for the deterioration in Henk's task performance has already been addressed. It appears likely that the presence of his homeroom teacher affected Henk's attentiveness to task. Comments about treatment effect are not possible where lack of

control of variables has become evident, as is the case for activities completed during the probe phase.

Henk's disruptive behaviours, number of teacher-dependent behaviours, errors and the number of times the teacher intervened decreased between the pretest phase and the final treatment phase. Overall, the data support the view that the introduction of the treatment variable brought about a substantial change in the four dependent variables from the pretest phase to the final treatment phase. Hypotheses 3, 4 and 5 for Henk were supported by the data at this point.

The most number of errors, teacher-dependent behaviours, teacher interventions and disruptive behaviours occurred for Henk during the pretest phase. After the pretest phase no other phase matched the level that was observed during the pretest level. The introduction of the treatment variable did not see an immediate negative change in slope and decrease in level for the dependent variables. Because of errors in procedure and the occurrence of a considerable number of teacher interventions during the fourth treatment phase, a procedural retraining module was implemented after this phase. A reduction in the dependent variables was recorded following the retraining session. A causative correlation between the treatment and the four dependent variables is suggested by the data following the commencement of phase five. A reduction in teacher-dependent behaviours, disruptive behaviours and teacher interventions is demonstrated. No occurrences, apart from two errors during the seventh phase of treatment, of any of the four variables is recorded between the fifth and eighth phase over nearly fifty task performances. The efficacy of the self-management strategy is suggested by this trend in the data.

It was noted that during the eighth phase of the study a different staff member took the role of 'teacher'. This may account for the increase in teacher intervention that is recorded during this phase. During the ninth phase the homeroom teacher again took

the role of 'teacher'. Four disruptive behaviours were recorded during this phase. No interventions were offered by the teacher. Henk self-managed and returned to his work completing all but one task due to unavailable time. While disruptive behaviour had occurred, it was self-managed. Work was resumed apart from external control. These results are consistent with the literature on self-management strategies, picture cue management systems and the TEACCH structured teaching approach to managing disruptive behaviours. In the literature the provision of a clear work routine, picture prompts, choice-making opportunities, an array of available reinforcers and clearly marked beginning and end to task expectations has been demonstrated to reduce dramatically the occurrence of disruptive behaviours without the influence of an external control agent (Dyer, Dunlap & Winterling, 1990; Cox & Schopler, 1993; Mesibov, Schopler & Hearsey 1994;Mesibov, 1997; Swaggart, Gagnon, Jones Bock, Earles, Quinn, Smith Myles & Simpson, 1995).

During the probe phase nine occurrences of teacher intervention, six occurrences of disruptive behaviour and three occurrences of teacher-dependent behaviour were observed. During this time the homeroom teacher was not engaged in the role of teacher and was out of the room. The confounding effect of teacher presence renders it difficult to determine just to what extent the results can be attributed to the removal of the treatment variable. This confounding effect on the experiment is likely to have contributed to the data recorded during this probe phase (Wolery, Bailey & Sugai, 1988; Kratochwill; 1978, Parsonson & Baer, 1978). The presence of the homeroom teacher appeared to influence Henk's attention to task and general performance.

One of the concerns of the literature has been the inability of individuals with a moderate or severe developmental disability to work independently and to demonstrate reductions in disruptive behaviour in the absence of supervision (Pierce & Schreibman, 1994; Chris Ninness, Fuerst, Rutherford & Glenn, 1991; Inkster & McLaughlin, 1993;

Naughton & McLaughlin, 1995; Fisher, Thompson, Piazza, Crosland & Gotjen, 1997). The TEACCH systematic teaching approach was designed specifically with individuals with autism and communication difficulties in mind. The TEACCH provision of schedules, individual work systems, physical organisation and routine has been demonstrated to assist these individuals with self-management of work tasks and behaviour control (Mesibov, Schopler, & Hearsey, 1994; Strickland, Marcus, Mesibov & Hogan, 1996).

The present study extended the research by testing the efficacy of the TEACCH procedures on two students with developmental disabilities. The overall results for both students show that, following the introduction of treatment, both participants were able to commence a series of task engagements and work to conclusion without intervention by treatment providers. One student's results indicated progress in the reduction of the amount of time required to complete a series of tasks. In addition, his results demonstrated that he was able to work without the tangible components of the work system at probe, maintaining and improving his performance over full treatment conditions. This showed that he had learned the response patterns of the schedule-following response chain involved in the procedure. This result was consistent with the findings of the literature (Connis, 1979; Pierce & Schreibman, 1994). The other student was not able to demonstrate improvement in time for task completion following the introduction of treatment. The removal of the physical components of the work system resulted in a deterioration of task performance. However, a confounding of variables renders difficult any firm conclusions about treatment effectiveness in regard to this variable for this participant. With this student a dramatic reduction in disruptive, dependent behaviours was demonstrated following the introduction of treatment. No similar dramatic evidence was found in the results for the first student for these dependent variables.

The single subject design focuses on the analysis of individual changes in patterns of behaviour under different treatments. However, there were some common patterns that were observed in the data for the two students. This is not suggesting that generalisations can be made across similar studies. Such is not the logic upon which single subject designs are based (Parsonson & Baer, 1978; Gay, 1992). From this investigation a number of important common findings emerged. First, despite the problem of confounding effect of teacher presence and the degree of variability noted earlier in the results, both students demonstrated the ability to begin task engagement and work to completion apart from intervention by an external control agent. This was a major achievement for both students. Art's violent outbursts, tantrums and destructive behaviours were not demonstrated during the course of the investigation. Nonetheless, anecdotal and historical records show that these are the expected behaviours when environmental circumstances do not match with Art's expectations. Opportunity during the study was available for the presentation of these behaviours but Art chose to engage in socially appropriate redress to the problems. Henk's general disruptiveness, table banging and teacher-dependent behaviour was demonstrated during several stages in the investigation. One such noteworthy episode occurred during the last treatment phase for Henk. Four incidents were recorded. However, the teacher did not respond. Henk self-managed, returned to task and completed the work apart from external prompting.

These examples suggest that the self-management package was effective for both students and the results are consistent with those studies which found similar success through the use of schedule-following response chains in increasing on-task and on-schedule behaviour and in reducing undesired behaviour (MacDuff, Krantz & McClannahan, 1993; Pierce & Schreibman, 1994; Swaggart, Gagnon, Jones Bock, Earles, Quinn, Smith Myles & Simpson; 1995; Connis, 1979). The sequentially ordered visual cue systems in all of these studies parallel the method that was implemented in

the present study. One reason for the success of this procedure could be the positive benefit in sequencing effect that, once established, yields an automatic prompting toward task performance by virtue of the process of habituation. This purposeful embedding of procedure is found in the TEACCH structured teaching approach. The method relies heavily upon the teaching of a same systematic and routinised work system (Mesibov, Schopler & Hearsey, 1994; Van Bourgondien, 1993; Mesibov, 1997, Cox & Schopler, 1993). Our study finds similar success in other studies where the provision an array of reinforcers was found to motivate task-completion and increased task engagement (Fisher, Thompson, Piazza, Crosland & Gotjen, 1997; Dyer, Dunlap & Winterling, 1990; Graff & Libby, 1999; Mithaug & Maur, 1980; Dunlap, DePerczel, Clarke, Wilson, Wright, White & Gomez, 1994).

A second important finding, based on anecdotal recording during the study, was that both students' self-engagement was punctuated by lengths of time during which they did not react to the intervention schedules in between tasks and sometimes during tasks. There were pauses in activity while unpacking materials involved in a given task. There were also pauses that occurred between moving from one task to another. Yet, this down time did not, in the majority of instances, deteriorate into complete inactivity. The pauses in task engagement were usually followed by self-managed resumption of work. The evidence for this is in the substantial lack of teacher interventions recorded, following the introduction of treatment for both participants. This finding has important implications. The literature is often concerned with self-monitoring of attentiveness. Automaticity and increased productivity are primary goals in many studies (Reid & Harris, 1989; Reid & Harris, 1993; Harris, Graham, Reid, McElroy & Hamby, 1994; Maag & Reid, 1993). However, the results of the present study demonstrate that the productivity in a self-management procedure need not be defined in terms of 100% task-engagement. Accuracy of task-engagement and freedom from dependence upon

external prompts can also be valid indices of effectiveness. Productivity need not be defined only by the amount of work that can be completed in a set time. Too much, it seems, of the literature reviewed here neglects this point, being concerned instead with the distinction between SMA and SMP (Reid & Harris, 1989; Reid & Harris, 1993; Harris, Graham, Reid, McElroy & Hamby, 1994; Maag & Reid, 1993). Self-monitoring of attention and self-monitoring of performance strategies do not necessarily assure accuracy and quality of work. This leads to a third common finding; the degree of accuracy of performance.

A third common finding is that for both students no deterioration in accuracy of performance was demonstrated throughout the course of the investigation. Following the introduction of treatment both participants recorded low error rates in task performance accuracy. The self-management strategy did not produce highly variable sets of data in regard to accuracy of performance rates. This offers promise that the self-management strategy used here may be of use in programs where maintenance of skills is a priority. Further studies would need to be conducted to establish what range of conditions, environments and to what persons the strategy can be applied.

Limitations

The present study suffered from some limitations. One limitation was the obvious variability noted for both students during different phases. High instability usually indicates a control problem. The possible presence of control variables other than the treatment variable has been noted for the second student. The homeroom teacher's presence appeared to influence Henk's results. Future studies would need to isolate these types of hidden variables and either extinguish their effect or find ways of negating their control over results (Parsonson & Baer, 1978). One way of reducing the effect of the homeroom teacher would have been to ensure that his presence or absence was constant throughout all of the phases of the study. Instability in the data should also

caution against proceeding to the next phase of a study until the variability has been brought under control. It is difficult to make conclusions about treatment effect when such variability exists.

Another limitation of the study was the obviously long number of task repetitions imposed on participants. Constant repetition can result in a threat to internal validity through maturation. Habituation, adaptation to the situation and reactive inhibition (Wolery, Bailey & Sugai, 1988; Gay, 1992) were hard to guard against in the present study. One solution to this problem in future studies would be the provision of like tasks replacing same tasks. This would help to avert the threat of reactive inhibition precipitating a possible corruption of results.

Where there is considerable variability in data the use of the mean may emphasise changes in trend suggesting a greater degree of experimental control than actually exists (Parsonson & Baer, 1978). The data for both students were characterised by substantial variability. This may have rendered the conclusions based upon the mean trend lines somewhat less firm than they might otherwise have been were the standard deviations smaller for the data.

Interobserver agreement was between 90-100% for the data of both students but this was not shadowed by other measures designed to safeguard the internal validity of the investigation (Wolery, Bailey & Sugai, 1988, Tuckman, 1988; Gay, 1992). Consistency of teacher intervention procedures was not always strictly followed by all researchers. Consequently, inconsistent responses to disruptive and teacher-dependent behaviours were presented to participants. Inconsistency of application can seriously jeopardise the integrity of results (Tuckman, 1988; Gay, 1992). Further studies would need to ensure that procedural reliability mechanisms were built in at the planning stage of an investigation. Such measures would help to ensure that it is only the treatment which is responsible for changes in the data.

Initial choice of reinforcers was conducted by the research team. No provision was made for participant choice of which items would be made available upon completion of work. As such, the strength of the preferred stimuli was not formally assessed. Future studies in this area would incorporate an environmental inventory to establish which items in students' leisure repertoire were the most desirable. It has been noted that loss of reinforcer effectiveness (Parsonson & Baer, 1978) is a factor that must be recognised as a possible control problem, particularly where a study is long. The testing for and provision of several highly preferred items amongst the reinforcers would help to address this threat to validity.

Implications for Practice

Our findings have shown that both students were able to utilise a TEACCH style self-management system to engage in on-task behaviour and to reduce disruptive behaviours and teacher dependency without external prompting. In addition, performance accuracy was maintained by both students during the course of the investigation following the introduction of treatment.

This investigation has demonstrated the effectiveness of the TEACCH procedures. It has been shown that they work well for two students who did not have autism but whose ability deficits are also equally well suited to the highly visual schedule-following chained task sequencing of the work system. Success has also been demonstrated by one student in performing tasks independently of physical props. In his case the removal of the physical components of the work system did not adversely affect task performance. Rather, an improvement in performance was noted. Art was able to perform more tasks in less time. This finding is consistent with the literature (Connis, 1979; Pierce & Schreibman, 1994). Some studies have suggested that the removal of the physical components of a self-management system is not possible for all individuals with disabilities (Rowland & Schweigert 1990; Wacker, 1997). Some individuals

appear to function well with the physical props and the removal of these would not allow them to retain the independence of function that has been achieved through the continued use of these components.

The results of the present study suggest that other students with a moderate to severe developmental disability may, under similar circumstances to those set out in this investigation, benefit from the same set of procedures that were employed. A reduction in dependent and disruptive behaviours and an increase in on-task engagement can be anticipated where schedule-following response chains and individual work systems are implemented and where a token economy choice of reinforcer provision is made available.

One strong conclusion from the present study is that there is a need for clarity, consistency of expectations and a clear set of indicators as to where a task sequence is to begin, how long it will take, and what will happen when it is completed. The TEACCH approach to structured teaching exemplifies those qualities which are purpose-designed for individuals with the particular unique deficits characteristic of autism and developmental disabilities. A strong feature of structured teaching is the provision of a visual communicative medium that will assist comprehension of task and expectations. The literature has demonstrated that in many cases this kind of proactive approach has also served to reduce aberrant behaviours in individuals with other disabilities.

The present study has advanced the research by holding out to practitioners the need for the principles of consistency, clarity of expectations and prescribed routines that can be employed in any context. The finer details as to how far the actual components of the TEACCH self-management system can be utilised successfully in the classroom, home, and other environments for individuals with other disabilities will need further refinement. The need is very great. Social difficulties, distress, dissatisfaction with social life, peer rejection, and loneliness are experienced by many individuals with

disabilities (Margalit, 1995). These factors, compounded by the additional problem of varying degrees of dependency experienced by those with disabilities, call out for programs that foster independence and increased social adaptability. There is a need for strategies designed to address high attentional and behavioural difficulties and dependency upon others for task performance. Reliance on an external change agent to modify behaviour risks inconsistent contingency management. In addition, teachers, supervisors and parents cannot always be present in every environment. Consistency across external change agents in different settings is difficult to achieve, rendering contingency management less than precise in such situations (Carter, 1993). Self-management can remove these difficulties. The present study has progressed toward demonstrating the effectiveness of a self-management strategy for two students with developmental disabilities. This is an important advance. Further improvements in teaching methodology are necessary because of the many advantages that self-management offers to individuals with learning difficulties. Dignity and self-determination are two vital fruits the value of which cannot be underestimated. These, ultimately, are the real goal of any self-management procedure.

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Appendix A Work table with work system and boxes (Figure A1) and Reinforcers Array Board (Figure A2).

Figure A1. Work table with work system and boxes.

Figure A2. Reinforcers Array Board (Figure A2).

Appendix A Tasks 1-6. Student: Art (Figures A3- A8).

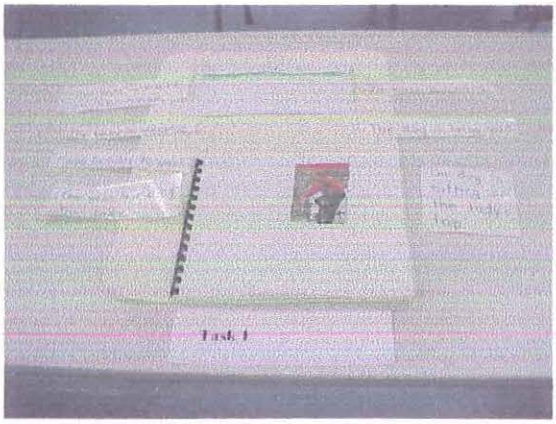


Figure A3. Task 1. Student: Art.

Figure A4. Task 2. Student: Art.

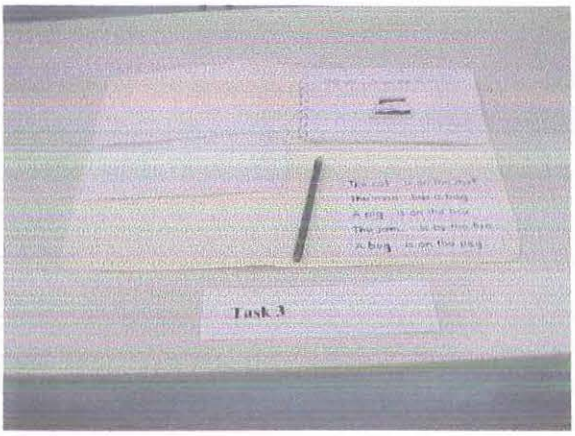
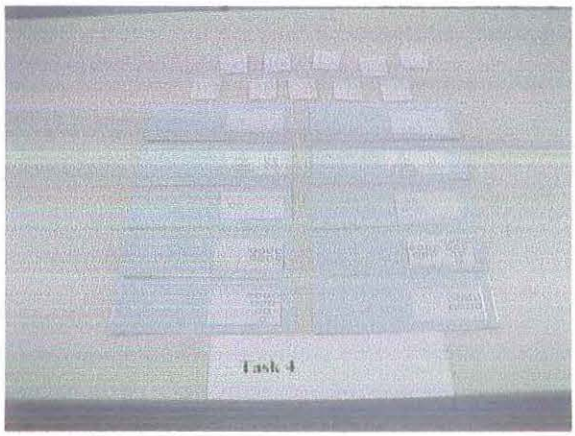


Figure A5. Task 3. Student: Art.



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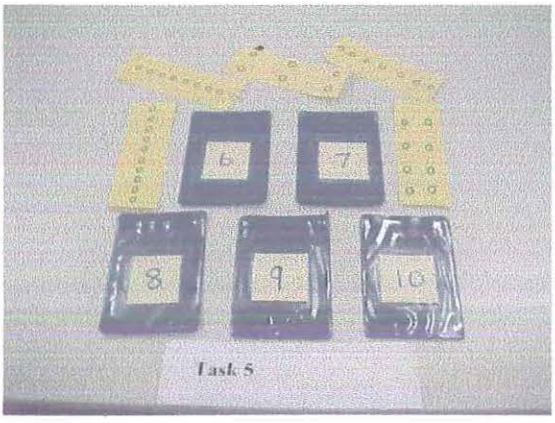

Figure A7. Task 5. Student: Art.

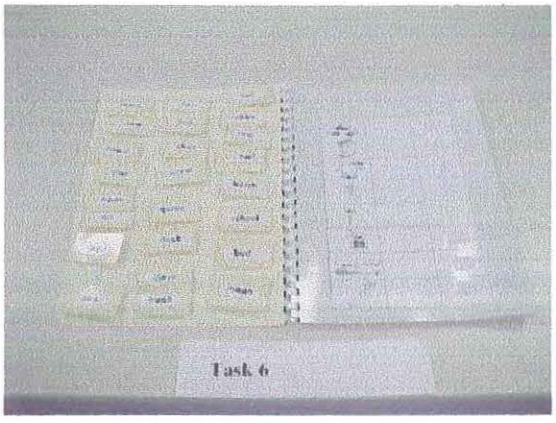

Figure A8. Task 6. Student: Art.

Appendix A Tasks 1-6. Student: Henk (Figures A9-A14).

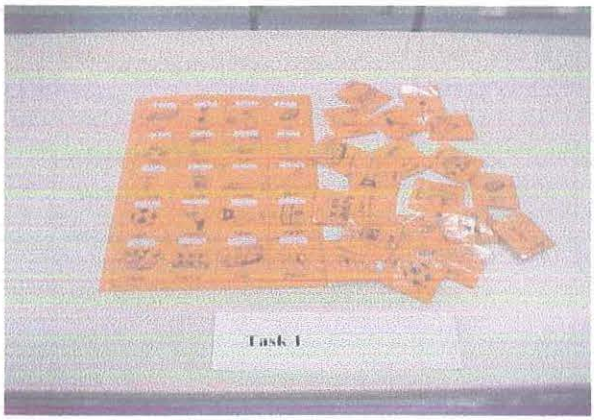

Figure A9. Task 1. Student: Henk.

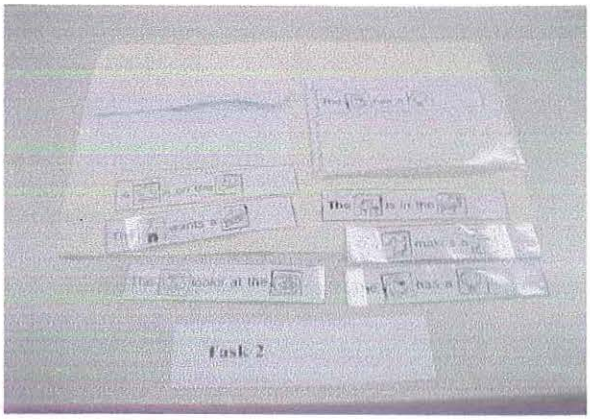

Figure A10. Task 2. Student: Henk.

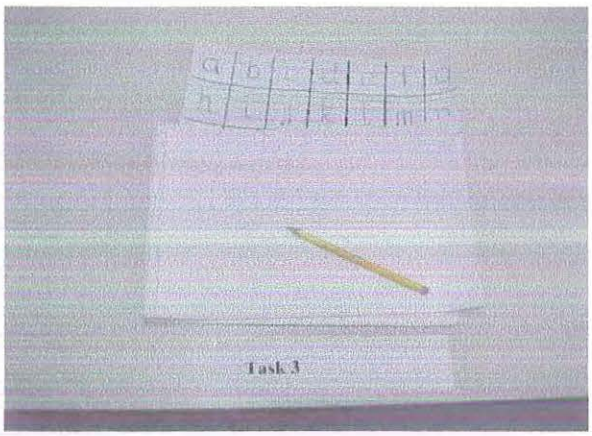

Figure A11. Task 3. Student: Henk.

Figure A12. Task 4. Student: Henk.

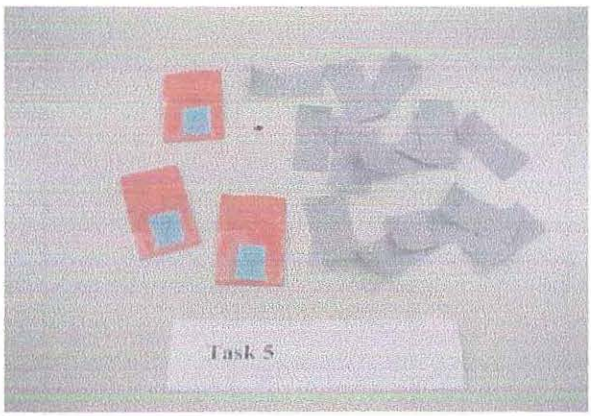

Figure A13. Task 5. Student: Henk.

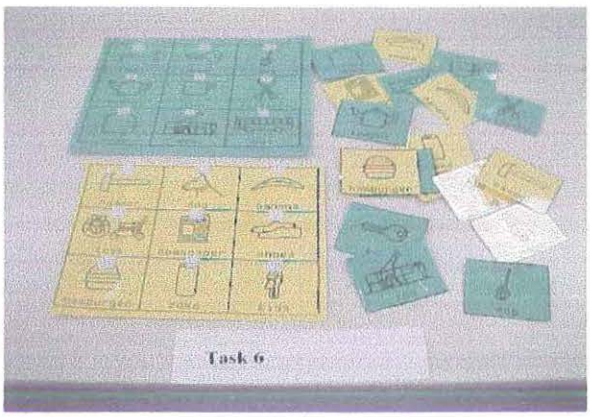

Figure A14. Task 6. Student: Henk.

Appendix B Sample Recording Sheet.

Name________________. Observer 1______________
Phase________________. Observer 2______________

observation number and date:	number of tasks completed	time taken to complete tasks	number of disruptive behaviours	number of teacher-dependent behaviours	number of times teacher intervened

Appendix C TEACCH-style work system used in this study. Figure shows Phase G work system set up for work on six tasks.

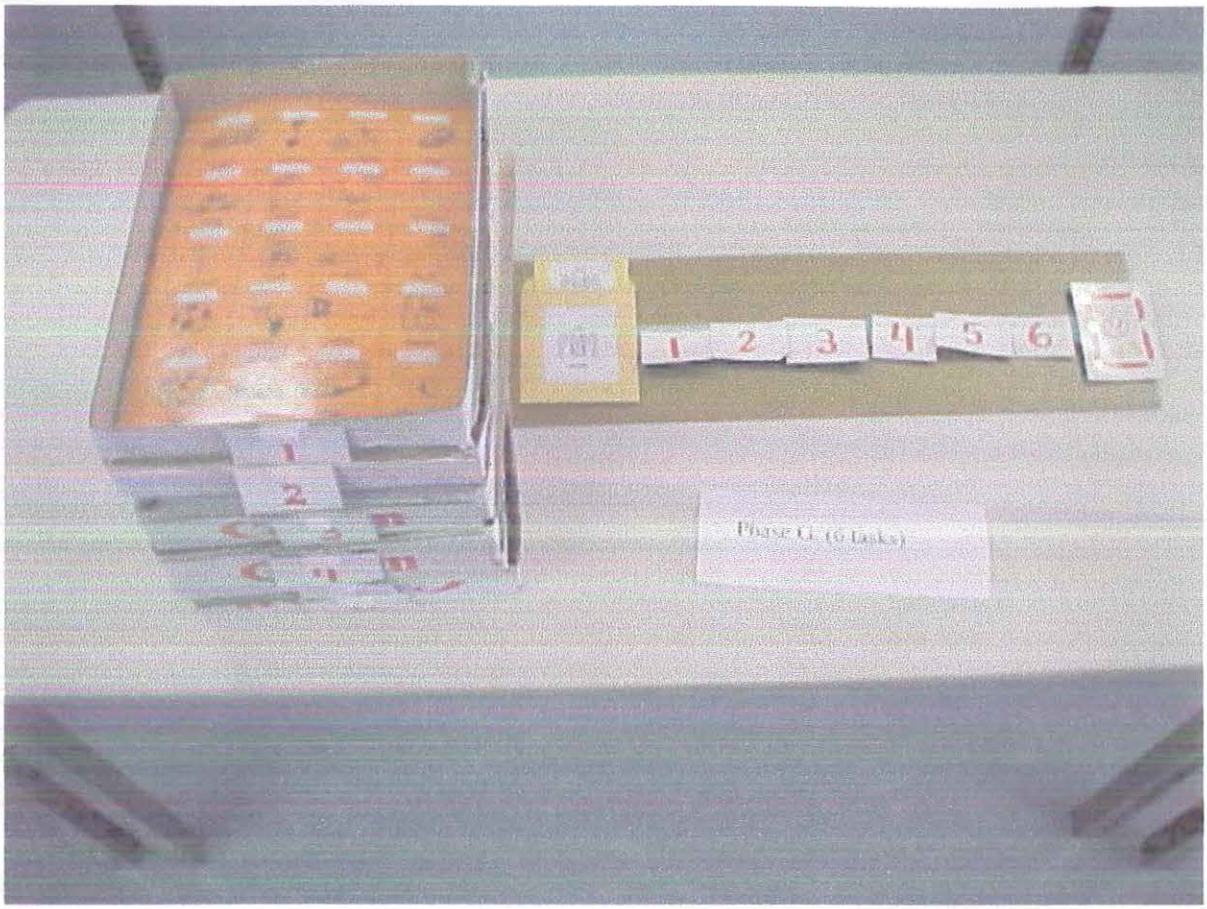

Figure C1. TEACCH-style work system used in this study.

Appendix D Art's Pretest-Phase H Data (Note: Tables have been labelled as Table D1a, D1b, D1c through to Tables D9a, D9b, D9c, corresponding to phases of the study, for ease of comprehension).

Table D1a

Student: Art. Number of seconds taken to complete tasks during pretest trials for Tasks 1-6 prior to implementation of Phase A.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/task/ session
1	118	211	122	209	134	126	920s= 15.3m	2.55m
2	92	65	96	208	197	130	788s= 13.1m	2.18m
3	79	113	101	253	151	140	837s= 13.9m	2.31m

Table D1b

Student: Art. Mean time taken for task completion during pretest trials.

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Mean time/ task/ phase
Mean time taken for task completion	289/3= 96.33s= 1.60 m	389/3= 129.66s= 2.16 m	319/3= 106.33s= 1.77 m	670/3= 223.33s= 3.72 m	482/3= 160.66s= 2.67 m	396/3= 132.00s= 2.20 m	848.33/6= 141.38s= 2.35m

Table D1c

Student: Art. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors during pretest trials for Tasks 1-6 prior to implementation of Phase A.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	

Table D2a

Student: Art. Number of seconds taken complete Task 1 during Phase A.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session
1	159						159s=2.65m
2	59						59s =0.9m
3	65						65s =1.0m
4	76						76s =1.2m
5	60						60s =1.0m
6	66						66s =1.1m

Table D2b

Student: Art. Mean time taken for task completion in Phase A.

	Task 1	Mean time/task/ phase
Mean time taken for task completion	485/6= 80.83s= 1.3 m	485/6= 80.83s= 1.34 m

Table D2c

Student: Art. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Task 1 during Phase A.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	

Table D3a

Student: Art. Number of seconds taken to complete Task 1 during Phase B.(training phase).

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session
1	116						116s= 1.9m
2	113						113s= 1.8m
3	90						90s= 1.5m
4	112						112s= 1.8m
5	93						93s= 1.5m
6	116						116s= 1.9m
7	102						102s= 1.7m
8	129						129= 2.1m
9	85						85s= 1.4m
10	96						96s= 1.6m
11	82						82= 1.3m
12	105						105= 1.7m
13	77						77= 1.2m
14	72						72= 1.2m
15	85						85= 1.4m
16	72						72= 1.2m

Table D3b

Student: Art. Mean time taken in seconds for the completion of Task 1 during. Phase B (training phase).

	Task 1	Mean time/ task/ phase
Mean time taken for task completion	1545/16= 96.56s= 1.60 m	1545/16= 96.56s= 1.60 m

Table D3c

Student: Art. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Task 1 during Phase B. (training phase).

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	student being taught WORK SYSTEM procedure
2	0	0	0	0	" "
3	1	0	0	3	
4	1	0	2	0	
5	1	0	1	0	
6	0	1	0	0	
7	0	0	1	0	
8	0	0	1	0	
9	0	0	1	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	

Table D4a

Student: Art. Number of seconds taken to complete Tasks 1 and 2 during Phase C.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/task/ session
1	92	202					294s=4.9m	147s= 2.45m
2	182	151					333s=5.4m	167.5s 2.79m
3	115	147					262s=4.3m	131s= 2.18m
4	92	191					283s=4.7m	141.5s= 2.35 m
5	90	145					235s= 3.9m	117.5s= 1.95m

Table D4b

Student: Art. Mean time taken to complete Tasks 1 and 2 during Phase C.

	Task 1	Task 2	Mean time/ task/ phase
Mean time taken for task completion	571/5=	836/5=	281.40/2=
	114.20s=	167.20s=	140.70s=
	1.90 m	2.78 m	2.34 m

Table D4c

Student: Art. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1 and 2 during Phase C.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	2	0	3	1	
2	0	1	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	

Table D5a

Student: Art. Number of seconds taken to complete Tasks 1, 2 and 3 during Phase D.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/task/ session
1	96	191	264				551s=9.1m	163.66s=3.06m
2	99	206	208				513s=8.5m	171.00s 2.85m
3	116	236	244				596s=9.9m	198.00s=3.31m
4	91	129	140				360s=6.0m	120.00s=2.00m
5	70	80	85				235s=3.0m	76.33s= 1.30m

Table D5b

Student: Art. Mean time taken to complete Tasks 1, 2 and 3 during Phase D.

	Task 1	Task 2	Task 3	Mean time/ task/ phase
Mean time taken for task completion	472/5= 94.40s= 1.57 m	842/5= 168.40s= 2.8 0 m	941/5= 188.20s= 3.1 3 m	451.00/3= 150.33s= 2.50 m

Table D5c

Student: Art. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1, 2 and 3 during Phase D.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	

Table D6a

Student: Art. Number of seconds taken to complete Tasks 1,2, 3 and 4 during Phase E.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/task/ session
1	80	98	80	156			414s=6.9m	103.50s= 1.72m
2	94	83	84	260			521s=8.6m	130.25s= 2.17m
3	85	86	80	258			509s=8.4m	127.25s= 2.12m
4	82	137	90	165			474s=7.9m	118.50s=1.97m
5	102	115	80	200			497s=8.2m	124.25s= 2.07m
6	62	70	75	137			344s=5.7m	86.00s= 1.43m

Table D6b

Student: Art. Mean time taken for completion of Tasks 1,2, 3 and 4 during Phase E.

	Task 1	Task 2	Task 3	Task 4	Mean time/ task/ phase
Mean time taken for task completion	505/6= 84sec= 1.4m	589/6= 98.1sec= 1.63min	489/6= 81.5s= 1.3min	1176/6= 196s= 3.2min	459.82/4= 114.95s= 1.91 m

Table D6c

Student: Art. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1,2, 3 and 4 during Phase E.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	

Table D7a

Student: Art. Number of seconds taken to complete Tasks 1,2,3,4 and 5 during Phase F.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/task/ session
1	72	66	56	170	120		484s= 8.0min	96.80s = 1.61m
2	145	140	110	183	144		722s= 12.0min	144.40s=2.40m
3	68	88	68	200	135		559s= 9.3min	111.80s=1.86m
4	54	78	63	265	99		559s= 9.3min	111.80s=1.86m

Table D7b

Student: Art. Mean time taken to complete Tasks 1,2,3,4 and 5 during Phase F.

	Task 1	Task 2	Task 3	Task 4	Task 5	Mean time/ task/ phase
Mean time taken for task completion	339/4= 84.75sec= 1.4 min	372/4= 93 sec= 1.5 min	297/4= 74.2 sec= 1.2 min	818/4= 204.5 s= 3.4 min	498/4= 124.5 s= 2.0 min	581.00/5= 116.20s= 1.93m

Table D7c

Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1,2,3,4 and 5 during Phase F.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	1	1	0	

Table D8a

Student: Art Number of seconds taken to complete Tasks 1,2 ,3,4, 5 and 6 during Phase G.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/task /session
1	75	140	98	200	138	85	736s= 12.2min	2.03m
2	100	190	108	335	90	96	919s= 15.3min	2.55m
3	107	199	110	345	113	78	952s= 15.8min	2.63m
4	65	81	77	202	77	93	595s= 9.9min	1.65m

Table D8b

Student: Art. Time taken to complete Tasks 1,2,3,4,5 and 6 during Phase G.

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Mean time/ task/ phase
Mean time taken for task completion	347/4= 86.75s= 1.44 min	610/4= 152.50s= 2.54 min	393/4= 98.25s= 1.63 min	1082/4= 270.50s= 4.50 min	418/4= 104.50s= 1.74 min	352/4= 88.00s= 1.46 min	800.50/6= 133.41s= 2.23 min

Table D8c

Student: Art Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1-6 during Phase G.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	2	2	0	(1) distressed over other students' useof train he had made; (2) other students coming into room announcing lunch, A "Oh no!" Both times Teacher intervened with assurances.
4	0	0	0	0	

Table D9a

Student: Art. Number of seconds taken to complete Tasks 1,2 ,3, 4 ,5 and 6 during Phase H.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/ task/ session
1	95	162	66	200	110	70	703s= 11.7m	1.91m
2	100	158	54	168	125	64	669s= 11.5m	1.91m
3	85	155	45	260	133	116	794s= 13.2m	2.20m
4	74	100	89	145	90	50	548s= 9.13m	1.52m

Table D9b

Student: Art. Time taken to complete Tasks 1-6 during Phase H.

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Mean time/task/ phase
Mean time taken for task completion	354/4= 88.50s= 1.47 m	575/4= 143.75s= 2.39 m	254/4= 63.50s= 1.05 m	773/4= 193.25s= 3.2 2 m	458/4= 114.50s= 1.90 m	300/4= 75.00s= 1.25 m	678.50/6= 113.08s= 1.88 min

Table D9c

Student: Art. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1,2,3,4,5 and 6 during Phase H.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	

Appendix E Henk's Pretest-Phase H Data (Note: Tables have been labelled as Table E1a, E1b, E1c through to Tables E10a, E10b, E10c, corresponding to phases of the study, for ease of comprehension).

Table E1a

Student: Henk. Number of seconds taken to complete tasks during pretest trials for Tasks 1-6 prior to implementation of Phase A.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/ task/ session
1	99	102	679	183	1003	118	2184s=36.40m	364.00s= 6.06m
2	193	186	2290	152	2520	224	5565s=92.75m	9275.00s= 15.45m
3	87	34	135	97	477	102	932s=15.53m	155.33s= 2.58m
4	979	39	265	86	157	120	1646s=27.43m	274.33s= 4.57m

Table E1b

Student: Henk. Mean time taken for task completion during pretest trials.

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Mean time/ task/ phase
Mean time taken for task completion	1358/4=	361/4=	3369/4=	518/4=	4157/4=	564/4=	2581.29/6=
	339.50s=	90.25s=	842.25s=	129.50s=	1039.25s=	141s=	430.29s=
	5.65 m	1.50 m	14.03m	2.15 m	17.32 m	2.35 m	7.17 m

Table E1c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors during pretest trials for Tasks 1-6 prior to implementation of Phase A.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	13	4	8	2	disruptive behaviour= shouting, pulling faces
2	37	0	30	0	disruptive behaviour= shouting, pulling faces, rude signs with middle finger, shouting "No!"
3	16	0	8	1	disruptive behaviour as above
4	1	0	3	0	

Table E2a

Student: Henk. Number of seconds taken complete Task 1.during Phase A.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session
1	103						103s=1.7m
2	90						90s =1.5m
3	90						90s =1.5m
4	106						106s=1.7m
5	88						88s =1.4m
6	145						145s=2.4m

Table E2b

Student: Henk. Mean time taken for task completion in Phase A.

	Task 1	Mean time/ task/ phase
Mean time taken for task completion	622/6= 103.6s= 1.72 min	622/6= 103.66s= 1.72 m

Table E2c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Task 1 during Phase A.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	

Table E3a

Student: Henk. Number of seconds taken to complete Task 1 during Phase B.(training phase).

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session
1	160						160s=2.6m
2	192						192s=3.2m
3	229						229s=3.8m
4	169						169s=2.8m
5	183						183s=3.0m
6	169						169s=2.8m
7	118						118s=1.9m
8	123						123s=2.0m
9	154						154s=2.5m
10	141						141s=2.3m
11	113						113s=1.8m
12	124						124s=2.0m
13	148						148s=2.4m
14	141						141s=2.3m
15	154						154s=2.5m
16	189						189s=3.1m
17	127						127s=2.1m
18	173						173s=2.8m
19	115						115s=1.9m
20	111						111s=1.8m
21	126						126s=2.1m
22	149						149s=2.4m
23	112						112s=1.8m
24	124						124s=2.0m

Table E3b

Student: Henk. Mean time taken in seconds for the completion of Task 1 during. Phase B (training phase).

	Task 1	Mean time/ task/ phase
Mean time taken for task completion	3544/24=	3544/24=
	147.66s=	147.66s=
	2.46 m	2.46 m

Table E3c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Task 1 during Phase B. (training phase).

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	student being taught WORK SYSTEM procedure
2	1	0	0	0	" " "
3	1	0	5	0	student being reminded of procedure
4	0	0	4	0	
5	1	0	2	0	
6	0	0	4	0	" "
7	0	0	2	0	
8	0	0	2	0	
9	0	0	2	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	2	0	
14	0	1	2	0	
15	0	1	0	0	
16	4	1	4	0	disruptive behaviour= watching others leave class & interacting
17	0	0	0	0	
18	0	0	1	0	
19	0	0	0	0	
20	0	0	1	0	
21	0	0	1	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	

Table E4a

Student: Henk. Number of seconds taken to complete Tasks 1 and 2 during Phase C1.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/ task/ session
1	119	109					228s=3.8m	114.0s= 1.90m
2	165	100					265s=4.4m	132.5s= 2.20m
3	215	82					297s=4.9m	148.5s= 2.47m
4	146	84					230s=3.8m	115.0s= 1.91m
5	125	64					189s=3.1m	94.5s = 1.55m
6	115	65					180s=3.0m	90.0s= 1.50m
7	110	62					172s=2.8m	86.0s= 1.43m
8	112	81					193s=3.2m	96.5s= 1.60m
9	96	62					158s=2.6m	79.0s= 1.31m
10	125	48					173s=2.8m	86.5s= 1.41m

Table E4b

Student: Henk. Mean time taken to complete Tasks 1 and 2 during Phase C1.

	Task 1	Task 2	Mean time/ task/ phase
Mean time taken for task completion	1328/10= 132.80s= 2.21 mins	757/10= 75.70sec= 1.26 mins	208.50= 104.25s= 1.73 min

Table E4c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1 and 2 during Phase C1.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	1	0	
2	0	0	2	0	box labelling error and did not follow box placement procedure
3	0	0	0	0	
4	1	0	2	0	failed to follow labelling procedure
5	0	0	1	0	
6	0	0	2	0	failure to follow system procedures
7	0	0	0	0	
8	0	0	1	0	box labelling procedural failure
9	0	1	1	0	looked for prompt to take reward card
10	0	0	1	0	procedural failure, teacher prompted

Table E5a

Student: Henk. Number of seconds taken to complete Tasks 1 and 2 during Phase C2 (following retraining procedure).

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/ task/ session
1	96	65					161s= 2.68m	80.50s= 1.34m
2	90	40					130s= 2.16m	65.00s= 1.08m
3	58	45					103s= 1.71m	51.50s= 0.85m
4	93	94					187s= 3.11m	93.50s= 1.55m

Table E5b

Student: Henk. Mean time taken to complete Tasks 1 and 2 during Phase C2.

	task 1	task 2	mean time/ task/ phase
Mean time taken for task completion	337/4=	244/4=	145.25/2=
	84.25s=	61.00s=	72.65s=
	1.40 m	1.01 m	1.21 m

Table E5c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1 and 2 during Phase C2.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	

Table E6a

Student: Henk. Number of seconds taken to complete Tasks 1,2 and 3 during Phase D.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/ task/ session
1	100	85	135				320s=5.33m	106.66s= 1.77m
2	105	80	108				293s=4.88m	97.66s= 1.62m
3	120	93	124				337s=5.61m	112.33s= 1.87m
4	82	65	127				274s=4.56m	91.33s= 1.52m
5	85	72	157				314s=5.23m	104.66s= 1.74m
6	138	69	122				329s=5.48m	109.66s= 1.81m

Table E6b

Student: Henk. Mean time taken for completion of Tasks 1,2 and 3 during Phase D.

	Task 1	Task 2	Task 3	Mean time/ task/ phase
Mean time taken for task completion	630/6= 105s= 1.75 m	464/6= 77.33s= 1.28 m	773/6= 128.83s= 2.14 m	311.16/3= 103.72s= 1.728 m

Table E6c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1,2 and 3 during Phase D.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	distractors present: other chn playing next to and making noise
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	

Table E7a

Student: Henk. Number of seconds taken to complete Tasks 1,2,3 and 4 during Phase E.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/ task/ session
1	113	54	88	99			354s=5.90m	88.50s= 1.47m
2	97	48	160	113			418s=6.96m	104.50s= 1.74m
3	145	31	165	89			430s=7.16m	107.50s= 1.79m
4	69	59	441	144			713s=11.8m	178.25s =11.88m
5	95	43	111	122			371s=6.18m	92.75s= 1.54m

Table E7b

Student: Henk. Mean time taken to complete Tasks 1,2,3 and 4 during Phase E.

	Task 1	Task 2	Task 3	Task 4	Mean time/ task/ phase
Mean time taken for task completion	519/5=	235/5=	965/5=	567/5=	457.20/4=
	103.80s=	47s=	193s=	113.40s=	114.30s
	1.73 m	0.78 m	3.21m	1.89min	1.90 m

Table E7c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1,2,3 and 4 during Phase E.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	2	task items incorrect
5	0	0	0	0	

Table E8a

Student: Henk. Number of seconds taken to complete Tasks 1,2 ,3, 4 and 5 during Phase F.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/ task/ session
1	92	69	320	113	112		706s = 11.76m	141.20s= 2.35m
2	37	91	186	169	112		595s = 9.91m	119.00s= 1.98m
3	1500	65	1560	121	85		3482s= 58.03m	696.40s= 11.60m
4	236	77	185	185	113		611s= 10.18m	122.20s= 2.03m
5	85	34	117	154	63		453s = 7.55m	90.60s= 1.51m
6	2640	61	414	125	76		3316s= 55.26m	663.20s= 11.05m
7	80	29	441	133	80		763s = 12.70m	152.60s= 2.54m

Table E8b

Student: Henk. Time taken to complete Tasks 1,2,3,4 and 5 during Phase F.

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Mean time/ task/ phase
Mean time taken for task completion	4670/7= 667.14s= 11.11 m	426/7= 60.85s= 1.01 m	3223/7= 460.42s= 7.67 m	1000/7= 142.85s= 2.38 m	641/7= 91.57s= 1.52 m		1422.83/5= 284.57s= 4.74 m

Table E8c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1-5 during Phase F.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	1	0	Self stimulating (hands in pants), head on desk. Teacher intervened after 58 mins. Tasks then completed.
4	0	0	0	0	
5	0	0	1	0	Teacher corrected procedural error
6	1	0	2	0	(1) Sat on floor-teacher directed to chair (2) Self stimulating. Teacher intervened after 44 mins; lunch time. Task then completed.
7	0	0	0	0	

Table E9a

Student: Henk. Number of seconds taken to complete Tasks 1,2 ,3, 4 ,5 and 6 during Phase G.

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/ task/ session
1	56	43	209	215	115	63	755s= 12.58m	125.83s= 2.09m
2	138	44	148	146	89	68	633s= 10.55m	105.50s= 1.75m
3	495	28	568	96	64	76	1327s= 22.11m	221.16s= 3.68m
4	167	47	187	132	78	105	716s= 11.93m	119.33s= 1.98m
5	160	44	133	162	101	114	714s= 11.90m	119.00s= 1.98m
6	2167	90	task not completed	86	82	85	2420s= 40.33m	403.33s= 6.72m

Table E9b

Student: Henk. Time taken to complete Tasks 1-6 during Phase G (note: data from session 6 was not included in mean calculation due to incomplete taskperformance at task 3 in session 6).

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Mean time/ task/ phase
Mean time taken for task completion	1016/5= 203.20s= 3.38 m	206/5= 41.20s= 0.68 m	1245/5= 249.00s= 4.15 m	751/5= 150.20s= 2.50 m	447/5= 89.40s= 1.49 m	426/5= 85.20s= 1.42 m	818.20/6= 136.36s= 2.27 min

Table E9c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1,2,3,4, 5 and 6 during Phase G.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	1	
5	0	0	0	0	
6	4	0	0	1 unfinished task	Self-stimulating (hands in pants), hitting desk, task 3 unfinished, completed following tasks. Selectively on task when teacher present. No teacher prompts in session 6.

Table E10a

Student: Henk. Number of seconds taken to complete Tasks 1,2 ,3, 4 ,5 and 6 without work system. during Phase H (probe).

Sessions	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total time taken/session	Mean time/ task/ session
1	2384	43	333	130	76	114	3080s= 51.33m	513.33s= 8.55m
2	985	96	255	211	146	95	1788s= 29.80m	298.00s= 4.96m
3	2160	35	133	113	100	105	2646s= 44.10m	441.00s= 7.35m

Table E10b

Student: Henk. Mean time taken to complete Tasks 1-6 without work system during Phase H (probe).

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Mean time/ task/ phase
Mean time taken for task completion	5529/3= 1843.0s= 30.71 m	174/3= 58.00s= 0.96 m	721/3= 240.33s= 4.00 m	454/3= 151.33s= 2.52 m	322/3= 107.33s= 1.78 m	314/3= 104.66s= 1.74 m	2504.65/6= 417.44 sec= 6.95 m

Table E10c

Student: Henk. Number of disruptive behaviours, teacher dependent behaviours, number of times teacher intervened and number of errors for Tasks 1,2,3,4, 5 and 6 during Phase H.

Sessions	Number of disruptive behaviours	Number of teacher dependent behaviours	Number of times teacher intervened	Number of errors	Comment
1	0	0	0	0	Playing in task 1, self stimulating, not working, calling out, Pencil lead broken in Task 3, not noticed by observer until session was over.
2	1	0	3	0	Making disruptive noises aimed at others. Watching peers 14 mins, self stimulating.
3	5	3	6	0	Failure to follow procedure 3 times. Self stimulating.

Appendix F Sample Letter Sent To Parents/Guardians.

Draft Letter requesting Participants' Parental/Guardian Consent

Dear parent or guardian,

I am conducting research to assess the effectiveness of a strategy that will help children to increase their completion of assigned work with independence and with a minimum of disruption to themselves and to others. As you would be aware, ability to work independently is a very important skill and one that is highly valued not only in school but also in life generally.

I am writing to ask for your consent to include your child in this research. If you agree, your child will be amongst other children who will, for short sessions, be doing some of their normal school work using a system that awards completed work with a reward of short periods with a preferred item of leisure. Such items include the use of computer and other activities in the classroom.

Children who have used this system of working in other educational settings, knowing that they are earning a time of reward, have found the sessions enjoyable and have demonstrated gains in independence, in amount of work they can complete successfully and have shown significant reductions in disruptive types of behaviours.

Your child's identity and the name of the school will be safeguarded in the reporting of the results and only myself and teacher aides personally involved will be aware of your child's participation in the research project.

If you have any questions about this research, or if you would like to see the results for your child, please contact me (on 9490 1531) and I will be happy to answer any questions.

Yours faithfully,

Jim Cabrera
17 Robina Street
GOSNELLS, W.A. 6110

I have read the information above and any questions I have asked have been answered to my satisfaction. I consent to my child _____ participating in the research. I realise I may withdraw him/her at any time.

I agree that the research data gathered for this study may be published provided my child is not identifiable.

_____	_____	_____
Name	Signature	Date