THE USE OF STRUCTURED TEACHING STRATEGIES TO SUPPORT STUDENTS ON THE AUTISM SPECTRUM TO STAY ON TASK IN MAINSTREAM CLASSROOMS

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Submitted in fulfilment of the requirements of the degree of Doctor of Philosophy
21st of July, 2017
Abstract

Students on the autism spectrum can find the mainstream classroom environment challenging, and there is a need for effective strategies to support these students within the mainstream context. Staying on task and transitioning independently between tasks have been identified as activities that can be particularly difficult for students on the spectrum. This thesis presents a research project that aimed to develop and evaluate an intervention based on two structured teaching strategies – visual schedules and work systems – which have demonstrated potential in supporting students on the spectrum to stay on task. Whereas other research has mainly evaluated these strategies in special educations or autism specific settings, or outside the classroom, this project examined their use as inclusive, whole-class practices to support students on the autism spectrum in mainstream classrooms. The research presented here involved a mixed-methods design over three distinct phases. In Phase 1, a case-study approach was used to trial the intervention as well as to test and refine research methods for use in the study that followed. In Phase 2, a multiple baseline design was employed to evaluate the use of visual schedules and work systems to support students on the spectrum to stay on task in mainstream settings. Finally, in Phase 3, an online survey and interviews were used to investigate the attitudes of mainstream teachers toward the intervention package. The pilot study established the feasibility of using visual schedules and work systems in mainstream settings, and facilitated the development and refinement of research methods suitable for use in the mainstream classroom. The evaluation of the strategies during Phase 2 demonstrated that their use had a positive and significant impact on the on-task behaviours of students on the spectrum. In Phase 3, teachers who had viewed and trialled the intervention package reported that it was suitable for use in mainstream classrooms. Together, these studies provide evidence that visual schedules and work
systems can be effectively implemented by teachers to support students on the spectrum to stay on task in mainstream settings. The research presented here has contributed to efforts to bridge the research-to-practice gap by evaluating these strategies in ecologically valid settings.
Statement of Originality and Ethical Clearance

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

This project was approved by the University of Queensland Behavioural and Social Sciences Ethical Review Committee (2013001446), the Griffith University Human Research Ethics Committee, the Queensland Department of Education, Training, and Employment (550/27/1415), and the Brisbane Catholic Education Research Committee (116).

(Signed)_____________________________

Elizabeth (Libby) Macdonald
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Acknowledgements

The work presented here would not have been possible without the support and guidance of my supervisors, Deb Keen, David Trembath and Debra Costley, and my former supervisor, Amanda Webster, who have all been generous with both their time and their extensive expertise. Thank you too, to the other members of the project team: Jill Ashburner, project leader, from whom I have learned a great deal; and Kaaren Haas, whose contribution has been invaluable. I would also like to convey my deepest gratitude for the extensive assistance provided by Keely Harper-Hill, David Klug, Korrine Byrnes and Elizabeth Stevens.

Thank you to my mother, Shena Macdonald, who hasn’t refused a single reasonable request for help during my candidature, and to Geordie and Violet Macdonald for their patience and encouragement.

Finally, I would like to gratefully acknowledge the teachers and students who took part in this research, who welcomed me into their classrooms and took the time to share their thoughts about this research. The teachers I have met over the course of this study have been inspiring.
Acknowledgement of Financial Support

I would like to gratefully acknowledge the financial support of the Cooperative Research Centre for Living with Autism (Autism CRC), established and supported under the Australian Government’s Cooperative Research Centres Program. I am also grateful for funds provided for research support by the Griffith Institute for Educational Research (GIER).
Acknowledgement of Papers included in this Thesis

Included in this thesis are papers in Chapters 5, 6 and 7 which are co-authored with other researchers. My contribution to each co-authored paper is outlined at the front of the relevant chapter. The bibliographic details and status for these papers including all authors, are:

Chapter 5:


doi:10.1080/13603116.2017.1335355

(Copyright assigned to Taylor & Francis Group, included here in accordance with provisions in the publishing agreement).

Chapter 6:


Chapter 7:

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) ____  (Date)___9/7/17_____
Elizabeth (Libby) Macdonald

(Countersigned) __  (Date)___13/7/17___________
Supervisor: Prof Deb Keen
Invited presentations resulting from this research


Peer reviewed abstracts and presentations resulting from this research


A Note on Terminology

The term *autism spectrum disorder* (ASD) is used only when discussing the diagnostic criteria described in *The Diagnostic and Statistical Manual of Mental Disorders: DSM 5* (American Psychiatric Association, 2013). Student participants in this research have been referred to as *students on the autism spectrum*, or *students on the spectrum*, throughout. At the time of writing, this is the preferred terminology within the Cooperative Research Centre for Living with Autism (Autism CRC). However, it is acknowledged that the language with which the autism spectrum is described is rapidly evolving.
Chapter 1: Introduction

Autism spectrum disorder (ASD) is a neurological, developmental condition estimated to affect 0.5% of the Australian population (Australian Bureau of Statistics, 2014). Although ASD is conceptualised as a spectrum and may manifest in diverse and individual ways, it is defined with reference to clusters of observable characteristics. For instance, the commonly used diagnostic criteria described in The Diagnostic and Statistical Manual of Mental Disorders: DSM 5 (hereafter, DSM-5) (American Psychiatric Association, 2013) include atypical social communication skills, restrictive and repetitive behaviours, and sensory processing differences. These differences in the way individuals on the autism spectrum perceive and interact with the world can impact on their successful participation in learning activities in mainstream classrooms. In mainstream educational settings, a lack of effective strategies to utilise these characteristics in a positive manner places children at great risk for underachievement and challenging behaviours (Ashburner, Ziviani, & Rodger, 2010; Humphrey, 2008; Machalicek, O’Reilly, Beretvas, Sigafoos, & Lancioni, 2007). The research presented here was aimed at addressing difficulties that students on the autism spectrum experience in staying on task and working independently within the context of mainstream educational settings.

There is a widely acknowledged need for effective intervention strategies to support students on the autism spectrum in mainstream classrooms (Ferraioli & Harris, 2011; Humphrey & Lewis, 2008; Koegel, Matos-Freden, Lang, & Koegel, 2012). Attending to, and completing, tasks has been identified as a problem common to many of these students (Ashburner et al., 2010; Banda & Kubina, 2006). While this is just one of many possible challenges experienced by students on the spectrum, the ability to attend to tasks and stay on task is fundamental to meaningful participation in classroom
activities, and can have broad consequences for learning. Attention difficulties may, for instance, be a contributor to the academic underachievement of students on the spectrum relative to their neurotypical peers (Ashburner et al., 2010). Additionally, being frequently off-task may be perceived as a behavioural issue, and this could be a factor in the high rates of exclusion or suspension from school among students on the spectrum (Ashburner et al., 2010; Barnard, Prior, & Potter, 2000; Humphrey, 2008).

In designing and evaluating supports for students on the spectrum, it is important that the supports are able to be translated into regular classroom practice within mainstream settings (Dingfelder & Mandell, 2011). In Australia – the geographical context in which the research was conducted – around 73% of students on the autism spectrum attend mainstream schools (Autism Awareness, 2014), and many parents or caregivers have reported that the levels of support their children receive in this environment are insufficient (Autism Awareness, 2014; Lilley, 2012). Studies conducted in Australia and the United Kingdom have also shown that teachers in mainstream settings often feel that they do not have appropriate skills or training to meet the needs of these students (Emam & Farrell, 2009; Soto-Chodiman, Pooley, Cohen, & Taylor, 2012), or face barriers to doing so, such as a lack of time and resources (Saggers et al., 2015). Providing teachers with practical strategies to support students on the spectrum within mainstream classrooms may help to improve the students’ educational outcomes. The basis for any such intervention must, however, begin with an understanding of autism and the strengths of, and challenges faced by, these students in an environment that does not always accommodate their differences.

**Social communication differences.** Difficulties with social communication can make it hard for students on the autism spectrum to navigate the complex social environment of the classroom. Atypical social communication can involve difficulties
with the appropriate, or adaptive, use of non-verbal cues such as facial expression, eye contact, and physical gestures (Bellini, Peters, Benner, & Hopf, 2007; Mundy, Sigman, Ungerer, & Sherman, 1986). Social communication differences can also involve more elaborate cognitive processes such as interpreting figurative language, reading subtle social cues, understanding emotional states, predicting others' thoughts from environmental contexts – that is, having a theory of mind (Baron-Cohen, Leslie, & Frith, 1985) – and being able to draw on, and apply, knowledge about social conventions in different situations (Myles & Simpson, 2001). Participation at school involves all of these aspects of social interaction and, therefore, communication within the classroom can demand deliberate, and often overwhelming, effort on the part of students on the spectrum. The social-communication characteristics of autism affect the quality of social interactions between students on the spectrum and their peers (Bellini et al., 2007; Reichow & Volkmar, 2010). Furthermore, these characteristics can also negatively impact on successful engagement during lessons as commonly evidenced by difficulties such as interpreting and responding to instructions, understanding aspects of the curriculum, and contributing ideas and communicating needs.

Repetitive and restricted behaviours. The DSM 5 (American Psychiatric Association, 2013), outlines a broad diagnostic category of repetitive and restricted behaviours, which covers characteristics such as a fixation on special interests, stereotyped or repetitive motor movements, insistence on routine and sameness, and sensory processing differences. Tendencies towards perseverance – a resistance to change, difficulty with transitions and paradigmatic shifts in thought patterns, or being “stuck in set” (Hill, 2004a, p. 202) – can affect the ways in which students respond to classroom demands, and these repetitive and restricted behaviours have been identified as a barrier to learning (Leekam, Prior, & Uljarevic, 2011). Saggers et al. (2015) and
several others (Sainato, Strain, Lefebvre, & Rapp, 1987; Schmit, Alper, Raschke, & Ryndak, 2000; Sterling-Turner & Jordan, 2007) estimated that as much as 25% of the school day in primary school (refers to Grades 1 to 6 in Australia) can be spent engaged in transitions, and resistance to transitioning can make it hard for students to start tasks and move from one task element to another. Supporting students on the spectrum by providing predictability and routine within the environment has been shown to have a positive impact on behaviours during transitions (Banda & Grimmett, 2008; Flannery & Horner, 1994; Lequia, Machalicek, & Rispoli, 2012).

Children on the autism spectrum have long been observed to have atypical responses to sensory stimuli, and this is now recognised as a diagnostic criteria for ASD in the DSM 5 (American Psychiatric Association, 2013). Not only can hypo- or hyper-stimulation in reaction to sensory input be challenging in itself, but it can also impact the ability of students to regulate their behaviour (Dunn, 2008). Difficulties modulating sensory input, including intense responses to sensory stimulation, may negatively impact on children’s ability to focus on tasks within the classroom and could be underlying factors for maladaptive behaviours (Laurent & Rubin, 2004; Leekam et al., 2011). Given that classrooms are often dynamic and loud with many potential distractions and competing sensations, it is likely that students on the autism spectrum will find aspects of the classroom environment challenging. Ashburner, Ziviani, and Rodger (2008) determined that difficulties with auditory filtering – which is the ability to discriminate between different, competing auditory stimuli – are associated with learning and attention difficulties, and may lead to educational disadvantage.

**Executive functioning**

The diagnostic criteria for ASD described in the DSM 5 (American Psychiatric Association, 2013) outline a set of observable behaviours. They do not, in themselves,
offer any explanation regarding the unobservable cognitive processes underlying, or resulting from, these behavioural traits. There are, however, theories that associate ASD with impairments in cognitive processes such as executive function (Hill, 2004b; Ozonoff, 1997). Such cognitive differences are not necessarily universal characteristics of this population, nor, indeed, traits that are experienced by persons on the spectrum exclusively (Ozonoff, 1997). However, theories about cognitive differences are used to provide plausible explanations for behaviours commonly displayed by students on the spectrum. Atypical social interactions may, for example, be understood with reference to the concept of theory of mind (Frith & Happé, 1999), and weak central coherence may serve to describe a perceived tendency for individuals on the spectrum to attend to details rather than the larger whole to which they belong (Happé & Frith, 2006).

Executive functioning can be seen as an umbrella term for a plethora of complex and interrelated cognitive processes. Ozonoff, Pennington, and Rogers (1991) describe executive functioning as “the ability to maintain an appropriate problem-solving set for attainment of a future goal” (p. 1083). This problem-solving set can draw not only upon planning and organising abilities and working memory, but also cognitive flexibility, including the ability to switch attention from one thing to another or to adapt to external changes (Geurts, Corbett, & Solomon, 2009). Executive function also involves self-control and the inhibition of inappropriate, or maladaptive, behaviours (Hill, 2004b; Leekam et al., 2011; Ozonoff et al., 1991).

There are conflicting views on what components of executive functioning are different in autism (Geurts et al., 2009; Ozonoff & Strayer, 2001; Van Eylen et al., 2011). Clinical studies using measures such as the Wisconsin Card Sorting Task (WCST) have produced variable results, perhaps due to the heterogeneity of individuals on the spectrum (Geurts, Sinzig, Booth, & Happé, 2014), the complexity of the tests
(Robinson, Goddard, Dritschel, Wisley, & Howlin, 2009; Van Eylen et al., 2011), or the multifaceted nature of executive functioning as a construct. A number of clinical studies examining executive functioning have confirmed a tendency for individuals on the spectrum to perseverate on thoughts, tasks, or elements of tasks (Hill, 2004a; Ozonoff et al., 1991; Van Eylen et al., 2011). Further, complex difficulties with executive functioning may arise in natural settings such as schools which include varied and diverse environmental conditions and performance expectations (McAuley, Chen, Goos, Schachar, & Crosbie, 2010).

Difficulties with executive functioning are implicated in a range of commonly observed organisational and sequencing difficulties that students on the spectrum appear to have in the classroom, such as transitioning independently between tasks or task elements (Hume & Odom, 2007; Milley & Machalicek, 2012). However, as Ozonoff and Strayer (2001) observed in their research on working memory, these difficulties may be related to context and the way material is presented. This suggests that presenting material in an appropriate way may help to mitigate some challenges with executive functioning. To illustrate, some interventions aimed at supporting the executive functioning of students on the spectrum have been shown to reduce maladaptive behaviours in the classroom (Carnett et al., 2014; Lequia et al., 2012; Sterling-Turner & Jordan, 2007). Additionally, executive functioning difficulties have been noted in children with other neurological disorders, such as attention deficit hyperactivity disorder (ADHD) (Hill, 2004b), and so interventions targeting these issues could have a positive impact on other students in the class.

**Students on the spectrum at school**

Transition times in classrooms can be particularly problematic for students on the spectrum (Joosten, Bundy, & Einfeld, 2012; Sterling-Turner & Jordan, 2007; Stoner,
Angell, House, & Bock, 2007) and, indeed, students on the spectrum have been shown to have higher anxiety levels during transitions than while engaged in activities or during free time (Joosten et al., 2012). This act of finishing an activity, switching between tasks, and initiating and following through on a new task can be seen to challenge students on the spectrum on multiple levels. For instance, when considered with reference to the diagnostic criteria in the *DSM-5* (American Psychiatric Association, 2013), during transition times social cognition is required to follow directions or ask for guidance, levels of sensory input may change dramatically as other children in the class move and talk, and the tendency to perseverate can make timely transitions challenging (Lequia et al., 2012). Transitions also require meta-cognitive, executive planning skills, in which children on the spectrum generally appear to have difficulties (Hill, 2004a). Not only do transitions have a major effect on the behaviour of students on the spectrum (Joosten et al., 2012), they also occur frequently throughout the day. As mentioned earlier, for primary school students, the time spent between activities (i.e., transitioning) may take up as much as a quarter of the day (Saggers et al., 2015; Sainato et al., 1987; Schmit et al., 2000; Sterling-Turner & Jordan, 2007). Minimising the time spent off task during these transitions is crucial in order to maintain engagement and increase learning opportunities (McIntosh, Herman, Sanford, McGraw, & Kira, 2004), with student outcomes strongly associated with time spent engaged productively in meaningful tasks (Angell, Nicholson, Watts, & Blum, 2011; Carnahan, Basham, & Musti-Rao, 2009).

Promoting independent self-initiation and self-regulatory behaviour among students on the spectrum is another important consideration in the education of these students, who are often given support to navigate transitions in the form of individual guidance or prompting from teachers and adjunct support staff (e.g., teachers’ aides).
(Milley & Machalicek, 2012). With this level of support, there is a danger that students may become over reliant or dependent on prompting to transition to a new task or task element, and to focus on the next activity (Cihak, 2011; Dettmer, Simpson, Myles, & Ganz, 2000; Humphrey, 2008), and so may fail to acquire the skills they need for independent functioning. Embedding antecedent supports by engineering the way the classroom and class activities are structured and presented – particularly during transition times – may reduce students' need for direct guidance and promote self-monitoring and self-regulation of their own engagement in tasks. Given that transitions may also be a challenge for other students in a mainstream class, it is possible that an intervention that is implemented for the whole class, with strategies accessible to all students, could improve overall classroom management and be regarded positively by teachers.

**Teaching students on the spectrum**

The difficulties experienced by students on the autism spectrum in mainstream classrooms are also problematic for teachers. Behaviour problems are a leading cause of stress for teachers (Forlin, 2001) and are associated with tension in the student-teacher relationship (Robertson, Chamberlain, & Kasari, 2003). Not only do students on the spectrum exhibit disruptive and sometimes challenging behaviours, but their behavioural difficulties may also be exacerbated if reactive methods of behaviour management are used (Mayton, Carter, Zhang, & Wheeler, 2014; Mesibov & Shea, 1996). Without a good understanding of the underlying characteristics of autism, these classroom behaviours may appear inexplicable or be misinterpreted, and the reasons for the behaviours overlooked (Helps, Newsom-Davis, & Callias, 1999).

There is evidence to suggest that students on the autism spectrum are disproportionately subjected to disciplinary action, possibly due to misinterpretation of
their behaviours. To illustrate, in a survey examining inclusion of students on the spectrum in the United Kingdom, Barnard, Prior, and Potter (2000) found that 21% of students on the spectrum had been excluded from school, a rate cited by Ashburner et al. (2010) as being over 20 times that of their neurotypical peers. Mayton et al. (2014) examined the level of intrusiveness in behavioural interventions used with 198 students with disabilities in the United States. The authors reported that - even with individual treatment plans in place - students on the spectrum were more likely to be subject to overly intrusive and reactive behaviour management when compared with other students with disabilities.

The challenges faced by teachers in educating students on the spectrum appear to be exacerbated by a lack of professional training and support. For instance, the results of several studies looking at the attitudes of teachers regarding the inclusion of students on the spectrum indicate that the teachers often feel unprepared and ill-equipped to meet the educational needs of these students (Segall & Campbell, 2012; Soto-Chodiman et al., 2012) and that they can sometimes feel resentful about the increased demands on their time and energy (Emam & Farrell, 2009; Soto-Chodiman et al., 2012). Overwhelmingly, researchers report that mainstream teachers of students on the spectrum acknowledge a need for further training or professional development to increase their understanding of autism and related teaching strategies (Emam & Farrell, 2009; Helps et al., 1999; Humphrey & Symes, 2013; McGregor & Campbell, 2001; Soto-Chodiman et al., 2012; Symes & Humphrey, 2011).

**A collaborative approach to supporting teachers**

Despite teachers’ apparent interest in further training, and an increasing selection of evidence-based strategies to support students on the spectrum (Kasari & Smith, 2013; Wong et al., 2015), there remains a research-to-practice gap (Dingfelder & Mandell,
Dingfelder and Mandell (2011) remarked that there may be as much as a 20-year lag before evidence-based practices to support students with special needs become routinely implemented in schools. The translation of research to practice must be a primary concern of any research into potential interventions for individuals on the spectrum if the findings are to have a tangible impact in mainstream school settings. Kasari and Smith (2013) noted that relatively few studies aimed at producing school-based interventions are conducted in the hectic milieu of a natural school setting, and that many studies involve highly trained interventionists who do not have large classes to manage. Interventions developed in this way may be impractical, time consuming, or expensive for teachers to deliver (Kasari & Smith, 2013). Engaging teachers as participants in the research process, and prioritising their views on the feasibility of interventions, could help narrow the gap between what works under ideal conditions and what is possible in mainstream classrooms (Kasari & Smith, 2013; Odom, Cox, & Brock, 2013).

Literature on teacher education and training often promotes engagement in critical or reflective practice, which in turn may lead teachers to make pedagogical innovations (Hagevik, Aydeniz, & Rowell, 2012; Korthagen & Kessels, 1999). A number of studies have shown that motivated teachers can quickly learn and accurately apply new skills to support their students on the spectrum through brief training sessions (Lerman, Vorndran, Addison, & Kuhn, 2004; Machalicek et al., 2010). However, even among highly motivated teachers, adherence to strategies taught in training sessions has been observed to dwindle when there is insufficient on-going support (Dingfelder & Mandell, 2011; Machalicek et al., 2010). As Sugai and Horner (2008) observed:

When classroom- and school-wide practices and systems are more reactive than preventive, are not evidence-based, are implemented without high accuracy and
sustainability, and do not actively and positively address the academic and social behavior needs of all students, even the best plans for individual students are likely to fail. (p. 74)

In contrast, interventions that have wide applications and are supported as class- or school-wide initiatives have a better chance of long-term success (Dingfelder & Mandell, 2011; Sugai & Horner, 2008). Accordingly, in this research, while the objective was to investigate an intervention to support students on the spectrum, ease of implementation and broader, class-wide applications were important considerations.

Summary

In this chapter, it has been explained that mainstream school settings can be challenging for students on the spectrum due to a mismatch between the cognitive and behavioural differences associated with ASD and the demands of the classroom environment. Difficulties with social communication, transitioning from one task, or task element, to another and issues with executive functioning can make staying on task particularly challenging for these students. Consequently, students on the autism spectrum may be missing out on learning experiences, or engaging in other off-task behaviours. This situation is challenging not only for students on the spectrum, but also for their teachers. There is a need for strategies that can help teachers to support these students to stay on task and work independently in mainstream classrooms. Chapter 2 presents a review of the literature focusing on a structured teaching approach which may address this need.
Chapter 2: Literature Review

The term *structured teaching* refers to a collection of strategies that are designed to create an environment in which students on the spectrum can function with greater independence (Bennett, Reichow, & Wolery, 2011; Hume, Loftin, & Lantz, 2009). This approach aims to address the mismatch between the environment and characteristics of autism. Structured teaching is central to the Treatment and Education of Autistic and Related Communication handicapped Children (TEACCH) program, which originated in North Carolina in 1972 (Mesibov & Shea, 2010) and has become an established model of educational practice in special education and autism-specific settings (Howley, 2013).

The primary focus of structured teaching is on providing support to students on the spectrum by creating an organised and predictable environment in which tasks and expectations are clearly defined. The physical environment is arranged to minimise sensory distractions, and includes well-defined physical spaces for different activities. Visual schedules are used to increase predictability and let students know what they are supposed to be doing at any given time. The use of work systems, or specific task organisation, is intended to facilitate independent task completion, and the use of visual structure presents information in a way that is intended to match the common reported learning preference of students on the spectrum and aid communication (Mesibov, Howley, & Naftel, 2016).

**Philosophy of structured teaching**

Structured teaching adapts the classroom to suit patterns of behaviour that Mesibov et al. (2004) term *the culture of autism*. It consists of a collection of antecedent supports that are used to mitigate challenges posed by the environment rather than seeking to remedy or suppress the characteristics of ASD. “We do not,” Mesibov et al.
(2004) have claimed in relation to the use of structured teaching, “take ‘being normal’ as the goal of our educational and therapeutic efforts” (p. 20). This model of teaching treats autism as difference, rather than disorder, and positions teachers as “cross-cultural interpreters” (Mesibov et al., 2004, p. 19) seeking to understand their students on the spectrum and implementing tools to allow them, in turn, to understand the culture and expectations of the classroom environment. While there is a growing body of knowledge focussing on the physical and neurological differences experienced by children with autism (Anagnostou et al., 2014; Bachevalier & Loveland, 2006), the way in which these children’s behaviour is understood is also, to some extent, defined through social constructs of normalcy and dysfunction (Cologon, 2013; Graham & Jahnukainen, 2011). This recognition that attitudes towards disability are socially constructed, rather than disability being innately negative, is the foundation for a strength-based approach to supporting students on the spectrum in educational settings.

A strength-based educational approach is one that emphasises what a student can do rather than focussing on areas of difficulty. In Australia, a publication by the Victorian government (Department of Education and Early Childhood Development, 2012) explains that “The strength-based approach consists of questioning strategies to identify what works for the child and how it works so that those strategies can be continued and developed to match the child’s abilities” (p. 6). This approach facilitates inclusion by demonstrating an acceptance of difference, and providing support to students to develop skills and abilities.

Components of structured teaching

The continued development of structured teaching practices over several decades has led to some variations in the ways researchers have grouped and described the different elements or strategies associated with this approach. However, Mesibov and
Howley (2016), as well as Hume (2015), have identified four distinct components of structured teaching: arrangement of the physical structure of the environment, the use of visual schedules, the use of work systems, and visual structure. These components and associated strategies for putting them into practice are defined and described in Table 1 below.

### Table 1. Elements of Structured Teaching

<table>
<thead>
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<th>Structured teaching component</th>
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<tr>
<td><strong>Physical structure of the environment</strong>&lt;br&gt;Supports differences in executive functioning by adding environmental meaning and context (Mesibov et al., 2016), and supports sensory differences.</td>
<td>* Clearly defined areas for different activities&lt;br&gt;* Clear labelling and positioning of materials&lt;br&gt;* Minimisation of visual distractions&lt;br&gt;* Minimisation of auditory distractions&lt;br&gt;* Seating arrangements that suit the individual needs of students on the spectrum (e.g., providing physical space around desks, seating students on the spectrum at the back or near the teacher, etc...).&lt;br&gt;* Provision of a sanctuary space&lt;br&gt;* Use of routines</td>
</tr>
<tr>
<td><strong>Visual schedules</strong>&lt;br&gt;Provide visual cues that make sequences of events predictable, promote independent transitions, and give forewarning of anticipated changes.</td>
<td>* Weekly schedules&lt;br&gt;* Individualised timetables&lt;br&gt;* Pictorial schedules&lt;br&gt;* Photographic schedules&lt;br&gt;* Visual representations of temporal order such as first-then or what next?</td>
</tr>
<tr>
<td><strong>Work systems and task organisation</strong>&lt;br&gt;Structure activities systematically so that physical and visual cues answer the following questions:&lt;br&gt;1. What task or activity to do?&lt;br&gt;2. How much work to do, or how much time it will take?&lt;br&gt;3. How to know that progress is being made or work is complete?&lt;br&gt;4. What to do next? (Mesibov et al., 2004).</td>
<td>* Individual work systems at desks with numbered tasks to the left and a place for finished work to the right.&lt;br&gt;* Work systems in folders with left to right organisation (unless right to left is more culturally appropriate) and itemised tasks.&lt;br&gt;* Tasks broken down and organised visually so that they are easy to follow</td>
</tr>
<tr>
<td><strong>Visual structure</strong>&lt;br&gt;Supports understandings of the environment and activities by presenting information with visual clarity.</td>
<td>* Using text or images to convey rules or instructions&lt;br&gt;* Organising materials to make their function clear&lt;br&gt;* The use of white space to make parts of instructions clear&lt;br&gt;* Colour coding</td>
</tr>
</tbody>
</table>
Visual schedules and work systems

Visual schedules and work systems are central components of structured teaching and the focus of the current research. These elements were identified as being suitable for use in this project due to their potential effectiveness in promoting on-task behaviour, as well as their potential applicability for use in mainstream classroom settings. A comprehensive structured teaching program, utilising all the above elements, may be impractical for implementation in mainstream classrooms where teachers may be limited in what they can do to alter the physical structure of the classroom. The classroom floorplan, for example, may simply not allow for additional space to be placed around students’ desks. Furthermore, it has been suggested that teachers may find it difficult to sustain comprehensive approaches like TEACCH with fidelity (Pellecchia et al., 2015; Stahmer et al., 2015). Therefore, there is a need to assess the effectiveness of separate elements of such approaches for the purpose of isolating key strategies (Callahan, Shukla-Mehta, Magee, & Wie, 2010; Mandell et al., 2013). As Callahan et al. (2010) explained, “consumers of CTMs [comprehensive treatment models] in autism desperately need to know which specific components of the models work in public school classrooms and/or homes, how and why they work” (p. 86).

Evidence for the effectiveness of visual schedules and work systems

To examine the body of research on visual schedules and work systems, searches were made of a number of online databases. ProQuest, Pychinfo, Eric and A+ Education were all searched using the terms ASD or autism paired with structured teaching, TEACCH, work systems, visual schedules, and/or activity schedules. The scope of the literature review was limited to peer-reviewed, experimental studies published in English involving participants of school, or preschool, age engaging in educational or school-based activities. Some studies, for example, were not considered relevant to
supporting students on the spectrum in mainstream classrooms because they focussed on activities commonly occurring in a home or community environment (e.g., Ichikawa et al., 2013; Orellana, Martinez-sanchis, & Silvestre, 2014; Ozonoff & Cathcart, 1998). Furthermore, a number of studies evaluated the use of structured teaching methods with adults (e.g., Persson, 2000; Probst, Jung, Micheel, & Glen, 2010; Siaperas & Beadle-Brown, 2006), and were excluded on the basis that the vocational skills and environments are qualitatively different from the learning activities and classroom expectations experienced by children in school settings.

The search returned 11 studies examining visual schedules. This is an area in which a large amount of research has been conducted and for which several systematic reviews already exist (Banda, Grimmett, & Hart, 2009; Knight, Sartini, & Spriggs, 2014; Lequia et al., 2012). These reviews were examined, but their scope extends beyond structured teaching to also include visual schedules used as part of other comprehensive treatment programs. Visual schedules and similar visual tools are used with approaches such as social stories (Schneider & Goldstein, 2010) or the Picture Exchange Communication System (PECS) (Dooley, Wilczenski, & Torem, 2001). Among the studies examining visual schedules, those aligned with a treatment approach other than structured teaching were excluded from this review. In addition to the research on visual schedules, this review yielded five studies which dealt specifically with structured work systems. An overview of these studies is provided in Table 2 (visual schedules), and Table 3 (work systems). These tables present the aims and outcomes of the studies, as well as the settings and intervention agents, in order to clearly illustrate the purposes for which structured teaching has been used, and the conditions in which it has been trialled.
<table>
<thead>
<tr>
<th>Author/s</th>
<th>Date</th>
<th>Participants</th>
<th>Aim</th>
<th>Dependent variables</th>
<th>Design</th>
<th>Agents/s</th>
<th>Setting</th>
<th>Schedule type</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bryan, L. C., &amp; Gast, D. L.</td>
<td>2000</td>
<td>3 males, 1 female, ASD, 7-8yrs</td>
<td>To examine the effectiveness of activity schedules in teaching on task and on schedule behaviour</td>
<td>On or off task and on or off schedule behaviours, prompting</td>
<td>Single subject withdrawal (ABA)</td>
<td>Researchers</td>
<td>Special ed classroom in mainstream school</td>
<td>Picture activity schedules</td>
<td>On task and on schedule behaviours increased, skills were generalised and the intervention rated highly on social validity measures with both special education and mainstream teachers.</td>
</tr>
<tr>
<td>Cihak, D. F.</td>
<td>2011</td>
<td>3 males, 1 female, ASD, 11-13yrs</td>
<td>To compare the effect of pictorial and video schedules during transitions</td>
<td>Independent transitions</td>
<td>Alternative treatments design (A,BC, B)</td>
<td>Teachers</td>
<td>Special ed classrooms</td>
<td>Video activity schedules (self-modelling), visual (pictorial) schedules</td>
<td>Both treatments similarly increased independent transitioning with static pictures rating slightly better.</td>
</tr>
<tr>
<td>Dettmer, S., Simpson, R. L., Myles, B. S. &amp; Ganz, J. B.</td>
<td>2000</td>
<td>2 males, ASD, 5-7yrs</td>
<td>To evaluate the use of visual supports in facilitating transitions</td>
<td>Frequency of prompts, latency</td>
<td>Single subject withdrawal (ABAB)</td>
<td>Caregivers</td>
<td>Home/Community</td>
<td>Visual schedules, finished box</td>
<td>Decrease in transition times and reduced prompting. Caregivers found it easy to implement.</td>
</tr>
<tr>
<td>Fage, C., Pommereau, L., Consel, C., Balland, E., &amp; Sauzéon, H.</td>
<td>2016</td>
<td>9 males, 1 female, ASD, 13-17yrs 1 male, 4 females, ID</td>
<td>To evaluate the use of a tablet-based activity schedule in promoting on-schedule behaviour and verbal communication</td>
<td>Task step completion of routine and verbal activities</td>
<td>Mixed factorial design</td>
<td>Researchers/ school aides</td>
<td>Special ed classrooms, mainstream classrooms</td>
<td>Tablet-based schedules</td>
<td>The independent completion of routine and verbal tasks improved for the group of students with ASD using the schedule.</td>
</tr>
<tr>
<td>Authors</td>
<td>Year</td>
<td>Participants</td>
<td>Description</td>
<td>Teacher Aides</td>
<td>Mainstream Setting</td>
<td>Photographic Activity Schedule</td>
<td>Reduction in Prompting, Engagement and On-Schedule Behaviour</td>
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<tr>
<td>Hall, L. J.</td>
<td>1995</td>
<td>1 male, congenital brain damage, 8.5yrs, 1 male, fragile X syndrome, 8yrs, 1 male, ASD, 7yrs</td>
<td>To promote independent engagement for children with disabilities and reduce prompting</td>
<td>Teacher aide prompting, engagement</td>
<td>Multiple baseline</td>
<td>Teacher aides</td>
<td>Reduction in prompting, engagement and on-schedule behaviour increased.</td>
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<tr>
<td>MacDuff, G. S., Krantz, P. J., &amp; McClannah, L. E.</td>
<td>1993</td>
<td>4 males, ASD, 9-14yrs</td>
<td>To evaluate the use of photographic schedules in promoting independent on-schedule behaviour</td>
<td>On-task and on-schedule behaviour, prompts</td>
<td>Multiple baseline</td>
<td>Researchers</td>
<td>Group home</td>
<td>Photographic activity schedules, graduated guidance</td>
<td>Increased independence and on-task behaviour, generalised to rearrangement and change of photographs.</td>
</tr>
<tr>
<td>Massey, N. G., &amp; Wheeler, J. J.</td>
<td>2000</td>
<td>1 male, ASD, 4yrs</td>
<td>To examine the efficacy of individualised activity schedules</td>
<td>Engagement, challenging behaviour</td>
<td>Multiple baseline</td>
<td>Teachers</td>
<td>Inclusive preschool</td>
<td>Individualised activity schedule</td>
<td>Increase in engagement, reduction in challenging behaviour, skill acquisition.</td>
</tr>
<tr>
<td>Mechling, L. C. &amp; Savidge, E. J.</td>
<td>2011</td>
<td>2 males, 1 female, ASD, 14yrs</td>
<td>To evaluate the use of a PDA to increase productivity and improve transitioning</td>
<td>Task boxes completed, Within-task transitions completed, Between-task transitions completed</td>
<td>Multiple probe</td>
<td>Teachers/res earcher</td>
<td>Special ed classroom</td>
<td>Visual (pictorial and video) and auditory prompts using a PDA within a TEACCH framework</td>
<td>Task completion and within-task transitions were high at baseline with use of picture schedules. Between-task transitions improved with PDA. Lack of fading.</td>
</tr>
<tr>
<td>Pierce, J. M., Spriggs, A. D., Gast, D. L., &amp; Luscre, D.</td>
<td>2013</td>
<td>4 males, ASD, 9-11yrs</td>
<td>To evaluate the use of visual schedules during transitions</td>
<td>Transition steps completed independently</td>
<td>Single subject withdrawal (ABAB)</td>
<td>Unspecified</td>
<td>Special ed classroom</td>
<td>Visual schedules</td>
<td>Independent transitions increased for all subjects. All three raters strongly agreed that visual</td>
</tr>
<tr>
<td>Study Authors</td>
<td>Year</td>
<td>Sample Size</td>
<td>Research Question</td>
<td>Design</td>
<td>Setting</td>
<td>Intervention</td>
<td>Outcomes</td>
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<td>Schmit, J., Alper, S., Raschke, D, &amp; Ryndak, D.</td>
<td>2000</td>
<td>1 male, ASD and lead toxicity, 6yrs</td>
<td>To evaluate the efficacy of a photographic cueing package in improving transition behaviours</td>
<td>Tantrums during transitions</td>
<td>Multiple baseline</td>
<td>Teacher/researcher Special ed classroom</td>
<td>Photographic cueing schedules were useful, agreed that independent behaviour was increased and strongly agreed they were socially acceptable.</td>
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<tr>
<td>Waters, M. B., Lurman, D. C., &amp; Hovanetz, A. N.</td>
<td>2009</td>
<td>2 males, ASD, 6yrs</td>
<td>To evaluate visual schedules, and extinction and differential reinforcement separately and in combination during transitions</td>
<td>Problem behaviours during transitions</td>
<td>Multiple baseline</td>
<td>Researchers Special ed classroom and inclusion</td>
<td>Visual schedules, extinction, rewards Concluded functional analysis and extinction to be effective. Visual schedules were demonstrated to be not effective without reinforcement (food reward).</td>
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<tr>
<td>Author/s</td>
<td>Date</td>
<td>Participants</td>
<td>Aim</td>
<td>Dependent variables</td>
<td>Design</td>
<td>Agents/s</td>
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<tr>
<td>Bennett, K. Reichow, B. &amp; Wolery, M.</td>
<td>2011</td>
<td>Study 1: 2 males 38mths (developmental delay) and 43mths (ASD) Study 2: 1 female, 46mths (ASD)</td>
<td>To extend the research on structured teaching by evaluating its effects on engagement, task completion, stereotypical behaviour, and escape attempts in preschoolers with disabilities</td>
<td>Engagement, task completion, stereotypical behaviour, escape attempts, researcher guidance</td>
<td>Study 1: ABAB withdrawal Study 2: Multiple baseline</td>
<td>Researchers</td>
<td>University affiliated early childhood program</td>
<td>All children showed significant improvements in task completion and fewer stereotypical behaviours and escape attempts.</td>
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<tr>
<td>Hume, K. &amp; Odom, S. L.</td>
<td>2007</td>
<td>3 males, ASD, 20yrs, 6yrs, 7yrs</td>
<td>To evaluate the use of work systems (a component of TEACCH) in increasing independent functioning in students with ASD</td>
<td>Time on task, prompting and tasks completed</td>
<td>Single subject withdrawal (ABAB)</td>
<td>Researcher</td>
<td>Place of employment and special education classroom</td>
<td>All participants spent more time on task, finished more tasks and required less prompting while using the work system. Social validity ratings were high.</td>
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<tr>
<td>Hume, K. Plavnick, J. &amp; Odom, S. L.</td>
<td>2012</td>
<td>3 males, ASD, 7yrs</td>
<td>To assess the efficacy of work systems in increasing accuracy and independence for students with ASD, both in special education and general education settings</td>
<td>Accuracy (number of steps completed correctly) and teacher prompts, generalisation</td>
<td>Multiple probe across participants</td>
<td>Researcher</td>
<td>Special ed and mainstream classrooms</td>
<td>All subjects increased task completion and accuracy and these results generalised to the general education classroom and were maintained without work systems.</td>
<td></td>
</tr>
<tr>
<td>Mavropoulou, S., Papadopoulou, E. &amp; Kakana, D.</td>
<td>2011</td>
<td>2 males, ASD, 7yrs</td>
<td>To measure the effects of a particular component of TEACCH – task organisation – on independent play in school-aged children.</td>
<td>On-task behaviour, task accuracy, task performance, and teacher prompting, generalisation across places, materials and people</td>
<td>Single subject withdrawal (ABAB)</td>
<td>Researcher</td>
<td>Special ed classroom</td>
<td>The intervention was found to be effective for only one of the students. Its effect was questionable for the other. Teachers rated the social validity of the intervention fairly highly, but did not think that the students would be able to start and finish activities independently.</td>
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<tr>
<td>O'Hara, M., &amp; Hall, L. J.</td>
<td>2014</td>
<td>2 males, ASD, 6yrs</td>
<td>To evaluate the use of a playground work system in increasing appropriate behaviour during recess</td>
<td>Student engagement and appropriate behaviour during recess</td>
<td>Multiple baseline</td>
<td>Special ed teacher</td>
<td>Special ed in mainstream school</td>
<td>All participants used the work system independently without prompts and remained engaged.</td>
<td></td>
</tr>
</tbody>
</table>
The research examining the effects of visual schedules and work systems includes a number of common characteristics. Eight of the 11 studies examining visual schedules specified independent transitioning or reduced prompting as a goal (Bryan & Gast, 2000; Cihak, 2011; Dettmer et al., 2000; Fage, Pommereau, Consel, Balland, & Sauzéon, 2016; Hall, 1995; MacDuff, Krantz, & McClannahan, 1993; Mechling & Savidge, 2011; Pierce, Spriggs, Gast, & Luscre, 2013), making the promotion of student independence the most common aim. Seven of the studies on visual schedules (Bryan & Gast, 2000; Fage et al., 2016; Hall, 1995; MacDuff et al., 1993; Massey & Wheeler, 2000; Mechling & Savidge, 2011; Pierce et al., 2013) had the goal of increasing on-task behaviour, engagement, or number of tasks completed. In other words, visual schedules were used with the aim of helping students on the spectrum be productive and attend to classwork. Three studies (Massey & Wheeler, 2000; Schmit et al., 2000; Waters, Lerman, & Hovanetz, 2009), expressly targeted challenging or maladaptive behaviours. Similar goals were found among work systems studies. These studies targeted engagement, productivity, or on-task behaviour (Bennett et al., 2011; Hume & Odom, 2007; Mavropoulou, Papadopoulou, & Kakana, 2011; O'Hara & Hall, 2014), independence or reduced prompting (Hume & Odom, 2007; Hume, Plavnick, & Odom, 2012; Mavropoulou et al., 2011), and challenging behaviours (Bennett et al., 2011; O'Hara & Hall, 2014). In addition to this, two studies looked at task accuracy. Hume et al. (2012) examined accuracy during academic tasks, and Mavropoulou (2011) looked at play-based tasks. These studies demonstrated the potential for these strategies to be used to support active learning, rather than simply as facilitators of rote behaviour or routines.

The results of the majority of the studies examining the efficacy of visual schedules or work systems indicated that these strategies were either very successful, or partially successful, in changing target behaviours – increasing the independence and productivity of children on the spectrum and decreasing maladaptive behaviours. The authors of these studies
reported that students using work systems or visual schedules spent more time engaged productively in on-task behaviours (Bryan & Gast, 2000; Hall, 1995; Hume & Odom, 2007; MacDuff et al., 1993) and that students who used visual schedules transitioned between tasks more smoothly and with greater independence (Cihak, 2011; Dettmer et al., 2000; Fage et al., 2016; Massey & Wheeler, 2000; Mechling & Savidge, 2011; Pierce et al., 2013; Schmit et al., 2000). Students using work systems were also reported to increase task accuracy (Bennett et al., 2011; Hume et al., 2012). Among the research examining visual schedules and work systems, only two studies did not achieve entirely positive results. Mavropoulou, Papadopoulou, and Kakana (2011) reported mixed results, with task organisation proving effective for only one of two participants but they acknowledged that the interpretation of their results was affected by the study's limited number of participants. Waters, Lerman, and Hovanetz (2009) reported that using visual schedules to help students transition from a preferred activity (computer games) to a non-preferred activity (academic work) was ineffective without the addition of reinforcers.

While these studies provide an insight into the way individual and contextual influences affect these interventions, the predominantly positive findings of these studies are in agreement with those of other recent reviews examining the broader use of visual schedules and work systems for individuals on the spectrum in various settings. Knight, Sartini, and Spriggs (2014), for example, in their extensive review of the literature which defined visual schedules to include work systems, concluded that visual schedules can now be considered an evidence-based practice. This was also the finding presented in the latest report from the National Autism Center (2015) which lists schedules as evidence-based practice for individuals on the spectrum.
Gaps in the research

Despite an increasing evidence base and the accepted use of structured teaching methods in special education settings, a review of Tables 2 and 3 reveals that there is scant research on the use of structured teaching methods in mainstream education settings. None of the studies identified here focussed on the use of visual schedules and work systems as implemented by mainstream teachers, in mainstream classrooms. Most of the research examining visual schedules and work systems has taken place in special education classrooms, involving participants enrolled in either self-contained programs or partial-inclusion programs where part of the day is spent in mainstream classes (Bennett et al., 2011; Bryan & Gast, 2000; Cihak, 2011; Hume & Odom, 2007; Hume et al., 2012; Mavropoulou et al., 2011; Pierce et al., 2013; Schmit et al., 2000). The activities that these students undertook in controlled, clinical settings, at home or in the community, may not accurately reflect the active learning tasks and self-regulatory demands involved in mainstream classwork. In fact, in studies in which the generalisation of the use of schedules or work systems to a mainstream setting was examined (Bryan & Gast, 2000; Fage et al., 2016; Hume et al., 2012), the skills were taught in a special education or pull-out setting. This type of training, involving one-on-one learning support outside of the classroom, may not be available to many students on the spectrum in mainstream settings.

For many students on the spectrum who are in mainstream classes without access to pull-out programs, using structured teaching to impart skills in this way may not be feasible. Also, the tasks performed by students in many studies involved pre-mastered sorting and matching or leisure activities (e.g., Bennett et al., 2011; Hume et al., 2012; Pierce et al., 2013) and do not necessarily reflect the curriculum-based tasks students are required to perform in mainstream settings, particularly as they progress to higher year levels. While the core components of structured teaching – the visual structuring of tasks through schedules
and work systems – may now be regarded as evidence-based interventions (Knight et al., 2014), there is a gap between research and practice (Dingfelder & Mandell, 2011; Humphrey & Parkinson, 2006) that needs to be bridged in order to facilitate the introduction of such supports into mainstream classrooms. The evidence for visual schedules and work systems is limited to particular environments and there is a recognised need to conduct research within the mainstream classroom context in collaboration with teachers and school staff, so that interventions can be evaluated within an ecologically valid setting, as they are intended to be used (Kasari & Smith, 2013; Mavropoulou et al., 2011).

**Summary**

As explained in Chapter 1, the challenges faced by students on the spectrum in mainstream classrooms can result in difficulties transitioning between tasks independently and staying on task. The literature appraised in this chapter has shown that visual schedules and work systems have been used to promote on-task behaviour and independence. Visual schedules are widely considered to be evidence based and, although the research focussing on work systems is limited, they too have been demonstrated to be effective in supporting students on the spectrum to stay on task. There is, however, a gap in the literature with no studies examining the use of these strategies in mainstream classrooms, implemented by classroom teachers as a whole-class practice.

The overall objective of this research was to improve the learning experiences for students on the autism spectrum by addressing the difficulties these students have with staying on task in mainstream settings. To this end, this research aimed to develop and evaluate an intervention using visual schedules and work systems that was suitable for implementation by mainstream teachers in mainstream classrooms. Given the lack of research examining the use of these strategies in mainstream contexts, a phased approach was required
involving the systematic development and evaluation of an intervention package in partnership with teachers. The specific aims of the project, reflecting these phases, were to:

1. refine an intervention package to provide teachers with guidance on using these strategies in mainstream classrooms and establish methods to evaluate the effectiveness of these strategies in mainstream contexts;

2. examine the impact of visual schedules and work systems on the on-task behaviours, productivity, and independence of students on the autism spectrum when these strategies are implemented by teachers in a mainstream setting; and

3. explore the views of mainstream primary school teachers on the use of visual schedules and work systems as outlined in the intervention package.

The theoretical foundations for the studies designed to address these aims are presented in Chapter 3.
Chapter 3: Theoretical Foundations

With its focus on real-world utilisation and improved outcomes for students on the autism spectrum, this project is informed by several interrelated theoretical perspectives. The drive to contribute to improving outcomes for students on the autism spectrum in mainstream settings is based on fundamental ideas about human rights and socially equitable ways of educating children with diverse needs. Specifically, this study is underpinned by the strong belief that students on the spectrum should have access to the same learning opportunities, and be enabled to participate in the same educational spaces, as neurotypical students. This basic principle of inclusive education leads in turn to an inclusion-focused outlook on the type of supports these students need and how they are to be delivered.

Inclusion

As discussed in Chapter 1, the majority of students on the autism spectrum are currently enrolled in mainstream education (Autism Awareness, 2014), and the need for educational strategies that promote an inclusive environment for these students is well recognised (Humphrey, 2008; Southall & Gast, 2011). The inclusion of students with disabilities, including those on the autism spectrum, in mainstream settings has become philosophically axiomatic of social justice in education. In this context, the term inclusion is used to indicate more than simple physical integration of these students into mainstream classes (Graham & Jahnukainen, 2011), emphasising instead the quality of their involvement as class members (Anderson, Klassen, & Georgiou, 2007).

Over the last several decades, there has been a global push by persons with disability and their families for de-institutionalisation and meaningful social inclusion, and educational inclusion can be viewed as an essential part of this broader social movement (Graham & Jahnukainen, 2011). Inclusive education has been described as “the most effective means of combating discriminatory attitudes, creating welcoming communities, building an inclusive
society and achieving education for all” (UNESCO, 1994, p. ix). To this end, the United Nations (2007) have recognised this in the Convention on the Rights of Persons with Disabilities, Article 24, where signatories express a commitment to ensure that “persons with disabilities can access an inclusive, quality and free primary education and secondary education on an equal basis with others in the communities in which they live.” Legislation in Australia supports this with the Disability Standards for Education 2005, in concert with the Disability Discrimination Act 1992, which indicate that education providers must make “reasonable adjustments” so that children are not excluded from education on the basis of disability (Australian Government, 2005).

In practice, however, the way this legislation is interpreted and acted upon can be variable. While research suggests that inclusion is beneficial for both students on the spectrum and their neurotypical peers (Anderson et al., 2007; Ferraioli & Harris, 2011), children with more complex needs are frequently diverted into special education classes when schools do not have the motivation or resources to accommodate them (Graham & Jahnukainen, 2011; Lilley, 2012). Mainstream classrooms are often not equipped with the trained staff and resources necessary to provide an inclusive environment for these students. In some cases, students may end up moving between special education and mainstream classes, attending school part time, participating in classes with one-on-one support, or spending time in pull-out programs. Children in situations such as these may be enrolled in mainstream schools, but the challenges they face in this environment may only be moderated using supports in locations external to the classroom that take them away from learning experiences, thus denying them access to the same learning opportunities as their peers. In this project, developing and evaluating an intervention that would support students on the spectrum to stay in their regular classrooms was a central priority.
Another priority was to provide support to students on the spectrum who are in mainstream classes full-time and are not perceived as needing this type of specialist support. Students on the spectrum who have the potential to engage successfully with the curriculum, with little or no modification, may be viewed as coping in mainstream settings. Nevertheless, these students can still need considerable support in order to manage anxiety and engage effectively in the metacognitive processes school work necessitates (Humphrey, 2008). As noted in Chapter 1, signs that students on the autism spectrum are not coping may be interpreted as misbehaviour (Laurent & Rubin, 2004) and lead to punitive exclusion. Many students on the autism spectrum are not formally diagnosed until school age, and others may have characteristics of autism without meeting diagnostic criteria. The mainstream context encompasses what Graham (2006) refers to as “unrecognized/unsanctioned forms of Otherness” (pp. 17-18). The concept of inclusion, by definition, needs to cover all of these students. This project was premised on the idea that inclusion for students on the autism spectrum can be facilitated with the use of non-discriminatory, whole-class supports, from which all students may benefit.

**Universal Design for Learning (UDL)**

A guiding principle for the development of inclusive educational supports is Universal Design for Learning (UDL), and this idea that principles of inclusion are reflected in the design of learning materials is incorporated in the theoretical foundations of this project. The origins of UDL can be traced to the concept of Universal Design (UD), which is described by the UN General Assembly (UN General Assembly, 2007) as “the design of products, environments, programs and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (p. 5). Initially, the concept was used to refer to design of the built environment (Jimenez, Graf, & Rose, 2007; Rao, Ok, & Bryant, 2014). The provision of ramps at building entries, for example, facilitates
accessibility by people using wheelchairs, but is also useful for others who may find stairs problematic, such as people with trolleys, luggage, or children in strollers. UDL applies this principle to education, with the aim of optimising methods of instruction for all students (Edyburn, 2010). In the educational context, the principle of universal design takes on a dynamic complexity. As Edyburn (2010) noted, while environmental design elements are generally static, the learning dynamics encompassed in UDL are complicated by the intricacies of interpersonal interactions and individual learning and teaching preferences.

While there are several frameworks for UD in education, they all share the aim of promoting accessibility for all (Rao et al., 2014). The UDL framework is underpinned by three guiding principles: the provision of multiple means of (a) representation, (b) expression or action, and (c) engagement (CAST, 2011), thus allowing all students to utilise their strengths to participate in learning experiences. In theory, embedding these principles in whole-class instruction can allow teachers to spend less time modifying lesson materials and delivery on an individual basis (Jimenez et al., 2007), which also entails less reliance on specialist staff or teacher aides (Giangreco, 2013). Additionally, adjustments based on UDL allow students on the autism spectrum to remain with their peers, and minimise the need for special supports that could lead to them being singled out or stigmatised.

With respect to this project, UDL has been regarded as a useful tool for informing the development and evaluation of interventions for students on the autism spectrum. While much of the detail and structure of the UDL framework is directed towards teachers as a pedagogical approach, embedding the basic principles in research design can help to ensure that interventions are able to be utilised as whole-class, inclusive measures rather than being designed and tested for one-on-one, or pull-out, scenarios.
Implementation science

Implementation science – the study of the translation of research to practice – has been described as an *emerging* (Cook & Odom, 2013; Wong et al., 2015) or *nascent* (Pellecchia et al., 2015) field. While the origins of implementation science may be traced back through the development of diffusion theories in the 1950s and 1960s (Dearing, 2009; Forman et al., 2013), its application to research in the field of autism is far more recent (Kasari & Smith, 2013). The theories surrounding implementation, which underlie this research, go beyond knowledge transfer (e.g., dissemination) to encompass questions about how sustainable practices can be facilitated. The formation of a coherent theory of implementation to better elucidate the translation of research to practice is still in its early stages. In addition to being relatively new, implementation science is a cross- or multi-disciplinary area of inquiry, in which theoretical structures have formed around context-specific components and processes (Cook & Odom, 2013; Forman, Olin, Hoagwood, Crowe, & Saka, 2009). That is, while some strong theoretical frameworks have emerged in the field of implementation science, there is no definitive interpretation of the complex processes by which new practices are utilised. As a theoretical construct, it is still evolving. Accordingly, the research detailed here does not adhere strictly to a particular extant theoretical model, but rather follows general implementation science principles with the acknowledgement that implementation within educational contexts will have its own specific taxonomy.

Odom (2009) characterises implementation in simple terms as “the link between evidence-based practices and positive outcomes” (p. 53). However, unpacking and evaluating that link is complicated. The complexity of implementation is hinted at in Fixsen, Naoom, Blasé, and Friedman’s (2005) recommendation that it be considered “a process with interactive components that are integrated and compensatory” (p. 74). A number of researchers have attempted to codify those components common to successful
implementation across disciplines. Fixsen et al. (2009), for example, identified seven core components: recruitment and selection of staff, preservice training, consultation and coaching, staff performance assessment (for the purpose of improving skills and training), decision support data systems (e.g., fidelity and outcome measures), facilitative administrative support, and systems interventions (i.e., organisational, systemic support for practitioners). However, while this model provides a useful conceptualisation of the organisational structures involved in implementation, it does not detail the role of research and intervention development in the implementation process.

The research presented here is most closely aligned with the Consolidated Framework for Implementation Research (CFIR) presented by Damschroder et al. (2009) in the context of health services research and used as a framework for discussing the implementation of autism research by Kasari and Smith (2013). Damschroder et al. (2009) identified eight aspects of an intervention that can have an effect on its adoption: the source of the intervention, or where the idea came from; the strength of the evidence supporting it; any perceived advantage to adopting the practice; how adaptable it is to the local, applied context; its trialability, or how easy it is to pilot without making permanent changes; its complexity and ease of use; the way in which it is packaged; and the associated costs. Research, such as that presented here, which has been undertaken with this view of implementation science in mind, includes “a focus on the feasibility, acceptability, and adaptation of interventions for the setting in which they will take place” (Kasari & Smith, 2013, p. 262).

As well as providing a framework for considering the characteristics of interventions, implementation science serves as a vehicle for focussing the attention of researchers on implementation as a dynamic process. The fluidity of the movement from research to practice is a challenge in this respect, necessarily entailing an approach to research that is flexible enough to be responsive to context and feedback and to accommodate change, while
maintaining scientific rigour. As Forman et al. (2013) noted, “a major issue for implementation science is determining whether program adaptations enhance program outcomes or result in loss of program effectiveness, and that the effectiveness of adaptations may differ with differing cultural contexts” (p. 82). This research was undertaken in the knowledge that applied school settings are complex environments and that program adaptability to suit this context would be necessary. Flexibility, in this regard, would allow teachers and students to shape the intervention to some extent, strengthening its relevance to those who may access this information and resources beyond the study.

Summary

Students on the spectrum in mainstream classrooms face complex challenges requiring supports that not only are effective for the student in isolation, but also work in the classroom environment and are of practical use to teachers. In approaching this complex problem, the overarching guidance of theoretical principles is constructive. This research has been based on an understanding of the importance of facilitating access to an inclusive educational environment, providing supports that can be used by all students, and exploring interventions in a way that is instrumental to the implementation of effective practices. The theoretical position taken here has not only influenced the selection of intervention and its method of implementation, it has also guided the choice of methodological approach. As outlined in the following chapter, these principles have guided the design of this research as well at the evaluation and dissemination of its findings.
Chapter 4: Methodology

The extent to which this research has prioritised future implementation underpins both the methodological perspectives and practical decisions involved in its design. The objective of the research method chosen has been not only to examine the effectiveness of visual schedules and work systems in an applied setting, but also, if found to be effective, to provide information to facilitate their translation to sustainable practice within this setting. Rather than focussing just on a single study of effectiveness, this research was conducted as a phased process accommodating flexibility and allowing capacity for adaptation and development. This approach has, at its foundation, a pragmatic view of the relationship between research and reality.

A pragmatic approach

The current project involves a view of research as a way of finding practical answers to tangible problems which, in turn, entails a particular epistemological stance. A focus on practical applications and solutions involves an understanding of the truth that is, at least in part, dependent on function and context (i.e., “Truth is what works at the time”; Creswell, 2013, p. 11). This practical understanding of episteme has been identified by methodologists such as Creswell as belonging to a pragmatic paradigm. As a philosophical movement, pragmatism is rooted in the early 20th-century works of authors such as Pierce, James, Schiller, and Dewey (Kloppenberg, 1996; Russell, 1961). Whereas realists and idealists are invested in the concept of objective truth and relativists in the multiple truths of subjective positions, pragmatists take the approach that truth lies somewhere between, in the experiential process of knowing (Biesta, 2007). Dewey's transactional understanding of knowledge, for example, posits human experience of the external environment as a means of understanding the world (Biesta, 2007; Dewey & Bentley, 1960; Vanderstraeten, 2002). “The world as we experience it,” he claimed, “is a real world” (Dewey, 1929, p. 295).
According to Dewey (1929), one of the vital aims of this pragmatic philosophy is “to interpret the conclusions of science with respect to their consequences for our beliefs about purposes and values” (p. 313). In other words, a pragmatist approach to research involves a consideration for the intended consequences of a study (Creswell, 2013). This project, for example, has the overall objective of improving learning experiences for students on the autism spectrum, and this purpose underpins the research methodology used. Creswell includes pragmatism as one of four types of worldview that inform research methodologies, and it is instructive to contrast these outlooks. As Creswell (2013) describes them, a postpositivist worldview utilises objective, quantitative measures to explain situations; a constructivist worldview measures subjective, qualitative experiences to understand socially constructed knowledge; and a transformative worldview seeks to describe and influence political and social power relationships. A pragmatic worldview, however, is not aligned to a particular set of beliefs, but rather is focussed on utilising methods best suited for tackling a particular problem. A pragmatic approach to research avoids the dichotomy of objective, quantifiable truth and subjective, qualitative truths by focussing instead on action towards solving tangible problems.

**Mixed methods**

The pragmatic foundation of this research project is reflected in the methodologies employed. Pragmatism is most strongly associated with a mixed-methods approach (Creswell, 2013; Feilzer, 2010): an approach which draws upon both qualitative and quantitative methods, taking what works best to understand a particular situation, and combining measures to gain a practical, contextualised understanding of specific problems (Feilzer, 2010; Morgan, 2007). The use of research incorporating mixed methods became widespread among cultural anthropologists and sociologists during the 20th century, but it is relatively recently that this way of incorporating different methods gained recognition as a
distinct research methodology (Greene, 2008; Johnson, Onwuegbuzie, & Turner, 2007). There is still debate about the conceptual compatibility of different research methods and whether, for those who do mix qualitative and quantitative approaches, pinning this down within a defined paradigm is, in fact, helpful (Shannon-Baker, 2015). Greene (2008), for example, argued that it is the “unsettled” and sometimes “jagged” combination of multiple certainties and possibilities that “actively engages us with difference and diversity in service of both better understanding and greater equity of voice” (p. 20).

For this research, which has sought to engage with diversity with respect to students on the autism spectrum, using a combination of different methods has been essential in capturing information about complex social and environmental contexts. Quantitative research methods were used to ascertain the effectiveness of visual schedules and work systems in the mainstream school context, and qualitative methods were used to collect insights into their implementation from teachers who had trialled them. This methodological approach has been essential in providing information aimed at bridging the research-to-practice gap. To facilitate the implementation of interventions in real-world contexts, empirical evidence needs to align with the subjective views of those for whom the interventions are intended.

**Participatory research**

In examining the use of visual schedules and work systems in mainstream classrooms, this project has taken a broadly participatory approach. While the research described here has not followed a collaborative action research model, it has sought to engage teachers both to actively contribute to the way in which the intervention is implemented, and to also provide meaningful feedback on its results. As Cornwall and Jewkes claimed (1995), “the key element of participatory research lies not in methods but in the attitudes of researchers, which in turn determine how, by and for whom research is conceptualised and conducted” (p. 1667).
In this case, while the research aims to improve educational outcomes for students on the spectrum, and has included student feedback in measuring social validity, it is their teachers who are required to implement the intervention. Furthermore, it is the teachers’ enthusiasm for the strategies that would allow them to be translated into a sustainable classroom practice. With this in mind, decisions about the way in which this research has been conducted, such as minimising disruptions to classes, allowing teachers flexibility in the way the intervention was implemented (e.g., allowing teachers to select from intervention materials, co-defining target behaviours), and inviting suggestions for further intervention development, have been informed by participatory research models.

**Iterative design**

Forman (2013) suggests that methodologies associated with implementation science are likely to be “iterative and reciprocal” (p. 93). An iterative approach ensures that intervention development is sensitive to the outcomes of the research process and stakeholder feedback. As Dykstra Steinbrenner et al. (2015) noted, there are currently few agreed guidelines for iterative research practices. However, the need for reflexivity in research methods is a common theme in literature concerned with implementation and bridging the research-to-practice gap (Damschroder et al., 2009; Fixsen et al., 2005; Parsons et al., 2013). In this research, a design involving a progressive series of studies allowed for repeated re-evaluation of both the intervention and research methods.

**Contextualising the research**

This research was conducted with support of the Cooperative Research Centre for Living with Autism (Autism CRC), a collaborative, interdisciplinary group of Australian universities, service providers, end users, and community. The Autism CRC *school years* program has as its stated aim, “the provision of appropriate educational environments and programs for students on the autism spectrum so that they have the best chance of social,
behavioural and academic success, and equip teachers and health professionals to manage even the most complex behaviours” (Autism CRC, 2017). This project was designed to align with this vision of research that aims to deliver positive outcomes in applied settings.

The research discussed in this thesis formed the major part of a larger collaborative effort to investigate the effectiveness and feasibility of using structured teaching strategies to support students on the spectrum in mainstream classes. In addition to the studies presented here, the project included the development of a workbook by Haas (2015) to provide teachers with information on structured teaching and guidance on the use of visual schedules and work systems and a continued utilisation phase to further refine and expand professional development resources for teachers. In presenting the manuscripts (both published and under review) in Chapters 5 – 7, explanations of the author’s role, as well as contributions by other team members, are provided.

Overview of research methods

The research was arranged into three phases in order to address the aims presented in Chapter 2 in a systematic fashion. These phases comprised a piloting phase, where the information package and research methods were trialled in a single classroom; an evaluation phase, during which a multiple baseline single-case experimental design was used to examine the efficacy of the intervention; and a utilisation phase, which focussed on asking teachers for feedback about the intervention to ensure that it was suitable for real-world application and to guide future development of the intervention package. The rationale, methods, results, and interpretation of findings for each phase are presented in the following chapters as journal article manuscripts. However, given the word-limit constraints within manuscripts, the following is the rationale for each study within the overall design of the project, including key methodological considerations and decisions.
Phase 1: Pilot study

The first phase involved piloting, or trialling, both the intervention package and the research methods to use in the subsequent multiple baseline study. While the multiple baseline study was intended to examine the effectiveness of the intervention, the pilot study did not have, as its primary aim, the production of reliable data concerning the intervention itself. Instead, it focused on the author collaborating with a teacher to decide upon times during typical school days when the intervention could be used in a consistent way, testing observation and data-collection methods, trialling reliability measures with a second observer, and identifying any potential issues that could be disruptive to the subsequent multiple baseline study. The pilot study served as a way to evaluate a number of methodological decisions that had been made with respect to the project as a whole.

Setting. The choice of setting was crucial given the rationale for this project. As previously discussed, earlier research looking at visual schedules and work systems as interventions to support students on the spectrum has failed to adequately examine their use by classroom teachers in mainstream classrooms. Situating implementation and evaluation of these strategies within the mainstream classroom context was a fundamental aspect of this project. Key purposes of the pilot phase were to trial the strategies within this context and adapt research methods to suit the mainstream classroom environment.

Before the pilot study commenced, the decision was made to focus on primary school classrooms. The key reason for this decision was that, by the time students have reached secondary school, they are expected to have already acquired the skills associated with using tools to support executive functioning. For many secondary school students, their days are organised using written timetables and they are expected to plan and attend to assignments and homework. Primary school students do not necessarily use these visual supports and there may be a benefit in instructing them in the use of such tools before they enter the more
challenging secondary school environment. Another reason for situating this research within primary schools was the inherent challenge of conducting observations and collecting reliable data in high school classrooms. Secondary school students move from class to class and there is less flexibility in their daily schedules. Additionally, it was anticipated that there would be difficulties associated with observing individual students in that environment without the risk of stigmatising them.

**Participants.** Following this line of thinking, a decision was made to recruit students on the autism spectrum from the later primary school year levels – Years 3-6 – as participants for the pilot and multiple baseline studies. Students in this age group would be less likely to have access to the sorts of visual supports used in early primary classes, and could be positively impacted in becoming familiar with these strategies before moving on to secondary school. For both the pilot and multiple baseline studies, students’ diagnoses were verified by the schools and the Social Responsiveness Scale, second edition (SRS-2) (Constantino & Gruber, 2012) was used to assess characteristics associated with autism. Targeting the intervention at this age group was intended to address an area of need by providing tools that could equip students for secondary school. It was also noted during the decision-making process that various visual supports are often used in early primary school classes, whereas they are less common in later primary year levels. While visual schedules and work systems have been used with younger students, and may be useful for classroom teachers of all year levels, evidence of their effectiveness would be more discernible in an environment where other visual supports were not in use.

A further consideration with respect to participants in this project was that, although they were recruited on the basis that they had difficulties with staying on task during classwork, the tasks that the intervention targeted needed to be ones they had the cognitive capacity to perform. Otherwise, the intervention would be inappropriately addressing a *distal*
effect of the students’ difficulties with the task itself, rather than their ability to stay on task. Although visual schedules and work systems have been used to support students with learning and communication difficulties (e.g., Dooley et al., 2001; Hume & Odom, 2007; Hume et al., 2012; Waters et al., 2009), the evaluation of these strategies as inclusive, whole-class practices in the mainstream context necessitated that participants in these studies be doing the same work as their peers. Accordingly, the decision was made to recruit students without intellectual impairment or learning difficulties who would most likely also require a modified curriculum. The ability of the students to complete their classwork was confirmed through discussion with their teachers, and participants were also administered a short-form IQ test – the Kaufmann Brief Intelligence Test, second edition (KBIT-2, Kaufman & Kaufman, 2004). The pilot phase of this research, which focussed on a single student, allowed trialling of this test, and the SRS-2, and an evaluation of their suitability for use in the multiple baseline study.

Information sheets were provided to the school principal (Appendix A), teacher (Appendix B), and the students’ parents (Appendix C), before the study began, and each provided their consent for the participation of the teacher and student. The student was also provided with information (Appendix D) and assented to participate in the research.

**Materials.** As mentioned earlier, Haas (2015) developed a workbook for use in this project. The workbook would be refined and developed over the course of the research project, and would, by Phase 3 of the research, be developed into *Finished! The On-task Toolkit* (Macdonald & Haas, 2016). In its original form, the workbook consisted of printed information on structured teaching, visual schedules and work systems, links to online information and videos, and guidance on the implementation of these strategies in mainstream classrooms. The workbook focused on guiding teachers in the construction of an individual visual schedule that served as a daily timetable, and designing a work system to
break down and structure a literacy task. The choice of task detailed in the workbook reflected the idea that students on the autism spectrum could have difficulty staying on task when presented with activities that are less structured and more open ended, such as creative writing (Harbinson & Alexander, 2009; Pennington & Delano, 2012). The pilot study further refined the choice of activity for the study with input from the teacher in identifying tasks with which the student was having difficulty and which would also be repeated over the course of the study.

The use of assistive technology to deliver the intervention was considered during the initial planning of this project. Research examining the use of tablet computers and other, similar technologies suggests that they may be a useful tool in increasing the independence of students on the spectrum (Cramer, Hirano, Tentori, Yeganyan, & Hayes, 2011; Fage et al., 2016; Gentry, Wallace, Kvarfordt, & Lynch, 2010; Mechling & Savidge, 2011), and it has been observed that these students appear highly motivated to use assistive technologies (Cihak, 2011; Wainer & Ingersoll, 2011). However, comparative studies have not demonstrated that delivering visual supports in this way is any more effective than using low-tech methods (Cihak, 2011; Mirenda, 2001). While some teachers may be keen to utilise technology, the use of assistive technologies for a whole-class approach would strain the resources of mainstream classrooms. Few schools in the Australian context are currently able to ensure that each student has access to a device throughout the day, and where class sets are available, technical issues and flat batteries may interfere with reliable delivery of the intervention. Furthermore, evaluating an intervention implemented using assistive technology may reveal more about students’ temporary enthusiasm for using a device than about the principles guiding the intervention. The decision was made to provide intervention materials that guided teachers on low-tech, paper-based ways to implement the strategies, with the flexibility for teachers to use assistive technologies if they felt this was appropriate.
Data Collection. One of the key objectives of the pilot study was to trial data collection under the often highly dynamic conditions of the mainstream classroom, and to refine the tools and processes involved. An observation sheet was developed (Appendix E) which allowed coded on-task and off-task behaviours to be recorded, as well as teacher prompting and any classroom events or interruptions. As described in the published article that follows, partial interval recording was conducted using an audio track, played through headphones, which alternated music and silence for 10 minutes. Any coded behaviours or prompts that occurred during the silent intervals were recorded and later calculated as a percentage of the total intervals during which the student was supposed to be working on the set task. This data-collection method allowed observations to be coordinated with a second observer for reliability using a double adapter headphone jack while observers were positioned is such a way that each other’s codes were not visible. Surveys were delivered to both the teacher (Appendix F) and student (Appendix G) at the end of the pilot study to gather feedback on the usefulness of the intervention.

Phase 2: Evaluation

The effectiveness of visual schedules and work systems in the mainstream classroom was investigated using a multiple baseline design study across classes with a baseline and intervention phase (AB) in each class. This design was chosen instead of those that require withdrawal of the intervention to establish intervention effect (such as that involved in an ABAB single-case study design) as doing so would entail removing potentially helpful supports and could be unsettling or frustrating for student participants. Additionally, examining the intervention across study participants (in different classes) rather than looking at several students in the one class, or one student in different lessons, simplified whole-class implementation for the teachers.
Setting. The four classes in which students were observed were situated in two mainstream Queensland schools. As originally planned, these were upper primary school classes, with one being a Year 3 class, and the others Year 5 classes.

Participants. A flyer publicising the study (Appendix H) was distributed to the principals of schools within a defined geographical area, and expressions of interest in participating were invited. The schools involved in the study selected students for participation who had a verified diagnosis of ASD and had difficulty staying on task. Teacher participants, the parents of student participants, and the students themselves were all provided with information and consent, or assent, forms as described in the recruitment for the pilot phase. The characteristics of the student participants are provided in detail Chapter 6.

Materials. The workbook used in the pilot study (Haas, 2015) was subject to minor refinement and adaptation for the multiple baseline study (Phase 2) in line with teacher feedback. Additions to the workbook included added examples of work systems and pro forma templates for both visual schedules and work systems. These were included to make lesson planning easier for the teachers. Nevertheless, none of the teachers used the templates, preferring instead to develop their own materials. Although there was variation in the ways in which teachers implemented the intervention, an implementation checklist (Appendix I) was provided to help teachers ensure that they were delivering the essential elements of the intervention strategies.

Data collection. Using the methods trialled in the pilot (Phase 1), teachers were consulted to determine appropriate tasks to observe and target behaviours specific to individual students. The partial interval recording method trialled in the pilot was continued for the multiple baseline study.
Phase 3: Utilisation

The utilisation phase of this project involved a mixed-methods exploration of teachers’ views of both the information package being prepared for wider dissemination, and the use of the strategies themselves. This phase included an online survey in which teachers provided feedback on the package, *Finished! The On-task Toolkit* (Macdonald & Haas, 2016), which had been developed from the workbook (Haas, 2015) used in Phases 1 and 2. Additionally, this phase included in-depth interviews with teachers who trialled the strategies in their classrooms. Listening to the views of teachers in this way served to further ensure that the intervention would be useful and relevant in applied settings. Allowing teachers to trial the strategies independently, with the flexibility to adapt approaches to suit their needs, contributed to an iterative research process that aimed to be responsive to implications for implementation in real-world contexts.

**Setting.** For the survey, the scope of the study was widened to include teachers of any year level in Australian mainstream primary schools. Those who continued on to trial the strategies in their classes were predominantly lower primary school teachers. While the intervention was designed for upper primary, this extension of the research facilitated an exploration of the usefulness of the strategies across different year levels.

**Participants.** A flyer (Appendix J) was used to share information about the survey through various organisations and professional bodies, as well as educational authorities. Teachers interested in participating were emailed participant information (this differed slightly from one state to another due to ethical considerations, e.g., Appendix K) and a link to the first part of the survey. Forty-one teachers completed the first part of the survey, 19 completed the second part, and four teachers participated in interviews after trialling the strategies.
**Materials.** Following the iterative process underlying this project, the workbook that was evaluated during Phase 2 was adapted further for this utilisation phase. This adaptation retained the information presented on visual schedules and work systems, but accentuated this with further explanations and examples. Whereas the workbook used in the previous studies (Haas, 2015) had been designed to facilitate evaluation of the strategies and was specifically aimed at guiding teachers through the implementation of the intervention during a particular task, *Finished! The On-task Toolkit* (Macdonald & Haas, 2016) presented the same information in a way that was broadly applicable across the school day (Appendix L). It also included more templates and visual examples, as well as pull-out, “at a glance” information sheets for quick reference. Teachers participating in the survey were not required to implement the strategies, but only to provide feedback on the toolkit. This allowed teachers to be recruited anonymously and so helped to ensure that feedback was candid. The small number of teachers who were subsequently recruited to trial the strategies independently were able to make their own decisions about how they were implemented.

**Data collection.** The online survey used SurveyMonkey Platinum (SurveyMonkey Inc.) to collect teachers’ responses. The first and second parts of the survey (Appendix M) were linked using the respondents’ email addresses, and these were later removed to de-identify the responses for analysis. The Statistical Package for the Social Sciences (SPSS; IBM Corp, Released 2016) was used to collate and analyse the results. Interviews with teachers who had trialled the strategies were semi-structured, following set questions (Appendix N) and conducted over the telephone.

**Summary**

In order to develop and evaluate an intervention using visual schedules and work systems that was suitable for implementation by mainstream teachers in mainstream classrooms, this project was designed to be conducted across three phases which consisted of
piloting, evaluation, and utilisation. A mixed-methods approach was used involving a multiple baseline evaluation as well as surveys and case studies. The following chapters present the findings of each phase in manuscript form. Chapter 5 describes the pilot study used to test and refine both the intervention package and the methods for evaluating the strategies it described in mainstream classrooms. Chapter 6 reports on the evaluation phase examining the impact of visual schedules and work systems on the on-task behaviours of students on the spectrum in mainstream settings. Chapter 7 presents the findings of the online survey and subsequent interviews used to explore teachers’ views of the intervention.
Chapter 5: Pilot

Statement of contribution to co-authored published paper

This chapter includes a co-authored paper. The bibliographic details of the co-authored paper, including all authors, are:


doi:10.1080/13603116.2017.1335355

My contribution to the paper involved:

The collection of data in the classroom, analysis of the data in collaboration with the project team, and writing the first draft of the manuscript.

(Signed) __________________________________ (Date) __11/07/17____________

Elizabeth (Libby) Macdonald

(Countersigned) ___________________________ (Date) __13/07/17____________

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Piloting autism intervention research with teachers in mainstream classrooms

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To cite this article: Libby Macdonald, Deb Keen, Jill Ashburner, Debra Costley, Kaaren Haas & David Trembath (2017): Piloting autism intervention research with teachers in mainstream classrooms, International Journal of Inclusive Education, DOI: 10.1080/13603116.2017.1335355

To link to this article: http://dx.doi.org/10.1080/13603116.2017.1335355

Published online: 05 Jun 2017.

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Piloting autism intervention research with teachers in mainstream classrooms

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ABSTRACT

Although there is a recognised need for effective practices to support students on the autism spectrum in mainstream schools, there is a research to practice gap in the area of autism and education, whereby evidence-based intervention may take decades to translate into mainstream classroom practice. Thus, current recommendations are that, rather than presenting mainstream school teachers with interventions developed and tested in clinical or special education settings, a participatory research process should be used to facilitate implementation in real-world mainstream classrooms. This article reports on a case study that aimed to refine a structured teaching intervention package for use in mainstream classrooms, while at the same time tailoring research methods for evaluating the package in these settings. The outcomes of the project are presented with respect to (a) the development and refinement of the intervention package in consultation with a mainstream classroom teacher and (b) the lessons learned during the process that other clinical researchers, teachers, and clinicians could apply when implementing educational interventions in mainstream settings.

With rises in the number of children diagnosed as being on the autism spectrum (Australian Bureau of Statistics 2014; Elsabbagh et al. 2012), and a move towards more inclusive approaches to education (Leach and Duffy 2009; UN General Assembly 2007), there is an increasing challenge to meet the needs of students on the autism spectrum enrolled in mainstream schools. In fact, in Australia, approximately 73\% of students on the spectrum are enrolled in mainstream schools (Autism Awareness 2014), and there is an identified need for practical ways to support the inclusion and optimise the learning outcomes of these students within mainstream settings (Saggers et al. 2015).

The school environment can be very challenging for students on the autism spectrum who have difficulty with aspects of typical social interaction and communication, a preference for predictability and routine, resistance to change, and/or atypical reactions to
sensory stimuli (American Psychiatric Association 2013). School can be a source of considerable stress and anxiety for these children and may contribute to difficulties in engaging with the curriculum and in self-regulation (Ashburner, Ziviani, and Rodger 2010; Humphrey and Lewis 2008). Teachers too, face challenges in this environment, tasked as they are with supporting the learning needs of students on the spectrum as well as numerous other students with diverse learning needs.

**Translating research to classroom settings**

Teachers in mainstream settings play a key role in supporting students on the autism spectrum to participate at school (Humphrey and Symes 2013), but research has indicated that teachers may feel ill-equipped to support the learning and development of these students (Emam and Farrell 2009; Soto-Chodiman et al. 2012). Furthermore, transferring teaching strategies that have been reported to be effective in clinical and special school environments directly to a mainstream school setting, without any adaptations, can be problematic. Interventions that have been shown to work under controlled research conditions are not necessarily as effective, or relevant, in the less controlled and less predictable classroom environment (Kasari and Smith 2013; Parsons et al. 2013). Additionally, the implementation of an intervention may not be practical for everyday classroom practice due to restrictions in time or resources, or may single out, and therefore stigmatise, students on the spectrum in ways that are inconsistent with inclusive classroom practices (Humphrey and Lewis 2008; Jordan 2008).

**Addressing the research–practice gap through participatory research**

Participatory research has gained popularity in the area of health as an approach with the potential to bridge the gap between science and practice (Cornwall and Jewkes 1995; Wallerstein and Duran 2010). To help close the research to practice gap in mainstream education for students on the autism spectrum and arrive at feasible and socially valid solutions to improve the educational experience and outcomes for these students, research needs to take place within mainstream classroom contexts, and should incorporate the goal of implementation, and participation of stakeholders (e.g. teachers, students) in the research process (Dingfelder and Mandell 2011; Dykstra Steinbrenner et al. 2015; Kasari and Smith 2013; Nastasi et al. 2000). Accordingly, some researchers have recommended a move away from controlled testing of interventions intended for applied settings, suggesting instead that development and evaluation take place primarily in situ (Kasari and Smith 2013; Weisz 2000). However, research methods that are commonly adapted to applied classroom settings may not be regarded as sufficiently rigorous to provide generalisable evidence (Barab and Squire 2004; Dykstra Steinbrenner et al. 2015) and the ‘noise’ of the classroom makes it challenging to gather clean experimental data rendering effects more difficult to interpret (Kasari and Smith 2013).

**A case study in participatory research**

This article describes a case study used to refine standard experimental research methods for use in a mainstream setting during which the ‘noise’ of the classroom environment was
evident. This case study, and a companion study employing a multiple baseline research
design and using the case study findings (manuscript in preparation), contributed to a
research project that aimed to develop and implement a teacher-mediated intervention
incorporating two structured teaching strategies: visual schedules and work systems. Visual
schedules consist of concrete items, pictures, symbols, or words that convey an idea of the
order of events to come (e.g. a daily timetable) (Hume 2015; Knight, Sartini, and Spriggs
2014). The use of visual schedules to support students on the autism spectrum has been
researched extensively and is now considered to be an evidence-based practice (Knight,
Sartini, and Spriggs 2014; National Autism Center 2015; Wong et al. 2015) Work systems
are defined as ways of visually organising activities so that students are informed of what
task to do, how much work is expected, how to know it is finished, and what to do next
(Howley 2015; Hume and Odom 2007; Mesibov, Shea, and Schopler 2004). A small
number of studies have focussed on work systems and have indicated that they may help stu-
dents on the spectrum to stay on-task, and transition between tasks, with greater indepen-
dence (Bennett, Reichow, and Wolery 2011; Hume and Odom 2007; Hume, Plavnick, and

Despite the promising findings of previous studies, however, these strategies are not
routinely used in mainstream classrooms. There is little research to support their use in
the mainstream context (Hume, Plavnick, and Odom 2012; O’Hara and Hall 2014) and
none examining their use as teacher-implemented strategies with a whole-class approach.
If such strategies prove effective in mainstream settings, they could potentially reduce the
amount of time teachers spend assisting individual students, and help to improve edu-
cational outcomes. Evaluating these strategies in an ecologically valid way, however,
involves reconciling a need for experimental control with the task of measuring the
effect of an intervention in a context where experimental control is lacking.

Case study aims

The first aim of this study was to consult with a classroom teacher to refine a structured
teaching intervention package for use in mainstream classrooms, and establish a method
for evaluating its effectiveness in preparation for the subsequent multiple baseline study.
This approach was chosen in an attempt to address the persistent research to practice gap
in the area of autism and mainstream education (Dingfelder and Mandell 2011; Parsons
et al. 2013) by adopting a participatory approach to engage with stakeholders (Kasari and
Smith 2013; Nastasi et al. 2000). It was considered that involving teachers in implementing
and evaluating the teaching strategies and testing their effectiveness in a mainstream
school environment would increase the likelihood of developing an intervention that
was workable in the real-life classroom setting, because, as described by Parsons et al.
(2013), this would facilitate a process of ‘knowledge exchange’ between stakeholders,
rather than merely ‘knowledge transfer’ (277).

The second aim of the case study was to document the process and outcomes so as to
inform the practice of researchers, clinicians, and educators who seek to implement
similar intervention packages in mainstream school settings. Accordingly, this article pre-
sents not a direct evaluation of the strategies themselves, but reflections on the process of
preparing to conduct empirical research in the natural classroom environment, and the
challenges that can entail. Insights about this process are often not included in accounts
of research outcomes, despite the growing recognition of the need for research that more closely facilitates implementation.

**Method**

**Research design**

The case study method was used as part of a research process with a focus on implementation. While a case study design may not lead to reliable generalisations, it can illuminate the detail of a specific situation and highlight the complexity of the environment. Case studies have been recommended where the phenomenon under investigation is inseparable from its context, or where experimental control of context is not possible (Yin 2014). In this case, the unit of analysis was the interaction between research practice and the complex context of the mainstream classroom setting. It was therefore considered the most appropriate method to achieve the aims of this study.

**Ethics**

Ethical clearance for this project was obtained from the authors’ universities and the relevant state educational authority.

**Participants**

The first author approached the principal of a local primary school and informed her about the research. The principal then identified a teacher, Mr Smith (a pseudonym), who was keen to participate, and he, in turn, identified a student on the autism spectrum for whom he believed the planned intervention could be useful. The principal, Mr Smith, other teachers working in the classroom, the student, and the student’s parents all formally consented to participate in the study.

The student, Ben (a pseudonym) was diagnosed with Asperger Disorder (American Psychiatric Association 2000) by a paediatrician at the age of six years, and was described by his parents as ‘high functioning’. At the time of this study he was nine years old and in Year 3 in a Year 3–4 composite class (i.e. comprising students from both year groups). Mr Smith reported that Ben was reluctant to engage with school work and was slow to start classroom activities, despite being capable of completing the work. The Kaufman Brief Intelligence Test, second edition (KBIT-2; Kaufman and Kaufman 2004) was used to provide an indication of academic ability, and Ben scored within the average range. Ben’s off-task behaviour was confirmed by the first author during initial classroom observations. To illustrate, Ben was usually the last student to enter the room after breaks, up to five minutes after his classmates. Despite receiving the same directions as his peers, Ben often did not start work immediately, but played with objects, sharpened pencils, or sat at his desk not engaged in any specific learning activity.

**Setting**

Ben’s school was a small regional public primary school (Grades Prep to Year 6) of 114 students. The school rated at 937 on the Index of Community Socio-Educational
Advantage (ICSEA) developed by the Australian Curriculum, Assessment and Reporting Authority (ACARA 2014), a rating which is below the national average of 1000. The class consisted of 20 students – 13 male and 7 female – in Years 3 and 4 aged between 8 and 10 years, and, according to their teacher, encompassed a wide range of academic ability. Ben was one of four students in the class with diagnoses on the autism spectrum.

Mr Smith’s class was managed using routines that he had established early in the school year and a school-wide point system that rewarded positive behaviour. He used various approaches to accommodate the range of abilities within the class, including the use of highly scaffolded lessons; different activities for different students or year levels; and because there were often up to three teacher aides or support staff in the class, one-to-one or small group pull-out activities. The literacy and numeracy lessons in class were generally taken directly from the government curriculum documents, with worksheet questions being completed one at a time as a whole-class activity. Prior to commencing this case study, the classroom had a daily visual schedule on the board; however, it was not regularly updated by the teacher and was not always accurate.

**Intervention and materials**

The participatory design of the study required the teacher, Mr Smith, to develop an intervention that would help Ben (and possibly other students in the class) to stay on-task and transition between tasks independently, so that this intervention could then be trialled and refined during this study. To support Mr Smith with this task, the study used a workbook specifically designed for this study (Haas 2015). The workbook was designed to guide mainstream classroom teachers to develop and implement two aids for use by the whole class: a visual schedule in the form of a daily timetable and a work system for a literacy task. The workbook contained an explanation of structured teaching principles, including the proposed benefits of using visual structure, links to online information, and guidance and examples on how to develop a daily timetable and a visually organised literacy task. To supplement this, the researcher also showed Mr Smith pictures of three other examples of different types of work systems – a carrel with numbered drawers and symbols, a folder system with ‘to do’ and ‘finished’ pockets, and a checklist with checkboxes, and gave the teacher an optional template for a checklist. The materials used to deliver the intervention were left to Mr Smith’s discretion. The intervention was intended to be deliverable with the simplest, low-tech equipment (i.e. pencil and paper), but there was scope to use technology if it was available.

Mr Smith chose to devise his own checklist format, which conformed to the definition of a work system by visually conveying information about what task to do, how much work was expected, how to know it was finished, and what to do next (Howley 2015; Hume and Odom 2007; Mesibov, Shea, and Schopler 2004). Using the teacher’s own class schedule, the first author reproduced timetables, and all students in the class were given a choice of a weekly timetable that could be stuck to their desks or an A5 booklet of daily timetables for the week. During the course of the study, to provide both guidelines for applying the strategies in the classroom and a measure of fidelity, the researcher developed and refined an implementation checklist based on the defining characteristics of visual schedules and work systems.
Procedure

The first author met with the school principal and Mr Smith early in the third school term to outline and discuss the purpose of the case study. Then, during the first half of the term, the first author spent a total of four full days making preliminary, informal observations, getting to know the classroom routines and procedures, and, when Mr Smith’s schedule permitted, consulting with him to obtain his input on task selection and selection of behaviours (i.e. dependent variables) that would be monitored as part of the intervention evaluation.

Selecting tasks

The first author consulted with Mr Smith about the types of activities, subjects and circumstances during which Ben seemed to have the most difficulty staying on-task. The first author then explained to Mr Smith that, from these, it was necessary to select a task, or set of tasks, to observe that would be repeated consistently throughout the study, so as to measure change over time. To assess effects on Ben’s independence while working, the task also needed to be one that could be done independently, and so would likely involve practising and reinforcing skills with which Ben was already familiar, rather than introducing completely new learning tasks. To provide an ecologically valid context and avoid causing inconvenience to Mr Smith and his class, Mr Smith was asked to identify suitable regular class tasks.

A handwriting task that regularly took place after a break met these criteria. In this task, students were required to write several lines of letters from the alphabet. The first author observed that, because the class were working on a longer written composition over a number of weeks, there was then a regular transition to the computers where students typed out previously finished written work. The typing activity was also selected as an appropriate task to observe for the study.

Identifying dependent variables

Visual schedules and work systems have been shown to promote on-task behaviour, reduce problem behaviours, and to increase students’ independence (Bennett, Reichow, and Wolery 2011; Hume and Odom 2007; Knight, Sartini, and Spriggs 2014; Lequia, Machalicek, and Rispoli 2012). To identify appropriate measures that could be used to assess Ben’s productivity, or his attention to task, before and after the introduction of the intervention, Mr Smith was further consulted about Ben’s behaviour. Two types of behaviours were chosen to be coded and measured: (a) behaviours associated with being on-task, or getting work done, and (b) problem behaviours associated with not engaging with the set activity. Mr Smith’s input in identifying these ‘off-task’ type behaviours was particularly valuable as these can be highly individual and context specific. Other dependent variables chosen to be recorded by observation were: teacher prompting as a measure of student independence; the time Ben took to start work, (or latency); and the amount of work Ben completed.

On-task. The first author communicated with Mr Smith about his expectations of Ben during the selected tasks. Task specific on-task behaviours were then identified and defined through the first author’s observations of Ben at work. For the handwriting
task, on-task behaviour was defined as holding a pencil such that the tip was touching the page. While on the computer, Ben was considered on-task when pressing a key on the keyboard. Mouse clicks were not coded as observations by the first author noted that these did not specifically contribute to completing the work that Mr Smith had indicated Ben was supposed to be doing (i.e. typing up his written work).

Problem behaviour. To accurately reflect what Ben was doing when not on-task, Mr Smith was asked about behaviours he had noticed occurring at times when Ben was having difficulty attending to work. Problem behaviours were defined to include yelling, lying on the ground, throwing objects, hitting, or running out of the room. These behaviours have been similarly described in several other studies examining the use of visual supports (Dooley, Wilczenski, and Torem 2001; Mavropoulou, Papadopoulou, and Kakana 2011; Waters, Lerman, and Hovanetz 2009). However, although these behaviours may occur in mainstream classrooms, they tend to be behaviours that occur infrequently and may not provide a sensitive measure. Mr Smith observed that behaviours that corresponded with time off-task included Ben being out of his chair, playing with toys, sharpening pencils. Accordingly, these behaviours were defined and observed.

Additional measures. In addition to the dependent variables that were defined with input from Mr Smith, the research team used a number of other measures to support the direct observational data and provide a more complete account of changes that occurred during the intervention.

Response latency. The time on the classroom clock was recorded at the moment Ben entered the classroom, and this was also when observations commenced. Calculations were then made to record the time between the start of class, Ben entering the class, and Ben’s first instance of on-task behaviour.

Productivity. In addition to recording on-task behaviours, productivity was measured by assessing the amount of work Ben completed during the first 10 minutes of the task. During the handwriting task, a count was made of the number of lines written, and, during work at the computer, the number of words typed were counted.

Teacher perception of productivity. During the course of the study, the research team developed a new measure whereby Mr Smith could indicate daily, on a scale from 1 to 10, how productive he thought Ben had been in comparison to his expectations of the class. This measure was trialled during the case study.

Teacher prompting. Previous studies have used the level of teacher prompting (i.e. the number of intervals during which prompting occurs) as a measure of change in student independence when transitioning to tasks (Hume and Odom 2007; Hume, Plavnick, and Odom 2012; Mavropoulou, Papadopoulou, and Kakana 2011). In this study, the research team collected data on Mr Smith’s interactions with Ben to provide information about the amount of assistance or direction required by Ben and the amount of time spent by the Mr Smith in supporting him. This was done without consultation with Mr Smith, so as to capture natural behaviours.
Social validity. To assess their perceptions of the value and practicality of the teaching strategies, at the end of the intervention phase both Ben and Mr Smith completed surveys developed for this study. The surveys consisted of both Likert-type and open questions. The teacher survey was provided via email as a digital file to be completed at Mr Smith’s convenience. It included questions about the effectiveness of the two structured teaching strategies, the ease with which they could be implemented, and asked for feedback on the workbook. The student survey was conducted in the form of a brief interview in which the first author read the questions to the student and wrote down his responses.

Evaluating the intervention
An AB single case experimental design was used to assess the feasibility of the research methods, and collect preliminary data on the effectiveness of the intervention strategies.

The first author trialled data recording procedures during both the handwriting and typing tasks. Not only did this allow observations of student behaviours during class activities, but it was also possible to gather information about latency during transitions into and between tasks. The first author continued to visit the class four times per week over a period of five weeks. After the initial six sessions, the first author provided Mr Smith with a hard copy of the intervention workbook on a Friday and emailed a digital copy to him later the same day. He began to use a work system in the form of a simple checklist on the following Monday. The first author then continued to trial data collection with the intervention in place.

Data collection
Other studies investigating the effect of work systems on student productivity and on-task behaviours have used video-recording as a data collection method (Bennett, Reichow, and Wolery 2011; Hume and Odom 2007; Hume, Plavnick, and Odom 2012; Mavropoulou, Papadopoulou, and Kakana 2011). This research team had three key concerns about video-recording in the mainstream classroom. First, that permission would be necessary from non-target children who would likely be captured during filming and this also led to concerns to protect their privacy; second, that the focus on filming Ben may have stigmatised him; and third, because video-recording may have made students and teachers more self-conscious about their behaviour, it may have artificially influenced their behaviour (Schuck and Kearney 2006). The research team therefore concluded that the case study was an opportunity to trial the feasibility of live data collection using partial interval recording of on-task and problem behaviours and teacher prompting. When taking observations, the research team took particular care to ensure that neither Ben, nor other students in his class, became aware that Ben was the subject of particular attention. Observations were usually taken from the back of the classroom or while circulating among the whole class.

Inter-rater reliability was also trialled with a trained secondary observer. Sessions with the second observer involved using a double adapter for a digital audio player so that both observers could synchronise the intervals during which they made their observations by listening to the same audio cues. There was agreement between observers for on- and off-task behaviours in 90.39% and 90.15% of intervals respectively, and, for teacher prompting, there was agreement in 87.18% of intervals.
Findings

The data collected during the course of the case study was not intended to evaluate the intervention, but rather to develop, refine, and trial methods and measures. The intervention was evaluated during the subsequent multiple baseline study with other teachers and students (manuscript in preparation). Thus, the findings of this study can be summarised as follows.

Intervention

This case study informed the refinement of the intervention package by providing a demonstration of its interpretation and application in a real-world setting, and an opportunity to obtain feedback from key stakeholders. As a result, the team made a number of adaptations to the workbook (Haas 2015), such as including supplementary information on visual schedules and work systems that had been provided to Mr Smith by the first author, and that he reported finding useful (i.e. additional visual examples of ways work systems could be used) and an implementation checklist to help teachers to implement the strategies. The feedback Mr Smith provided on his survey also indicated areas in which the intervention could possibly benefit from further refinement as the project progressed.

Task selection

The choice of a class activity to focus on, that was both an authentic classroom practice as well as a reliable constant during observations, was a key factor in combining a quantitative AB research design with the qualitative case study approach that would be sensitive to the complex classroom conditions. Task selection in consultation with the teacher was demonstrated to be a feasible way to work within a mainstream classroom setting, and to capture data in an ecologically valid way.

Identifying and defining measures

Identifying target behaviours with input from Mr Smith allowed measures to be created that were nuanced and individualised with respect to Ben in particular as well as being relevant to the Mr Smith’s expectations and classroom culture as a whole. The process used to identify behaviours, involving both direct input from the Mr Smith and consultation to confirm additional observations by the first author, provided relevant and clearly defined measures.

Social validity

On the social validity survey, Ben indicated that he found the timetable to be of some help, and the work system to be very helpful. He expressed a willingness to keep using both strategies. Mr Smith reported that the timetables were very useful and easy to implement. He indicated that the work systems were very helpful in keeping the student on the autism spectrum on-task and also helpful for some of the other students in the class. However, his
feedback was that he would not recommend it as a whole-of-class intervention, due to the
time required to develop the task checklists to his satisfaction for multiple students with
diverse abilities.

**Data collection**

This case study was instrumental in refining and practising data collection methods that
were intended to be unobtrusive and sensitive to the classroom context. While the class
was accustomed to the presence of other adults in the room, such as teacher aides and
parent volunteers, regular visits to become familiar with the class prior to the data collec-
tion phase minimised the impact of the first author’s presence and allowed for monitoring
of any apparent changes in Ben’s behaviour when observations began. Making obser-
vations while seated at the back of the classroom, or while circulating and scanning the
entire class also helped to minimise the impact of an observer in the classroom. Reliability
measures indicated that data could be collected live in this way with acceptable levels of
accuracy.

**Discussion**

In preparing to conduct empirical research in a mainstream classroom environment, this
case study provided a way to test and refine a teacher-implemented intervention. Furth-
ermore, it provided a way for research procedures to be designed, refined, and modified to fit
the classroom context. This case study provided a logical step in an iterative research
process, and one that might increase the relevance of research to applied settings. In
this particular case, the case study was influential in devising ways to better fit both the
research procedures and intervention to the context. It highlighted a number of potential
issues that, with preparation, could be managed or addressed.

**Advantages of piloting in the classroom**

In this case study, tasks were selected, and dependent variables defined, in consultation
with the teacher, using tasks already undertaken by the student as part of current class
activity, and observing behaviours occurring naturally in the classroom. This approach
allowed the research design to be tailored to specific classes and individuals rather than
developing a task specifically for the purpose of the research or looking for generic beha-
vior. In this case, the handwriting task was practised by the whole class as a transition
activity to reinforce a familiar skill, and the typing activity was part of a longer writing task.
This method of getting to know the class and working with teachers to make decisions
about the way the research will be conducted can also be applied to other classes, as a
means of ensuring that research in the classroom is ecologically valid. Similarly, the
process used to identify dependent variables that are relevant to the teacher and student
can lead to measures that are highly specific and individual. Patterns of disruptive behav-
ior noted by teachers can be targeted, even though in other contexts, or for other indi-
viduals, they may not be considered problematic.

There are precedents for researchers working with teachers to identify and address indi-
vidual needs in students on the spectrum. Hume, Plavnick, and Odom (2012), for
example, consulted with their subjects’ special education teacher to identify appropriate tasks to focus on, and other researchers have targeted individual behaviours in consultation with teachers and parents (Cale et al. 2009; Cihak et al. 2009). It is less common, however, for empirical studies to fit around the culture of a mainstream classroom. However, tailoring research to the mainstream classroom, rather than simply an individual within this setting, could be an important step in developing interventions that can be implemented in an inclusive way by mainstream teachers. By observing natural activity and supporting teachers to identify and define behaviours they consider important to change, it is possible to create a research design that is more relevant to teachers’ understanding of the unique characteristics of their class and the outcomes they wish to achieve for their students. For teachers, the conceptualisation of research as a practice that can fit within the classroom environment may facilitate more teacher-driven, or teacher-implemented evaluations of interventions. Such an approach could contribute to bridging the research to practice gap by involving stakeholders in the research to practice process in a fundamental way (Nastasi et al. 2000).

For researchers, tailoring a study to fit the classroom, rather than attempting to engineer controlled conditions, may be beneficial in offering practical, ecologically valid approaches to evaluating interventions. In this case study, the development and testing of data collection procedures in the classroom was not only feasible, it also resulted in a strong alignment between the research design and the environment. Whereas taking a student from the classroom to a more controlled environment is likely to have an effect on the student’s behaviour and responses to an intervention, classroom data collection can provide insights into whether an otherwise effective treatment is worth applying in a real-world context. If it is possible to minimise the impact of the researcher in the classroom through frequent visits and unobtrusive observation techniques, as described above, it may be possible to capture more authentic and relevant behavioural responses. Pilot testing of the data collection method can be helpful in ensuring that it is workable. In this case, the pilot testing of live data recording confirmed that the presence of the researcher in the room was not a distraction, and was in many ways preferable to video-recording. The data collection method was also demonstrated to be reliable through inter-rater observations on all the central measures. Furthermore, reliability improved as methods were refined.

While examination of the observational data may give an indication of the efficacy of an intervention, if those for whom it was intended do not perceive it as useful, or see barriers to implementation, then it would be difficult to regard the intervention as a success. Although social validity measures have been considered to be an essential aspect of experimental rigour (Reichow, Volkmar, and Cicchetti 2008), Howley (2015) identified the social validity of structured teaching strategies as an area where quantitative methods have limitations, and a more thorough, in-depth analysis is needed. Feedback provided on an intervention trialled in the classroom during normal lessons, and implemented by teachers using materials available to them, is informed by relevant experience. Social validity measures in studies such as this may link research to implementation more closely than features of research design focussed on producing quantitative data about behavioural outcomes.

The social validity surveys for this study revealed positive attitudes about the use of the strategies in supporting Ben to stay on-task. However, as mentioned earlier, Mr Smith
reported some difficulties with adapting the intervention for the whole class. While classroom diversity and the composite nature of Mr Smith’s class may have been contributing factors to the decision in his particular circumstances, this feedback highlighted issues pertaining to the development of resources following universal design principles. A broader study of teacher perceptions would be required to ascertain whether the time taken to implement a whole of class intervention was a common concern.

Challenges and recommendations

This case study encountered a number of difficulties that are commonly experienced in school environments. The most significant was the interruption during the intervention phase due to the absence of Mr Smith due to injury. During his absence, a relief teacher, Ms Hall (a pseudonym), was appointed to take his class. Ms Hall did not consistently implement the intervention, despite expressing an interest in the research and the strategies. The class was challenging at times, and she was an experienced teacher with her own collection of strategies and resources. During this time, Ben, and others, became very concerned with small changes made by Ms Hall to their timetable and routine, and corrected her if activities did not proceed in the correct order. Data collection became challenging, because the set tasks were not always performed at the same time, and routines surrounding entering the class and starting work changed. These challenges were, however, instructive in demonstrating differences in teaching styles and classroom practices and the marked effect these can have on research in the natural classroom setting.

Ben was also absent from school for a number of days due to illness. Interruptions such as these are a potential challenge in real-world settings. Unpredictable events in teachers’ and students’ lives can make it difficult to link the introduction of the intervention to any changes in the student’s behaviour. These absences made it difficult to collect the necessary observational data prior to the end of term. Overall, a major challenge in conducting research within schools is the need to fit around school terms, special events and holidays. The first and last week of each term may be atypical and impact student behaviour. The beginning and end of the school year can be particularly disruptive as students settle in or prepare to transition to new classes. Researchers are therefore advised to time their classroom visits carefully, allowing extra time for unexpected interruptions, or including more participants, and consulting with teachers and school administration about special events when developing their research design.

This case study served both as a way to refine an intervention for practical use and an informative experience from which to reflect on the way research may be undertaken in a naturalistic setting. The experience of continual and unplanned disruptions to class time typifies many mainstream school settings, and it is possible that these disruptions actually contribute to some of the challenges faced by students on the autism spectrum. As Flannery and Horner (1994, 158) observed, ‘natural school environments are not consistent, thereby forcing teachers to choose between including the student in inconsistent, regular school activities or providing the student with highly consistent, but more isolated educational options’. The concerted use of structured teaching strategies, which prepare students for upcoming changes and provide greater structure to individual activities, may be useful in ameliorating the unavoidable disruptive nature of the typical mainstream school setting. However, a rigorous empirical examination of the implementation of these
strategies would traditionally call for a significant amount of environmental control, resulting in high levels of predictability and structure. From this observation, two conclusions may be drawn. First, researchers may find the mainstream school environment challenging in very similar ways to students with on the autism spectrum. Second, an in situ evaluation of this type of intervention may not be possible without using flexible methods that take account of the inconsistencies and unpredictability of the school environment.

During the course of conducting this case study it was possible to identify, and deal with, potential issues with the data. There were, for instance, some difficulties with consistently collecting data on student productivity due to the varying length of the task and due to frequent, often externally driven interruptions to the student’s work (e.g. a visitor to the classroom). This led to the development and trialling of an additional measure where the teacher was asked to rate the student’s productivity at the end of each session. This measure served to quantify the teacher’s views of the intervention’s effect and provided another flexible measure of child behaviour. Without trialling and adapting methods in this way, the larger study would have relied on measures that may not have been appropriate in the real classroom context.

Aside from helping to refine methods and engage teachers, piloting research procedures can also be recommended so that researchers approach larger scale studies in schools forewarned, or so that teachers and therapists trialling interventions in situ can evaluate them with greater accuracy. This study highlighted the need for contingency plans, such as increasing the number of participants to protect against attrition due to participant absences, or other unforeseen circumstance. Sports and swimming carnivals, camps, rescheduling of non-contact time, reporting, professional development, visiting speakers, excursions, and many other events clamour for a place in the school calendar, and working around these with sensitivity for teachers’ time requires careful planning. A case study can help to increase awareness of the frequency of these events and the effect they have on school life and students on the spectrum in particular. Piloting can also be instrumental in arriving at operational definitions that can be modified and applied to fit unique individuals and changeable settings and form the basis of a flexible research design.

**Conclusion**

There is both an urgent need for interventions to support students on the autism spectrum in mainstream settings, and a widely acknowledged difficulty in translating research into educational practice (Dingfelder and Mandell 2011; Parsons et al. 2013). Although controlled studies are necessary to provide reliable data for isolated strategies without the interference of uncontrolled variables, the evidence that they provide is incomplete without testing and refining in an applied setting. It is, in part, the chaotic, unpredictable nature of the school environment that drives the need for intervention. If it were possible to create classroom conditions that were suitably controlled, perhaps the need for educational interventions for students on the spectrum would be less urgent. However, as controlled classroom environments are unlikely to be attainable in mainstream schools, research in this context is bound to be messy yet essential to the development, assessment, and implementation of interventions.
As considerations of implementation become increasingly part of research into interventions for children on the spectrum, rather than a secondary process (Dykstra Steinbrenner et al. 2015), there may be a need to further adapt experimental research methods to the school environment and to foster a culture of research participation among educators. Clearly, there is more work to be done in this area. While researchers are feeling their way, the use of a single case trial like this one can be recommended. Case studies like this one may be instrumental in forwarding discussion about ways in which individual research projects can be tailored to educational settings, framing questions of validity, and preparing researchers for the many possible challenges that they may encounter.

Disclosure statement
No potential conflict of interest was reported by the authors.

Funding
The authors acknowledge the financial support of the Cooperative Research Centre for Living with Autism (Autism CRC), established and supported under the Australian Government’s Cooperative Research Centres Program. This work was also supported by the Griffith Institute for Educational Research. David Trembath is supported by a NHMRC ECR Fellowship [grant number GNT1071811].

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Debra Costley is a special educator with 30 years of experience in special education teaching and research. Debra is a research affiliate in the Faculty of Health Sciences at Sydney University, a conjoint senior lecturer in the Faculty of Psychiatry at the University of New South Wales, and an honorary fellow in the School of Education at Wollongong University. In her role as National Director, Aspect Practice at Aspect, Debra has responsibility for applied research across Aspect and the development of models of service delivery for young people and adults with an autism spectrum disorder.

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References


Chapter 6: Evaluation

Statement of contribution to co-authored published paper

This chapter includes a co-authored paper. The bibliographic details/status of the co-authored paper, including all authors, are:


My contribution to the paper involved:

The refining of the study design in collaboration with the project team, the collection of data, data analysis in collaboration with the project team, and writing the first draft of the manuscript.

(Signed) _______________________________ (Date) __11/07/17___________

Elizabeth (Libby) Macdonald

(Countersigned) ___________________________ (Date) __13/07/17___________

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Supervisor: Prof Deb Keen
The use of visual schedules and work systems to increase the on-task behaviour of students on the autism spectrum in mainstream classrooms

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Acknowledgements

The authors acknowledge the financial support of the Cooperative Research Centre for Living with Autism (Autism CRC), established and supported under the Australian Government’s Cooperative Research Centres Program. Funding was also provided by the Griffith Institute for Educational Research. David Trembath is supported by a NHMRC ECR Fellowship (GNT1071811).
Abstract

Apparent differences in executive function can lead to challenges for students on the autism spectrum in mainstream settings. Difficulties with staying on task and transitioning between tasks or task elements can interfere with students’ participation in educational activities and lead to stress and anxiety. While the use of visual supports, such as visual schedules and work systems, has been shown to be effective in supporting students to stay on task in special education and autism-specific settings, there is little research to support the use of these strategies by teachers in mainstream classrooms. This study evaluated the use of visual schedules and work systems in supporting four students on the autism spectrum to stay on task and work independently in a mainstream setting. These strategies were implemented by teachers as inclusive practices, and evaluated using observations within the natural classroom environment to examine their feasibility in mainstream settings. All participants demonstrated improvements in on-task behaviours. Results for other, secondary, dependent variables were mixed, with some students showing reduced off-task behaviours and increased productivity. The implications for clinical practice and future research directions are discussed.

Keywords: autism spectrum disorder, visual schedules, work systems, on-task behaviour, mainstream classrooms.
The use of visual schedules and work systems to increase the on-task behaviour of students on the autism spectrum in mainstream classrooms

The mainstream school setting can be challenging for students on the autism spectrum due to difficulties with social communication and restricted and repetitive patterns of behaviour which can involve a desire for routine and sameness, restricted interests, and/or sensory differences (American Psychiatric Association, 2013). These cognitive and behavioural differences may have an impact on the ways in which students on the autism spectrum approach tasks that require high levels of executive functioning such as staying on task, transitioning between activities, and following activities with multiple steps independently (Banda & Grimmett, 2008; Hill, 2004; Milley & Machalicek, 2012). As a result, students with autism spectrum disorder (ASD) may have difficulty engaging with school work. Issues with executive functioning may also contribute to anxiety and reduce students’ ability to regulate their own behaviour. These problems may, ultimately, translate to poor educational outcomes (Ashburner, Ziviani, & Rodger, 2010; Laurent & Rubin, 2004; Stoner, Angell, House, & Bock, 2007). There is evidence to suggest that structured teaching strategies such as visual schedules and work systems may support students on the autism spectrum to stay on task and navigate transitions. Yet, while these strategies may be appropriate for a broad range of students, not just those with more complex needs (Bryan & Gast, 2000; Hume & Reynolds, 2010; Hume, Sreckovic, Snyder, & Carnahan, 2014), there is a dearth of research focussing on the use of these strategies by teachers in mainstream classrooms. Accordingly, there is a need for further research to examine whether these strategies are feasible and effective in mainstream contexts in order to inform practice in this area.
Structured Teaching

Structured teaching operates from the principles of supporting a *culture of autism* (Mesibov, Shea, & Schopler, 2004), and working with students’ strengths. Structured teaching developed as a central component of the Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) programme in the early 1970s (Mesibov & Shea, 2010), and has become a popular approach in ASD-specific education settings (Humphrey & Parkinson, 2006; Peerenboom, 2003). It is an approach “designed for individuals of all ages and functioning levels” (Mesibov & Shea, 2011, p. 2473) comprising strategies aimed at creating an “autism-friendly” environment through the use of physical and visual structure. The use of visual information is central to this approach, which aligns with research suggesting students on the spectrum may have difficulty processing transient, auditory information (Quill, 1997), as well as with theories about the processing of static, visual information being a relative strength (Baron-Cohen, Ashwin, Ashwin, Tavassoli, & Chakrabarti, 2009; Grandin, 1995; O' Riordan, Plaisted, Driver, & Baron-Cohen, 2001). There is some evidence to support TEACCH as a comprehensive treatment program (D'Elia et al., 2014; Panerai, Ferrante, & Zingale, 2002; Panerai et al., 2009). However, implementing structured teaching as a whole, comprehensive package in mainstream settings may be problematic. The time, space, and resources required to implement a complete program may be prohibitive for mainstream teachers, and could be considered disproportionate to the needs of students in the class. Parts of the TEACCH approach could, however, be adapted to the mainstream environment with relative ease. Evaluating separate elements of comprehensive treatment programs may help to identify constituent parts (e.g., teaching strategies) that are the “active ingredients” from the total sum employed. Various programs might include effective components that could be used in flexible modular ways (Boyd et al., 2014) and suit the eclectic and responsive way in which teachers often adopt new practices (Callahan,
Shukla-Mehta, Magee, & Wie, 2010). Two key elements of structured teaching which may be practical for use in mainstream settings are visual schedules and work systems.

**Visual Schedules**

Visual schedules are used to orientate students and provide predictability within the classroom by informing students of an anticipated sequence of events using pictures, symbols, and/or written language. The National Autism Center (2015) lists “schedules” among its 14 “established interventions” indicating that they are useful in promoting independence and helping students to plan. Wong et al. (2015) similarly categorise “visual supports”, including schedules, as an evidence-based practice, and a review by Knight, Sartini, and Spriggs (2014) concluded that visual schedules were effective in promoting on-task behaviour and facilitating independent transitions. Together, these reviews indicate that the use of visual schedules is an effective way to support students on the spectrum. However, in considering the individual studies presented in these reviews (Knight et al., 2014; National Autism Center, 2015; Wong et al., 2015), none were conducted under conditions where the intervention was implemented by a mainstream class teacher as part of everyday classroom practice.

**Work Systems**

Work systems are a way of structuring tasks, or task elements, such that students know (a) what they are expected to do; (b) how much work is expected; (c) how to know progress is being made, or that work is complete; and (d) what to do next (Hume & Reynolds, 2010; Mesibov, Howley, & Naftel, 2016). The evidence for work systems is less established than for visual schedules, although they share common elements (e.g., sequencing tasks, or task elements), and were included in the review by Knight et al. (2014). Both the National Autism Center (2015) and Wong et al. (2015) have found insufficient evidence for work systems due to the small number of studies focussing on this practice. Only a small number
of studies has evaluated the use of interventions specifically identified as work systems in isolation with school-aged children on the spectrum (Hume & Odom, 2007; Hume, Plavnick, & Odom, 2012; Mavropoulou, Papadopoulou, & Kakana, 2011; O'Hara & Hall, 2014). Of these, all but one (Mavropoulou et al., 2011) found that the use of work systems had increased on-task behaviour, engagement, task accuracy, behaviour regulation, or the ability to work independently. Mavropoulou et al. (2011) noted clear improvements in on-task behaviour for one of two participants, and questionable results for the other. Hume and Odom (2007) recorded an increase in on-task behaviour and a reduction in prompting for three students with the introduction of work systems. Hume et al. (2012) found that the use of a work system not only lead to improvements in task accuracy but also the intervention was associated with a reduction in teacher prompting, and the changes generalised to a general education classroom. Finally, O’Hara and Hall (2014) found that work systems increased the engagement of students on the spectrum during play activities at recess. Nevertheless, despite preliminary data pointing to the potential benefits of work systems in supporting students on the autism spectrum, and their suitability for use in different contexts with diverse individuals (Hume, 2015), only two studies collected data in mainstream settings (Hume et al., 2012; O'Hara & Hall, 2014). Furthermore, neither study examined implementation in class, by the classroom teacher. Questions remain about whether the positive outcomes experienced by students using work systems and visual schedules in special education or clinical settings are translatable to inclusive, mainstream pedagogical practice.

The aim of this study was to examine the impact of visual schedules and work systems on the on-task behaviours, productivity, and independence of students on the autism spectrum when these strategies are used as a whole-class approach in a mainstream setting. The evaluation of these strategies in an inclusive classroom context follows recommendations by Kasari and Smith (2013) and Weisz (2000) for bridging the gap between research and
practice. The first, and primary, hypothesis of this study was that the implementation of visual schedules and work systems, as described in the workbook for teachers, would result in a measurable increase in students’ on-task behaviours. The second hypothesis was that there would also be a decrease in their off-task behaviours. The third was that students, working more independently, would require less guidance from teachers in the form of prompting, and the fourth, that the students would complete more work.

**Method**

**Ethics Approval**

Ethics approval for the study was granted by the University of Queensland ethics committee (No. 2013001446) and relevant educational authorities.

**Design**

A multiple-baseline, single-case experimental design across participants was used to evaluate the effect of visual schedules and work systems, as described in a workbook for teachers, on the on-task behaviours, productivity, and independence of students on the autism spectrum.

**Participants**

The participants were three students in their fifth year of formal education, and one student in their third year, who met the following eligibility criteria: (a) verified as having an ASD diagnosis by the Department of Education and Training, which requires written documentation of diagnosis according to the DSM-IV-TR or DSM-5 from a paediatrician, psychiatrist, or neurologist; (b) attending mainstream classes in upper primary years (Years 3 to 6 of formal schooling); (c) having the academic ability to complete work set for the class; and (d) being perceived, by their teachers, to have difficulty staying on task and/or transitioning between tasks. Information about the study was distributed to school principals and teachers, who then identified potential participants, prior to obtaining teacher and parent
consent, and student assent. Parents provided information about diagnoses, and the Social Responsiveness Scale (SRS-2) was used as a quantitative measure of traits associated with ASD (Constantino & Gruber, 2007). All four students had T-scores (total scores) over 60, which “indicate deficiencies in reciprocal social behavior that are clinically significant” (Constantino & Gruber, 2012, p. 18). Teachers were asked about the students’ ability to complete classwork, and the students’ potential academic ability was examined using the Kaufman Brief Intelligence Test, second edition (KBIT-2; Kaufman & Kaufman, 2004). The test was administered by the first author, and all students scored in the average, or above average, range for their chronological ages (see Table 1).

James (pseudonym) was 10 years and 7 months old and had an SRS-2 T-score of 61. He was in Year 5 at intake to the study. His teacher described him as reluctant to participate in class activities, often leaving his seat and wandering around the room to find preferred activities. James sometimes refused to enter the classroom and his teacher had implemented strategies in an attempt to manage his behaviour, including offering free time on the computers as an incentive to complete classwork, and allowing him to spend part of the day in another, supervised setting when he determined the class to be overwhelming. His scores on the KBIT-2 revealed him to be of above average intelligence, and this finding was consistent with teacher reports.

Aaron, Edward, and Sam (pseudonyms) all attended a different school from James, but were in separate classes. Aaron was 10 years and 4 months old and in Year 5. Aaron’s SRS-2 T-score was 75, and his KBIT-2 score placed him in the category of above average intelligence. His teacher described him as having difficulty getting started on non-preferred tasks. He was sometimes noncompliant, and, when frustrated, would occasionally scream or growl at the teacher.
Edward was 11 years old and his teacher reported that his behaviour in class was highly variable. While generally on task when in class with his usual class teacher, he sometimes displayed very challenging behaviour with substitute teachers and teachers for specialist subjects. This could include yelling, being out of his chair, and throwing items. Edward’s SRS-2 T-score was 69 and his KBIT-2 score fell in the average range. His primary caregiver reported that he had secondary diagnoses of attention deficit disorder, oppositional defiance disorder, and foetal alcohol syndrome.

Sam was a Year 3 student who was 8 years and 11 months old. On the KBIT-2, he scored within the average range, and his SRS-2 T-score was over 90. Sam’s teacher reported that he was sometimes reluctant to start tasks and would often complete tasks at speed and move on without completing all steps, or with little attention to the work. Strategies she used in an attempt to manage Sam’s behaviour included offering free time playing with toys at the back of the class as an incentive to complete classwork.

Table 1. Student Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>SRS-2 T score</th>
<th>KBIT-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>James</td>
<td>10 years, 7 months</td>
<td>61</td>
<td>Above average</td>
</tr>
<tr>
<td>Aaron</td>
<td>10 years, 4 months</td>
<td>75</td>
<td>Above average</td>
</tr>
<tr>
<td>Edward</td>
<td>11 years</td>
<td>69</td>
<td>Average</td>
</tr>
<tr>
<td>Sam</td>
<td>8 years, 11 months</td>
<td>&gt;90</td>
<td>Average</td>
</tr>
</tbody>
</table>

Setting

The study took place in two mainstream primary schools. All classes had between 20 and 25 students. For James, Aaron, and Sam, the intervention was implemented by the classroom teacher as part of regular whole-class lessons. For Edward, the intervention was
delivered by the classroom teacher during separate languages other than English (LOTE) lessons, as this was identified as a class where he had particular difficulty attending to tasks.

In all classes, there were frequently other adults present – volunteers, teacher aides, student teachers – who would sometimes give instructions and interact with the students. Lesson planning and the preparation of class materials was, however, undertaken by the main classroom teacher in each setting.

Materials

Teachers were provided with guidance on implementing visual schedules and work systems in the form of a workbook resource closely based on work authored by Haas (2015) and available from the corresponding author. The workbook provided general information on structured teaching as well as more specific information about visual schedules and work systems, with links to online information. It then gave guidance on creating a daily timetable (a visual schedule) for students and developing a work system, with examples of different types of work systems including a checklist and a structured literacy task using numbered task elements. Teachers were also provided with a template for a simple checklist to break down and organise a task.

Included in the workbook was an implementation checklist consisting of 12 points divided into two sections focusing on visual schedules and work systems. The checklist included items based on core elements of visual schedules and work systems, as described in the workbook, as well as principles for inclusive implementation. For example, the checklist directed teachers to ensure that visual schedules and work systems be available for use by all students, that schedules be kept up to date, and that the work systems used conveyed information for the students about what to do, how much to do, how to know it is finished, and what to do next. Within these guidelines, teachers were instructed to use their discretion in deciding what materials to use. The strategies, as described in the workbook, were
intended to be simple and able to be implemented with very few resources (e.g., paper and pencil) but had the scope to be implemented using computers or mobile computing devices (e.g., iPads) depending on what was available and teacher preference.

**Procedures**

**Pre-baseline.** The researcher met with each of the classroom teachers who had volunteered to participate in the study, and explained the procedures. The teachers were consulted about which regular classroom activities coincided with off-task behaviours in their students on the spectrum in order to identify tasks that could be observed consistently over the course of the study. James’ teacher suggested a journal writing task. This involved writing for a period of time in response to a brief written stimulus shown on the board. Aaron’s teacher selected a creative writing task that students completed three times a week during which she provided a stimulus, either on the board or in the form of a booklet. Edward was observed during independent work in the specialist class, which usually consisted of a worksheet, writing activity, or craft. Sam’s teacher selected a creative writing task. Teachers were asked to describe behaviours that would indicate on-task and off-task behaviour for each student, and these descriptions then became the focus of coding dependent variables.

**Baseline.** The first author observed each student on a minimum of five occasions prior to the intervention to establish baseline rates of target behaviours. Teachers were instructed to conduct lessons as they normally would. Both student behaviours and teacher prompting of the target students were recorded from the start of the task (when the teacher indicated students should start work).

**Data collection and coding.** Data were collected in person by the first author. Ten-second partial interval coding was used, with behaviours being recorded if they occurred at any time during an observation interval. This partial interval recording allowed both on- and off-task behaviours to be recorded if they occurred in the same interval. A 10-minute audio
track, which consisted of alternating 10 seconds of music and 10 seconds of silence, was played through a digital audio device. Listening through earphones, the first author made observations during the silent parts of the track, and recorded those observations while the music played. Tasks varied in length. Observations began at the start of the selected task, when the teacher gave the instruction to commence work, and continued for the duration of short activities. Where tasks were extended over longer periods, observations were timed to sample the start, middle, and end of the task in order to capture student behaviour at different task stages. Unforeseen interruptions to classroom activities, where students were expected to stop work, were noted on the observation sheets, and excluded from the observations. Following coding, the proportion of intervals in which the student demonstrated the target behaviour was calculated as a percentage of the total number of observed intervals.

**Intervention.** The first author started each intervention phase by providing the teacher with a hard copy of the workbook, and meeting face-to-face with the teacher for approximately 30 minutes to discuss its contents. At this time, teachers were told about the rationales for the strategies they were to implement, and guided through the checklist for implementation provided in the workbook. In addition to hard copies, digital copies of the workbook were emailed to teachers within 48 hours. Data-collection procedures used during the baseline phase continued unchanged during the intervention period, with the exception that the same implementation checklist provided to the teachers was used to record fidelity. The way in which teachers implemented the intervention varied, but consisted of individual visual schedules, structuring tasks with task lists or numbered instructions, providing clear visual cues about how much work was provided (e.g., visual timers, pages marked with an end point), and what to do next (e.g., concrete materials for the next task, next item on schedule). The order in which the intervention was initiated across students was determined
by factors such as the frequency and timing of sessions and teacher availability, and was decided in consultation with all of the teachers.

**Dependent Variables**

*“On-task” type behaviours.* Following discussions with teachers and identification of target behaviours, the primary dependent variable of on-task behaviour was operationalised as follows: writing, or typing, where, if at any point during an observation interval, the student’s pencil, or other writing implement, is held with the tip touching the paper, worksheet, or exercise book, or if the student presses a key on a computer keyboard. For Edward, who was observed undertaking a wider variety of independent work, on task included: cutting, colouring, or gluing where this was the activity in which the student was expected to be engaged, and if the student was using scissors to cut the intended material, if his pencil, other colouring implement, or glue stick, was held with the tip touching the paper, or he was pressing paper with glue to the intended surface.

*“Off-task” type behaviours.* For each individual student, teachers were asked to identify the behaviours that occurred when that student was off task. For James, off-task type behaviours included being out of his chair, walking around the room, leaving the room, working on activities other than the teacher-directed task (e.g., drawing or going on the computers), and talking. For Aaron, off-task behaviour included refusals to work and talking. Aaron’s teacher also noted that he would conceal books under his desk and read covertly instead of engaging in classwork. Reading in this way was coded as having a book open on the desk or in the lap and directing eyes towards the pages. Edward reportedly also enjoyed reading, and this item was included in his off-task behaviours, as was talking, being out of his chair and throwing objects. Sam’s only additional off-task behaviour was refusal to work. In addition to individual behaviours, the operational definition of off task included a number of generic problem behaviours that applied to all students. These were yelling, throwing objects,
leaving the work area or room, lying on the ground, and being aggressive towards other students or teachers (i.e., grabbing, hitting, pushing, or shouting).

**Teacher prompting.** Prompting was defined as any instruction, assistance, reminder, or cue given by the teacher, teacher aide, or adult volunteer to direct the student’s attention to the task, work system, or schedule, consisting of (a) verbal instructions, (b) using his name, (c) gesturing or pointing, (d) touching the student, (e) touching or tapping his chair or desk, (f) showing him a visual cue, (g) using proximity to direct his attention (i.e., moving to stand within 1 metre of his desk), or (h) using hand-over-hand guidance. Teachers were not given any instructions regarding prompting. When prompting was recorded, a distinction was made between prompts directed specifically to the student (e.g., those using the student’s name) or in response to the student engaging with the teacher (e.g., answering the student’s questions), and prompts made more generally to the whole class (e.g., whole-class instruction). Only prompts directed toward, or responding to, the student were taken into account.

**Words written.** Where it was possible to accurately count the number of words written by students engaged in writing tasks, totals were recorded. For the students engaged in writing tasks, samples of writing were collected by either photographing or photocopying students’ work and calculating the amount of writing completed during activities in baseline and intervention phases. It was not possible to make an accurate count of the number or words written for each student during every session. Some writing tasks went for more than one session and it was not always clear how many words the student added during a particular lesson and, in some cases, students put away undated work before it could be photographed.

**Social validity.** Teachers and students were asked to complete a survey which was emailed to them at the end of the intervention phase. The survey included questions asking teachers about how effective they felt the strategies described in the workbook were, how
easy visual schedules and work systems had been to implement, how motivated and independent their students were in using these strategies, whether they would recommend the strategies to other teachers, and how useful the workbook format had been. In addition, the first author interviewed the students to ascertain how they felt about using visual schedules and work systems, how easy they had found visual schedules and work systems to use, and how helpful they felt these strategies had been. This interview was structured using a survey with set multiple choice responses, and was conducted by taking the student out of class at a time convenient to the student and his teacher.

**Reliability**

Reliability of coding was measured with a second observer who had been trained in the data-collection methods used during a pilot study preceding this study. The second observer was provided with written instructions regarding the dependent variables and a sheet for recording observations which was identical to that used by the first author. Observations were made with both observers sitting near each other at the back or side of the classroom, using a shield to prevent either one from seeing the other’s recording. A second pair of earphones was used with both observers listening to the audio track simultaneously. Reliability was calculated for 27% of sessions observing James, 27% of sessions with Aaron, 27% of the observations of Edward, and 33% of sessions observing Sam. The percentage of intervals in which both observers were in agreement was above 87% for all measures.

**Fidelity**

Fidelity was measured by the first author during classroom observations using the same 12-point implementation checklist that was included in the workbook. The checklist was based on the defining elements of both visual schedules and work systems, and included items such as, “The target student has an individual schedule” and, “The activity or lesson is broken down into a number of tasks/task steps which clearly indicate: a) what the students
have to do, b) how much they have to do, c) how to know they are finished, d) what to do next.”

For each session, the first author checked off items for which there was visual evidence and the number of checked items was calculated as a percentage. As the checklist was divided into two separate sections for visual schedules and work systems, in Edward’s class, where observations were made during a class with a different teacher, the section for visual schedules was checked off in consultation with the classroom teacher, while the section for work systems was checked during the specialist subject classes.

**Analysis**

Data were initially analysed visually to identify changes in level, variability, trend, overlap, intercept gap, and consistency across phases (Vannest & Ninci, 2015). In addition, the Tau-U method of analysis was also used to quantify the change between baseline and intervention as it provides a way of calculating non-overlap of data while controlling for baseline trends, and is considered suitable for small data sets (Parker, Vannest, Davis, & Sauber, 2011; Vannest & Ninci, 2015). Benchmarks for effect sizes in Tau-U are such that a change of less than .20 is considered small, .20-.60 signifies a moderate change, .60-.80 can be deemed a large effect, and over .80 would be regarded a very large change (Vannest & Ninci, 2015).

**Results**

James, Aaron, and Edward were each observed for six baseline sessions and baseline observations for Sam covered five sessions. James was observed for eight sessions during the intervention phase, Aaron for five, and both Edward and Sam for four. A maintenance probe was also conducted in James’ classroom, something that was not possible in other classes due to the end of the school year. A summary of the statistical analysis of the results is presented in Table 2.
On-task Behaviours

As presented in Figure 1, a change in on-task behaviour from baseline to intervention was evident for all four children. James’ baseline data reflected some variability in the way he behaved during the selected task. His teacher reported that his engagement with classroom activities was often impacted, not only by his level of interest in the activity, but also by events earlier in the day. Nevertheless, the average percentage of intervals in which James engaged in on-task behaviours increased from a mean of 20% intervals (range of 5%-36%) during baseline to 53% (range of 29%-79%) during intervention, representing a large, statistically significant effect (Tau-U = .6458, \( p = .045 \)). However, during the maintenance probe session, the percentage of intervals during which James was on task fell to 8%.

Table 2. Tau-U Calculations for Dependent Variables

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>James</th>
<th>Aaron</th>
<th>Edward</th>
<th>Sam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tau-U</td>
<td>p</td>
<td>Tau-U</td>
<td>p</td>
</tr>
<tr>
<td>On-task behaviours</td>
<td>.6458</td>
<td>.0454</td>
<td>.8333</td>
<td>.0225</td>
</tr>
<tr>
<td>Off-task behaviours</td>
<td>-.3958</td>
<td>.22</td>
<td>-.3667</td>
<td>.3153</td>
</tr>
<tr>
<td>Teacher prompting</td>
<td>.0208</td>
<td>.9485</td>
<td>-.2333</td>
<td>-.5228</td>
</tr>
<tr>
<td>Words written</td>
<td>.7857</td>
<td>.0184</td>
<td>1.5</td>
<td>.0015</td>
</tr>
</tbody>
</table>
Figure 1. Percentage of intervals in which students were observed engaging in on-task behaviours.
Aaron started the term with a relatively high level of on-task behaviour. His teacher described this as out of character for him, and possibly an effect of returning from holidays with lowered levels of anxiety. The average percentage of intervals during which Aaron engaged in on-task behaviours was 40% (range 19%-80%) during baseline, increasing to a mean of 60% (range 47%-68%) during intervention. This represented a large, statistically significant effect (Tau-U = .8333, p = .0225).

Edward’s on-task behaviour demonstrated the clearest difference between baseline and intervention phases, and there was a period prior to the introduction of the intervention where he refused to take part in the specialist lessons altogether (no data were taken during these lessons). The average percentage of intervals during baseline was 9% (range 0%-26%) and this rose to 65% (range 57%-78%). The effect size was very large, and statistically significant (Tau-U = 1.25, p = .004). The average percentage of intervals during which Sam demonstrated on-task behaviours was 61% during baseline (range 37%-90%), rising to 86% (range 85%-90%). This constituted a moderate effect size, but was not statistically significant (Tau-U = .35, p = .3913).

Off-task Behaviours

The difference between baseline and intervention phases for off-task behaviours was not as clear as for on-task behaviours (see Figure 2). James had an average percentage of intervals with off-task behaviours of 58% during baseline and 43% during the intervention (with ranges of 46%-84% and 19%-63%). This represented a moderate, but not statistically significant, effect (Tau-U = .3958, p = .22). Aaron’s off-task behaviours occurred in an average of 40% of intervals (range 14%-72%) during the baseline phase, and 23% (range 0%-57%) during the intervention. This was calculated to be a moderate effect size, but, again, was not statistically significant (Tau-U = -.3667, p = .3153).
Figure 2. Percentage of intervals in which students were observed engaging in off-task behaviours.
The mean number of intervals in which Edward engaged in off-task behaviours during baseline was 65% (range 0%-92%) and this fell to 22% (range 41%-65%) after the intervention was introduced. This was a large effect size, but not statistically significant (Tau-U = -.7917, \( p = .1098 \)). Sam’s off-task behaviours were low in baseline and did not show change in the intervention phase (Tau-U = .1). The average percentage of intervals in which Sam was off task was 26% (range 7%-32%) in baseline and 25% (range 7.5%-39%) during the intervention. Statistically, this difference was not significant \( (p = .8065) \).

**Teacher Prompting**

As can be seen in Figure 3, the percentage of intervals in which teachers prompted each of the students did not show any significant change between the baseline and intervention phases. James, for whom the intervention ran the longest, initially received more prompting from his teacher followed by a decrease in prompts. Overall, this was not statistically significant (Tau-U = .0208, \( p = .9485 \)). Aaron’s teacher demonstrated only a slight change in prompting levels, but this was not statistically significant (Tau-U = -.2333, \( p = .5228 \)). Edward received a moderate, but not statistically significant, increase in prompting during the intervention phase (Tau-U = .4167, \( p = .2864 \)). However, his class had a substitute teacher for the last two lessons in the intervention phase, and differences in teaching style may have had an impact on the data. For Sam, there was no discernible difference in teacher prompting before and after the intervention, and this was borne out in statistical analysis (Tau-U = 0, \( p = 1 \)).
Figure 3. Percentage of intervals in which teachers prompted or responded to each student.
Words Written

Both James and Aaron recorded large and statistically significant increases in productivity (see Figure 4). The average number of words James wrote during an observation session before the intervention was 36 (range 0-68) and after the intervention it was 77 (range 41-148, Tau-U = .7857, p = .0184). Aaron wrote an average of 37 words (range 10-72) in baseline sessions, and 105 (range 78-121) in sessions after the intervention (Tau-U = 1.5, p = .0015). In contrast, Sam’s word count went down slightly with the average falling from 98 (range 40-144) to 90 (range 86-98). While this represented a moderate change, it was not statistically significant (Tau-U = -.6667, p = .1904). Edward’s class was not consistently engaged in writing tasks during the observations, as this was not an activity performed by students during the specialist lessons, and so no data on words written were available.
Social Validity

Teachers were surveyed to ascertain their opinions regarding the ease of use of visual schedules and work systems, whether they helped their students on the spectrum stay on task and transition between tasks, and whether they would recommend these strategies to other teachers and as a whole-class approach. Five teachers were surveyed, as this included both Edward’s classroom teacher and the specialist teacher. All teachers reported feeling that

Figure 4. Number of words written by students engaged in writing tasks in each session.
visual schedules and work systems were either very helpful or somewhat helpful in their classrooms, and all teachers reported that they were very easy or somewhat easy to implement. Several teachers did, however, flag having sufficient time and/or resources as a potential difficulty. Responses were more mixed on questions regarding student motivation to use visual schedules and work systems, and their independence in using these strategies.

Three of the teachers noted that they perceived that the students in the study were sometimes unmotivated and two of the teachers reported that the students were only sometimes independent. Four of the five teachers indicated that they would strongly recommend these strategies to other teachers and for use with other students, and the fifth teacher would be likely to recommend them in both cases. Four of the five teachers would be either likely to recommend, or strongly recommend, visual schedules and work systems as a whole-class approach and one teacher was neutral on the matter.

Student survey responses were mixed. James reported that he did not like using the visual schedule; however, at the end of the interview he explained that his feelings were due to the visual schedule changing (to accommodate end-of-year activities) without the schedule being updated. He selected a positive response (I love it) when asked how much he liked using a work system. James reportedly found both visual schedules and work systems easy to use and somewhat helpful. Aaron’s teacher involved the students in copying down and maintaining their own schedules and work systems. Aaron reported neutral feelings about using the strategies saying that he didn’t like to write things down. He reported finding both visual schedules and work systems easy to use and, while he claimed that he did not find visual schedules helpful, he found work systems of some help.

Edward claimed that he barely used a schedule, but this was at odds with his teacher’s reports of his behaviour. He did say that, despite his negative feelings, he preferred having a work system in place to not having one. Sam’s interview responses were, in contrast,
consistently positive, indicating that he found both visual schedules and work systems very easy to use and very helpful.

Fidelity

Intervention fidelity was scored using the 12-point implementation checklist provided to teachers and calculated as a percentage (see Figure 1). James’ teacher implemented the intervention with a mean fidelity of 65% (range 50%-83%). For the first three sessions after the intervention was initiated, the teacher did not yet have individual visual schedules made up and fidelity was scored at 50% for each session. Implementation fidelity in Aaron’s class was calculated to be 77% on average (range 75%-83%). Edward’s teachers implemented the intervention with a mean fidelity of 69% (range 58%-83%), and, in Sam’s class, mean fidelity was 79% (range 75%-83%).

Discussion

The primary hypothesis of this study was that the implementation of visual schedules and work systems would have the effect of increasing students’ on-task behaviours. Indeed, the data did indicate an increase in on-task behaviours for all students after teachers implemented the strategies described in the workbook. A positive effect on on-task behaviour is consistent with findings of previous studies that have examined the effects of work systems (Hume & Odom, 2007; Mavropoulou et al., 2011; O’Hara & Hall, 2014). In this study, however, this effect has been observed in a mainstream classroom with the intervention implemented by classroom teachers, thus extending the findings of previous research. The findings of this study suggest that the success of these strategies in controlled environments may translate to applied settings and that offering mainstream teachers information on the use of these strategies can lead to positive outcomes for students on the spectrum.

The second hypothesis of the study was that the intervention would result in a decrease in off-task behaviours. However, no statistically significant effect was detected.
While it may seem intuitive that a decrease in off-task behaviours would occur as on-task behaviours increase, the operational definitions of each set of behaviours were different and the relationship between them more complicated. With the use of partial interval recording, it was possible for a student to have brief periods of on-task and off-task behaviours during the same interval. Coding for off-task behaviours also did not include time the students spent sitting at their desks without being engaged in any activity, as there was no way to tell whether they were in fact engaged in on-task thought processes. It is possible that the increase in on-task behaviours saw a corresponding reduction in time spent unsure of what to do or distracted by other thoughts, while behaviours considered off task may have served other purposes (e.g., fulfilling a need for sensory stimulation). Additionally, off-task behaviours, coded as they were to include both generic disruptive behaviours as well as individualised behaviours, did not distinguish between those behaviours that might be considered extreme (e.g., throwing items or walking out of class) and those that could be thought of as minor distractions (e.g., talking to a neighbour). Off-task behaviour may have a variety of possible triggers unrelated to specific classroom activities and not addressed by teaching strategies in isolation. The lack of change in this measure may indicate the need for a more comprehensive approach to supporting students on the spectrum in mainstream classes. While off-task behaviours did not decrease, neither was there a rise in these behaviours during the intervention despite the fact that the study ran close to the end of the year when disruptions can have a large impact on student behaviour.

The third hypothesis of the study was that increases in student independence would be reflected in a reduction in the need for prompts from teachers. Other studies investigating the use of work systems with school-aged children have used teacher/adult prompting as a measure of student independence (Hume & Odom, 2007; Hume et al., 2012; Mavropoulou et al., 2011). This study attempted to replicate this approach while capturing the natural
prompting behaviour of teachers in mainstream classrooms. The relationship between student behaviour and teacher prompting is, perhaps, informative in an environment where the student has an adult’s undivided attention, or where experimental conditions can be put in place to determine when prompting will occur. In a mainstream class, however, where there are potentially a large number of students requiring attention from the teacher at any time, the relationship might not be so direct. It may be for this reason that, unlike other, similar studies (Hume & Odom, 2007; Hume et al., 2012; Mavropoulou et al., 2011), this study did not reveal any association between the introduction of visual schedules and work systems and the number of prompts students received from the teacher. Prompting was recorded to be at relatively low levels in baseline for two of the students, suggesting that, possibly, other demands on the teachers’ attention in the classroom environment may have affected the result. Having a primary focus on natural prompting levels, and selecting teachers with high levels of prompting at baseline, or a specific interest in reducing prompting, would, perhaps, provide a way of assessing whether the reduction in prompting observed in other studies would translate into a reduced need for teacher prompting in the classroom.

The fourth hypothesis tested in this study was that student productivity would increase with the introduction of the intervention. For James and Aaron, the introduction of visual schedules and work systems corresponded with an increase in the amount they wrote during the writing activity. For Sam, there was no increase. His teacher, however, used the work system, in part, to direct him to check and edit his work, and there may have been a corresponding improvement in the quality of his writing that was not measured during this study. Hume et al. (2012) are alone in focussing on the effect of work systems on the accuracy, and thus the quality rather than simply the quantity, of student work with their examination of task steps completed correctly, and they identify improvements in this area as an important part of independent learning.
Although teachers selected activities involving writing as the context for the intervention for three of the four students, it is important to reiterate that the intervention was designed to support on-task behaviour, not to develop writing skills. To this end, no attempt was made to evaluate such things as the content or complexity of the students’ work. Further research into writing interventions for students on the spectrum is warranted (Delano, 2007; Pennington & Delano, 2012), and it is possible that adapted work systems could be effective in this regard. Broader educational applications of these strategies are something future research could continue to explore (Howley, 2015).

**Social Validity**

As described earlier, teacher feedback on the intervention was largely positive, although indicating that approaches further addressing teachers’ lack of time and resources would be helpful. Student feedback, however, was mixed, and in some cases directly contradicted teacher reports. The issues experienced by the students – unreliable schedules, the perception of extra work (in particular, handwriting), and the possible impact of the interviews themselves interrupting scheduled classroom activities – are all things that the strategies described in the workbook could be used to address. The students’ responses suggest areas in which information for teachers regarding visual schedules and work systems could better target the needs of students on the spectrum. A focus on ensuring the reliable and consistent implementation of the strategies and the provision of alternatives to handwriting, which research suggests is a challenge and a concern for many students on the spectrum (Kushki, Chau, & Anagnostou, 2011; Saggers et al., 2015), could improve the acceptability of these strategies for students on the spectrum.

**Limitations**

There are well-documented challenges and limitations inherent in conducting experimental research in mainstream classrooms where it is difficult to achieve high levels of
control (Berliner, 2002; Brown, 1992; Collins, Joseph, & Bielaczyc, 2004; Sandoval & Bell, 2004). As Brown (1992) has noted, the move to more ecologically valid educational settings involves a “trade-off between experimental control and richness and reality” (p. 152). In this study, time constraints were problematic, affecting the number of possible baseline observations and the feasibility of conducting maintenance probes in three of the four classes. Additionally, Sam was late in joining the study, and so his baseline observations did not begin until after the intervention was started with James. Contrasts with baseline and intervention between Sam, Aaron, and Edward do, however, indicate control. There is considerable “noise” in the classroom environment – such as interruptions to, or abrupt changes in, planned activities, as well as the sometimes unpredictable behaviours of other students – which can affect not only the rigour of research, but also the on-task behaviours of students on the autism spectrum. Fidelity was also an area where this study faced limitations. Allowing teachers the freedom to make decisions about how the strategies would be implemented introduced a certain amount of variability in the way visual schedules and work systems were interpreted and used. This involvement of teachers was, however, important to the study’s aim of evaluating these strategies in an ecologically valid way. As Kasari and Smith (2013) emphasise, this research in context is vital in developing interventions that can be implemented and sustained in real classrooms.

This study has provided preliminary evidence that visual schedules and work systems can have a positive effect on students’ on-task behaviour; however, in order to achieve some experimental control in the classroom setting, the scope of the study was necessarily limited to just one class or activity during the day. Following on from this research, a next step could be to gather feedback from teachers on the use of these strategies in different classes across the school day.
Conclusion

Visual schedules and work systems are simple strategies that are relatively easy to communicate to teachers and can be implemented by teachers in mainstream classes. Evidence from previous studies that these strategies can improve on-task behaviour in students on the autism spectrum appears to have been replicated here under real mainstream classroom conditions. There is, however, a need for further research to explore other possible uses and effects, and to refine the delivery of information for teachers.
References


Graham Child Development Institute, Autism Evidence-Based Practice Review Group.
Chapter 7: Utilisation

Statement of contribution to co-authored published paper

This chapter includes a co-authored paper. The bibliographic details/status of the co-authored paper, including all authors, are:


My contribution to the paper involved:

Research design in collaboration with the project team, the collection of interview data, data analysis in collaboration with the project team, and writing the first draft of the manuscript.

(Signed) _________________________________ (Date) __11/07/17___________
Elizabeth (Libby) Macdonald

(Countersigned) ___________________________ (Date) __13/07/17___________
Corresponding author of paper: Prof Deb Keen

(Countersigned) ___________________________ (Date) __13/07/17___________
Supervisor: Prof Deb Keen
Running header: Mainstream teachers’ responses

Examining mainstream teachers’ responses to an intervention for students on the autism spectrum to facilitate implementation

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Acknowledgements

The authors acknowledge the financial support of the Cooperative Research Centre for Living with Autism (Autism CRC), established and supported under the Australian Government’s Cooperative Research Centres Program. This work was also supported by the Griffith Institute for Educational Research. David Trembath is supported by a NHMRC ECR Fellowship (GNT1071811).
Abstract

A number of studies have demonstrated visual schedules and work systems to be effective in assisting students on the autism spectrum to stay on task and work independently in special-education settings. However, evidence of effectiveness does not ensure a timely implementation of interventions in real-world contexts. The translatability of interventions depends to a large extent on their contextual fit and how they are perceived by those who will use them. This mixed-methods study examines mainstream teachers’ responses to an information toolkit outlining the use of visual schedules and work systems as inclusive, whole-class practices. While teachers regarded the toolkit positively, their responses also offer insights into potential barriers to implementation.

Keywords: Autism spectrum disorder, implementation science, work systems, visual schedules, mainstream classrooms, teachers
Examining mainstream teachers’ responses to an intervention for students on the autism spectrum to facilitate implementation

Students on the autism spectrum can face significant challenges in accessing formal education. Accordingly, researchers have investigated interventions that may potentially support these students, resulting in the identification of a number of evidence-based practices (National Autism Center, 2015; Wong et al., 2015). However, there is a widely acknowledged lag in the translation of evidence-based practices, as identified by researchers, to real-world settings (Cook & Odom, 2013; Dingfelder & Mandell, 2011; Kasari & Smith, 2013), with some estimating the delay in the implementation of educational interventions to be 20 years or more (Dingfelder & Mandell, 2011; Walker, 2004). For mainstream education teachers, whose time and resources may be scarce, there may be limited opportunities to seek out research findings. In addition, knowledge of evidence-based practices alone may be insufficient to ensure implementation, with many potential barriers to using practices that have been devised and tested in clinical environments (Kasari & Smith, 2013). There is, then, a need for researchers to engage with teachers to find effective ways of exchanging information and to maximise the social and ecological validity of evidence-based practices (Dykstra Steinbrenner et al., 2015; Parsons et al., 2013).

In order to address this need to maximise social and ecological validity, this study examined teachers’ views regarding an intervention designed to support students on the spectrum to stay on task in mainstream settings. The staying on task has been identified as a particular challenge for students on the spectrum (Ashburner, Ziviani, & Rodger, 2010), and it is believed they may benefit from interventions that support executive functioning (Hill, 2004; Hume, Loftin, & Lantz, 2009). The present study was the utilisation phase of a project that had examined the use of two structured teaching strategies – visual schedules and work systems – as whole-class practices to support students on the autism spectrum to stay on task.
in mainstream settings. Following on from an earlier evaluation documenting the successful implementation of these strategies (Macdonald, Trembath, Ashburner, Costley, & Keen, under review), the current study examined teachers’ responses to the information package used in the previous study, and involved collecting feedback through an online survey and follow-up interviews. The overall objective of the current study was to work towards bridging the research-to-practice gap by engaging with teachers to ensure the strategies described in the package were regarded as practical and helpful for everyday use, and that the package itself was an effective way to communicate information to teachers prior to its distribution in the community. Not only did this study elicit constructive feedback from individual teachers, but it also provided an opportunity to gain further insights into the complexities of the implementation process.

**Visual schedules and work systems**

Visual schedules and work systems have been used since the 1970s as part of the structured teaching approach associated with the Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) program (Carnahan, Harte, Schumacher, Hume, & Borders, 2011; Mesibov, Howley, & Naftel, 2016). Visual schedules, which help to orient students by providing a visual representation of a sequence of events (e.g., a timetable), have been researched extensively and have been shown to have a positive impact on on-task behaviours and transitioning between activities (Knight, Sartini, & Spriggs, 2014; Lequia, Machalicek, & Rispoli, 2012). Work systems visually break down tasks into elements allowing students to see what to do, how much there is to do, how to know they are finished, and what to do next (Howley, 2015). Work systems have been the focus of only a small number of studies involving school-aged children (Hume & Odom, 2007; Hume, Plavnick, & Odom, 2012; Mavropoulou, Papadopoulou, & Kakana, 2011; O'Hara & Hall,
2014) but, like visual schedules, have been shown to increase on-task behaviour and productivity.

These structured teaching strategies can be adapted to a mainstream classroom setting (Hume, 2015; Hume, Sreckovic, Snyder, & Carnahan, 2014; Mesibov et al., 2016), and many teachers may already use elements of this sort of visual structure throughout the day. However, published research on their use in supporting students on the autism spectrum in mainstream classrooms is scant. The study preceding this one evaluated the implementation of visual schedules and work systems by classroom teachers using a whole-class approach and found they had a positive impact on the on-task behaviours of students on the spectrum (Macdonald et al., under review). This study used a workbook (Haas, 2015) that was later adapted to become a professional development package called \textit{Finished! The On-task Toolkit}. While there was preliminary evidence for the effectiveness of the package, the need to address the potential research-to-practice gap required an examination of its broader application in classrooms outside of controlled research conditions, with diverse students undertaking various activities. Observations during the previous study were restricted to particular times and contexts and the instructions given to teachers were specific to the task observed. Given that structured teaching strategies might be useful throughout the school day, and may be instrumental in helping to lower anxiety in general, further research is warranted to determine the utility and social validity of the toolkit.

Both Howley (2015) and Knight et al. (2014), in reviewing the literature on structured teaching and visual schedules, identified a lack of measures showing generalisation to other contexts as a limitation in many studies. In both cases, the authors also noted the need for a deeper investigation of social validity. While many studies have included a social validity measure, these are generally limited in scope and number of participants (Howley, 2015). In conducting research with the aim of producing findings that translate into real-world
implementation, taking into account the views and experiences of intended users is crucial (Dingfelder & Mandell, 2011; Parsons et al., 2013).

**From research to implementation**

Dearing (2009) provided a “top 10” list of mistakes that are made in the dissemination of social science research. The first is the common assumption that the evidence provided by researchers is central to whether or not a practice is adopted. Dearing (2009) listed variables such as compatibility, simplicity, and cost as examples of other factors influencing whether an intervention is adopted or not. For teachers, there are many potential barriers to implementing new evidence-based practices. The pressures of time, workload, and limited training or resources may all negatively impact the uptake of research findings (Forlin, 2001; Forlin, Keen, & Barrett, 2008; Kyriacou, 2001). Discourse on the research-to-practice gap in autism and special education invariably leads to recommendations that researchers communicate, collaborate, or engage with teachers to ensure that research outcomes are relevant and useful in classroom contexts (Dykstra Steinbrenner et al., 2015; Kasari & Smith, 2013; Parsons et al., 2013).

Engaging with teachers to ensure the translation of research into sustainable practice was a primary concern of this study. The aim of the study was to explore the views of mainstream primary school teachers on the use of visual schedules and work systems as described in *Finished! The On-task Toolkit*, and to obtain their feedback on its utility in assisting teachers to implement these strategies in their classrooms. Specifically, the questions this study aimed to address were:

- How did teachers interact with the toolkit?
- What were their views on the toolkit itself?
- What were their views on implementing the strategies described in the toolkit?
• Did their knowledge of, and confidence using, visual schedules and work systems change after reading the toolkit?
• What were the experiences of those who did go on to implement the strategies?

**Method**

**Study Design**

A mixed-methods approach was used across two phases in the current study. In Phase 1, a two-part survey was used to assess teachers’ responses to *Finished! The On-task Toolkit* and the strategies it outlines. In Phase 2, a qualitative case-study approach was used to obtain further feedback about the use of the strategies outlined in the toolkit, and to capture the complexity and richness of the classroom experience implementing it (Yin, 2014). Teachers who had participated in Phase 1 were invited to implement the strategies outlined in the toolkit and participate in semi-structured interviews about their experience.

**Ethical clearance**

Ethics approval for the study was granted by the University of Queensland ethics committee (No. 2013001446). Approval was also obtained from relevant educational authorities and, where required, from other groups involved in the distribution of survey information.

**Phase 1**

**Participants**

Forty-one Australian primary school teachers with between one to 35 years of experience agreed to participate and commenced the online survey. All 41 completed Part 1 of the survey with 22 going on to complete Part 2.

**Materials**

*Finished! The On-task Toolkit* (Macdonald & Haas, 2016) consisted of four sections that included information and guidance for implementation: (a) background information
about structured teaching, (b) key information about using structured teaching strategies in mainstream classrooms, (c) information about visual schedules, and (d) information about work systems. Included were links to online resources and videos, templates for daily timetables and checklists, pull-out “at a glance” fact sheets about the strategies, and an implementation checklist.

**Online survey.** The survey was conducted using SurveyMonkey Premium. The two parts were linked using the participants’ email addresses, which were later removed to de-identify data prior to analysis. The survey was designed to assess teachers’ engagement with, and response to, the toolkit, their views on the strategies it described, and changes to their knowledge and confidence with respect to visual schedules and work systems after viewing the toolkit. The survey included multiple choice and open questions, but, for the most part, used 7-point Likert scale questions. Part 1 collected participants’ demographic information, asked them about teaching strategies that they currently used, and recorded their knowledge of, and confidence using, both visual schedules and work systems. Part 2 of the survey recorded information about the way in which teachers responded to the resource itself – that is, whether they read each section or followed links to other information, whether they thought the resource was useful, and, although survey respondents were not asked to implement anything in their classrooms, whether they believed the strategies themselves would be useful. Teachers were also asked to rate their knowledge and confidence regarding visual schedules and work systems since viewing the toolkit.

**Procedure**

A flyer with information about the survey was distributed to teachers through a number of professional organisations, teachers’ unions, and through social media. The flyer and participant information were also distributed through government schools in several states, and Catholic and independent schools. Teachers wishing to participate were then sent
a link to Part 1 of the survey. On completion of Part 1, participants were given a link to Dropbox where they were able to download a digital copy of *Finished! The On-task Toolkit*. After a minimum of 2 weeks to allow them time to review the package, teachers were emailed a link and asked to complete Part 2 of the survey.

**Data analysis**

Data were downloaded from SurveyMonkey™ (www.surveymonkey.com) into the Statistical Package for the Social Sciences (SPSS; IBM Corp, Released 2016) where responses were de-identified. Descriptive analysis was used to assess teachers’ responses to the toolkit, and views about the usefulness of the strategies. The Wilcoxon signed rank test was used to make a comparison between questions in Part 1 and Part 2 which asked participants about their knowledge of visual schedules and work systems, and their confidence using these strategies.

**Phase 2**

**Participants**

Teachers who had completed Part 2 of the survey were invited to indicate an interest in participating in follow-up qualitative interviews. Of those who responded positively, four teachers who were covered by ethical approval for this phase agreed to participate. All of the teachers worked within government schools, three taught Year 1 classes (the second year of formal education), and the other was a special education teacher working with students in different year levels within a mainstream school. Demographic information relevant to the study are presented in the following qualitative vignettes that capture their experiences.

**Procedure**

Participants were familiar with the toolkit from completing the survey, and some had already begun either to implement the strategies in their classes, or to reflect on similar strategies that they had already put in place. They were given a further 3 weeks to trial the
structured teaching strategies in their classrooms prior to interview. The interviews were semi-structured and ran from 38 minutes to 75 minutes. Participants were asked for information about the classes they taught, the strategies they were already using, how they implemented the strategies described in the toolkit, how their students responded, and what they thought about using the strategies. They were also asked for feedback on the toolkit itself and how it could be further developed and disseminated. Interviews were all conducted over the telephone and, with the participants’ permission, recorded for analysis.

Data analysis

Halcomb and Davidson (2006) suggest that due to the technical difficulties associated with transcription and its role in generating meaning, the need for verbatim transcription of interview data should be questioned. In alignment with this perspective, complete transcripts of the interview recordings were not used in this study. Following the process Halcomb and Davidson (2006) outline, field notes were made during the interviews and revisited with subsequent reviewing of the recordings. The content of each interview was organised according to the same thematic structure, addressing the teacher’s implementation of visual schedules, their implementation of work systems, their views on how these might work as whole-class or inclusive practices in mainstream classrooms, and feedback and recommendations regarding the toolkit itself. Transcriptions were made of salient quotes and illustrative points. The participants’ accounts were summarised in a short, narrative vignette form, as suggested by Yin (2014) for the purpose of combining multiple cases in a mixed-methods design. This narrative approach to interpreting interview data necessarily involves the cocreation of meaning through the interaction of participant and interviewer (Polkinghorne, 2007). However, a substantial length of time was devoted to each interview to ensure that the resulting understanding of participants’ views and experiences had validity.
Phase 1 Results

Survey Respondents

Teachers who volunteered to take part in the survey generally had experience with students on the autism spectrum, and had some professional training in this area. Only four of the 41 teachers who completed Part 1 of the survey had no training relevant to teaching students on the spectrum. School-based professional development had been available to 26 of the teachers, 21 had participated in on-line training, 15 reported attending workshops, and 15 had attended conference sessions. The extent of the teachers’ professional knowledge was reflected in the practices that they already had in place to support students on the spectrum, with 28 participants explicitly listing visual schedules or timetables. Four teachers mentioned task analysis, or breaking down tasks, and two more were using approaches based on the TEACCH program. Other popular strategies included timers, sensory interventions, social stories, and other visual supports. When asked to indicate how challenging their students on the spectrum found transitioning, staying on task, and working independently, 37 rated transitions to be somewhat challenging to very challenging, 38 reported that staying on task was somewhat to very challenging, and 37 said working independently was somewhat to very challenging.

Teachers’ response to the toolkit

Of the 22 teachers who went on to complete the second part of the survey, three had not read the toolkit and were excluded from further analysis. Two of the 19 remaining did not read the toolkit in its entirety. More than half of the teachers did, however, follow links provided in the toolkit to access further information.

When asked to rate on a 7-point scale (1= very difficult, 4 = neither difficult nor easy, 7 = very easy), most respondents indicated that they found all four sections of the toolkit easy, or very easy, to follow (mean = 5.95 – 6.37). Respondents were also asked to rate how
useful they found different elements of the toolkit on a scale of one to seven (1 = not useful at all, 4 = somewhat useful, 7 = very useful). Apart from a single outlier in a few cases, respondents indicated that the different elements of the toolkit were somewhat to very useful (see Table 1).

Table 1. How Useful were Elements of the Toolkit?

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<th>Mean</th>
<th>Median</th>
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<td>4^a</td>
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<td>18</td>
<td>5.56</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Links to videos</td>
<td>18</td>
<td>5.44</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Instructions on how to implement visual schedules</td>
<td>19</td>
<td>5.84</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Instructions on how to implement work systems</td>
<td>19</td>
<td>5.95</td>
<td>6</td>
<td>6^a</td>
</tr>
<tr>
<td>Examples of visual schedules</td>
<td>19</td>
<td>5.84</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Examples of work systems</td>
<td>19</td>
<td>5.95</td>
<td>6</td>
<td>6^a</td>
</tr>
<tr>
<td>Templates for implementing visual schedules and work systems</td>
<td>19</td>
<td>5.90</td>
<td>6</td>
<td>6^a</td>
</tr>
<tr>
<td>Pull-out &quot;at a glance&quot; information sheets</td>
<td>19</td>
<td>5.74</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Implementation checklist</td>
<td>19</td>
<td>5.74</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

a. Multiple modes exist. The smallest value is shown
Teachers’ views on the strategies described in the toolkit

The strategies were considered to be useful and easy to implement by most of the teachers; however, visual schedules were regarded more favourably than work systems, with 15 respondents saying that they would be very likely to use visual schedules compared to eight who said they would be very likely to use work systems (see Table 2).

Table 2. Usefulness and Useability of Visual Schedules and Work Systems

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived usefulness in teaching your student on the spectrum (1 = not at all useful, 4 = somewhat useful, 7 = very useful):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual schedules or timetables</td>
<td>19</td>
<td>6.21</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Work systems</td>
<td>19</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td><strong>Perceived usefulness in teaching other students in the class:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual schedules or timetables</td>
<td>19</td>
<td>6.42</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Work systems</td>
<td>19</td>
<td>5.74</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td><strong>How easy would it be to implement (1 = very difficult, 4 = neither difficult nor easy, 7 = very easy):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual schedules or timetables?</td>
<td>19</td>
<td>6.42</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Work systems?</td>
<td>19</td>
<td>5.42</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>How likely would you be to use (1 = not at all likely, 4 = somewhat likely, 7 = very likely):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual schedules or timetables?</td>
<td>19</td>
<td>6.63</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Work systems?</td>
<td>19</td>
<td>5.74</td>
<td>6.5</td>
<td>7</td>
</tr>
</tbody>
</table>
Changes in teachers’ knowledge and confidence

The survey asked teachers to rate their knowledge of, and confidence using, visual schedules and work systems, before and after reading the toolkit. As presented in Table 3, there was a non-significant increase in teachers’ self-reported knowledge regarding visual schedules and work systems after reading the toolkit. There was a statistically significant increase in teachers’ self-reported confidence in using visual schedules \((Z = -2.543, p = .011)\), and the improvement seen in confidence in using work systems was also statistically significant \((Z = -2.708, p = .007)\).

Table 3. Wilcoxon Signed Rank Test of Knowledge and Confidence

<table>
<thead>
<tr>
<th></th>
<th>Before reading toolkit</th>
<th>After reading toolkit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Median</td>
</tr>
<tr>
<td>Knowledge of visual schedules</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>Knowledge of work systems</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>Confidence using visual schedules</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>Confidence using work systems</td>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>

Wilcoxon Signed Ranks Test

Based on negative ranks.

* Represents significant difference \((p < .05)\)
Phase 2 Results

The following four case-study vignettes describe the reported experiences of teachers who trialled the strategies described in the toolkit, and their views on its implementation. Names used are all pseudonyms. All four teachers had completed the survey and were recruited to trial the toolkit during the last term of the school year. Interviews took place at the end of the school year.

Case study one

Kathy was a Year 1 teacher (second year of formal education) with a class of 25 students. She had one student with a diagnosis of autism who had gradually transitioned to mainstream schooling from an autism-specific setting by attending each setting part-time. He had difficulty in staying on task and with transitions and changes to his routine.

**Visual schedules.** Kathy reported that she had been using a daily timetable since the beginning of the year with some success. However, she claimed that the toolkit had enhanced her understanding of the strategy and led her to refine the way in which it was used. She said she had simplified what she was doing, used more visuals, and was relying less on giving verbal instructions, which she felt were not always taken in by her student on the spectrum. According to Kathy, the schedule helped her student, who was often non-verbal when stressed, become more talkative. “He would instigate conversation, which he hadn’t been doing,” Kathy reported. “Now he’s really much more verbal. He’ll ask questions about the timetable in the morning … or if something’s missing he’ll tell me.”

**Work systems.** Kathy said that she had previously tried using a work system similar to the ones used in the autism-specific setting, with just her student on the spectrum; however, he did not respond well to this. Kathy noted that he did not like being isolated from the other students and, although he required some modification to the classwork, he preferred to be working on the same curriculum. After reading the toolkit and linked information,
however, work system elements were incorporated into visual supports for the whole class such as a visual display that students could check at any time to know where they were supposed to be and what they needed for that activity.

**Whole-class implementation.** The inclusive, whole-class approach promoted in the toolkit worked well, Kathy reported. Visual schedules, she claimed, worked with all of the students. “All the children are more engaged,” she said. She noticed faster transition times for all students, and this was also beneficial for the student on the spectrum. Kathy observed, “What has been good for [the student on the spectrum] … those transitions are difficult for him, but the noise is less and the kids are quicker to get ready.” She would recommend these strategies to other teachers, she stated, and continue to use them even if she had a class without any students on the spectrum.

**Feedback and recommendations on the toolkit.** Kathy said that finding time to just read the toolkit was a challenge and that this could be an issue for teachers. As Kathy put it, “If I don’t have a need to know what you’re telling me, I’m not going to connect with it”. Kathy responded positively to the toolkit itself, noting that focusing on just the two strategies and basic information made it accessible to busy teachers. She suggested including examples of visual schedules and work systems for each year level, and signalled that she thought video modelling and further face-to-face professional development might be effective ways of communicating this approach to teachers. Kathy described herself as “not very techie” and reported that she was unsure about the idea of using technology to implement the strategies.

**Case study two**

Like Kathy, Trudy was a Year 1 teacher. She had two students with autism spectrum disorder (ASD) diagnoses in her class of 22.

**Visual schedules.** Trudy already used visual timetables in her classroom. She said she had taught students on the spectrum previously and was aware that visual schedules were
helpful for them, and for teaching in early childhood more generally. In the year of the current study, however, she had changed the way in which she was using schedules as she felt that her students on the spectrum required more consistency. While she had initiated these changes prior to receiving the toolkit, she subsequently reflected on the way in which she had implemented visual schedules. She made the schedule very simple “to keep the visual noise down” and, later in the year, she transitioned the class to written timetables, involving students in writing themselves. She said she found this valuable for reinforcing literacy skills.

**Work systems.** After reading the toolkit, Trudy had trialled work systems by breaking down tasks and found the approach useful. However, she reported that the strategy was not as helpful for her students on the spectrum as it was for the rest of the class. Work systems increased on-task behaviour in other class members, but she said her students on the spectrum were unsettled due to end-of-year changes to their routine. Trudy noted that one of those students had, however, constructed an individual work space for himself similar to those used in the TEACCH program.

**Whole-class implementation.** Trudy said she would have liked to create similar work spaces for other students, but did not have the room. In the new year, Trudy was intending to use these strategies as a whole-class approach regardless of whether she had students on the spectrum in her class or not. “All classes, regardless of age, should have some sort of visual cueing system and regardless of whether you have somebody on the spectrum or not,” she said.

**Feedback and recommendations on the toolkit.** Trudy noted the need for different resources for different age groups with students in the early years needing more support to learn the skills required to work independently. Classroom space was a challenge for Trudy, and an issue in her school more generally. Like Kathy, she reported holding conflicting views about the idea of implementing visual schedules and work systems using technology. “The
jury is still out with me,” she said. She suggested that information for parents would be useful, and web-based resources would be helpful, if principals and teachers were aware they were there. She suggested that it would be useful to have a place where teachers could share what they had done and what had worked well. Like Kathy, Trudy said she liked the idea of further professional development, noting that “it really needs to be part of our training at university”.

Case study three

Marie was also a Year 1 teacher with a class of 26 children. Three of her students were on the autism spectrum and she was anticipating having four students on the spectrum in her class the following year. She noted that the school where she taught had a reputation in the community for having a “good [special education] unit” and had a large number of students with identified support needs. She had also undertaken postgraduate study in autism.

Visual schedules. As with Kathy and Trudy, Marie was already using a whole-class timetable. She also employed other visual supports like colour coding of books, organising equipment, and using visual communication tools to help with emotional regulation. According to Marie, the positive effects of using a visual schedule were evident when it was changed or removed. “When you suddenly have to have a rush assembly and you don’t do the schedule … they get very anxious,” she observed.

Work systems. Marie had implemented further structure around classroom activities since receiving the toolkit. She reported following the links to further information and videos in the toolkit and becoming familiar with the TEACCH program. As she had a large double classroom, she was able to establish work systems using individual working areas with visually structured tasks.

Whole-class implementation. Marie found this approach successful in helping all of her students to stay on task and work independently. “The children were giving me
feedback,” she reported, “saying ‘nobody’s disturbing me and I can actually concentrate’”.

Work systems would become a part of Marie’s teaching practice, she claimed, whether or not she had students on the spectrum in her class.

Feedback and recommendations on the toolkit. The greatest challenge Marie faced in implementing the strategies described in the toolkit, she said, was sourcing equipment like the furniture and room dividers she used to make individual work spaces. However, she noted that there would have been ways to manage with limited resources. For other teachers, she thought, the barriers to using these strategies would more likely be related to a lack of training and a limited understanding of the needs of students on the spectrum. “There are still a group of teachers who don’t want to know about autism, and don’t want to make any changes for autism,” she said. Marie was enthusiastic about the idea of further face-to-face professional development on the use of the strategies outlined in the toolkit, “because people can ask questions, and teachers ask lots of questions”. She was positive about technology-based implementation as she reported that her class was well resourced with a set of iPads. However, she said she found the physical manipulation of materials more effective.

Case study four

In contrast to Kathy, Trudy, and Marie, Jenny was not a classroom teacher. She was a special education teacher in a mainstream primary school supporting students across all year levels. She worked mainly in the classroom, but withdrew students from the classroom at times when they needed a break. She worked with six students on the autism spectrum ranging from 5 to 10 years old.

Visual schedules. As she was not involved in the general running of the classroom, Jenny was not involved in implementing visual schedules, but she noted that most classrooms in the school did use them to some degree. Some of the children she worked with had
individual visual schedules that were used to provide structure to lunch breaks, and these worked well.

**Work systems.** Since receiving the toolkit, Jenny focussed on creating a work system for a Year 2 student on the spectrum who spent a large part of each day in the special education unit, and rarely did any work. Jenny used a box with numbered folders to break down tasks, and initially used a reward of “free time” to motivate the student to use the system. After a while, the student reportedly stopped asking for the reward and started asking for more work to do. “He loved it because it was work that was … not too challenging for him,” Jenny said. She was conscious of making the system simple so that classwork, differentiated by the teacher, could be used. “It had to be something, obviously … that the teacher could eventually implement,” she said.

**Whole-class implementation.** Jenny aimed to continue using work systems as a way to facilitate inclusion of the students she was supporting in the mainstream classrooms. Previously, Jenny said, the unit was used mostly for withdrawal with students spending hours there each day. “The teachers at this school, some teachers, were very good at differentiating, but were made to feel that they weren’t in charge of the ASD kids, or the verified kids - that was SEP [special education program],” Jenny noted. The SEP had focussed on developing social and emotional skills and students were missing out on classwork. As Jenny put it, “SEP time was just play time”. Jenny viewed work systems as a useful tool for getting her students back in the classroom. “If you have a system like this in place, it does mean that you don’t have to spend so much time directing these students,” she said. “You can have them learning, you can have them doing work, and you don’t have to be babysitting them all the time.” Jenny thought that something similar to the work system she created could be used to scaffold learning for the class more generally, and said that she would recommend the use of
these strategies regardless of whether there were students in the class with diagnoses of autism.

**Feedback and recommendations on the toolkit.** The toolkit provided very good basic information, Jenny concluded. She liked being able to access further information following the links, but thought that the time needed to sit down and watch videos could be a barrier to teachers accessing the supplementary information. Jenny was of the opinion that special education support teachers such as herself were ideally placed to communicate these ideas to teachers, who often did not have time to research and develop resources. Having a way to share these ideas within the school would be helpful. Jenny felt that it was sometimes difficult to communicate with teachers who were working with other SEP staff. Jenny was enthusiastic about the idea of using technology to implement work systems in her school. Her suggestions for further development of the toolkit included providing some sort of information-sharing space for teachers (e.g., a blog, webpage, or a group email), where they could display what had worked for them. Workshop-style professional development, or school visits where the strategies could be demonstrated, would be very useful, she said, and could provide an opportunity to deliver more detailed information and show videos. “PD now and then would be great,” she remarked, “the teachers love it.”

**Discussion**

The present study sought to assess teachers’ views on *Finished! The On-task Toolkit*, and the strategies it outlines, to ensure that it can be a suitable resource for use by mainstream teachers to help support their students on the spectrum. While research into the strategies the toolkit describes has provided some evidence that they are effective, this does not ensure their translation to classroom practice. As McIntyre (2005) puts it, “the kind of knowledge that research can offer is of a very different kind from the knowledge that classroom teachers need to use” (p. 359). The findings of this study suggest that the toolkit itself may be well
regarded by teachers, and the strategies it describes may be considered useful. However, aspects of the study can be seen to highlight some of the challenges involved in translating research to practice, and indicate that providing teachers with further information and support may be helpful in facilitating the implementation process.

**Teachers’ responses to the toolkit**

Both the survey and the interviews aimed to discover, initially, how teachers interacted with the toolkit and their views on the toolkit itself. Teachers who provided feedback on the toolkit in Part 2 of the online survey were overwhelmingly positive in their responses. They found the toolkit easy to follow and indicated that they felt that it was useful. There were no particular elements of the toolkit that were identified as unhelpful. While the number of participants completing the survey was small, this response would suggest that the toolkit was appropriate for teachers’ use as intended. Those who trialled the toolkit also regarded it positively, but when asked about possible recommendations for further enhancing teachers’ understanding of the strategies, they were each keen to see other forms of support provided, such as video modelling and face-to-face professional development.

A lack of time was repeatedly identified as a potential barrier for teachers in engaging with the toolkit, and may have been a factor for those who did not complete the survey. Workload has been shown to be a leading cause for teachers’ concerns about inclusion (Round, Subban, & Sharma, 2016; Soto-Chodiman, Pooley, Cohen, & Taylor, 2012), and the way interventions are packaged may impact perceptions of their feasibility. Damschroder (2009) cites design and presentation of intervention packages as characteristics that influence implementation, and this is something that could be given greater consideration during intervention research. While, in the current study, the toolkit was intended to be concise, feedback clearly indicated that teachers felt the use of other modes of communication, in
addition to print, would enhance their ability to access and understand this information efficiently.

**Teachers’ views on the strategies described in the toolkit**

Among teachers who completed the two parts of the survey, both the structured teaching strategies and the toolkit itself appear to have been regarded positively. Teachers largely felt that the strategies would be useful in their classes for both students on the spectrum and students without autism diagnoses, and found the toolkit, and the information it presented, useful. There was, though, a discernible difference between responses regarding the implementation of visual schedules and work systems. A large proportion of survey respondents, and all three of the classroom teachers interviewed, had indicated that they were already using visual schedules to support their students on the spectrum. Others may have already been using daily schedules or timetables in their classes without an awareness of how or why they are effective with students on the spectrum (Knight et al., 2014). This familiarity with visual schedules may be the reason that respondents seemed to consider them to be easier than work systems to implement and would be more likely to use them despite, perhaps, gaining more from information on the less familiar strategy.

Work systems were defined broadly in the toolkit and a number of diverse examples were provided including individual work spaces and assistive technology. Teachers trialling the toolkit reported different ways of implementing work systems depending on the space and resources they had available, and the needs of their students. It seems that the variability of classroom environments and student cohorts necessitates that school-based interventions be adaptable. Rigidly outlined practices are likely to be discontinued or altered by teachers, whereas in-built adaptability could promote implementation and lead to higher levels of fidelity (Damschroder et al., 2009; Dearing, 2009).
The concept of adaptability raises again the question of how to effectively communicate information about an intervention to teachers. If teachers do not have the time to read and apply an intervention, the idea of making adaptations may seem particularly onerous. Two of the suggestions made by teachers during this study could be helpful in addressing this issue: the idea of having a platform for sharing information about workable applications between teachers, and the idea of specialised teachers acting as a “communication link” (Fixsen, Naoom, Blase, & Friedman, 2005) between researchers and teachers.

**Changes in teachers’ knowledge and confidence**

There was a significant change in the confidence levels of those who completed the survey with respect to using both visual schedules and work systems. That there was less change in self-reported levels of knowledge about the strategies could be due to how well informed the cohort was to begin with. While causality cannot be determined in the current study, these measures indicate a possible relationship between the intervention materials and teacher self-efficacy concerning providing support for students on the spectrum, something that is a crucial factor in behavioural change (Damschroder et al., 2009; Fixsen et al., 2005).

**Implementing the toolkit**

All of the teachers trialling the toolkit in their classrooms had some level of success with implementing the strategies, and all were keen to continue using them again in the following year regardless of whether they had students on the spectrum in their classes. While these strategies had been implemented during the earlier multiple-baseline study (Macdonald et al., under review), the current study has shown that teachers were able to use the toolkit to implement the intervention independently as part of their day-to-day teaching practice. Additionally, both strategies were considered to be useful, or potentially useful, for
students not on the autism spectrum. In fact, in one case, work systems were found to be more helpful for these students than for the students on the spectrum.

Limitations

The most obvious limitation of this study was the small number of teachers to express an interest in taking the online survey and, following on from that, the large number of teachers who completed Part 1 but did not follow up to complete the second part of the survey. However, this limitation is, perhaps, indicative of some barriers to translating research to practice. Engaging teachers in research is, unsurprisingly, a challenge, due largely to the many demands teachers have upon their time. Despite efforts to distribute information about this survey as widely as possible, the number of teachers offering to take part remained small, with almost half failing to complete the second part. Those who did participate tended to have a high level of professional interest in the subject of autism. While the expertise of these teachers has resulted in valuable feedback, the survey did not seem to reach those for whom the toolkit may have been most useful. As Kathy observed, without “a need to know” teachers may not seek out, or spend time learning about, effective strategies for supporting students on the spectrum.

While there is growing recognition among researchers that involving teachers in the research process is an essential element in developing interventions that are both based on evidence and readily translated to real-world settings (Abbott, Walton, Tapia, & Greenwood, 1999; Parsons et al., 2013), there is, perhaps, little incentive for teachers to become involved in projects not immediately relevant to their specific teaching practice. Giving consideration to teachers’ workloads during the research design phase is, of course, to be recommended; however, teachers’ working conditions are influenced by larger organisational and societal systems, and concomitant issues concerning time management are, to a large extent, intractable. As things stand, though their numbers are small, teachers who do self-select to be
involved in research might play a critical role in the implementation process by taking on roles of “early adopters” (Fixsen et al., 2005) or “innovators” (Dearing, 2009).

Technical issues may also have had an impact on the numbers to complete Part 2 of the survey, with the email links and reminders generated by SurveyMonkey™ being filtered as spam by some email servers, and not being received by the survey participants. Attempts were made to counter this by sending further, personal reminder emails; however, this did not lead to a noticeable rise in responses. Some institutional internet servers also did not allow teachers to access file-sharing sites, and so some teachers had difficulty downloading the toolkit from Dropbox™. Again, this technical issue was countered by emailing the toolkit as a pdf attachment to teachers who had completed Part 1. An awareness of this type of potential barrier to communication with teachers may allow other researchers to avoid similar pitfalls.

Conclusion

With the lag in evidence-based interventions making their way into classrooms, there is a need to give consideration to issues of implementation during the research process. Research findings do not necessarily, nor automatically, translate to effective practice (Dearing, 2009; Dingfelder & Mandell, 2011). By engaging teachers to share their views on both intervention strategies and the information package in which they are outlined, this study aimed to ensure that the intervention would be of use in the real-world classroom setting, and regarded favourably by teachers.


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Chapter 8: General Discussion

The overall objective of this project was to improve learning experiences for students on the autism spectrum by addressing difficulties faced by these students in mainstream classrooms, particularly the difficulties these students may have in staying on task through the many transitions that occur in this setting. Not only do the vast majority of students on the spectrum attend mainstream schools, but a large number of those students do so without specialist support in the classroom (Autism Awareness, 2014). As mentioned in Chapter 1, many parents and caregivers feel that the support their children on the spectrum receive is inadequate (Autism Awareness, 2014). Additionally, research suggests that teachers feel ill equipped to meet these students’ needs (Emam & Farrell, 2009; Soto-Chodiman et al., 2012). While there are educational interventions that may be helpful to students on the spectrum (National Autism Center, 2015; Wong et al., 2015), they are not necessarily effective in mainstream contexts or able to be used by mainstream teachers.

In response to the need for interventions that will work in mainstream settings to support students to stay on task, the aim of this research was to develop and evaluate an intervention using visual schedules and work systems that was suitable for implementation by mainstream teachers in mainstream classrooms. All three phases of the project presented here have been predicated on the need for greater ecological validity in research into educational interventions for students on the spectrum (Kasari & Smith, 2013). Ultimately, successful implementation is likely to be facilitated by research conducted in a way that is reflexive and responsive to applied settings (Dingfelder & Mandell, 2011; Kasari & Smith, 2013).
Outcomes

The first phase of this project succeeded in trialling the intervention package and refining a research design that would have the flexibility to allow ecologically valid data collection in mainstream classrooms. This phase provided information that clarified the opportunities and challenges involved in implementing and evaluating interventions in the complex classroom environment. In Chapters 1 and 4 of this thesis, the highly dynamic nature of the mainstream classroom setting was acknowledged. As Berliner (2002) noted, the social dynamics of educational settings make it hard to produce generalisable scientific findings. He observed,

The ordinary events of life (a sick child, a messy divorce, a passionate love affair, migraine headaches, hot flashes, a birthday party, alcohol abuse, a new principal, a new child in the classroom, rain that keeps the children from a recess outside the school building) all affect doing science in school settings. (2002, p. 19)

In Phase 1 of the present study, illness, injury, and absences of both teacher and student during the pilot led to precautionary measures being taken in planning the multiple baseline study, including scheduling as many observation sessions as feasible and recruiting a fourth participant to allow the recommended three demonstrations of intervention effect in the event of a participant’s absence or withdrawal. The first phase of the project was also useful in understanding the culture of mainstream classrooms (e.g., curriculum pressures, routines, behavioural expectations, and school rules) and the pressures and challenges faced by both teachers and students within that setting. This understanding led to the development of data-collection procedures that could accommodate disruptions. For instance, the research conducted during this phase highlighted the need for researchers to spend time in the classroom and to work in a participatory fashion with teachers. By working in this way to refine research methods,
it became possible to capture data necessary for Phase 2 (evaluation) within the classroom environment.

Utilising the insights provided by the pilot study, the second phase of this research demonstrated visual schedules and work systems to be effective in supporting four primary school students on the spectrum to stay on task within mainstream classrooms. The study was conducted with teachers implementing the intervention, as outlined in the earlier, workbook version of the toolkit (Haas, 2015), and observations being made in real time. The results were consistent with those of previous studies in showing an increase in on-task behaviours (Bennett et al., 2011; Hume & Odom, 2007; Hume et al., 2012; Mavropoulou et al., 2011; O'Hara & Hall, 2014) but succeeded in extending earlier findings by demonstrating effectiveness in mainstream settings.

Furthermore, the approach taken in this study and its findings may serve to give teachers confidence that it is likely to be feasible and worthwhile to employ these strategies in their classrooms.

Again, as with the pilot study, the mainstream school setting presented a number of challenges. Resembling the events listed by Berliner (2002), lockdowns, fire drills, sports carnivals, sickness, disruptions due to other students, and even dangerous wildlife in Phase 2 all served to highlight the ways in which this context differs from the ideal research environment. Such events may have nuanced and unmeasurable effects that impact study results, possibly lessening the measurable effect of the intervention. Within this complex context, this study’s findings of effectiveness may perhaps be conservative. However, for an intervention to be of practical use in classrooms, it must be flexible enough to be effective under these conditions.

The aim of Phase 3 was to explore the views of mainstream primary school teachers on the use of visual schedules and work systems as outlined in the intervention
package. This utilisation phase revealed that the intervention was perceived by the mainstream teachers who accessed the toolkit to be suitable for use in their classes. Ascertaining social validity in this way is a recommended element in addressing the research-to-practice gap (Dingfelder & Mandell, 2011; Leko, 2014). Although interventions may be effective under experimental conditions, they are not always a good fit with real-life educational environments (Dearing, 2009; Greenwood & Abbott, 2001).

Evidence collected during Phase 3 indicates that the toolkit, which was found to be effective in Phase 2, is also acceptable and helpful to those for whom it is intended. Additionally, with some of these teachers trialling the strategies as part of their everyday pedagogical practice, and employing them in different learning contexts throughout the day, this phase extended the work of the previous studies which had focussed on a small set of specific tasks, and demonstrated that the strategies can have broader application. The information gathered in Phase 3 has also informed future directions for the dissemination of the information provided in the toolkit, with teachers making suggestions about ways of effectively communicating to others in their profession. The four teachers who trialled the toolkit, and who were the focus of qualitative interviews and the case vignettes presented in Chapter 7, indicated that they would continue to use the strategies and were likely to tell other teachers about them.

**Secondary outcomes**

In assessing the effectiveness of this intervention, the primary focus of this research has been student on-task behaviours. Other potential outcomes of the intervention may warrant further investigation. Whereas previous studies have shown visual schedules and work systems to be effective in reducing teacher prompts and off-task behaviours (e.g., Bennett et al., 2011; Hume & Odom, 2007; Hume et al., 2012;
Mavropoulou et al., 2011; O'Hara & Hall, 2014), in this project results for these measures were mixed and no significant effect was observed. The difference in apparent effectiveness between settings is understandable, as prompting and self-regulation of behaviour may be qualitatively different in mainstream classes. With the distraction of a large class, teachers’ prompting, for example, may look very different from that of a teacher working one-on-one with a student in a controlled environment. Similarly, off-task behaviours may have a different set of possible causes in this setting (such as classroom noise and distractions). Different ways of measuring independence and self-regulation, such as using self or peer evaluation, or utilising school records of behavioural interventions, could be used to further explore the impact of visual schedules and work systems.

Inclusive research and practice

As outlined in Chapter 3, an underlying principle of this research is the idea that education should strive to provide all students with the chance to access high quality, inclusive settings (UN General Assembly, 2007), and that educational interventions for students on the autism spectrum should be designed in accordance with this goal. To this end, this research aimed to employ universal design principles, with an intervention designed for use with the whole class. This is in alignment with the ideals of the TEACCH program which involves adapting the classroom to fit the culture of autism (Mesibov et al., 2004) rather than directing remedial treatment towards the behaviours of students on the spectrum. The one-to-one support provided to some students on the spectrum who may be allocated teacher aide time, and the use of programs that involve withdrawing students for the classroom, can be socially isolating and stigmatising (Emam & Farrell, 2009; Giangreco, 2013). This research has built on previous studies by showing that it is possible for teachers to implement effective interventions as part of
regular classroom practice, potentially lessening the need for more targeted intervention such as one-on-one support. When employed in this way in the mainstream classroom, the *prosthetic environment* (Humphrey & Parkinson, 2006; Jordan, Jones, & Murray, 1998) structured teaching is designed to facilitate students on the spectrum to work with greater independence whilst also being available to assist any other students who found the support useful.

In each phase of this research, a whole-class approach was promoted. However, some teachers presented visual information differently to different students, according to what they felt the needs of each individual were at the time. During the pilot study (see Chapter 5), for example, diversity within the class made uniform, whole class implementation difficult. As the class was comprised of multiple year levels as well as having several other students with additional needs, the students were rarely engaged in the same class work. Similarly, in Phase 2 (see Chapter 6, evaluation), in addition to the whole-class approach described in the manuscript, students on the spectrum sometimes received more targeted support than their peers (e.g., having printed visual supports at their desk while the rest of the class referred to the whiteboard). While tailoring an intervention in this manner is consistent with the practice of personalised learning (Australian Curriculum, 2013) and caters to individual needs, there is a danger that other students who may appear to be coping (e.g., appear to be on task but not making progress in the steps of the activity) could miss out on accessing this support. An analysis of the benefits of integrating supports into whole-class instruction for other students was beyond the scope of this research, and is an area in which further research may be warranted. Anecdotally, the three classroom teachers who trialled the strategies during the third phase of the project reported that other students without autism spectrum diagnoses also benefitted. There was consensus that visual schedules and work
systems would be useful strategies regardless of whether there were students on the spectrum in the classroom.

Not only did this project focus on strategies that could be used to facilitate inclusion, but the research methods used were themselves also designed to promote inclusion by minimising or avoiding singling out individual students. Like one-to-one teacher aide support or programs that remove students from class (Giangreco, 2013; Humphrey & Lewis, 2008), classroom based research may risk drawing attention to, or stigmatising, student participants if the researcher is continually in close proximity to the student. In several of the previous studies on work systems, the primary researcher was involved in the implementation of the intervention or training of students (Bennett et al., 2011; Hume & Odom, 2007; Hume et al., 2012). This level of interaction with an individual student would be difficult to orchestrate within mainstream classrooms without isolating the student from the classroom activity. In each phase of this project, there was a conscious effort to avoid drawing attention to the student participants. Observations in class were made from a vantage point where the student participant could be seen, but was not obviously the object of attention, and often the researcher circulated among the other students. While the student participants in Phases 1 and 2 had provided consent to participate in the study, and so were cognisant that they were helping with this research, this method of observation may have helped to reduce self-conscious behaviour during these sessions. Researchers working to close the research-to-practice gap by conducting autism intervention research in mainstream settings need to consider the social implications of their research methods for the students involved. Although participants in this research were not directly questioned about their experience in being part of this process, there may be merit it doing so in future studies.
Implementation

While supporting students who are having difficulty staying on task is a compelling reason to use visual schedules and work systems, the effectiveness of these strategies, even in an authentic context, is not enough to ensure they will work as intended in the mainstream classroom on every occasion. The way in which these strategies are communicated to teachers has a large bearing on whether they will be implemented effectively, or, indeed, at all. In other words, the presentation of information in the intervention package – in this case, the on-task toolkit – has a large bearing on the overall effectiveness of this approach. Once again, the development of ways to impart intervention strategies to others was not a focus of previous studies examining work systems, in many of which the researcher implemented the intervention themselves (Bennett et al., 2011; Hume & Odom, 2007; Hume et al., 2012; Mavropoulou et al., 2011). However, consideration for how these strategies may be delivered to mainstream teachers has been an important element of the research presented here. The “manualization” of interventions is, according to Odom (2009, p. 57), an essential element in the implementation process. During the course of this research, an iterative approach was taken to the development of the toolkit as it transitioned from a workbook designed to facilitate the evaluation of the strategies, to a resource for general use in a mainstream setting. The suitability of the toolkit was examined further in Phase 3, where the survey and interviews allowed teacher responses to the toolkit to be thoroughly explored prior to dissemination.

While the core elements of the intervention have remained consistent, teachers participating in this research have been offered flexibility to implement visual schedules and work systems in a variety of ways. This not only provides flexibility to meet the individual needs of students (e.g., the need for pictures or symbols to communicate task
elements, or accommodating the use of assistive technology), but also fits with a modular and eclectic pattern of implementation. In this way, the toolkit takes an approach that aligns with the way in which teachers generally adopt and adapt selected strategies rather than implementing complete comprehensive programs without alteration (Kasari & Smith, 2013). As Damschroder et al. (2009) noted, “without adaptation, interventions usually come to a setting as a poor fit, resisted by individuals who will be affected by the intervention, and requiring an active process to engage individuals in order to accomplish implementation” (p. 3). A lack of flexibility in intervention design can, as Cook and Odom (2013) point out, compromise overall effectiveness. By incorporating adaptability in the design of the intervention, fidelity to essential components may be increased (Dearing, 2009), and teachers may be more likely to incorporate these strategies into their everyday pedagogical practice.

**Limitations**

Limitations specific to the different phases of this project are discussed in the preceding chapters. When considered together, however, there are some general observations to be made about limitations to these studies that could provide important insights for future research in this area. First, and most salient, are the apparent difficulties associated with research that takes place in real-world settings. Research in classrooms is necessarily conducted with less environmental control than can be achieved in clinical-research settings, and this will have an impact on findings that is difficult to gauge. Although steps were taken through the course of this research to accommodate classroom noise by piloting and refining the intervention and research methods, the complexities of the classroom environment will have influenced all aspects of the implementation and evaluation of the intervention. Capturing information relevant to this setting was the purpose of investigating the use of visual schedules and
work systems in mainstream classrooms. Nevertheless, the uncontrolled nature of the setting must be acknowledged as a limitation of using experimental research designs in applied settings. There is a balance to be struck between collecting information in a way that reflects environmental validity and providing reliable evidence.

A second general limitation is the small number of participants across studies. This is a limitation common to single-subject research designs, where individual cases contribute to a cumulative body of evidence (Zhan & Ottenbacher, 2001). Despite the small number of students observed during this research, the findings can be seen to add to, and build on, the results of previous research. It would, however, have been preferable to have had a larger number of teacher participants involved in this research, particularly in the Phase 3 survey and case study interviews. The teachers in each part of this project were self-selecting, and many had both experience and professional interest in supporting students on the spectrum. While their feedback was valuable, difficulty in recruiting a large and diverse sample of teachers may mean that further work is needed to facilitate implementation. Questions remain about whether teachers who do not already have an understanding of autism would find the toolkit easy to understand or see value in implementing these strategies.

Future directions

The research presented here can be seen to precipitate a number of further questions about how visual schedules and work systems may function to support students on the spectrum in mainstream classrooms. These strategies appear to have potential as supports that would fit within the mainstream context, but their many possible applications in this setting have not been thoroughly explored. Howley (2015) has identified the need for further investigation into the use of structured teaching strategies in relation to learning and the curriculum. Indeed, an exploration of ways in
which these strategies could be integrated with curriculum content could result in novel ways to improve the learning experience for students on the spectrum. Additionally, further research could examine the use of these strategies to promote different functional skills, such as emotional self-regulation or social communication skills. Further research into the use of these strategies as a whole-class approach, and how they are experienced by neurotypical class members or students with different special needs, may be useful in determining how well visual schedules and work systems align with universal design principles.

In a continuation of the research presented here, *Finished! The On-task Toolkit* will be prepared for dissemination to teachers through the Autism CRC. Feedback provided by survey and interview participants in Phase 3 indicated that, in addition to the toolkit itself, other supporting resources (such as video modelling and professional development workshops) would be welcome. While beyond the scope of this project, future research is intended to examine the dissemination and implementation of this intervention to determine which resources have been most effective, and to provide an evaluation of the research-to-implementation process used here.
Chapter 9: Conclusion

The research presented here has addressed the widely acknowledged need for effective strategies that can support students on the spectrum in mainstream settings. These students often experience challenges in mainstream classrooms (Ashburner et al., 2010; Humphrey, 2008), and their teachers may not have the skills, knowledge, or resources to provide them with adequate support (Emam & Farrell, 2009; Soto-Chodiman et al., 2012). As discussed in the review of the literature in Chapter 2, previous research has shown that visual schedules and work systems may be effective in supporting students on the spectrum to stay on task and transition between tasks independently (Bennett et al., 2011; Hume & Odom, 2007; Hume et al., 2012; Knight et al., 2014; Mavropoulou et al., 2011; O'Hara & Hall, 2014). None of these earlier studies, however, has specifically examined the use of visual schedules and work systems in mainstream settings. This research has worked towards bridging the gap between research and practice by focusing on the use of these strategies in mainstream classrooms, implemented by mainstream teachers.

As outlined in Chapter 3, this project has been underpinned by three core theoretical perspectives. At its foundation was the conviction that students on the autism spectrum should have the option of accessing quality education with their peers in inclusive settings (UN General Assembly, 2007). The principle of universal design for learning (UDL) informed the way in which the intervention was developed to facilitate an inclusive approach to providing support to students on the spectrum. By promoting a whole-class approach to implementing the intervention strategies, this research had the goal of making classrooms more autism-friendly. Recent theories about implementation science aligned with the project objective to produce research that could be readily translated to practice. This latter theoretical perspective was a guiding principle in the
research design for this project. As Chapter 4 outlined, the mixed methods approach taken here was applied across three study phases, with each contributing sequentially to the development and evaluation of a resource to be used by mainstream teachers.

The pilot study described in Chapter 5 indicated that visual schedules and work systems can be adapted to mainstream settings, and that research design can be tailored to fit the mainstream environment. The subsequent multiple baseline study presented in Chapter 6 demonstrated that these strategies were effective in supporting students on the spectrum to stay on task in mainstream classrooms. Finally, Chapter 7 established that the resource developed to communicate the intervention (the on-task toolkit) was viewed positively by a cohort of mainstream teachers, and worked to enable four teachers to implement the strategies independently.

Overall, this research has been successful in evaluating the use of visual schedules and work systems in mainstream settings, and has established that these strategies can be adapted for use by mainstream teachers. This project has extended previous research focussing on these strategies by examining their implementation in mainstream classrooms in an ecologically valid way. Addressing this gap in the existing research literature is significant not only because it has provided preliminary evidence that visual schedules and work systems may be effective in real mainstream settings, but also because it contributes to a growing body of literature utilising “innovative research strategies” (Kasari & Smith, 2013, p. 254) aimed at developing interventions aligned with the realities of mainstream school contexts. The methodological framework used here may be informative for other researchers working to bridge the gap between autism intervention research and implementation in mainstream schools.
References


doi:10.1016/j.rasd.2011.01.025


Appendix A: Participant Information for Principals

Participant Information Sheet for Principals

PROJECT TITLE
Use of Classroom Structure and Technology to Enhance Student Productivity and Transitioning Between Tasks

LAY TITLE:
Helping students stay on-task and move between tasks

Investigators:
- Elizabeth Macdonald, PhD candidate, Griffith University (PhD candidate)
- Dr. Jill Ashburner, Autism Queensland/The University of Queensland (project leader)
- Dr. Amanda Webster, Griffith University (PhD supervisor)
- Professor Deb Keen, Griffith University (PhD supervisor)
- Dr. Debra Costley, General Manager, Education Development & Research, Autism Spectrum Australia (PhD supervisor)
- Kaaren Haas, Aspect Practice & Research, Autism Spectrum Australia (Research Assistant)

What is the purpose of this study?
The aim of this study is to overcome the difficulties that students with ASD often have with staying on task and transitioning between tasks. The use of structured teaching approaches including structured work systems, visual schedules and classroom structure to help students with ASD to help students stay on-task and move between tasks in grades 4 to 6 will be evaluated. Training materials for teachers on the use of these approaches will be developed. This project is being funded as part of the Autism Cooperative Research Centre for Living with Autism Spectrum Disorders (Autism CRC) [http://www.autismcrc.com.au/](http://www.autismcrc.com.au/). The Queensland Department of Education, Training and Employment is a core participant of this project and is contributing funds to the CRC. The teacher training package will then be refined and published on the Autism CRC website (ASD Connect Hub).

What is involved?
Researchers will work in partnership with the classroom teacher and the student's special education support staff (e.g., special education teacher, teacher aide and
assistive technology support personnel), with the aim of developing a training package for teachers on structured teaching. The researchers will also work in the classroom to evaluate the effectiveness of structured work systems and visual schedules in helping students stay and task and transition between tasks. It is likely that the strategies will benefit other students in their class as well. It is intended that these strategies be incorporated into their classroom program so that they will not take extra time to do. Teachers will be asked to complete a teacher survey on the effectiveness of the strategies, which may take around 15 minutes, or contribute to an online focus group which is expected to take around 1 hour. If you are happy to allow us to invite teachers in your school to participate in the study (they are free to decline), please complete the consent form attached.

**How will I get feedback on the results?**
Summaries of the key findings of the research project will be provided to your school to distribute to the students, teachers and parents who were involved with the study.

**Can my teachers withdraw?**
Participation in the study is entirely voluntary and there is no penalty for declining participation. It will not affect your teacher’s current or future employment. If they agree to participate, they are free to withdraw from the study at any time without affecting service provision. If they withdraw, they do not have to provide a reason for doing so. If they decide to withdraw, the data already collected will be destroyed.

**Are there any risks involved?**
There is no risk from your involvement in this study that is beyond that of normal educational practices.

**Benefits:**
The research is aiming to improve the capacity of your students with ASD to be included and to succeed at school. The strategies used are also likely to benefit other students.

**How will privacy be protected?**
All information collected will be kept confidential. This information will be stored securely in a password protected storage unit at the university that is accessible only by the researchers. If there are audio-taped interviews they will also kept in a locked filing cabinet until transcribed. At the end of the study all audio-tapes will be destroyed to maintain your confidentiality. Your teachers and students will not be identified in any way in any publication arising from the research and no individual data will be used, as the reporting of results will use only group data. Computer data files will be password protected and only available by the research team. All material will be destroyed after a period of five years after the end of the study. This study has been cleared with the human ethics committee of the University of Queensland in accordance with the National Health and Medical Research Council’s guidelines. You are free to discuss your participation in this study with the project leader, Dr Jill Ashburner, who is contactable on (07) 3273 0075 or through email at Jill.Ashburner@autismqld.com.au. Should you wish to speak to an officer of the University who is unrelated to the research study, you can contact the University Ethics
Officer on (07) 3365 3924. This information sheet is for you to keep for future reference.

Thank-you for your interest in this research project

Dr. Jill Ashburner, Autism Queensland/the University of Queensland
Appendix B: Participant Information for Teachers

Participant Information Sheet for Teachers

PROJECT TITLE
Use of Classroom Structure and Technology to Enhance Student Productivity and Transitioning Between Tasks

LAY TITLE:
Helping students stay on-task and move between tasks

Investigators:
- Elizabeth Macdonald, PhD candidate, Griffith University (PhD candidate)
- Dr. Jill Ashburner, Autism Queensland/ The University of Queensland (project leader)
- Dr. Amanda Webster, Griffith University (PhD supervisor)
- Professor Deb Keen, Griffith University (PhD supervisor)
- Dr. Debra Costley, General Manager, Education Development & Research, Autism Spectrum Australia (PhD supervisor)
- Kaaren Haas, Aspect Practice & Research, Autism Spectrum Australia (Research Assistant)

What is the purpose of this study?
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What is involved?
Researchers will work in partnership with the classroom teacher and the student's special education support staff (e.g., special education teacher, teacher aide and assistive technology support personnel), with the aim of developing a training package for teachers on structured teaching. The researcher will also work in your classroom to

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evaluate the effectiveness of structured work systems and visual schedules in helping students stay and task and transition between tasks. It is likely that the strategies will benefit other students in the class as well. You will be asked to contribute your ideas and provide feedback on the strategies that are implemented in your classroom (e.g., the effectiveness of structured teaching approaches and the ease with which they can be integrated into the classroom programs). It is intended that these strategies be incorporated into your classroom program so that they will not take extra time to do. You may be asked to complete a teacher survey on the effectiveness of the strategies, which may take around 15 minutes, or contribute to an online focus group which is expected to take around 1 hour. If you are happy to be involved, please complete the consent form attached.

**How will I get feedback on the results?**
Summaries of the key findings of the research project will be provided to your school who will arrange for the information to be distributed to the students, teachers and parents who were involved with the study.

**Can I withdraw?**
Participation in the study is entirely voluntary and there is no penalty for declining participation. It will not affect your current or future employment. If you agree to participate, you are free to withdraw from the study at any time without affecting your service provision. If you withdraw, you do not have to provide a reason for doing so. If you decide to withdraw, the data already collected will be destroyed.

**Are there any risks involved?**
There is no risk from your involvement in this study that is beyond that of normal educational practices. Should you experience distress, you may wish to discuss this with someone. Trained counselors are available Lifeline 24-hour telephone counseling service: phone 13 11 14.

**Benefits:**
The research is aiming to improve the capacity of your students with ASD to be included and to succeed at school. The strategies used are also likely to benefit other students.

**How will my privacy be protected?**
All information collected will be kept confidential. This information will be stored securely in a password protected storage unit at the university that is accessible only by the researchers. If there are audio-taped interviews they will also kept in a locked filing cabinet until transcribed. At the end of the study all audio-tapes will be destroyed to maintain your confidentiality. Your will not be identified in any way in any publication arising from the research and no individual data will be used, as the reporting of results will use only group data. Computer data files will be password protected and only available by the research team. All material will be destroyed after a period of five years after the end of the study.

This study has been cleared with the human ethics committee of the University of Queensland in accordance with the National Health and Medical Research Council’s guidelines. You are free to discuss your participation in this study with the project...
leader, Dr Jill Ashburner, who is contactable on (07) 3273 0075 or through email at Jill.Ashburner@autismqld.com.au. Should you wish to speak to an officer of the University who is unrelated to the research study, you can contact the University Ethics Officer on (07) 3365 3924. This information sheet is for you to keep for future reference.

Thank-you for your interest in this research project

Jill Ashburner

Dr. Jill Ashburner, Autism Queensland/the University of Queensland
Appendix C: Participant Information for Parents

Participant Information Sheet for Parents

PROJECT TITLE
Use of Classroom Structure and Technology to Enhance Student Productivity and Transitioning Between Tasks

LAY TITLE: Helping students stay on-task and move between tasks

Investigators:
- Elizabeth Macdonald, PhD candidate, Griffith University (PhD candidate)
- Dr. Jill Ashburner, Autism Queensland/ The University of Queensland (project leader)
- Dr. Amanda Webster, Griffith University (PhD supervisor)
- Professor Deb Keen, Griffith University (PhD supervisor)
- Dr. Debra Costley, General Manager, Education Development & Research, Autism Spectrum Australia (PhD supervisor)
- Kaaren Haas, Aspect Practice & Research, Autism Spectrum Australia (Research Assistant)

What is the purpose of this study?
The aim of this study is to overcome the difficulties that students with ASD often have with staying on task and transitioning between tasks. The use of structured teaching approaches including structured work systems, visual schedules and classroom structure to help students with ASD to help students stay on-task and move between tasks will be evaluated. Training materials for teachers on the use of these approaches will be developed. This project is being funded as part of the Autism Cooperative Research Centre for Living with Autism Spectrum Disorders (Autism CRC) http://www.autismcrc.com.au/ The Queensland Department of Education, Training and Employment is a core participant of this project and is contributing funds to the CRC. The teacher training package will then be refined and published on the Autism CRC website (ASD Connect Hub).

What is involved?
The researcher will work with your child in the classroom to evaluate the use of structured work systems and visual schedules to prompt him or her to complete all the steps in a task and move from one task to another. Your child’s rate of task completion (e.g. number of items of fully completed work and number of items of partially
completed work) and independence during transitions (e.g. number of verbal prompts when transitioning) will be measured both with and without the structured work systems and visual schedules. Your child may be video-taped in order to record observation of his or her attention to task. The study will be incorporated into your child’s regular classroom program at their school and will not take any extra time to do. Your child will be asked to complete a questionnaire (in child-friendly language) on his or her likes and dislikes with regard using these strategies. If you are happy for your son or daughter to be involved, please complete the consent form attached and have it witnessed. Please also explain the study to your son and daughter and ask him or her to complete the assent form if he or she is happy to be involved.

**How will I get feedback on the results?**
Summaries of the key findings of the research project will be provided to your child’s school who will arrange for the information to be distributed to the students, teachers and parents who were involved with the study. The investigators will also provide you with a written summary of the results pertaining to your child.

**Can I withdraw my child from the study?**
Participation in the study is entirely voluntary and there is no penalty for declining participation. It will not affect you and your child’s ability to receive services from his or her school or autism-specific services. If you agree to your child’s participation, you are free to withdraw your child from the study at any time without affecting your service provision. If you withdraw, you do not have to provide a reason for doing so. If you decide to withdraw, the data already collected will be destroyed.

**Are there any risks involved?**
There is no risk in your child’s involvement in this study that is beyond that of normal educational practices. Should your child experience distress, you may wish to discuss this with someone. For children with ASD and their families, trained counselors are also available at Autism Queensland (07) 3273 0000;

**Benefits:**
The research is aiming to improve the capacity of your child to be included and to succeed in writing tasks at school.

**How will my and my child’s privacy be protected?**
All information collected about your child will be kept confidential. This information will be stored securely in a password protected storage unit at the university that is accessible only by the researchers. If there are videotaped observations they will also kept in a locked filing cabinet until transcribed. At the end of the study all videotaped will be destroyed to maintain your child’s confidentiality. Your child will not be identified in any way in any publication arising from the research and no individual data will be used, as the reporting of results will use only group data. Computer data files will be password protected and only available by the research team. All material will be destroyed after a period of five years after the end of the study.

This study has been cleared with the human ethics committee of the University of Queensland in accordance with the National Health and Medical Research Council’s guidelines. You are free to discuss your participation in this study with the project
leader, Dr Jill Ashburner, who is contactable on (07) 3273 0075 or through email at Jill.Ashburner@autismqld.com.au. Should you wish to speak to an officer of the University who is unrelated to the research study, you can contact the University Ethics Officer on (07) 3365 3924. This information sheet is for you to keep for future reference.

Thank-you for your interest in this research project

[Signature]

Dr. Jill Ashburner, Autism Queensland/the University of Queensland
Appendix D: Participant Information for Students

Participant Information Sheet for Students:
Helping Students Stay On-Task

Some university researchers are doing a study about helping students concentrate on their work and move between tasks at school. The researchers would like to know if some strategies can help students get their schoolwork done on time.

The researchers would like to invite you to be part of the study. They will look how quickly you get your schoolwork done with and without technology to help.

What you do in this study will be kept private. You do not have to be part of the study and you are allowed to stop being in the study at any time if you want to. The decision is yours.

Thanks,
The researchers

(Elizabeth Macdonald, Jill Ashburner, Amanda Webster, Deb Keen, Debra Costley and Kaaren Haas)
# Appendix E: Data Collection Sheet

## Data Collection Sheet

**Procedure:** Each interval is 10 seconds followed by 10 seconds recording.

An event is recorded if it occurs at any time during the observation interval.

Please refer to attached sheet for operational codes

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Start Time

### Interval

| 0:10 | 0:20 | 0:30 | 0:40 | 0:50 | 1:00 | 1:10 | 1:20 | 1:30 | 1:40 | 1:50 | 2:00 | 2:10 | 2:20 | 2:30 | 2:40 | 2:50 | 3:00 | 3:10 | 3:20 | 3:30 | 3:40 | 3:50 | 4:00 | 4:10 | 4:20 | 4:30 | 4:40 | 4:50 | 5:00 | 5:10 | 5:20 | 5:30 | 5:40 | 5:50 | 6:00 | 6:10 | 6:20 | 6:30 | 6:40 | 6:50 | 7:00 | 7:10 | 7:20 | 7:30 | 7:40 | 7:50 | 8:00 | 8:10 | 8:20 | 8:30 | 8:40 | 8:50 |
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### Classroom Activity

**Teacher**

- Orange
- Blue
- Yellow
- Green
- Red

**Response to request**

**Prompt to whole class**

**Behaviour 1**

**Behaviour 2**
Appendix F: Teacher Questionnaire

Teacher’s Questionnaire

1. Have visual schedules and work systems been easy to implement in your classroom?

□ □ □ □ □

Very difficult  Somewhat difficult  Sometimes difficult and other times easy  Somewhat easy  Very easy

2. Please describe any factors that contribute to, or prevent the use of visual schedules and work systems in your classroom.

................................................................................................................................
................................................................................................................................

3. Have visual schedules and work systems been helpful in your classroom?

□ □ □ □ □

Not at all helpful  Somewhat unhelpful  Sometimes unhelpful, other times helpful  Somewhat helpful  Very helpful

4. Would you recommend the use of visual schedules and work systems to other teachers?

□ □ □ □ □

Not at all recommended  Unlikely to recommend  Neutral  Likely to recommended  Strongly recommended

5. Rate the extent to which your student with ASD is motivated to use visual schedules and work systems.

184
6. Rate the extent to which visual schedules and work systems have been helpful to your student with ASD in staying on task.

   □ □ □ □ □
   Not at all helpful
   Somewhat unhelpful
   Sometimes unhelpful, other times helpful
   Somewhat helpful
   Very helpful

7. Rate the extent to which visual schedules and work systems have been helpful to your student with ASD in transitioning between tasks.

   □ □ □ □ □
   Not at all helpful
   Somewhat unhelpful
   Sometimes unhelpful, other times helpful
   Somewhat helpful
   Very helpful

8. Please describe ways visual schedules and work systems have been helpful/not helpful to your student in staying on task and transitioning between tasks:

   ................................................................................................................................

9. Rate the extent to which your student with ASD has developed independence in the use of the visual schedules and work systems.

   □ □ □ □ □
   Requires a lot of help/reminders
   Requires some help/reminders
   Sometimes independent/sometimes requires reminders
   Usually uses it independently
   Almost always uses it independently
10. Incorporating the use of visual schedules and work systems into my classroom program has been:

- □ Very time-consuming and difficult
- □ Somewhat time-consuming and difficult
- □ Sometimes difficult and other times easy
- □ Somewhat quick and easy
- □ Very quick and easy

11. Please describe any factors that contribute to, or prevent the use of visual schedules/work systems in the classroom (e.g. time required to make, fit with the curriculum, etc…).

………………………………………………………………………………………......................................
……………………………………………………………………………………………………………………

12. Would you recommend the use of visual schedules and work systems for other students?

- □ Not at all recommended
- □ Unlikely to recommend
- □ Neutral
- □ Likely to recommended
- □ Strongly recommended

13. Please describe ways structured teaching strategies have been helpful/not helpful to other students in your class in staying on task and transitioning between tasks:

………………………………………………………………………………………......................................
……………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………

14. Would you recommend the use of visual schedules and work systems as a whole class approach?

- □ Not at all recommended
- □ Unlikely to recommend
- □ Neutral
- □ Likely to recommended
- □ Strongly recommended

ABOUT THE WORKBOOK

15. How easy did you find it to use the workbook?

- □ Not at all easy
- □ Unlikely to use
- □ Neutral
- □ Likely to use
- □ Strongly easy
Very difficult  Somewhat difficult  Sometimes difficult and other times easy  Somewhat easy  Very easy

Why was this so?

What was easy?

What was difficult?

16. How useful did you find the workbook?

Very useful  Somewhat useful  Sometimes useful and other times not  Somewhat useful  Very useful

Why was this so?

What was useful?

What was not useful?

- content
- instructions/tips
- layout
- writing style
Appendix G: Student Questionnaire

Student’s questionnaire

Name: ........................................................................................................

Year Level: ..............................................................................................

School: ....................................................................................................

How much did you like using a daily timetable?

(Put a circle around one of these faces)

I hate it.  I don’t like it much.  It’s not too bad, but not great.  I like it a bit.  I love it.

How easy was it to use a daily timetable?

It’s very confusing  It’s a bit confusing  Sometimes easy, sometimes confusing  Mostly easy  Very easy
How useful has having a timetable been in helping you to keep up with your work?

No help  Not enough help  A little bit of help  Some help  Lots of help

How much did you like using a written task list?

(Put a circle around one of these faces)

I hate it.  I don't like it much.  It's not too bad, but not great.  I like it a bit.  I love it.

How easy was it to use a written task list?

It's very confusing  It's a bit confusing  Sometimes easy, sometimes confusing  Mostly easy  Very easy
How useful has having tasks written down been in helping you to keep up with your work?

No help  Not enough help  A little bit of help  Some help  Lots of help

Are you happy to keep using a timetable and task list?

No  Depends?  Maybe  Yes

(For example, how much time I have, whether it is in class or for homework, how long the story is)
Is there anything that bothers you about using a timetable or a task list?
Appendix H: Phase 2 Flyer

Take part in a research project to help students with autism.

This research project aims to help students work productively and transition between tasks using a structured teaching approach. We are looking for teachers and students with ASD in years 4–6 in 2016 and their parents who are interested in participating in this study and who live in the Gympie, Sunshine Coast or Southern Wide Bay areas.

What is the study about?
- Do you have students with ASD who have difficulty working independently in the classroom?
- Does their attention wander?
- Do they fail to complete tasks?
- Do they focus on things that are not relevant to the task?
- Do they get annoyed or upset when asked to transition to a new task?
- Do other students in your classroom have similar issues?

If you answered yes to these questions, you may be interested in participating in this study funded by the Cooperative Research Centre for Living with Autism Spectrum Disorder (Autism CRC).

Structured approaches can facilitate engagement in learning, and transitions between learning tasks. The physical layout of the classroom environment is organised to provide greater clarity with reduced noise and clutter. Work systems inform the student about ‘what to do’, ‘how long for’, ‘when the task is finished’, and ‘what happens next’. Visual schedules and explicit cues prepare students for transitions within the school day.

What is involved?

Teachers
The researcher will work in your classroom to evaluate the effectiveness of structured teaching approaches in helping students stay on task and move between tasks, and you will be asked some questions on the effectiveness of the strategies and the ease of using the strategies in your classroom.

Parents
You will be asked to complete short questionnaires on background information about your child (e.g., ASD diagnosis, other diagnoses) and your child’s symptoms of ASD.

Students
Students will be evaluated when using structured teaching strategies such as work systems and visual schedules and will be asked some questions about how much they like using the strategies.

Who to contact for further information?
Libby Macdonald, PhD candidate
p: 5484 9188
e: elizabeth.macdonald2@griffithuni.edu.au

Autism CRC is the world’s first national, cooperative research effort focused on autism across the life span.
For more information visit autismcrc.com.au
# Appendix I: Implementation Checklist

## Implementation Checklist

<table>
<thead>
<tr>
<th><strong>Daily Schedules</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Every student has access to a daily timetable. They are able to refer to either an up to date schedule on the board, or to individual printed schedules.</td>
<td></td>
</tr>
<tr>
<td>The target student has an individual schedule.</td>
<td></td>
</tr>
<tr>
<td>Schedules are kept up to date and changes or additions to the schedule are made as necessary.</td>
<td></td>
</tr>
<tr>
<td>Students are prompted to make any necessary changes to individual schedules.</td>
<td></td>
</tr>
<tr>
<td>Students are prompted to refer to their schedules when they want to know what to do, rather than relying on verbal instructions.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Work Systems/Task Organisation</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The activity or lesson is broken down into a number of tasks/task steps which clearly indicate: what the students have to do</td>
<td></td>
</tr>
<tr>
<td>how much they have to do</td>
<td></td>
</tr>
<tr>
<td>how to know they are finished</td>
<td></td>
</tr>
<tr>
<td>what to do next.</td>
<td></td>
</tr>
<tr>
<td>Every student has access to a task list for the English lesson, whether it is written down on the board, copied onto individual checklists or written down for them by a teacher or teacher aide.</td>
<td></td>
</tr>
<tr>
<td>The target student has an individual task checklist.</td>
<td></td>
</tr>
<tr>
<td>Students are prompted to refer to their task list when they want to know what to do rather than relying on verbal instructions.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix J: Phase 3 Flyer

TEACHERS NEEDED FOR RESEARCH TO HELP CHILDREN ON THE SPECTRUM STAY ON TASK

Many students on the autism spectrum experience difficulties staying on task and transitioning between tasks. This research project is investigating the use of structured teaching strategies to help address these problems so that these children can be more productive in the classroom.

What is the research project about?
- Do you have students with autism who have difficulty working independently in the classroom?
- Does their attention wander?
- Do they fail to complete tasks?
- Do they focus on things that are not relevant to the task?
- Do they get annoyed or upset when asked to transition to a new task?
- Do other students in your classroom have similar issues?

Who can participate?
If you are a primary school teacher in a mainstream classroom and answered yes to any of these questions, you may be interested in participating.

What is involved?
You will be asked to complete part 1 of an online survey and then to examine a structured teaching information package over a 3 week period. You will then complete part 2 of the survey.

What is in the information package?
Resources and strategies based on ‘structured teaching’ that can facilitate engagement in learning and transitions between learning tasks.

Who to contact for further information?
Libby Macdonald, PhD candidate
p: 07 5484 9188
elizabeth.macdonald2@griffithuni.edu.au

Autism CRC is the world’s first national, cooperative research effort focused on autism across the life span.
For more information visit autismcrc.com.au
Appendix K: Participant Information for Survey

Participant Information Sheet for Teachers

PROJECT TITLE
Use of Classroom Structure and Technology to Enhance Student Productivity and Transitioning Between Tasks

LAY TITLE:
Helping students stay on-task and move between tasks

Investigators:
Elizabeth Macdonald, PhD candidate, Griffith University (PhD candidate)
Dr. Jill Ashburner, Autism Queensland/ The University of Queensland (project leader)
Dr. David Trembath, Griffith University (PhD supervisor)
Professor Deb Keen, Griffith University (PhD supervisor)
Dr. Debra Costley, General Manager, Education Development & Research, Autism Spectrum Australia (PhD supervisor)
David Klug, Queensland University of Technology (Research Assistant)

What is the purpose of this project?
The aim of this project is to overcome the difficulties that students on the autism spectrum often have with staying on task and transitioning between tasks. In an earlier phase of the project, the use of structured teaching strategies - work systems and visual schedules - to help students on the spectrum stay on-task and move between tasks within mainstream classrooms was evaluated. Following on from this, an information package for teachers on the use of these approaches is being developed. We are now seeking feedback from mainstream primary school teachers through an online survey in order to incorporate the perspectives of educators to refine this package.

This project is being funded by the Cooperative Research Centre for Living with Autism (Autism CRC) [http://www.autismcrc.com.au/](http://www.autismcrc.com.au/), and is being conducted in partnership with Griffith University, Autism Queensland, Autism Spectrum Australia (Aspect) and...
the University of Queensland. The teacher training package will be refined and published on the Autism CRC website (ASD Connect Hub).

**What is involved?**
During this phase of the research, we are recruiting mainstream primary school teachers to read/look at the 50 page information package and undertake an online survey in order to give feedback on the current, draft version of the package. **If you would like to participate, please contact the principal researcher, Libby Macdonald, by emailing Elizabeth.macdonald2@griffithuni.edu.au to be sent a link to the survey.** You will be consenting to participate in this research by filling in the survey, and you may stop the survey at any time and your survey entries will be deleted. Your survey responses will be de-identified before being analysed or stored.

The survey will be in two parts. Each part will take approximately 10-15 minutes to complete. At the end of part one, you will be asked to download the draft information package using a Dropbox link. You will then be given a minimum of two weeks before being asked to provide feedback. This is part 2 of the survey.

At the end of the second part of the survey, the next phase of the research project is described and you may indicate if you are interested in being involved in the next phase of the research. The opportunity for further participation is dependent on ethical clearance/research approval being granted by relevant educational authorities and you will not be contacted about the project until we have approval.

**Are there any risks involved?**
There is no risk from involvement in this survey. No specific information about schools, classes or students will be collected. Teachers will not be asked to trial anything in their classrooms or alter their teaching practice in any way. They will simply be providing their professional opinion on the information package and answer background questions about their experience of teaching students with autism.

**Benefits:**
The research is aiming to improve the capacity of students on the autism spectrum to be included and to succeed at school. The strategies used are also likely to benefit other students. During the course of the survey, you will be provided with information about strategies that may increase your understanding of learners on the spectrum and how to support them.

**How will privacy be protected?**
The two parts of the survey will be linked by assigning individual links to the survey to participants’ email addresses. The survey responses will be de-identified prior to any data analysis. Email addresses will only be used for the purpose of disseminating survey links and linking surveys.
The survey will be conducted using Survey Monkey Platinum, which will allow the research team to retain ownership and control of all data. Survey Monkey servers, where the survey data will be collected, are based overseas and therefore the data collected (including your email address) is not protected by Australian Privacy legislation. By completing this survey, you agree to this transfer of your survey responses. Survey responses and your email address will be deleted once the surveys have been downloaded from Survey Monkey. It takes 90 days for the data to be removed from the Survey Monkey system.

Computer data files will be password protected and only available by the research team. All material will be destroyed after a period of five years after the end of the study. This study has been cleared with the Human Ethics Committee of The University of Queensland in accordance with the National Health and Medical Research Council’s guidelines. You are free to discuss your participation in this study with the project leader, Dr Jill Ashburner, who is contactable on (07) 3273 0075 or through email at Jill.Ashburner@autismqld.com.au. Should you wish to speak to an officer of the University who is unrelated to the research study, you can contact the University Ethics Officer on (07) 3365 3924. This information sheet is for you to keep for future reference.

Thank you for your interest in this research project,


Dr. Jill Ashburner, Autism Queensland/The University of Queensland
Appendix L: *Finished! The On-task Toolkit*

Due to its length, *Finished! The On-task Toolkit* is attached at the end of this document.
Appendix M: Online Survey Questions

Griffith Survey: Part I

Thank you for your interest in taking part in this research. This online survey will be presented in two parts. The first part will gather background demographic information and ask about your experience in teaching students on the autism spectrum. It will take about 10-15 minutes to complete. After completing part one, you will be given a resource to examine which outlines a couple of structured teaching strategies. You will not be asked to use or trial the strategies in your classroom, just to look at the resources. The second part of the survey will ask you to evaluate the resource. Part two will take approximately 10-15 minutes to complete. We will then use this information to further enhance the resource based on your feedback and that of other participants, prior to release.

By filling in the survey questions, you are consenting to participate in this research. You may discontinue participation at any time, data from unfinished surveys will be deleted, and all survey responses will be de-identified as only aggregate scores will be used for analysis.

If you have any questions or concerns, please contact:

Libby Macdonald – elizabeth.macdonald2@griffithuni.edu.au

* 1. Are you a mainstream primary school teacher?
   ○ Yes
   ○ No

Background Information
2. What is your gender?
- Male
- Female

3. What is your age?
(enter as whole number)

* 4. What is your highest educational level?
- Degree
- Postgraduate qualification in a field related to education
- Other postgraduate qualification

* 5. How many years teaching experience do you have?
(Please enter how many year teaching experience as a whole number)

* 6. Was this:
- full-time employment
- part-time employment
- a mixture of full-time and part-time employment

* 7. Which state or territory do you teach in?
- QLD
- NSW
- VIC
- TAS
- SA
- NT
- WA
- ACT
8. Which sector do you teach in?

- State government/public school
- Distance education
- Catholic school
- Autism specific school
- Independent school
- Special school
- Other (please specify)

9. Are you currently a:

- Classroom teacher
- Specialist educational support staff (e.g. specialist/consultant teachers, guidance officers)?
- School administrator

10. Which year levels do you teach?
(select more than one if you teach a composite class)

- Prep
- Year 1
- Year 2
- Year 3
- Year 4
- Year 5
- Year 6

11. How many students do you teach?
(if you teach more than one class, record the number you normally teach at one time)
(enter as whole number)

Class 1
Class 2
Class 3
Class 4
Class 5

Experience with Students on the Autism Spectrum

12. How many students on the autism spectrum have you taught in the past 3 years?
(enter as whole number)
13. Please rate the extent to which the following activities seem to be challenging for your student/s on the autism spectrum?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all challenging</th>
<th>Somewhat challenging</th>
<th>Very challenging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transitioning between tasks (e.g., delays or behavioural challenges occur when moving between tasks)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Staying on task</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Working independently</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Please indicate what training or professional development you have undertaken relevant to teaching students on the autism spectrum (you can select more than one).

- None
- Positive Partnerships training program
- School-based professional development
- On-line training module(s)
- Half day, or part day, workshop
- Other (please specify)
15. Please rate your knowledge of the following aspects of autism spectrum disorder (ASD).

<table>
<thead>
<tr>
<th>No knowledge (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Sound knowledge (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Excellent knowledge (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you rate your knowledge of the core diagnostic features of ASD?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>How would you rate your knowledge of the social characteristics of students on the spectrum?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How would you rate your knowledge of the communication characteristics of students on the spectrum?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How would you rate your knowledge of the behavioural characteristics of students on the spectrum?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How would you rate your knowledge of the cognitive/learning characteristics of students on the spectrum?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How would you rate your knowledge of the sensory processing characteristics of students on the spectrum?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>How would you rate your knowledge of the co-morbid conditions of students on the spectrum (other conditions that students on the spectrum often have)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
16. Please rate how confident you feel about these aspects of teaching students on the autism spectrum.

<table>
<thead>
<tr>
<th>How confident do you feel in addressing the behavioural challenges of students on the spectrum in your class?</th>
<th>Not at all confident (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Somewhat confident (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very confident (7)</th>
</tr>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How confident do you feel about making educational adjustments to help students on the spectrum to learn?</th>
<th>Not at all confident (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Somewhat confident (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very confident (7)</th>
</tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>How confident do you feel about communicating effectively with students on the spectrum in your classroom?</th>
<th>Not at all confident (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Somewhat confident (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very confident (7)</th>
</tr>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>How confident do you feel about making educational adjustments to help students on the spectrum to stay on task?</th>
<th>Not at all confident (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Somewhat confident (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very confident (7)</th>
</tr>
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<tbody>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How confident do you feel about making adjustments to help students on the spectrum to be included socially in the classroom?</th>
<th>Not at all confident (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Somewhat confident (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very confident (7)</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>How confident do you feel about making adjustments to accommodate the sensory issues of students on the spectrum?</th>
<th>Not at all confident (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Somewhat confident (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very confident (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. Please describe any strategies, practices or resources you use/have used to support students on the autism spectrum:

**Current Practices**
Please rate your current knowledge of these teaching strategies, and how confident you would feel about using them.

**Visual schedules**: visually inform students of an anticipated sequence of events using pictures, symbols or written language.
**Work Systems**: Visually structuring tasks, or task elements, such that students know (a) what they are expected to do, (b) how much work is expected, (c) how to know progress is being made, or that work is complete, and (d) what to do next (Hume & Reynolds, 2010; G. Mesibov et al., 2015).

* 18. Knowledge

<table>
<thead>
<tr>
<th>No Knowledge (1)</th>
<th>Sound Knowledge (4)</th>
<th>Excellent Knowledge (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual schedules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work systems</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 19. Confidence

<table>
<thead>
<tr>
<th>Not at all Confident (1)</th>
<th>Somewhat Confident (4)</th>
<th>Very Confident (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual schedules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work systems</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Griffith Survey: Part I**

End of Survey

THANK YOU for taking the time to complete this survey!

The information you have provided will help to guide the future work of the Autism CRC Education Programmes.

If you have any other thoughts, issues or ideas, please contact the Libby Macdonald (07) 5484 9188 (elizabeth.macdonald2@griffithuni.edu.au) or for technical support email d.klug@qut.edu.au.
Thank you for taking the time to fill in part two of this survey. This part of the survey will ask your opinions about the On-Task Toolkit and will take approximately 10-15 minutes to complete.

* 1. 1. You have received a digital copy of an information package – the On-Task Toolkit – outlining the use of visual structures and work systems. Please indicate which of the following actions you have undertaken with respect to the On-Task Toolkit.

1. Did you read the entire On-Task Toolkit?
   (If yes, skip to Q5)

<table>
<thead>
<tr>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If answered "No" above, how much did you read?
(e.g. some of it, or none of it)

---

* 2. Please indicate which of the following actions you have undertaken with respect to the On-Task Toolkit.

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Did you read the introductory section?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Did you read the section on visual schedules?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Did you read the section on work systems?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
* 3. Approximately how many minutes did you spend looking at the On-Task Toolkit?

* 4. Please indicate which of the following actions you have undertaken with respect to the On-Task Toolkit.

<table>
<thead>
<tr>
<th>Action</th>
<th>No</th>
<th>Yes</th>
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<tbody>
<tr>
<td>6. Did you follow links provided in the On-Task Toolkit to further information about structured teaching?</td>
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<tr>
<td>7. Did you follow links provided in the On-Task Toolkit to further information about visual schedules?</td>
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<tr>
<td>8. Did you follow links provided in the On-Task Toolkit to further information about work systems?</td>
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<td>9. Did you watch any of the videos linked in the On-Task Toolkit?</td>
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</table>

* 5. Please indicate how easy you felt sections of the On-Task Toolkit were to follow.

<table>
<thead>
<tr>
<th>Section</th>
<th>Very difficult (1)</th>
<th>Neither difficult nor easy (4)</th>
<th>Very easy (7)</th>
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<tbody>
<tr>
<td>Section A: Background reading on structured teaching</td>
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<tr>
<td>Section B: Key information about using structured teaching strategies in mainstream classrooms</td>
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<td>Section C: Visual schedules</td>
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<td>Section D: Work systems</td>
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</table>
6. Please rate how useful you feel the following elements of the On-Task Toolkit would be in helping to implement these strategies in your classroom.

<table>
<thead>
<tr>
<th>Element</th>
<th>Not useful at all (1)</th>
<th>(2)</th>
<th>Somewhat useful (4)</th>
<th>(5)</th>
<th>Very useful (7)</th>
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<tr>
<td>Information about autism.</td>
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<td>Information about structured teaching.</td>
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<td>Information about visual schedules.</td>
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<tr>
<td>Information about work systems.</td>
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<td>Links to other information online.</td>
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<td>Links to videos.</td>
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<tr>
<td>Instructions on how to implement visual schedules.</td>
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<tr>
<td>Instructions on how to implement work systems.</td>
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<tr>
<td>Examples of visual schedules.</td>
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<tr>
<td>Examples of work systems.</td>
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<tr>
<td>Templates for implementing visual schedules and work systems.</td>
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<tr>
<td>Pull-out “at a glance” information sheets.</td>
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<tr>
<td>Implementation checklist.</td>
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</table>

Is there anything you would change or add to the On-Task Toolkit?

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7. Please rate your current knowledge of these teaching strategies, and how confident you would feel about using them.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>No Knowledge (1)</th>
<th>(2)</th>
<th>Sound Knowledge (4)</th>
<th>(5)</th>
<th>Excellent Knowledge (7)</th>
</tr>
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<tbody>
<tr>
<td>Visual Schedules</td>
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<tr>
<td>Work Systems</td>
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8. Please rate your current knowledge of these teaching strategies, and how confident you would feel about using them.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Not at all Confident (1)</th>
<th>(2)</th>
<th>Somewhat Confident (4)</th>
<th>(5)</th>
<th>Very Confident (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Schedules</td>
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<tr>
<td>Work Systems</td>
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</table>
* 9. Please rate how useful you think each of the following elements of the intervention may be in teaching your student on the autism spectrum if you were to implement them in your classroom.

<table>
<thead>
<tr>
<th></th>
<th>Not at all useful (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Somewhat useful (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very useful (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual schedules or Timetables</td>
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<td>Work Systems</td>
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</table>

* 10. Please rate how useful you think each of the following elements of the intervention may be for teaching other students in the class without an autism diagnosis if you were to implement them in your classroom.

<table>
<thead>
<tr>
<th></th>
<th>Not at all useful (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Somewhat useful (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very useful (7)</th>
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<td>Work Systems</td>
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</table>

* 11. Please indicate how easy you feel it would be to implement these strategies for your whole class.

<table>
<thead>
<tr>
<th></th>
<th>Very difficult (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Neither difficult nor easy (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very easy (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual schedules or Timetables</td>
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</table>

* 12. Please rate how likely you would be to use these strategies in your classroom.

<table>
<thead>
<tr>
<th></th>
<th>Not at all likely (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>Somewhat likely (4)</th>
<th>(5)</th>
<th>(6)</th>
<th>Very likely (7)</th>
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**Griffith Survey: Part II**

**End of Survey**

THANK YOU for taking the time to complete this survey.
The next phase of this research will involve collecting feedback from teachers on the use of visual schedules and work systems in their classrooms. If you would be interested in hearing more about this research, please provide contact details below (these will be stored separately from your survey responses).

Email: Please feel free to contact me if you have any further questions or concerns (elizabeth.macdonald2@griffithuni.edu.au).

Libby Macdonald

13. Are you interested in hearing more about this research?

☐ Yes
☐ No
Appendix N: Semi-structured Interview Questions

Project 2.011 Use of Classroom Structure and Technology to Enhance Student Productivity and Transitioning Between Tasks

Interview questions:

Section 1. Background information

(Provided in writing)

Section 2. Response to the toolkit.

The next questions are from the survey, so you may have answered them already. However, that data is being de-identified for analysis so won’t be linked to the survey data. Sorry for the repetition.

- Did you read the entire On-Task Toolkit?
  - Did you read the introductory section?
  - Did you read the section on visual schedules?
  - Did you read the section on work systems?
- Did you follow links provided in the On-Task Toolkit to further information about structured teaching?
- Did you follow links provided in the On-Task Toolkit to further information about visual schedules?
- Did you follow links provided in the On-Task Toolkit to further information about work systems?
- Did you watch any of the videos linked in the On-Task Toolkit?
- How easy did you feel the following sections of the On-Task Toolkit were to follow?
  - Background section on autism and structured teaching. (V. difficult, neither difficult nor easy, V. easy)
  - Section on visual schedules.
  - Section on work systems.
- How useful do you feel the following elements of the On-Task Toolkit were in helping to implement these strategies in your classroom.
  - Information about autism. (Not at all, somewhat, very)
- Information about structured teaching.
- Information about visual schedules.
- Information about work systems.
- Links to other information online.
- Links to videos.
- Instructions on how to implement visual schedules.
- Instructions on how to implement work systems.
- Examples of visual schedules.
- Examples of work systems.
- Templates for implementing visual schedules and work systems.
- Pull-out "at a glance" information sheets.
- Implementation checklist.

• What parts of the toolkit did you find most helpful?

Section 3. Implementation

• Can you describe what you did to implement visual schedules and work systems in your classroom?
  - What parts of the package did you implement? Both visual schedules and work systems?
  - When were they used? During what tasks and at what time of day?
  - Did you use them for a sustained period of time?
  - Did you use a whole class approach, or did you just implement them with some students?
  - Did you have any support in implementing these strategies (e.g. support teacher, teacher aide, specialist teacher, administrative support)?

• Did you have any difficulties using visual schedules and work systems as a whole class approach?

• Were there any issues in implementing the strategies (e.g. time, resources)?

• How much time did you spend in planning and preparing materials?

• How much time did you spend using VS and WS in class?
Section 4. Results.
- Do you think these strategies were helpful for your students? What sort of effect do you think the strategies had?
  - Can you describe any changes you have observed in the on-task behaviours of your student/s on the spectrum?
  - Can you describe any changes you have observed in the way your student/s on the spectrum transition between tasks or task elements?
  - Can you describe any changes that visual schedules and work systems may have had on the behavior of other students in the class?
- How do you think your students on the spectrum felt about visual schedules and work systems? How did they respond? Were they motivated to use them? What about other students?

Section 5. Recommendations
- Will you be using these strategies in the future as part of your usual teaching practice?
  - What would you do differently? What would you repeat?
  - Would introducing the strategies at the beginning of the year be easier?
  - Would you use the strategies in a class without any students on the spectrum?
- Would you recommend this approach to other teachers?
- Are there any barriers you can think of to teachers using these strategies?
- Can you think of any ways to encourage teachers to incorporate these strategies?
- Are there other resources, or is there further information, that you would like to see included in the toolkit?
- Would any of the following be helpful in making this information accessible for teachers:
  - Web-based resources?
  - Videos?
  - More or different templates?
  - Technology-based implementation?
  - More information?
  - Professional development?
- Is there any other feedback you would like to add?
Finished!

The On-Task Toolkit

A teacher’s guide to using visual schedules and work systems in mainstream classrooms

Libby Macdonald (Autism CRC funded PhD scholar) Griffith University
Kaaren Haas, Autism Spectrum Australia (Aspect)

Adapted from:
Helping students in mainstream primary classrooms stay on-task and transition between tasks: Visual schedules and work systems. A workbook for teachers prepared by Kaaren Haas, Autism Spectrum Australia (Aspect).
August, 2015.

Contact Libby Macdonald – elizabeth.macdonald2@griffithuni.edu.au
This workbook is an adaptation of

*Helping students in mainstream primary classrooms stay on-task and transition between tasks: Visual schedules and work systems*

*A workbook for teachers*

prepared by Kaaren Haas, Autism Spectrum Australia (Aspect).

August, 2015.
Introduction

Staying on-task and transitioning between tasks are known to be key areas where students on the autism spectrum face significant challenges that can impact their learning progress and inclusion in the typical mainstream classroom.

Within special education settings, Structured Teaching approaches have been shown to be highly effective in helping students on the autism spectrum to stay on-task and transition between tasks. Two of the key strategies used in a Structured Teaching approach that can be translated into a mainstream classroom setting are visual schedules and work systems. These strategies are deceptively simple, and probably already feature to some extent in your classroom, but used consistently and with understanding, they can help to reduce anxiety for students on the spectrum.

For students on the autism spectrum in mainstream schools, a customised approach may not always be viable, and may also inhibit their inclusion in the social environment of the classroom and the school. An alternative is a whole-of-class approach, which seeks to accommodate the needs of the student on the autism spectrum by creating an inclusive, autism-friendly learning environment that integrates the work patterns of the students on the autism spectrum as seamlessly as possible with those of other students in the class.
About this toolkit

The primary aim of this toolkit is to enable you, the teacher, to develop two new resources that all of your students can use in your classroom:
- a visual schedule (i.e. a timetable)
- a work system

The toolkit is organised into 4 sections.

Section A: Background information about Structured Teaching

We recommend a quick read to gain a basic understanding of the principles of structured teaching. To learn more about structured teaching, look up the additional resources listed at the end of Section A.

Section B: Key information about using structured teaching strategies in mainstream classrooms

This will help you understand how structured teaching strategies work with the strengths and interests of your students on the autism spectrum so that they can be effective learners while being integral, fully-participating members of your class.

Section C: Information about visual schedules

This section will show you how to develop visual schedules that you can implement in your classroom. You will be provided with step-by-step guidance, plus tips, examples and templates

Section D: Information about work systems

Like section C, this section will give you information, examples and templates to help you to implement work systems in your classroom.
SECTION A
BACKGROUND READING
We recommend a quick read to gain a basic understanding of the principles of Structured Teaching
About Structured Teaching

What is Structured Teaching?
Structured teaching describes a collection of strategies that are used to create an environment in which students on the autism spectrum can function with less stress and greater independence and is a well-established model of educational practice in special education and autism-specific settings. Structured teaching is underpinned by the view that autism involves difference rather than disability, and it is an approach that aims to provide an educational environment that works with the strengths of students on the spectrum.

The aim of structured teaching is to provide support to students on the autism spectrum by creating a structured and predictable environment in which tasks and expectations are clearly defined and presented in a manner that suits the ways that individuals on the spectrum view the world.

Structured Teaching strategies and principles can support all aspects of each student's life (i.e. school, home and community), and can be used to develop both academic and functional skills across all Key Learning Areas (KLAs).

How and why Structured Teaching works
Structured Teaching approaches have been specifically developed to assist people on the autism spectrum to function with success within a neuro-typical culture.

Structured Teaching can reduce the stress, anxiety and frustration that may be experienced by students on the spectrum due to challenges they experience in some or all of the following areas:

- comprehension
- expressive language
- social relating
- sensory processing
- change and unfamiliarity
- organisation and sequencing
- identifying relevant information and seeing and understanding the big picture
- concentration and impulse control
- generalisation of skills learnt
- concepts of time.

What is TEACCH®?
Structured teaching is an approach that was developed as part of the Treatment and Education of Autistic and Related Communication handicapped CHildren (TEACCH®) programme which
originated in North Carolina in the early 1970s. The TEACCH® Autism Program is a systematic approach to organising the learning environment to address and meet students' needs for routine, structure and visual clarity by

- using visual schedules, work systems and visual structures to supplement auditory communications; together with
- customising teaching materials and methods so as to engage students' through their individual interests and strengths.

How and why TEACCH® works
Starting with a good understanding of each student's individual strengths and needs, TEACCH® seeks to:

- organise the environment to make it more meaningful for each student;
- develop motivating activities by incorporating each student's special interests and learning styles; and
- help each student to understand what is expected of them, by using flexible routines, schedules, work systems and visual structure
- continually assess and adjust these strategies as to increase success and independence.

The benefits of implementing the elements of Structured TEACCHing include:

- improved receptive language
- increased learning
- building independence
- calming and organising
- as a behaviour management tool.

The TEACCH® method
The key elements of the TEACCH® approach are:

- Understanding the ‘culture of autism’
- Developing a learning/teaching plan that accounts for each student’s learning strengths and interests
- Structuring the physical environment
- Using visual structure and supports to make the sequence of daily activities predictable and understandable, with any change forewarned and explained
- Using visual structure and supports to make individual tasks understandable.

The key steps to apply the TEACCH® approach are:

1. When developing teaching and learning programs, first assess the student’s’ strengths and interests to incorporate into the teaching activities.
2. Using this assessment of the student’s strengths and interests, apply the principles of visual structure (Visual Instruction, Visual Clarity and Visual Organisation) to address the student’s needs for structure across the learning program.
   a. Address the student’s needs for physical structure
   b. Address the student’s needs for routines and flexibility
   c. Address the student’s needs for schedules
   d. Address the student’s needs for work systems.
3. Continually monitor the student’s interaction with the elements of Structured TEACCHing and adjust the program to enable increasing independence and success.

Where to find out more about Structured Teaching and TEACCH®

**Book**

TEACCH APPROACH TO AUTISM SPECTRUM DISORDERS
Written by the program’s co-founders and their colleagues describes in detail the philosophy and practices of the TEACCH Program and traces the growth of the program from its inception over 30 years ago to its current status as an internationally-renowned centre offering interdisciplinary services and training.

**Website and online articles**

STRUCTURED TEACHING STRATEGIES: A SERIES
Indiana Resource Center for Autism
This intro webpage provides links to a set of four definitive articles on Structured Teaching strategies
http://www.iidc.indiana.edu/?pageTitle=3520
http://www.iidc.indiana.edu/styles/iidc/defiles/IRCA/Structured%20Teaching%20Strategies%20Article%201.pdf
http://www.iidc.indiana.edu/styles/iidc/defiles/IRCA/Structured%20Teaching%20Strategies%20Article%204.pdf
INTRODUCTION TO STRUCTURED TEACHING
Produced by Camden Council, UK.
https://www.youtube.com/watch?v=vkymZzmg4jw
Narrated and acted by a primary school student on the spectrum; set in her school. She demonstrates her school day and how ST strategies are used to enable her to integrate and be happy and productive in a mainstream class.

COMPONENTS OF STRUCTURED TEACHING
Produced by Upper Canada District School Board.
https://vimeo.com/15113443
Educators demonstrate how they have creatively adapted their mainstream classroom environments and approaches to successfully engage children on the autism spectrum, so as to enable these students to access school curriculum by presenting it in a structured form. Shows ST in action.
SECTION B
KEY INFORMATION ABOUT USING STRUCTURED TEACHING STRATEGIES IN MAINSTREAM CLASSROOMS

This section will provide information on how and why to use:

- a whole-of-class approach to Structured Teaching
- visual structure
- routines

and to understand what’s different about learning for your students on the autism spectrum.
Why use a whole-of-class approach to Structured Teaching?

Structured Teaching approaches such as the TEACCH® Program have been shown to be highly effective within special education settings to help individual students on the autism spectrum to stay on-task and transition between tasks. A key feature of the TEACCH approach is to assess the individual student’s strengths and interests and address that student’s’ particular needs.

In a mainstream classroom, one way in which a teacher can adopt this approach is to develop a tailored teaching program for each individual student on the autism spectrum. This customised program is likely to differ significantly from the program for other students in the classroom. This approach is based on highlighting differences between the student of the autism spectrum and other students in the classroom.

An alternative approach is to recognise the needs of the students on the autism spectrum within the context of being an integral member of the whole class learning group. This whole-of-class approach considers the particular needs of the students on the autism spectrum and seeks to develop and apply solutions that can work for all students in the class. A whole-of-class approach seeks to accommodate the needs of the student on the autism spectrum by creating an autism-friendly learning environment that integrates the work patterns of the students on the autism spectrum as seamlessly as possible with those of other students in the class. This approach is based on the premise that many of the principles of Structured Teaching, such as utilising visual structure and routines, can be beneficial to promoting the learning and independence of all students in the classroom, not only students on the autism spectrum.

Adopting a whole-of-class Structured Teaching approach requires you, as the teacher, to:

- understand and know how to access the strengths and interests of each of our students on the autism spectrum, both as an individual learner and as a fully participating member of a the class
- carefully plan the content, teaching strategies and teaching style that you will employ for the whole class so as to account for the needs and leverage the strengths and interests of the students on the autism spectrum
- monitor and adapt these over time as each student develops their skills, knowledge, confidence and independence.
What's different about learning on the autism spectrum?

Often classrooms and teaching resources have been designed to work for neuro-typical students. Students on the autism spectrum often have atypical strengths and ways of processing the world and information, so they can find typical school environments very stressful.

Structured teaching aims to provide an educational environment that works with the strengths of students on the autism spectrum and provides structure, direction and certainty. This is underpinned by the view that autism involves difference rather than disability.

While every person on the autism spectrum experiences life in a unique way, in general there are a number of common characteristics and possible tendencies that can make aspects of the standard school day challenging to negotiate.

As a teacher, you will probably also recognise some of these characteristics and behaviours in some neuro-typical students. That’s why there can be benefits for the whole class in applying elements of Structured Teaching to help students stay on-task and transition between tasks. By working with visual processing strengths, supporting executive function through the use of structure and organisation and helping to provide predictability, a whole-of-class approach to structured teaching aims to create a learning environment that is less stressful for students on the spectrum, and may also have benefits for neuro-typical students.
We are each different and the same.

We tend to have a strength in and show a preference for processing visual information, rather than auditory processing, particularly when we are processing language.

We will give frequent attention to details rather than the big picture. We tend to separate rather than combine ideas and concepts. So we can find it challenging to understand the meaning of how those details fit together – for example, we can tend to see a lot of the detail about the trees, rather than seeing the whole forest.

Some of us do not have a strong interest in organising ideas, materials, and activities (termed ‘executive functioning’); for others of us, we work well when these things are always organised in a very particular way.

We can have very strong interests and impulses in engaging in favoured activities, and once we are engaged, in a favoured activity we do not want to disengage.

We can also be fearful and anxious about change and transitions.

So, at times we can be very distractible, at other times, when we are engaged in an activity, we will continue to focus on the activity when it is time to make a transition.

Compared to other people, we can move too quickly or too slowly from one activity to another, and we can need help to see the beginning, middle, or end of an activity.

We can tend to communicate and use language differently to others. This can vary by developmental level but it commonly includes differences in the social use of language (termed ‘pragmatics’).

We tend to become attached to routines, with the result that we will associate certain activities with the original learning situation but we may not extend this to other learning situations. We can tend to be upset, confused or uncomfortable when our routines are disrupted.

Each of us is likely to have marked shared and individual sensory preferences and dislikes – for example, it is common that when we need to concentrate and feel at ease, we prefer soft lighting, quiet environments and uncluttered spaces. Maintaining our own personal space can be very important to us. Some of us can be very sensitive to touch, others to certain smells.
What’s visual structure?

Why it works
Many people, including those on the autism spectrum, tend to be visual learners, and therefore their ability to understand visual information is generally superior to their ability to comprehend verbal information.

Visual information (objects, photographs, line drawings, written word) supports and develops the student’s understanding.

Providing appropriate visual structure aids comprehension, minimises anxiety and helps students to perform their work more effectively.

Principles
Visual structure can be used across every element of the classroom environment and activities. The amount of visual structure that a student requires is determined by the degree to which that student:
- needs a concept or task to be more clear or concrete;
- is distracted by the content or materials;
- has a level of organisational ability resulting in the student being unable to complete a task independently;
- requires their interests to be incorporated into the activity to increase motivation and engagement with the task.

Method
Visual structure can be implemented by using:
- visual instruction
- visual organisation
- visual clarity.

Visual instruction
Visual instruction shows how a task/activity begins, the sequence of steps in the activity and the end point of the activity.

Some examples of visual instruction are:
- Left to right sequence of materials
- Templates or visual supports that shows what materials are needed
- Picture sequences
- Social Stories and Comic Strip Conversations
• Lists
• Product samples (a model to show the finished product)
• Photos or picture dictionaries that displays a collections of choices
• Written instructions.

**Visual organisation**
Organise visual supports, space and materials to enhance the student’s attention and independence.

Some examples of visual organisation are:

• Self-contained tasks
• Containers used to organise materials
• Containers in sequence, with a picture sequence
• Stabilised materials
• Limits on the amount of space or materials
• Information organised vertically
• Information organised in a book format; with the script paired with photos.

**Visual clarity**
Use visual clarity to draw the student’s attention to the most relevant information.

Some examples of visual clarity are:

• Colour coding
• Highlighting important information
• Using Boardmaker® symbols, photos or written words
• Numbers to show progress with a task
• Check boxes on list, to show progress with a task and highlight when the task is completed.

**About routines**

**Why routines with flexibility work**
Routines are strategies for understanding and predicting events, tasks and activities. Routines help to minimise agitation, promote skill development and increase understanding. Routines with in-built flexibility help to reduce anxiety levels by keeping the students' focus on the *structure* of the activity instead of on the *detail* of the activity.

All students need routines.

Routines need an element of flexibility.
How to apply routines in your classroom
You probably already use many routines during the school day. Devise routines that allow the content of the activity to vary whilst retaining the structure of the activity.

Use visual aids to communicate, implement and reinforce routines, such as:

- picture activity sequences
- video modelling
- visual schedules.

Teach each student to check their individual schedule after completing each activity. This routine can be generalized to multiple situations across a lifetime and can help students on the autism spectrum develop independence.

When introducing changes to a routine, or introducing new or challenging activities to the routine, prepare the students before the change. Useful techniques to prepare students for changes in the routine include:

- priming
- rehearsal
- social stories.
SECTION C
VISUAL SCHEDULES

In this section you will find

- information about visual schedules
- how to develop and implement visual schedules in your classroom
- visual schedule templates
Visual Schedules
Using a visual schedule to structure a routine

A visual schedule, such as a timetable, gives a visual representation of what activities will occur and in what sequence.

Why visual schedules work
Visual schedules support a student’s receptive language difficulties by explicitly showing the student what is expected. While students may be familiar with the class routine, or may be shown a schedule at the start of each day, the effort of retaining and recalling this information can be stressful for some. As adults, we often use diaries, organisers or reminders to help plan our days, and would probably feel considerably more anxious about what we have to do without these aids. Having an individual schedule that they can refer to when needed can help students feel more secure and in control as well as helping them to learn valuable planning and organisational skills that they will need as they get older. This is something that can be useful for every student in the class.

Schedules can also be used to increase a student’s motivation to complete less desired activities by strategically alternating more preferred with less preferred activities on the student's individual schedule, and they can be personalised to be more meaningful for individual students.

Principles
Provide all students with a visual schedule, such as a timetable. Always present visual schedules in a consistent format.

Visual schedules can be individualised to take into account each student's visual literacy and their comprehension level, and to incorporate their personal interests.

Visual schedules are not crutches from which students are weaned, but rather assistive technologies with the potential to increase independent functioning throughout life at home, school and in community settings.
Selecting the most appropriate visual schedule
What type of schedule do the students need to learn to use in their next educational placement? Choose a style of visual schedule that will help the students to progress towards functioning independently in their future educational placement, such as high school.

Learn more about how to use visual schedules
Slides: [https://www.thewatsoninstitute.org/resource/schedule-powerpoint/](https://www.thewatsoninstitute.org/resource/schedule-powerpoint/)
Video: [https://www.youtube.com/watch?v=K0xeKPOpd0A](https://www.youtube.com/watch?v=K0xeKPOpd0A)

Use the step-by-step guide on the following pages to help you use visual schedules in your classroom.
Using Visual Schedules

How to develop and implement a whole-of-class visual timetable

Step 1: Assess your students’ needs

Answering the following questions about your students will help you to determine what information to include on the timetable, how to best present that information and the best format and location for the timetable.

- What type of timetable do the students need to learn to use in their next educational placement?
- Thinking about each student with autism and the class group, what time period best suits the students’ needs for clarity, certainty and help to transition through the classroom routine?
  - How far ahead in the classroom routine do the students need to prepare and plan?
  - How often is the classroom routine repeated?
  - How frequently and when is the classroom routine changed?
  - How much information does each student with autism need at one time?
  - How much information can every student in the class take in at one time?
- Choose a time period for the timetable that matches the amount of information that the students need at one time in the classroom routine. Some students are less anxious when they can see what is happening for a whole term, other students may be too distracted with a whole day timetable, others may be confused or overwhelmed by a large amount of information and only need to know what they are about to do.
- What way of interacting with and changing the timetable best suits each student with autism? And all students in the class?
- When and where in the class routine will the timetable be used - i.e. when and where will the students look at the timetable and manipulate it?
- When transitioning from one activity to the next, how can every student move smoothly from checking their timetable to starting the next activity?
  - Choose a location where the timetable will be used that is consistent throughout the classroom routine and fit the mobility that students need to best transition between activities.
  - Timetables can be kept on a wall or desk, a shared or individual whiteboard, an iPad, a clipboard, or in a folder.
  - Storing the timetables in a folder or an iPad allows the timetable to be portable if the students move from one location to another for different activities.
- Within the student group, what is the range of visual literacy skills, including each student with autism? What symbols does every student understand?
- How will each student show on the timetable any individual in-class or extra-curricular activities that they undertake within their school routine, such as music lessons, learning support sessions, sports training or performance rehearsals?
Step 2 Design the timetable
Using the information from your answers, design a timetable that can be used by each student in the class. Here are some additional tips:

- Consider if the students can be involved in designing (and individualising) their own timetable
- Format the timetable with a consistent visual structure. In general, arrange timetables from top to bottom, or left to right
- Supplementing written words with symbols, colour coding, objects, photographs and drawings can support students’ understanding of the timetable and encourage their engagement with the timetable.
- Timetables can incorporate social interactions or reminders of specific rules for different situations; e.g., 'show completed work to teacher', 'quiet voice in library'.
- General timetables can be shared as a class group and each student can have an individualised version.
- Sets of timetables can be used where routines are repeated over a period of time, e.g. a set of daily timetables for a week, a set of weekly timetables for a term.
- Students may at different times need to refer to different timetables for both shorter and longer time periods, e.g. daily timetable, weekly timetable, term timetable and yearly planner.

Example of a simple daily visual timetable:
Use this space to sketch your timetable:
Step 3 Implement the timetable in the classroom

- Introduce and explain the timetable to the students
- Teach students how, when and why to use the timetable.
- Incorporate the use of the timetable into the classroom routine.
- When first using the timetable in the classroom, prompt the class to refer to their timetable at transition times, and to use it to mark off finished work, mark changes, and add extra tasks.
- Adapt your classroom routine to incorporate a regular and consistent transition action that indicates to the students to check their timetable when they are finishing one activity and moving to the next.
- When a student is unsure of what to do, or asks questions that the timetable can answer, prompt the student to refer to their timetable.
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Visual Schedules

At a Glance

Visual Schedules

• are a visual representation of a sequence of activities or events.
• reduce anxiety by making events more predictable
• can be used to prepare students for upcoming changes to routines.
• can be individualised according to needs and interests.
• are tools that students can learn to use to increase independence across settings and into adulthood.

To use a daily schedule or timetable

• Take into account the individual needs and interests of your students.
• Where possible, involve students in designing and individualising schedules.
• Make referring to the schedule part of your classroom routine and use it consistently.
• Keep schedules up to date so that they are reliable.
• Prompt students to refer to their schedule when they are unsure of what to do.
SECTION D
WORK SYSTEMS

In this section you will find

- information about work systems
- how to develop and implement work systems in your classroom
- simple checklist work system templates
Work Systems

Using a work system to visually structure a task
A work system is a system for organising the way that a task or set of tasks or activities is started, undertaken and completed.

Why a work system helps
A work system is a powerful routine for sequencing, independence and generalisation.

Work systems help students to understand what is expected of them in a particular activity or task. The visual clarity of a work system promotes errorless learning. In doing so, work systems promote organisational skills, independence, concentration, engagement, confidence and task completion.

A work system lets students know:

- What task or activity to do.
- How much work to do, or how much time it will take.
- How to know that progress is being made or work is complete.
- What to do next.

Principles
Each task or set of tasks for each student is organised into a work system.

Work systems can be customised to suit each student's individual needs, strengths and interests.

Using the same format and routine for manipulation in the work system that is also used in their timetable will increase the student's comprehension of what they are expected to do.

Learn more about work systems

Online article: "I Can Do it Myself!" Using Work Systems to Build Independence in Students with Autism Spectrum Disorders.

http://www.iidc.indiana.edu/?pageId=416

A brief but comprehensive 'how to and why' article from TEACCH

Use the step-by-step guide on the following pages to help you use work systems in your classroom.
Using Work Systems
How to develop and implement a work system

Step 1: Assess the scope to structure the task
- What output(s) are the students to produce in the task?
- What are the different actions and/or parts in the task?
- Is there an order in which each part of the task is to be done?
- What action do the students take to start each part of the task?
- What action do the students take to finish each part?
- What happens when the student finishes that part of the task?
- What happens when the student completes the whole task?
- What equipment do the students need to do each part of the task?
- How can the student’s personal interests be incorporated in the work system?

Step 2: Structure the task into a work system
- Break the activity or lesson down into discrete task steps
- Present the ordered task steps in a left to right, top to bottom sequence with the work for the student to start on the student's left.
- Include a way for students to engage with or manipulate the work system so that they can monitor their progress - e.g. crossing items off a task list, using check boxes, moving concrete task items, pictures or symbols to a "finished" area, etc...
- If possible, use the same format and routine for manipulation that the student uses to manipulate their timetable.
- A work system can also involve the students moving to various locations to collect lesson materials.
Example of a simple checklist work system
A work system can be a simple "to do" list where a task is broken down into manageable steps and students can self-monitor their progress. The level of detail can be tailored to suit the needs of students.

1. Answer questions one to three on the worksheet.
2. Place worksheet in “finished” folder.
3. In your writing book, use each of your spelling words in a sentence (write 8 sentences).
4. Check that you have capital letters at the beginning of each sentence and that the spelling words are correct.
5. Place writing book in “finished” folder.
6. Free time on computer till 1pm.

Then: Lunch

Example of a work system folder
Work systems can also consist of a logical sequence of concrete tasks, as demonstrated in this folder of numbered activities. It is clear what, and how much, needs to be done, and there is a place for finished work allowing the student to visually gauge their progress.
Example of a work system for a literacy task
More complex, open tasks can be presented in a logical, visually structured way.

In this example, students are individually writing a fantasy-themed narrative. An initial task, before the students begin to write their narrative, is to plan the plot, setting and characters of their narrative.

A work system providing visual structure for this task is on the following page
**My plan for my fantasy narrative**

Write or draw in each box to answer the questions. **Start** at 1.

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5. Look at your table. Are there any spaces you need to fill? What do you think you need to research to fill in the missing spaces?

☐ **FINISH** Is your plan finished? Tick ✓ the box, then put the finished sheet in the FINISHED box.
Step 3 Implement the work system

- Ensure the work system provides visual structure that answers the following four questions for the student:
  - What work am I to do?
  - How much work and is there?
  - How can I tell I am finished?
  - What do I do next?
- Introduce and explain the structure of the work system to the students, include Start and Finish.
- Provide a designated place for finished work such as a folder or labelled "FINISHED" box or tray in the classroom.
- When first using the work system, prompt students to step through the sequence in the work system.
- When a student is uncertain about what to do, prompt the student to use the structure of the work system to understand what to do next.
- Emphasise the importance of Start and Finish. If and when appropriate, support the learning of Start and Finish with positive affirmation and rewards.
- Reward systems such as preferred activities can be incorporated in the work system.

Work systems and assistive technology

Some students on the autism spectrum may already be using personal computing devices in class, and many find technology of this sort highly motivating. There are many apps available that can facilitate the implementation of both visual schedules and work systems, from basic organisers to autism specific apps. When choosing an app it may help to consider what apps the student is already familiar with, the student’s age, interests and the sort of visual supports that might be helpful.

One simple idea for the use of assistive technology in creating an individual work system is to use a mobile device to photograph a schedule or list of instructions from the board. There are a number of apps (such as Evernote or Google Keep) that will allow students to write on top of photographs so that they can cross off or check items as they complete each task.
Example of a simple work system on a tablet device.

When using technology for supports upon which students may rely, it is a good idea to give consideration to the availability of devices (are they used as a shared class set?) and their battery life, as offering these supports in a way that is inconsistent or unreliable can be a cause of anxiety.
TEMPLATES
Task/Lesson: ________________________

I will need: __________________________

Tick box when done

1. __________________________________

2. __________________________________

3. __________________________________

4. __________________________________

5. __________________________________

6. __________________________________

Finished:___________________________

Then:______________________________

Task/Lesson: ________________________

I will need: __________________________

Tick box when done

1. __________________________________

2. __________________________________

3. __________________________________

4. __________________________________

5. __________________________________

6. __________________________________

Finished:___________________________

Then:______________________________
Work Systems

At a Glance

A work system

- provides visual structure to a task or set of tasks.
- lets students know
  - What to do
  - How much to do
  - How to tell they are finished
  - What to do next

To use a work system

- Take into account the individual needs and interests of your students.
- Consider what the student will need to complete the task, and what the expectations are for each part of the task.
- Break the task or tasks down into discrete steps and present these visually and in a logical order.
- Include a way for students to interact with the work system so they can monitor their progress (e.g. moving items to a “finished” box or crossing items of a list)
- Incorporate reinforcements or preferred activities.
You can use the following checklist to facilitate the implementation of visual schedules and work systems in your classroom:

## Implementation Checklist

### Visual Schedules
Every student has access to a daily timetable. They are able to refer to either an up to date schedule on the board, or to individual printed schedules.

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Student/s on the autism spectrum has access to an individual schedule.

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Schedules are kept up to date and changes or additions to the schedule are made as necessary.

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Students are prompted to make any necessary changes to individual schedules.

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Students are prompted to refer to their schedules when they want to know what to do, rather than relying on verbal instructions.

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### Work Systems
The activity or lesson is broken down into a number of tasks/task steps which clearly outline:

- what the students have to do
- how much they have to do
- how to know they are finished
- what to do next.

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Students have access to a work system for the activity or lesson, provided as a structured task/s, written instructions printed or copied from the board onto individual checklists, etc...

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Students are prompted to refer to their work system when they want to know what to do rather than relying on verbal instructions.

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Thank you—your feedback on this toolkit is appreciated!