# The use of structured teaching strategies to support students on the autism spectrum to stay on-task in mainstream classrooms

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Dr. Elizabeth Macdonald

Professor Deb Keen

Dr David Trembath

Dr Jill Ashburner

Associate Professor Debra Costley

Kaaren Haas

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**Dr Elizabeth Macdonald**

The Cooperative Research Centre for Living with Autism (Autism CRC)

Griffith University

**Professor Deb Keen**

The Cooperative Research Centre for Living with Autism (Autism CRC)

Autism Centre of Excellence, Griffith University

**Dr David Trembath**

The Cooperative Research Centre for Living with Autism (Autism CRC)

Griffith University, NHMRC ERC Fellow, Senior Lecturer

Menzies Health Institute Queensland

**Dr Jill Ashburner**

The Cooperative Research Centre for Living with Autism (Autism CRC)

Autism Queensland

**Associate Professor Debra Costley**

The Cooperative Research Centre for Living with Autism (Autism CRC)

School of Education, University of Nottingham (formerly Autism Spectrum Australia)

**Kaaren Haas**

The Cooperative Research Centre for Living with Autism (Autism CRC)

Autism Spectrum Australia

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**About the Cooperative Research Centre for Living with Autism (Autism CRC)**

The Cooperative Research Centre for Living with Autism (Autism CRC) is the world's first national, cooperative research effort focused on autism. Taking a whole-of-life approach to autism focusing on diagnosis, education and adult life, Autism CRC researchers are working with end-users to provide evidence-based outcomes which can be translated into practical solutions for governments, service providers, education and health professionals, families and people on the autism spectrum.

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# Acknowledgements

## 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.

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# 1. Introduction

Attending to and completing tasks can be challenging for many students on the autism spectrum (Ashburner, Ziviani, & Rodger, 2010; Banda & Kubina, 2006). Difficulties with transitions and shifts in thought may affect the ways that these students respond to ever-changing tasks, activities and routines in school environments (Hill, 2004). Additionally, differences in executive functioning capabilities may influence the ways that students on the spectrum approach and stay on-task, transition between activities, and independently follow activities involving sequential steps (Banda & Grimmett, 2008; Hill, 2004; Milley & Machalicek, 2012). Structured teaching refers to a group of strategies used to create an environment where students on the spectrum can operate with increasing independence (Bennett, Reichow, & Wolery, 2011; Hume, Loftin, & Lantz, 2009; Mesibov & Shea, 2010).

Visual schedules and work systems are two of the key strategies of structured teaching used to support students on the spectrum. Visual schedules utilise sequential pictures, symbols and/or written language to inform students about upcoming events. Work systems provide a means of structuring tasks, or elements of a task, which students can use to understand:

a) what they are expected to do
b) how much work is required
c) how much progress they are making or when work is finished
d) what task to focus on next (Hume & Reynolds, 2010; Mesibov, Howley, & Naftel, 2016).

The aim of this research was to develop and evaluate the effectiveness of an intervention using visual schedules and work systems in mainstream classrooms. A three-phased approach was employed to systematically develop and assess the intervention in partnership with teachers.

# 2. Phase 1

The aim of Phase 1 was to refine a structured teaching intervention package for use in mainstream classrooms, and to pilot a method for evaluating its effectiveness. A single case study method was used, and the research took place in a mainstream primary school classroom which had 20 students, including four students on the spectrum.

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The intervention was planned by a teacher for a nine-year old male student, diagnosed with Asperger Disorder. The Kaufman Brief Intelligence Test, second edition (Kaufman & Kaufman, 2004) indicated that the student had average academic ability. Initial classroom observations indicated that he often engaged in off-task behaviour.

The teacher was given a workbook written by Haas (2015) to learn how to create and implement a visual schedule and a work system. He used 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 (Mesibov, Shea, & Schopler, 2004).

A handwriting task was used to assess the student's independence while working. The first researcher consulted the teacher about the student's behaviours associated with being on-task, and problem behaviours associated with being off-task. The research team took observations from the back of the classroom or while circulating among the whole class. Student and teacher perceptions of the strategies were measured using social validity surveys.

This case study informed the refinement of the intervention package, the development of a checklist for implementation of the strategies, and the process used to identify behaviours as appropriate dependent variables. Task selection in consultation with the teacher was found to be a feasible and ecologically valid way to work within a mainstream classroom. The student indicated that the visual schedule was of some help, and the work system was very helpful. The teacher also reported that the visual schedules were very useful and easy to implement, and that the work systems were very helpful. However, the teacher did not recommend the use of work systems as a whole-of-class intervention, due to the time required to develop task checklists for students with diverse abilities.

# 3.   Phase 2

The aim of this research phase was to investigate the effect of visual schedules and work systems on the on-task behaviours, productivity and independence of students on the spectrum when these strategies were implemented by a mainstream teacher for the whole class. A multiple-baseline, single-case experimental design was used with four participants.

All participants were primary school students who met the following eligibility criteria: (a) verified as having a diagnosis of ASD by the Queensland Department of Education and Training; (b) attending upper primary year mainstream classes; (c) having the academic ability to complete set work; and (d) being perceived as having difficulty staying on task and/or transitioning between tasks. They ranged in age from 8 years 11 months to 11 years. All students had total Social Responsiveness Scale scores indicating clinically significant differences in reciprocal social behavior (Constantino & Gruber, 2012). The Kaufman Brief Intelligence Test, Second edition (Kaufman & Kaufman, 2004) indicated that all four students had either average or above average intellectual ability.

For James, Aaron, and Sam, the intervention was implemented by their classroom teacher during whole-class lessons. For Edward, visual schedules were implemented by the classroom teacher, while the work systems component of the intervention was delivered during whole-class Languages other than English (LOTE) lessons by the LOTE teacher.

The intervention consisted of individual visual schedules, and structuring tasks with lists or instructions, visual cues about work to be completed (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 the schedule).

A change in on-task behaviour between baseline and intervention was apparent for all participants: on-task behaviours increased from a mean of 20% intervals during baseline to 53% for James (Tau-U = .6458, $p$ = .045); from a mean of 40% during baseline to 60% for Aaron (Tau-U = .8333, $p$ = .0225); from a mean of 9% during baseline to 65% for Edward (Tau-U = 1.25, $p$ = .004); and from a mean of 61% during baseline to 86% for Sam (the only change that did not reach statistical significance) (Tau-U = .35, $p$ = .3913).

No significant difference was found for teacher prompting or off-task behaviours between baseline and intervention phases.

James and Aaron showed significant increases in the number of words written during observations, with James increasing from a mean of 36 words at baseline to 77 after the intervention (Tau-U =.7857, $p$ = .0184). Aaron's productivity rose from an average of 37 words at baseline to 105 after the intervention (Tau-U = 1.5, $p$ = .0015). Sam's change in words written between phases was not statistically significant, and no data was collected for Edward because the class was not consistently engaged in writing tasks during observation sessions.

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# 4.  Phase 3

The aim of this phase was to obtain feedback from mainstream primary school teachers on the utility of visual schedules and work systems in their classrooms.

A two-part survey was used to assess teachers' responses to the intervention package developed from the workbook used in Phases 1 and 2, *Finished! The On-task Toolkit* (Macdonald & Haas, 2016) and the strategies it outlines. Forty-one mainstream primary school teachers completed Part 1 of the survey and 22 completed Part 2.

A qualitative case-study approach was used to obtain further feedback from four mainstream teachers 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).

After reading the toolkit, teachers' confidence in using visual schedules (Z = -2.543, p = .001) and in using work systems (Z = -2.708, p = .007) improved significantly. No significant improvement was found in teachers' knowledge of visual schedules and work systems, but the teachers' responses to the toolkit were overwhelmingly positive, in that they found it easy to follow and useful. All four teachers who trialed the toolkit's strategies had some level of success. They were keen to continue using the strategies, which they considered useful for all students (not only those on the spectrum). Qualitative feedback indicates that these teachers were able to independently deliver the intervention as part of their everyday practice.

# 5.  Discussion

The findings from the pilot study helped researchers clarify appropriate data-collection procedures, and provided useful information on the culture of mainstream classrooms, and the need for data-collection procedures that accommodate the disruptions that occur with great frequency in these classrooms.

Phase 2 results indicated that visual schedules and work systems effectively supported four students on the spectrum to stay on-task during activities within their mainstream classrooms. The present study adds to previous findings by offering new insights on the effectiveness of the intervention in mainstream schools.

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Phase 3 data revealed that teachers who had accessed the toolkit, found it to be helpful and suitable to use in their classrooms. While the increase measured in teachers' knowledge of the strategies was not significant, this may have reflected the already high levels of knowledge among participants. Teachers' level of confidence in using visual schedules and work systems improved significantly and they reported that they would continue to use the toolkit's strategies and share their knowledge with their colleagues.

The complexity of classroom environmental factors may have impacted the delivery and evaluation of visual schedules and work systems. A second shortcoming of the present study was the small numbers of participants across the three phases, which is a common limitation of single-subject research designs (Zhan & Ottenbacher, 2001). It would have been preferable to include more participants, especially with the online survey and interviews in Phase 3.

Further investigation could explore the potential of structured teaching strategies in fostering curriculum and learning outcomes, and functional skills, such as emotional regulation and social communication skills, and the utility of these strategies for typically developing students and students with other special needs.

# 6. Conclusion

The current project has contributed to the field by focusing on the effective delivery of structured teaching strategies in ecologically valid settings. The refined intervention package may be viewed as an eclectic approach (Kasari & Smith, 2013) which realistically aims to support students on the spectrum to learn in inclusive education classrooms. The current methodological design may assist researchers to investigate other autism interventions in mainstream schools.

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