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ORIGINAL ARTICLE

A Model of Practice for Improving Autism Knowledge in Teachers of Mainstream Students on the Autism Spectrum in Australia†

Susan Bruck[1,2], Ainslie Robinson[1*] and Emma Gallagher[1]

[1]Aspect Research Centre for Autism Practice (ARCAP), Australia, and [2]Griffith University School of Medicine, Australia
*Corresponding author. Email: arobinson@autismspectrum.org.au

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Abstract

Australian mainstream school teachers report a severe shortage of accessible autism-focused resources, strategies, and professional development (PD). This 2-part mixed methods study investigated the effect of using a web-based model of practice (MoP) for PD. The MoP contains evidence-based, autism-specific educational practices and resources designed for mainstream teachers of students on the autism spectrum. The aim was to examine teacher responses to using the MoP and the impact of the mode of delivery. In Part 1, 3 PD delivery conditions for using the MoP were trialled (8 weeks): face-to-face support, online support, or web-based access to detailed resources only. Support was provided by expert autism educators. Teachers ($N = 15$) reported that the MoP was an accessible, comprehensive, and practical support for educational decision-making, and that support encouraged implementation of the MoP practices. Part 2 trialled a hybrid PD model in 6 regional schools. Limited face-to-face and online support plus access to the MoP was trialled. Interview data indicated that a hybrid model can be an effective method of providing immediate support for teachers.

Keywords: autism; educators; professional development; knowledge; confidence; teachers

The Australian Curriculum provides teachers, parents, students, and the community with resources and clear instructions for what all Australian students should be taught, regardless of their geographic location or educational setting (Australian Curriculum Assessment and Reporting Authority; https://www.acara.edu.au/). To enable teachers to provide students on the autism spectrum in mainstream settings with an inclusive education, timely access to evidence-based resources and relevant support is essential. In this study, we investigated professional development (PD) delivery options of a model of practice (MoP) in a range of educational settings. The MoP is an evidence-based educational resource containing universally designed practice briefs that detail strategies and resources for supporting teachers to make informed choices on educational adjustments and implementation sequences (Falconer, Finlay, & Fincher, 2011; Falconer & Littlejohn, 2009).

Inclusive educational settings offer equal learning opportunities for all students (Armstrong & Armstrong, 2019). Inclusive teaching practices provide students on the autism spectrum with individualised support that respects their learning style (Carrington et al., 2015) through the use of tailored adjustments, such as different technology delivery (Stone, Mills, & Saggers, 2019). Educators, parents, and allied health practitioner collaborations can support the provision of relevant and sustainable classroom adjustment options (Roberts et al., 2018; Saggers et al., 2019). However, accommodating these

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adjustments for students on the autism spectrum is reported to be a challenge (Roberts & Simpson, 2016; Soto-Chodiman, Pooley, Cohen, & Taylor, 2012).

Background

Roberts and Simpson (2016) conducted a comprehensive literature search of peer-reviewed journal articles on the inclusion of students on the autism spectrum and found that school education and specialist staff including allied health professionals and psychologists reported a limited understanding of autism, were often unable to access relevant resources, and were unsure of how to individualise academic adjustments for students on the autism spectrum. Reports from students and their parents have detailed the barriers they encounter accessing inclusive learning settings (Saggers et al., 2018). A need for accessible, autism-focused resources on curriculum adjustments and differentiation, regulating emotions and behaviours, identifying, and appropriately supporting sensory and communication requirements, and preparing students for a range of transitions through their school life has been identified (Saggers et al., 2018).

Mainstream teachers of students on the autism spectrum are reported to be concerned about their limited understanding of the needs of the child or the family, and parents of students on the autism spectrum recognise the need for autism-specific training for teachers and call for appropriate PD (Roberts & Simpson, 2016; Saggers et al., 2018). PD can support teachers to understand autism and increase their confidence when introducing educational adjustments and engaging with parents (Murray, Munger, Colwell, & Claussen, 2018). However, accessing PD opportunities and appropriate resources can be challenging for geographically isolated teachers (Johnsson, Lincoln, Bundy, & Costley, 2016). Online technologies have the potential to provide PD and support for teachers living in regional areas (Johnsson, Kerslake, & Crook, 2019; Kovalchuck & Vorotnykova, 2017) as they can reduce travel time and costs, when robust internet services are available (Ashburner, Vickerstaff, Beetge, & Copley, 2016).

Confident teachers are more likely to provide a positive learning environment and improve education outcomes of students on the autism spectrum (Love, Findley, Ruble, & McGrew, 2020; Oakes et al., 2018). A teacher's self-efficacy, their confidence in their skills and knowledge to impact student outcomes, can influence their choice of teaching strategies (Bandura, Freeman, & Lightsey, 1999; Ruble, Usher, & McGrew, 2011). However, acquiring knowledge is not a linear process.

Social cognitive theory (Wood & Bandura, 1989) illustrates a teacher's perception of their ability to teach, and it is influenced by external factors, such as school policies and legislative requirements. These influences can affect the teacher's motivation and efficacy (Anglim, Prendeville, & Kinsella, 2018). Improving teaching practices requires the accumulation of knowledge and experience over time. This accumulation of learned experiences is explained in the learning curve theory (Argote, 1996) by a dynamic process whereby knowledge is gained in varying rates in response to the environment. Morrison (2008) explains that new skills can lead to improved practice; however, without ongoing support, these achievements can be difficult to maintain. When support is available, and learnings are monitored for effectiveness, skills can be consolidated through a continuous improvement cycle (Cornelius, Rosenberg, & Sandmel, 2020; Zangwill & Kantor, 1998).

Description of the study

The study was conducted in two parts: Part 1 of the study evaluated the Middle Years MoP resources with Year 7 and Year 8 mainstream school teachers with three PD delivery options. The findings from Part 1 of the study informed Part 2. Part 2 trialled a hybrid delivery of the MoP with teachers in regional schools (see Figure 1).

In 2018, a multistage study was undertaken in Australia to develop and trial the Early Years (EY) – MoP for kindergarten/Year 1 (aged 5–7 years) and the Middle Years (MY) – MoP for Year 7/Year 8 (aged 11–13 years). Each MoP contains education practice briefs that describe evidence-based

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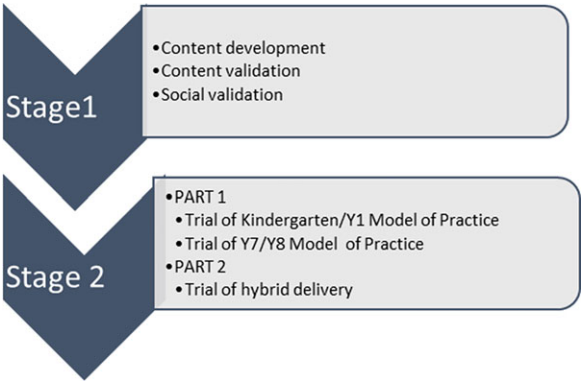

Figure 1. Stages of the Study.

strategies and resources for implementing support for students on the autism spectrum. The Stage 1 development of the MY-MoP is described in detail elsewhere (Taylor, Beamish, Tucker, Paynter, & Walker, 2021).

Stage 2 of the study evaluated the trial of the MoP. This paper outlines the trial of the MY-MoP and is referred to as Part 1. The EY-MoP trial is reported by Beamish and colleagues (2020). In Part 2 of the study, a hybrid delivery of the MoP (EY and MY) was trialled in regional schools.

PART 1

The MY-MoP developed in the first stage of this project (Costley, Bruck, Robinson, & Gallagher, under review) is a validated, autism-specific collection of evidence-based strategies and resources for teachers of students on the autism spectrum. Details of the process of content validity (Polit, Beck, & Owen, 2007) and social validity (Wolery & Bredekamp, 1994) are outlined in a previous article (Costley et al., under review).

The 3Rs framework was chosen as a way of organising the MY-MoP teaching practices (Test, Smith, & Carter, 2014). The 3Rs framework promotes *rigorous* learning opportunities, encourages the delivery of *relevant* lessons pertinent for post-school life, and inspires students to engage in *relationships* with key members of their school and community by encouraging connectedness, often through special interests (Carter, Draper, McNaughton, & Beukelman, 2010; Test et al., 2014).

Coaching

PD ensures that teacher practices are relevant, but the new knowledge in isolation is unlikely to sustainably change the educational practices (Bradshaw, Pellicano, van Driel, & Urbanowicz, 2019). Access to expert mentors who address the challenges facing teachers can improve the competency and capability of teachers (Cornelius et al., 2020). New online technologies are available that can enable teachers to participate in remote PD options (Kovalchuck & Vorotnykova, 2017).

The MY-MoP Briefs

Practice briefs contain validated evidence-based strategies and resources (Costley et al., under review). The MY-MoP comprises 36 practice briefs (see Table 1) that are mainstream class focused and include instructions for single-step classroom adjustments under the 3Rs framework: rigour (13), relevance (12), and relationships (11; see example in the Appendix). Each practice brief contains a description of the practice, how it helps the student, how the practice works, instructions on implementation, downloadable resources, and links to relevant information.

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Table 1. Practice Brief Titles

Rigour	Relevance	Relationships
Instructional sequences	Teaching test preparation skills	Home–school communication
Active supervision	Modifications to intensity, methods, or curriculum	Parent communication — homework
Supporting receptive language	Test adjustments	Home base
Task analysis	Oral assessment adjustments and alternatives	Incidental social coaching and safety
Visual supports	Exemplars	Classroom rules
Organised classroom	Technology-aided instruction	Flexible grouping strategies
Student organisational supports	Adjustments for projects and assignments	Inclusive language and incidental social coaching
Prompting	Authentic assessment	School belonging
Supporting expressive language	Choice-making	Reinforcing appropriate behaviour
Visual study guidelines, planners, and timelines	Special interests	Responding to inappropriate behaviour
Visual self-management tools	Self-monitoring	Peer interaction
Visual instructional supports	Sensory needs	No practice brief
Routines and visual schedules	No practice brief	No practice brief

This aim of the study was to trial the MY-MoP in mainstream schools using face-to-face support, online support, and website access only across metropolitan, regional, and remote schools, and answer the following research questions:

1. Did access to the MY-MoP improve teachers' confidence in relation to teaching students on the autism spectrum?
2. Did the participating educator's perceived knowledge in relation to teaching students on the autism spectrum improve after using the MY-MoP?
3. Is there a relationship between the implementation condition (face-to-face support, online support, website only) and changes in knowledge and confidence?
4. Which practices are most frequently utilised by teachers?
5. What are teacher perceptions of the MY-MoP?

Ethics approval was granted through Griffith University's Human Research Ethics Committee (2016/851).

Recruitment

School principals of mainstream government, Catholic, and independent secondary schools (Year 7–Year 12) in Queensland, New South Wales, and Victoria were invited by email to participate in the study. School principals who agreed to participate were emailed participant information packs, and they promoted the study to Year 7 and Year 8 teachers through the regular school communication lines such as weekly staff newsletters. To be eligible to participate, teachers needed a student with a formal diagnosis of autism spectrum in their class and to have a minimum of 6 months classroom teaching experience. Participating principals and teachers emailed signed informed consent forms to the recruitment officer.

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Table 2. Conditions

	Condition	Support
1	Face-to-face support + MY-MoP website	2 x 2-hour sessions
2	Online support + MY-MoP website	2 x 2-hour sessions
3	MY-MoP website only	Nil

Schools that had more than one teacher participating in the study nominated one teacher to be the autism instructional leader (AIL). The AIL was necessary in Year 7/Year 8 classes, as students usually have more than one teacher across different subject areas. The AIL delivered the MY-MoP training to all participating teachers to ensure there was consistent implementation of the practices between subject teachers. AILs received support and training in the use of the MY-MoP from a trained coach.

Coaches

Nine speech pathology, occupational therapy, psychology, or education professionals from Autism Spectrum Australia (Aspect) and Autism Queensland who had a minimum of 5 years of experience in their discipline working with individuals on the autism spectrum accepted an invitation (15 invited) to train as a coach and then to deliver PD and support teachers in this study.

Coaches attended two 2-day coaching workshops. The coaching sessions provided the coaches with skills for delivering the PD on implementing the practices in the MY-MoP and an online training session with the project team to (a) familiarise them with each of the practices within the MY-MoP and its respective content and (b) introduce guidelines for the delivery of support to the AILs.

Procedure

The 8-week school implementation trial of the MY-MoP took place between September and November 2017. Participating teachers and AILs were emailed instructions on accessing the MY-MoP website, a link to introductory videos, and information on the support condition their school had been allocated. AILs conducted the teacher pre-implementation sessions on the MY-MoP.

Project sequence

1. Pre-implementation session
   (a) Introductory video on navigating the MY-MoP website, information on finding relevant information and strategies, and an explanation of each section of the practice brief. The introductory video explained the 3Rs framework of the MY-MoP: rigour, relevance, and relationships (Test et al., 2014).
   (b) Pre-implementation survey was completed after watching the introductory video and exploring the MY-MoP briefs.
2. Implementation of the MY-MoP. Schools were randomly allocated into implementation conditions (C; see Table 2), The support sessions covered the website orientation and individualised advice on implementing MY-MoP practice brief strategies and resources in class. Teachers identified practice briefs they planned to use to support the students on the autism spectrum in their classes. All conditions had unlimited access to the MY-MoP website. Once the first support session was completed, the teacher could implement practices required in class. C3 was designed to act as a control group and did not include any support.

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Table 3. Survey Content

	Pre-implementation	Post-implementation
Demographics	Age, state, location	Not applicable
Knowledge of autism	Likert scale: 1 = *very good*, 2 = *good*, 3 = *fair*, 4 = *poor*, 5 = *very poor*	Likert scale: 1 = *very good*, 2 = *good*, 3 = *fair*, 4 = *poor*, 5 = *very poor*

Table 4. School Location

	Metropolitan schools	Regional schools
Victoria	1	1
New South Wales	0	2
Queensland	2	3
Total	3	6

The trial ran for 8 weeks. Teachers implemented the practices from the MY-MoP as required. Participants in C1 and C2 received support (see Table 2) during the trial.

3. Post implementation. After 8 weeks, a post-implementation survey was distributed to the AILs and teachers for completion and return.
4. At the completion of the project, a $35 Coles-Myer e-Gift voucher was offered as a token of appreciation for project completion (ethics approved).

Materials

The Teachers' Self-Efficacy Scale (TSES; Tschannen-Moran & Hoy, 2001) is a reliable and valid self-assessment instrument (Likert scale) for measuring teachers' perceptions of teaching issues faced in the classroom (see Table 3). It was chosen for its ability to measure and compare a broad range of teacher capabilities across numerous subject areas, in high schools and primary schools located in three state jurisdictions with varied availability of teacher supports (Hoy & Spero, 2005; Zee & Koomen, 2016). The TSES is effective in measuring task-specific, instructional practices, classroom management, and student engagement (Zee & Koomen, 2016).

The pre-implementation survey covered demographic questions, Likert scale (1–5) on the participant's perceived knowledge of and confidence in working with students on the autism spectrum, the TSES, and the list of practices the educator planned to use. The post-implementation survey repeated the knowledge and confidence and TSES measures and included a box for comments on the participant's experience using the MY-MoP. Demographics were not collected.

Results

Thirty teachers (20 teachers, 10 AILs) from nine Australian secondary schools across three states (see Table 4) participated. The participation rate was approximately 10% of the invited schools. Most of the participating schools (70%) were from regional including remote areas as determined by the Australian Bureau of Statistics Australian Statistical Geography Standard (ASGS). Metropolitan schools included cities as determined by the ASGS. More than half of the participating schools (58%) were government-

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Table 5. Age of Participating Teachers

Age	Count	Percent
Under 30	9	29
30–39	5	16
40–49	10	32
50–60+	6	20
No response	1	3
Total	31	100

Table 6. Recruitment

			Autism instructional leader		Teacher	
	School	Region	Recruited	Withdrawn	Recruited	Withdrawn
Face to face	1	Regional[a]	1	0	1	0
	2	Regional	1	0	2	2
	3	Metro[b]	1	1	2	2
	4	Regional[b]	2	2	2	2
Online	5	Regional	1	0	2	1
	6	Regional	1	0	4	1
MY-MoP	7	Metro	1	1	2	1
	8	Regional	1	0	3	2
	9	Metro[a]	11	0	2	0
Subtotal			10	4	20	11
Post-implementation total			6		9	

[a]All recruited participants completed. [b]School withdrew.

funded schools. Other schools were from the independently funded school sector (32%) and Catholic education sector (10%). Six of the nine schools were in regional locations. Twenty-nine percent of teachers were aged under 30 years and 32% between 40–49 years (see Table 5).

Thirty participants completed the pre-implementation survey and 15 completed the post-implementation survey across the seven schools (see Table 6). The substantial attrition is discussed in the limitations section of the article; however, it is worth noting here that the teachers reported they lacked the necessary time to commit to the study, and, as a result, the three experimental conditions were collapsed for analysis, thereby losing the ability to compare conditions against a control group (website only). Relationships between the implementation condition (face-to-face support, online support, website only) and changes in knowledge and confidence were also unable to be investigated.

Two schools out of the four recruited in the face-to-face condition withdrew prior to the post-implementation survey. All participants in one school in the face-to-face condition and one school in the MY-MoP web access only condition completed both surveys. Six AIL and nine teachers completed the surveys.

The difference between the pre-implementation and post-implementation survey sample size meant that there was insufficient power in the sample to conduct a *t*-test. A Wilcoxon matched-pairs signed-rank test is a nonparametric analysis and is a valid and reliable alternative to compare a

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Table 7. Wilcoxon Matched-Pairs Signed-Rank Test for Knowledge and Confidence Surveys

		M	*SD*	*M*	*SD*	
	N	Pre-implementation		Post-implementation		Significance
Knowledge	15	2.47	0.640	1.73	0.704	$z = -2.810$, $p < 0.005$
Confidence	15	2.80	0.676	1.80	0.561	$z = -3.218$, $p = 0.001$

Table 8. Positive Aspects of the MY-MOP

Positive aspects	Examples
Accessible — MY-MoP strategies and resources	'Easy to read well laid out reminders of good practice'. 'It is a comprehensive collection of strategies that can be selected individually to support a particular student'. 'The three areas are well named with the three R's — a good memory hook. When I discovered the practice briefs, they made a lot more sense to me. Colour coding was helpful [3 R's framework]. Spoken in everyday language. Addressed many facets of practice. Layout great not overcrowded. Some basic sound advice for practitioners to follow'.
MY-MoP supports autism-specific educational decision-making	'Enables teachers to better consider the student's needs'. 'A fantastic toolbox of ideas to use when you need it most. A great professional development exercise that is scaffolded for your personal use through your own goal setting if you do it correctly. A wonderful reflection tool for your own practices'. 'These are consistent with our current practices. We can and will use these as a means to ensure we are doing all that is practical to support students in our classes'.
Expert mentorship inspires teachers	'It was interesting receiving strategies that I had never thought of or strategies that I didn't realise could be applied with these kids'. 'The discussions were really useful, very clear and practical — focusing on one behaviour rather than all the behaviours of the student'.

pre-implementation with a post-implementation matched-pair measure. The general assumption that the data is a random sample was met (Pallant, 2013).

A Wilcoxon matched-pairs signed-rank test indicated a statistically significant change in perceived knowledge of autism following implementation of the trial. Reported confidence also demonstrated a significant change at the post-implementation survey compared to the pre-implementation survey (see Table 7).

Wilcoxon matched-pairs signed-rank tests indicated no significant changes in any of the TSES (Tschannen-Moran & Hoy, 2001) statements between the pre-implementation and post-implementation surveys. The 12-item TSES scale was used as it measures the underlying construct of efficacy. The total score is an appropriate gauge of efficacy. Subscale scores were not universally relevant to the range of teacher experiences, settings, and responsibilities so were not used (Tschannen-Moran & Hoy, 2001).

The frequency of the implementation of each practice by the teachers was tabulated. Six teachers implemented instructional sequences, task analysis, and organised classroom. Four teachers implemented student organisational supports, and sensory needs. Three teachers implemented parent communication, homework, classroom rules, and reinforcing appropriate behaviour.

Participants were asked to comment on their experience of using the MY-MoP. Positive and negative aspects of the project identified by participating teachers are outlined in Table 8 and Table 9.

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Table 9. Difficulties Participating in the MY-MOP Study

Difficulties	Examples
Scheduling	'I needed time to go through them and unfortunately there is no time at school'. 'No release time. Met at lunchtimes and had conversations in spare periods'.
Timing	'It was a difficult time of year to be conducting this experience. Could have been more useful at beginning of year'.

PART 2

Rationale

Part 1 findings were based on a small sample of teachers' responses that indicated that expert mentorship either online or face to face could encourage teachers to access resources and implement relevant and appropriate inclusive practices. To investigate these findings, a further study was conducted with teachers who were naïve to the MoP.

Part 1 findings suggested that teachers in regional schools were looking for support as 70% of the schools recruited were from these locations. To address this need, a hybrid approach that combined individualised face-to-face and online support plus access to the web-based MY-MoP was developed.

Recruitment

Invitation to participate was advertised through the Aspect Facebook, Twitter, and LinkedIn pages. Regional schools that had not participated in Part 1 of the study that had an enrolled student with an autism diagnosis were eligible to participate.

Six teachers participated from six New South Wales schools, even though the study was open to other state jurisdictions. Griffith University's Human Research Ethics Committee approved the research (GU HREC 2019/154). Ethics approval was also granted by the NSW Department of Education (SERAP 2019/121 DOC 19/251902). The Catholic Diocese of Wilcannia-Forbes granted ethics approval in their region. Signed inform consent was received from each participating school principal and teacher. Ethics approval was granted by the school principal for the independent school.

Participants

Teachers from five regional and one remote school participated. Most of the teachers had 1 to 5 years teaching experience and two reported over 15 years. Three teachers taught kindergarten–Year 1 (K/Y1; 5–7 years), one teacher taught Year 7–Year 8 (12–14 years), and two teachers taught special support classes (5–7 years).

Materials

The MY-MoP Part 1 of the study was used for the senior school. The junior school used the K/Y1 EY-MoP, a comparable online resource, which has been reported elsewhere as part of the larger study (Taylor et al., 2021).

Personnel

One expert autism educator conducted all the face-to-face, online, and the autism awareness sessions. The project research assistant conducted the post-study interview.

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Procedure

The hybrid approach consisted of:

1. 1-hour introductory webinar — individualised training with the expert autism educator on implementing the practice strategies and using the resources of the age-appropriate MoP.
2. practice briefs selected — teachers identify most relevant practices for their student.
3. one 2-hour face-to-face session — mentoring and monitoring with the expert autism educator.
4. two 1-hour online mentoring and monitoring session with the expert autism educator.

After the webinar, the teachers were asked to choose individual practices from the MoP. In the following week, the expert autism educator visited the school and conducted the face-to-face session. The teachers then had one school term (approximately 10 weeks) to use the MoP. During this time, the expert autism educator conducted the 1-hour online session at a time that suited the teacher. These mentoring sessions provided an opportunity for the expert autism educator to monitor the progress of the implementation of the practices and provide support for any challenges the teacher was experiencing.

Interview

Semistructured interviews were conducted by teleconference prior to teachers implementing practices in their classroom. The interviews consisted of the following questions:

1. Was the information provided in the practice briefs useful/practical? Do you have any suggestions about how the practice briefs could be improved?
2. Did you end up implementing any of the information from the practice briefs in the classroom? If yes, tell me about that; if no, tell me about that.
3. Were there any issues around your online professional development support sessions (e.g., any technology issues, difficulty getting release time)?
4. Do you have any suggestions about how these sessions could be run more effectively?
5. How did you find the face-to-face sessions? Were there any difficulties with attending these sessions or the way the sessions were conducted? Could they have been improved in any way?
6. How important were these face-to-face sessions for you? Do you think you could have implemented the practice briefs with online support only?
7. Overall, what were you hoping to get from the professional development support sessions? Was this delivered?
8. Would you recommend the website to another teacher? Why or why not?
9. Do you think the support is necessary to be able to implement the practice briefs? What about face to face? Is that necessary or is online sufficient?

As an acknowledgement of participation, the entire school teaching staff were invited to attend an onsite, ethics approved, 2-hour post-research autism awareness session conducted by the expert autism educator. This session was conducted after the research data collection was completed.

Results

Semistructured interviews were audio-recorded and transcribed verbatim. Interview transcripts were then manually coded through an iterative process using codes collaboratively identified by the project research assistant and a researcher who was not involved in this project.

Deductive coding was established for three distinct categories: (a) the information available in the practice briefs, (b) the consultation process, and (c) the overall combined experience. These categories

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were predetermined to match the research questions. The subcodes within each category were then determined through identifying emerging themes using an inductive process (Thomas, 2006).

Three themes emerged from the interview data:

1. **Hybrid delivery promotes the implementation of evidence-based strategies.** The individualised hybrid delivery was described as a relevant and accessible method of support, PD, and resources. The anytime, anywhere access to the MoP was extremely useful for finding evidence-based strategies for the student on the autism spectrum as well as for the whole class when it was needed.
2. **Expert autism educator motivated the teachers and enabled access to the MoP.** Individualised support provided the opportunity to 'bounce ideas' and tailor the strategies in the MoP to the student's needs.
3. **Online follow-up sessions support and motivate teachers.** Regional teachers reported that the follow-up sessions were motivating and supported consolidation of their understanding and the implementation of the MoP practice strategies and resources.

Discussion

Teachers report that access to evidence-based autism-specific PD and resources is often limited (Saggers et al., 2018). This two-part study addressed the challenge of accessing relevant educational support by availing teachers with unlimited access to the MoP. The teachers reported that evidence-based strategies and practical resources contained in the MoP were easy to read and relevant for supporting teachers to have the confidence and the knowledge to implement the educational adjustments required for an inclusive educational setting for students on the autism spectrum (Armstrong & Armstrong, 2019; Falconer et al., 2011; Falconer & Littlejohn, 2009). The introduction of a hybrid delivery option of the MoP that included face-to-face and online mentoring and monitoring of the teacher's progress was reported to be a motivator for implementing inclusive educational adjustments and strategies and a practical PD option.

Part 1 of the study indicated that teachers who implemented the MY-MoP strategies reported that it is a well-organised, easy-to-read resource that provided relevant advice for teachers working with students on the autism spectrum. The MY-MoP was described by the teachers as a comprehensive and accessible resource. The comments from the post-implementation survey suggested that there was greater interest in learning about autism and more focus on inclusive learning when support and mentoring are available. These results support previous research that suggests that teachers are more competent in supporting students after participation in PD programs (Oakes et al., 2018).

Teacher self-efficacy, or self-confidence in their ability to teach, can influence the choice of strategies that the teacher implements in a classroom (Bandura et al., 1999; Love et al., 2020; Ruble et al., 2011). In Part 1 of this study, after 8 weeks of access to the MY-MoP and implementing the evidence-based strategies, there was a significant but negative change in the knowledge and confidence reported, and there was no change in the self-efficacy of the teachers. These results are incongruent with other studies (Love et al., 2020; Ruble et al., 2011) but consistent with the K/Y1 EY-MoP study (Taylor et al., 2021).

The change in knowledge and confidence can be interpreted through the learning curve theory that states that the accumulation of experiences leads to improved performance (Argote, 1996). The lower mean in the post-implementation survey suggests a phenomenon known as the 'model of learning by doing under constraints' (Morrison, 2008, p. 1183) where learning happens through the accumulation of experience. In the trial of the MoP, the limited time available to implement it appears to have been too short for teachers to accumulate sufficient experience (Argote, 1996; Wood & Bandura, 1989) to realise the improvements in their knowledge and confidence in teaching students on the autism spectrum. By asking the teachers to reflect on their efficacy to deliver instructional practices, classroom

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management, and student engagement, we propose that the teachers became aware of gaps in their knowledge and therefore reported lower confidence in their abilities (Anglim et al., 2018; Cornelius et al., 2020; Morrison, 2008; Waterworth, 2000; Zangwill & Kantor, 1998).

Furthermore, although expert autism educator support was offered in two conditions, the time constraints meant that the mentoring and monitoring, as part of the continuous improvement cycle, was unavailable. By missing this fundamental support along the learning curve, opportunities to be mentored on the implementation of the strategies were lost (Zangwill & Kantor, 1998). It is also feasible that the teachers who volunteered to participate had reasonable confidence in their knowledge of autism and that the TSES questions had limited relevance to them. A more relevant measure may better identify interactions between the variables of this study.

Despite the quantitative findings, the qualitative data provided a more positive report. The post-implementation survey comments that indicated that the MY-MoP is relevant and easy to use informed the development of Part 2 of the study. The focus of Part 2 was to develop accessible PD that would support regional school teachers (Saggers et al., 2018). A hybrid delivery of the MoP offering unrestricted web-based MoP access, limited face-to-face and online expert autism educator mentoring and monitoring was trialled.

Teachers from geographically isolated schools, especially early career teachers with limited experience or training working with students on the autism spectrum, reported that the MoP is a useful toolbox of practices that is accessible when they need it and a useful option for PD. The teachers in regional locations stated that the expert autism educator support motivated them to investigate strategies from the MoP and implement them. The feedback suggests that the process of reflection, mentoring, and monitoring of practice implementation from the expert autism educator (Morrison, 2008) can initiate and sustain interest in learning new strategies. Currently, teacher education courses generally include limited autism-specific content, and this may explain the finding that fundamental practices such as instructional sequences, task analysis, and organised classroom were the most frequently utilised practices from the MY-MoP.

This hybrid delivery of PD appears to be a model worthy of further investigation as a method of improving teacher self-efficacy (Morrison, 2008; Waterworth, 2000; Zangwill & Kantor, 1998) and empowering them to make educational adjustments to support the student's learning style (Carrington et al., 2015). As one teacher stated, 'It [the MY-MoP] allows the teacher to reflect on their own practices to ensure they cater for all students'. Moreover, having the MY-MoP located on a website that was available at anytime and anywhere was extremely valuable to the teachers, and was especially important to the teachers in regional schools who often find difficulty in accessing autism-specific resources and attending relevant PD (Saggers et al., 2018). Another teacher commented, '[The MY-MoP is] a great PD exercise that is scaffolded for your personal use through your own goal setting if you do it correctly. A wonderful reflection tool for your own practices'.

PD and autism-specific support is already successfully delivered to remote communities by therapists using technology (Johnsson et al., 2019; Johnsson et al., 2016). The hybrid delivery of technology-based, expert-supported PD may offer an option in the toolbox of teachers of students on the autism spectrum, especially for teachers who are geographically isolated. The findings are relevant to policy-makers, as it presents evidence that teachers in all educational settings and especially regional schools, who often have limited access to PD, can benefit from a delivery of technology-based individualised mentoring, monitoring, and accessible evidence-based resources.

Limitations

There are several limitations in this study. After the Part 1 pre-implementation survey was conducted, 15 of the participants withdrew from the study citing a lack of time to investigate the MY-MoP and to implement the practices. It is possible that the remaining participants represented those teachers with the greatest need for access to evidence-based strategies and resources, and this could be a result of the higher number of regional schools that volunteered to participate in the study.

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Notwithstanding that the conclusions about the confidence and knowledge were based on a single-item analysis, the feedback from the teachers in regional schools in Part 2 of the study supported the view that given additional time to use the MoP significant self-efficacy scores would be more likely. Subsequent research would benefit from considering a validated measure such as the TPACK that uses a Likert scale to capture a more detailed picture of the changes in perceived knowledge and confidence (Archambault & Barnett, 2010; Dong, Chai, Sang, Koh, & Tsai, 2015; Pamuk, 2012), with a larger cohort of teachers.

Personalised expert autism support was highly valued by the teachers who received mentoring from the coaches and viewed it as PD, as one teacher stated, 'Face-to-face dialogue is the most effective way to learn and be guided'. The coaching of the autism experts in Part 1 of the study was intended to standardise the delivery and fidelity of the mentoring of the teachers; however, due to the limited time teachers were able to set aside, mentoring did not occur in all schools. In Part 2, fidelity of the mentoring was resolved as one expert autism specialist conducted all the teacher mentoring.

A constant barrier for the teachers was the lack of understanding by the school that teachers need school support to allocate time in their schedule to participate in the study. The additional time to read the information pack, watch the introductory video, become familiar with the content of the MY-MoP and complete the surveys, and meet with the expert educator and AIL (as required) was often not factored into the school's understanding of the participation commitment. Compounding the time constraints was the issue of the project running the trial late in the school year when teachers were busy with end-of-year school commitments, which resulted in a significant number of participants failing to complete the post-implementation survey.

Conclusion

Bridging the gap from the research findings to a relevant and accessible resource has been achieved. The MoP contains accessible strategies and resources for inclusive learning practices that are relevant for teachers of students on the autism spectrum in mainstream schools. It can offer teachers, and in particular, isolated educators, a way of accessing PD whenever it is needed.

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APPENDIX. Practice Brief: Rigour 12: Visual Instructional Supports

The practice: Teachers make complex information easier to understand by communicating key concepts and big ideas using a variety of visual instructional supports, including posters, diagrams, tables, charts, and graphic organisers.

How does it help?
Many people on the autism spectrum experience challenges with verbal and nonverbal forms of communication, impacting their ability to learn with traditional methods, which are often language heavy. People on the spectrum often have strengths in visual learning. Visual instructional supports can help individuals learn more effectively by making abstract concepts more concrete, allowing students the time they need to process new information, and assisting them to focus on the task. This also reduces a student's anxiety about their performance on certain tasks, as the visual instructional supports enable students to focus on the key concepts and help students express their thoughts through a communication system that is easily understood by most people.

What is it?
Visual instructional supports are materials that illustrate important information visually. Teachers use a variety of visual instructional support tools to increase the understanding of language and environmental expectations, and to provide structure and support for students. Key concepts displayed using visual instructional supports aid students' learning and understanding. The format of the visual instructional supports is chosen based on the preferences, abilities, and strengths of the student (e.g., posters, diagrams, tables, charts, and graphic organisers).

How does it work?
Teachers provide support to students in using these tools initially but then assist students to become gradually more independent with using the tools.

(*Continued*)

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(*Continued*)

How do I do it?
- Decide which visual instructional supports are appropriate to the learning objectives of the task and consistent with student abilities and strengths.
- Introduce and talk through the visual instructional support with the student.
- Model how to use the visual instructional support.
- Prompt the student to use the visual instructional support during language-heavy tasks.
- Check for the student's understanding of the visual instructional support by monitoring their use of the tool.
- Keep visual supports accessible for the student to refer to when necessary.

It works better if ... (Tips and tricks)
- once a student becomes responsive to a particular visual support, teachers use the support as consistently as possible so that the individual can become comfortable with it.
- teachers provide prompts for students to use visual supports, eventually fading prompts out once students become independent with this (see practice brief: Prompting).
- visual supports are easily accessible and simple to use.
- students are praised for their use of visual instructional supports (see practice brief: Reinforcing appropriate behaviour) and incorrect use is gently corrected.
- visual supports are used in a variety of settings and classrooms.

It does not work if ... (Pitfalls)
- visual instructional support is too complex or displays too much information. Only display and highlight key concepts and the relationships between them.

How will I know if it is working?
- Students grasp key concepts being taught and are able to present their thoughts and ideas.
- Students are independently using visual instructional supports.
- Students can more readily complete set tasks or activities and respond more appropriately to instructions or requests.

Where can I go to find out more?
- Visual supports for children with autism: https://www.autismspectrum.org.au/content/visual-supports
- Graphic organisers: https://www.youtube.com/watch?v=k6xsCE4kkb0

Australian Professional Standards for Teachers
The implementation of this practice will meet the Australian Professional Standard(s) for Teachers:
1.5 – Differentiate teaching to meet the specific learning needs of students across the full range of abilities
3.3 – Use teaching strategies

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