

Designing a Model of Practice for Australian Teachers of Young School-age Children on the Autism Spectrum

Annalise Taylor BEd^{1,4}, Wendi Beamish PhD^{1,4}, Madonna Tucker PhD^{2,4},
Jessica Paynter PhD^{1,4}, Sue Walker PhD^{3,4}

¹Griffith University

²AEIOU Foundation

³Queensland University of Technology

⁴Cooperative Research Centre for Living with Autism

Abstract

Extensive work has been undertaken in North America on effective practices in early childhood education, early childhood special education, and autism-specific interventions. Much of this work, however, has not been disseminated in teacher-friendly ways nor has it been translated into useable formats that support teacher uptake and incorporation into everyday classroom practice. The research presented here drew on practice literature from North America and a Design-Based Research approach to produce a Model of Practice (MoP) for Australian classroom teachers working with students on the autism spectrum in their first year of primary school. This practice model aims to support pedagogical decision making in relation to the effective and inclusive education of this student cohort. Iterative cycles of design involving generation of educational practices from the literature, content validation by experts, and social validation by classroom teachers were undertaken. These cycles were guided by MoP design principles and resulted in a prototype Early Years Model of Practice (EY-MoP) comprising 29 empirically-supported practices, which were highly endorsed by Australian teachers. The field testing of the EY-MoP should provide preliminary evidence of the applicability of this tool in Australian early years classrooms.

Key Words: Model of Practice, Autism, Inclusive Education, Primary Education, Teacher Practice

DESIGNING A MODEL OF PRACTICE FOR AUSTRALIAN TEACHERS OF YOUNG SCHOOL-AGE CHILDREN ON THE AUTISM SPECTRUM

Across the lifespan, educational outcomes are lower for students on the autism spectrum when compared to those of students with and without other disabilities (Australian Bureau of Statistics [ABS], 2015; Shattuck et al., 2012). Recent shifts in inclusive education policy and implementation in Australia and internationally have resulted in the majority of these students spending some or all of their time in non-segregated schools (71.7% Australia, ABS, 2015; 90.9% United States, Snyder, de Brey, & Dillow, 2016).

Yet, most initial teacher education programs do not adequately prepare teachers to work in inclusive classrooms with students on the spectrum (Coates, Lamb, Bartlett, & Datta, 2017; Morrier, Hess, & Heflin, 2011). Consistent with this position, teachers, specialists, and parents in an Australian wide, autism-specific survey (Saggers et al., 2016) identified a lack of specific staff training as a key barrier to the effective education of students on the spectrum in non-segregated schools. Likewise, in a review of stakeholder perspectives on inclusive education, educators, parents, and people on the spectrum identified a need for additional staff training to better support the inclusion of this student cohort (Roberts & Simpson, 2016). A gap,

therefore, between empirically-supported practice and regular classroom practice has been highlighted both in Australia (Commonwealth of Australia, 2016) and internationally (Cook & Cook, 2013; Guldborg, 2017).

Bridging this research-to-practice gap has its challenges, as autism is a complex and multifaceted neurodevelopmental condition, which has given rise to a diverse range of recommended educational practices (Pellicano, Dinsmore, & Charman, 2014). These practices vary in their level of research support with a number of reviews seeking to identify practices that meet criteria (e.g., number of randomised or quasi-experimental design studies, number of single-subject design studies) to be classified as evidence-based (e.g., National Autism Center [NAC], 2015; Wong et al., 2015).

Identification as an evidence-based practice, however, is not enough to result in teacher uptake and implementation in regular classrooms. For example, Cook, Cook, and Landrum (2013) argue that the translation of research into real-world settings is limited by end-users rarely engaging with passively disseminated content (e.g., in journal articles). This concern is compounded by the fact that less than a third of the materials published in special education journals translate intervention research into an easy-to-use format for teachers (Hott, Berkeley, Raymond, & Reid, 2018). Moreover, while carefully planned knowledge translation efforts do support the diffusion of knowledge more widely, they do not necessarily encourage teacher uptake (Cook et al., 2013; Hott et al., 2018). Materials and supports that help teachers make decisions regarding the selection and implementation of effective educational practices that relate to their context, therefore, are required (Fink Chorzempa, Smith, & Sileo, 2018).

On the other hand, Gulberg (2017) contends that evidence-based practices do not adequately incorporate teacher knowledge and skills. She argues for a more transactional approach to autism educational research where recommended practice involves the integration of evidence-based practice with practice-based evidence (i.e., knowledge gained from practice). Practices with an evidence base are characterised by rigour and internal validity (i.e., the degree to which studies minimise bias), while those related to practice-based evidence feature relevance and external validity (i.e., generalisability). For teachers, relevance and external validity help them to decide if “a practice will work for their students and whether it can be implemented in the realities of their classroom” (Smith, Schmidt, Edelen-Smith, & Cook, 2013, p. 148). In addition, the extent to which a practice is valued for its purpose, procedure, and outcomes (i.e., social validity) facilitates decision making about practice adoption (Wolery & Bredekamp, 1994).

Smith et al. (2013) have also put forward the notion that the identification and translation of educational

practices that are both evidence- and practice-based can be made more effective by using design-based research (DBR) and Communities of Practice (CoPs) coupled with practitioner engagement and sharing. Further, Elsabbagh et al. (2014) have identified practitioner engagement to be the primary facilitator of knowledge translation, and engagement of this kind has been used by Dew and Boydell (2017) in the application of a knowledge translation framework within their Australian disability research. Taken together, this body of work suggests that bridging the Australian research-to-practice gap in autism education, therefore, requires relevant, valid, and teacher-friendly sources of information (e.g., frameworks, resources, or tools) that translate this knowledge while supporting teacher decision-making and practice.

Learning design, an aspect of e-learning, is concerned with the modelling and sharing of good teaching practice via digital representations which range from abstract to highly contextualised (Agostinho, 2009). Abstract learning designs, also known as *generic learning designs, models of practice* or *practice models*, or *patterns*, are “generic approaches to the structuring and orchestration of learning activities for pedagogic purposes” (Falconer & Littlejohn, 2009, p. 20). Falconer and colleagues (2009; 2011), together with Goodyear (2005), conceptualised Models of Practice as organisational frameworks that represent educational practices for pedagogical use. According to Falconer and Littlejohn (2009), a Model of Practice (MoP) is an approach that empowers teachers to make informed choices about the structuring and implementation of learning activities. Models of Practice, therefore, should: (a) inspire teacher implementation and practice change, (b) be grounded in authentic practice, (c) be generic, and (d) detail sequence and orchestration of learning activities (Falconer, Finlay, & Fincher, 2011). Collectively, these elements could be considered MoP design principles (McKenney & Reeves, 2012). Models of Practice developed in accordance with these design principles therefore could be considered a novel approach to educational knowledge translation.

The Models for Learning (Mod4L), Planet, and Effective Project work in Computer Science (EPCoS) projects investigated tertiary educators’ use of abstract learning designs (MoPs, patterns, and bundles respectively) when representing, sharing, and adopting good teaching practice (Falconer et al., 2011). The Mod4L project concluded that for MoPs to be both effective and sustainable, they must be “*representations of effective practice* (signify successful instances of good practice) and *effective representations of practice* (have high impact on practice)” (Falconer & Littlejohn, 2009, p. 21). In contrast, the Planet project found that while patterns had “the advantage of being generic and generative” (Falconer et al., 2011, p. 114), the prescriptive and unfriendly format was a barrier to widespread adoption. In response to these findings, the

EPCoS project used a derived form of patterns known as bundles to represent teacher practice. Bundles “capture and represent specific, individual, pieces of effective practices” (Falconer et al., 2011, p. 115). In application, bundles provide “information about what the practice is, why it works, and whether there are any pitfalls in its implementation” (Falconer et al., 2011, p. 114). They also highlight the benefits of practice implementation by adding to the motivational or inspirational aspects of the representation. Both MoPs and bundles, while currently unique to the field of e-learning, were seen to have the potential to act as the vehicles by which knowledge regarding the effective education of young students on the spectrum could be translated.

In order to translate the knowledge and bridge the research-to-practice gap regarding the inclusive education of students on the spectrum, a project using MoPs which aimed to build the knowledge and capacity of Australian teachers working with this student cohort was developed. This project was driven not only by the MoP design principles (McKenney & Reeves, 2012) but also by the Knowledge-to-Action (KTA) Framework with its elements of knowledge creation and application (Graham et al., 2006). Accordingly, the project employed strategies from the KTA framework when developing two knowledge products (viz., Models of Practice); one for early years teachers (i.e., teachers of Prep/Kindergarten to Year 2) and the other for middle years teachers (i.e., teachers of Years 5 to 8). Both of these stages of schooling impact on students’ adjustment and achievement (Maguire & Yu, 2015; Sims, 2013). The effectiveness of early years education, in particular, is crucially important for later academic achievement (Sims, 2013). Each Model of Practice was designed as a digital tool with the potential to support teacher decision making regarding the effective education of students on the spectrum upon entry to primary or secondary school.

This paper reports the research undertaken to design the EY-MoP for Australian primary school teachers working with young children on the autism spectrum in their first year of school (viz., Prep/Kindergarten). The guiding research question was:

Which practices should be embedded in an EY-MoP to support teacher decision making in relation to the effective education of students on the autism spectrum as they move through the first year of school?

METHOD

Design-Based Research (DBR) was the methodology employed to develop the EY-MoP as this method emphasises (a) an iterative cyclical process of design, evaluation, and redesign, and (b) involvement of both researchers and practitioners in collaborative partnerships (Anderson & Shattuck, 2012; McKenney & Reeves, 2012). The iterative

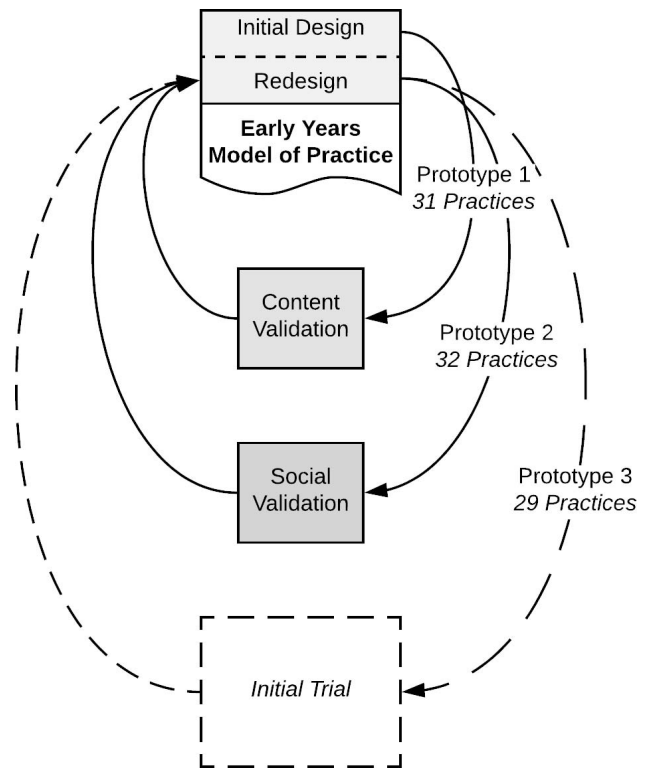


Figure 1: Graphical Representation of the EY-MoP Design and Redesign

design and redesign of the EY-MoP prototype involved the generation and validation of practices. Figure 1 shows the progression of these cycles across (a) practice generation and design of Prototype 1, (b) content validation of these practices, (c) practice refinement and redesign to create Prototype 2, (d) social validation of these practices, and (e) practice refinement and redesign to create Prototype 3 for trial in classrooms. Ethical clearance for all phases of the research was obtained from the Human Research Ethics Committee, Griffith University (Ref. No. 2016/564), which specifically covered the collection of validation data. All aspects of the development of the EY-MoP were informed by the MoP design principles, namely that MoPs should (a) inspire teacher implementation and practice change, (b) be grounded in authentic practice, (c) be generic, and (d) detail sequence and orchestration of learning activities.

Of the above design principles, the notion of authentic practice required further conceptualisation. Within this project, therefore, authentic practice was defined as practices that were both empirically-supported and socially validated, with teacher endorsement of practices being a key feature of the research design. The term, empirically-supported practices, was adopted to ensure that targeted educational practices were general and not “overly narrow or restrictive” (Simpson, Mundschenk, & Heflin, 2011, p. 12). Practices, therefore, were not to be limited to established evidence-based practices for students on the spectrum (see, for example, Wong et al., 2015). Empirically-supported practices were defined as quality indicators

that have “been identified as having research data generated using methods that meet scientific standards and demonstrate a level of efficacy deemed worthy of application and evaluation of effectiveness on a large scale” (Center for Mental Health in Schools [CMHS], n.d., p. 1).

Design of the EY-MoP (Prototype 1)

The initial design of the EY-MoP featured the generation of practices using a structured identify-sort-refine procedure. Criteria for practice inclusion were: (a) degree of empirical support within published literature and (b) extent of alignment with the organisers (*Belonging, Being, Becoming*) from the Australian Early Years Learning Framework (EYLF; Department of Education Employment and Workplace Relations for the Council of Australian Governments [DEEWR], 2009). This procedure enabled relevant first generation (created knowledge comprising individual pieces of research) and second generation (synthesised knowledge such as systematic reviews and practice listings (i.e., set of recommended practices with empirical support) research to be identified and refined into a usable knowledge product (third generation research), the EY-MoP (Graham et al., 2006). It also ensured the EY-MoP comprised empirically-supported practices.

Identify. Established practice listings from the fields of early childhood education and early childhood special education were identified by the project team. Confirmatory literature searches were also conducted. Identified listings had to be comprehensive (i.e., address multiple aspects of the topic and comprise multiple elements), from reputable sources (i.e., peak bodies, research centers, or universities), and backed by peer-reviewed research.

This search procedure resulted in the identification of two practice listings (viz., Division for Early Childhood [DEC] Recommended Practices, Developmentally Appropriate Practice [DAP]), and one inventory (viz., Inventory of Practice for Supporting Social Emotional Competence). DAP (Copple & Bredekamp, 2009; National Association for the Education of Young Children [NAEYC], 2009) and the Inventory of Practice for Supporting Social Emotional Competence (Center on the Social and Emotional Foundations for Early Learning [CSEFEL], 2013) comprised of endorsed practices for early childhood programs whereas the DEC Recommended Practices (DEC, 2014) comprised practices validated for use with young children with developmental disabilities. As the DEC Recommended Practices and the practices within the CSEFEL inventory and associated Pyramid model were developed for use with young children from birth to age 5 (DEC, 2014; Fox, Dunlap, Hemmeter, Joseph, & Strain, 2003). Both listings were eligible for inclusion as almost half of the children starting school in New South Wales, Queensland, and Victoria are aged between 4.5 and 5 years of age making the practices in the aforementioned listings pertinent. The

66 practices within the DEC Recommended Practice listing (2014) supplemented by the 116 Kindergarten (ages 5-6 years) practices within the DAP listing (Copple & Bredekamp, 2009) along with the 28 practices that comprise the Inventory of Practices for Supporting Social Emotional Competence (CSEFEL, 2013) were tagged for inclusion in the first EY-MoP prototype.

In addition to the above ECE and ECSE listings, practice-based publications comprising autism-specific educational practices were identified using the search string “Autism” AND “Educational Practice” OR “Effective Practice” with comprehensive listings from reputable sources supported by or comprising peer-reviewed research being extracted. Listings of focused-intervention practices (e.g., National Autism Center [NAC], 2015; Wong et al., 2015) were not considered for inclusion as foundational classroom supports rather than focused-intervention practices were sought. The search yielded five practice-based publications containing first, second, and third generation autism-specific research. Of these publications, three were papers (Hurth, Shaw, Izeman, Whaley, & Rogers, 1999; Iovannone, Dunlap, Huber, & Kincaid, 2003; Long & Simpson, 2017), one was a report (National Research Council [NRC], 2001), and one was a conceptual framework (Simpson & Crutchfield, 2013). The practices within these materials were reviewed for commonalities and overlap. Following this review, nine foundational practices were tagged for inclusion in the first EY-MoP prototype. These practices were *early intervention; time spent actively engaged in teaching and learning activities; individualised supports and services; systematic instruction; comprehensible and structured environment; specialised curriculum focusing on communication and interaction; functional approach to problem behaviours; family involvement; and, qualified/well trained staff* (Hurth et al., 1999; Iovannone et al., 2003; Long & Simpson, 2017; NRC, 2001; Simpson & Crutchfield, 2013).

The identification of practice listings and practice-based publications unique to each field (i.e., ECE, ECSE, and autism) ensured practices included in the EY-MoP were triangulated (i.e., those most likely to meet the needs of not only students on the spectrum but all students within the classroom, including those with other disabilities).

Sort. The practices from the 2014 DEC Recommended Practice listing, the DAP Kindergarten listing, the CSEFEL Inventory, and the identified practice-based publications were drawn together to form a large working set of practices. Practices were then scrutinised by the lead author for alignment with the organisers, *Belonging, Being, and Becoming*, from the Australian Early Years Learning Framework (EYLF; DEEWR, 2009). This alignment ensured the EY-MoP complemented the EYLF by providing early years teachers with targeted assistance relating to the

effective and age-appropriate education of young children on the spectrum. It also ensured that the EY-MoP inspired teacher implementation by presenting authentic practices in a way that was familiar yet novel. Practices related to the adjustment of the physical, social-emotional and behavioural aspects of the learning environment were categorised as *Belonging*. Practices related to the development of social-emotional skills and a preventative approach to challenging behaviours were categorised as *Being*. Practices related to the delivery of the Australian Curriculum, with a focus on communication, literacy, and numeracy were categorised as *Becoming*. Practices that did not align with any of these organisers were excluded (e.g., those related to family, leadership, and teaming from the 2014 DEC Recommended Practice listing). To ensure accuracy, practice alignment was cross-checked by the project team.

Refine. Following practice sorting, three members of the project team collaboratively refined the practices at a face-to-face session. Collaboration, in this context, facilitated the convergent development of the team members' conceptualisation of the practices within the EY-MoP (McKenney & Reeves, 2012). Consensus decision-making was used throughout this process. Initially, the team compared practices for overlap and duplication, which at times involved the combination of practices. Progressive editing and elaboration of practices were then undertaken. Finally, practices were reworded using teacher-friendly language and restructured as single, standardised sentences in the form of a *teachers—what—how* configuration (e.g., Teachers provide structure and consistency by establishing, teaching, and using routines). This multifaceted process resulted in the construction of the first prototype of the EY-MoP.

Content Validation

The evaluation of Prototype 1 involved validating the content of the practices within the model. It was established by five subject matter experts in the autism field from Queensland and New South Wales. All experts were female, with a qualification at masters or doctoral level, and had extensive experience in autism and education, early childhood education, and/or special education.

The experts completed an online survey in which they rated the relevance of each practice on a 4-point Likert scale (1 = *not relevant*, 2 = *somewhat relevant*, 3 = *quite relevant*, 4 = *highly relevant*) and commented on the importance, feasibility, sustainability, and wording of that practice (Dally & Dempsey, 2015; Polit, Beck, & Owen, 2007). The online survey was built and administered using LimeSurvey, an open source application hosted by Griffith University. As recommended by Polit et al. (2007), rating data were analysed to determine the Individual Content Validity Index (I-CVI) and Average Scale Content Validity Index (S-CVI/Ave). I-CVIs were determined by the

proportion of respondents in agreement about relevance, which was calculated by counting the number of individual ratings 3 or 4 divided by the number of individuals. The calculation of the S-CVI/Ave required the I-CVIs to be averaged resulting in an S-CVI average (Polit et al., 2007).

Thresholds were used to evaluate the content validity (i.e., relevance) of the practices, organisers, and the EY-MoP. That is, a threshold of .78 or higher for the I-CVI and .90 or higher for the S-CVI/Ave were used as meeting the criterion for *excellent* content validity as used by (Polit et al., 2007). Comments about practices were coded using a simple protocol (*green* = no review required, *orange* = review required).

First Redesign of the EY-MoP (Prototype 2)

Analysis of respondent comments regarding the importance, feasibility, sustainability, and wording of the practices with Prototype 1 provided critical input into the redesign of the EY-MoP. Flagged practices were reviewed by the project team for both clarity and feasibility and combined, divided, or reworded as required. Once again, a consensus decision-making protocol was used.

Social Validation

The evaluation of Prototype 2 involved socially validating the practices within the model. Methodology for establishment of social validity followed that used by Odom, McLean, Johnson, and Lamontagne (1995) and McLean, Snyder, Smith, and Sandall (2002) for the validation of the DEC Recommended Practices and by Beamish and Bryer (1999) and Beamish, Bryer, and Klieve (2014) for the validation of Australian practice listings for young students with disabilities including autism. Social validation of the practices within the EY-MoP was seen to establish the authenticity of the practices and the model as a whole.

Early years teachers from Queensland, New South Wales, and Victoria were invited to participate in an online social validity survey via advertisements (a) e-mailed to teachers by government and non-government education sectors and teacher registration bodies, and (b) posted on social media (viz., Facebook and Twitter). In total, 277 early years teachers were recruited.

The survey structure was similar to that used by Odom et al. (1995) and comprised of four sections. The first section featured demographics including years of teaching and experience with students on the spectrum. The second (*Belonging*), third (*Being*), and fourth (*Becoming*) sections all comprised a context statement (e.g., *Belonging* practices support the provision of high-quality, inclusive education with regard to the physical, social-emotional, and behavioural aspects of the learning environment) and associated question set which asked respondents to rate their agreement with the statement that each practice represent-

ed a recommended practice for students on the spectrum in the early years of schooling. A Likert-type scale (*strongly agree, agree, disagree, strongly disagree, no opinion, don't understand*) was used to rate level of agreement. For each organiser (*Belonging, Being, Becoming*), respondents were invited to comment on the importance, feasibility, sustainability, and wording of the practices. As with content validity, the survey was built in LimeSurvey so that it could be completed online.

Level of agreement (i.e., that a practice item is deemed to be a recommended practice) was calculated according to the method outlined by Odom et al. (1995). To examine the level of agreement for each practice, the stringent international benchmarking convention of 80% was used (Beamish, 2008; Williams, Fox, Thousand, & Fox, 1990). Mean ratings for individual practices as well as an average mean rating for all practices within each organiser were calculated. Content analysis was used to code comments about practices within each organiser to identify practices for review (Neuman, 2014).

Second Redesign of the EY-MoP (Prototype 3)

Once analysed, the findings of the social validity survey were factored into the redesign of the EY-MoP (i.e., the construction of Prototype 3). Consistency of the EY-MoP with the design principles outlined previously was considered and, as the practices within the MoP in and of themselves do not detail sequence and orchestration of authentic practices, the project team recognised the need to develop supplementary information in the form of a brief for each practice in the model. Practice briefs, as shown in Table 1, are 2-page guides that support the implementation of practices. The design of the briefs was based on the notion of bundles as put forward by Falconer et al. (2011). As with previous redesigns, a consensus decision-making protocol was used by the team.

RESULTS

Results are reported according to the progression of cycles of the EY-MoP as practices are reduced and refined as outlined in Figure 1.

Design of the EY-MoP (Prototype 1)

A review of the literature yielded 219 practices sourced from the 2014 DEC Recommended Practice listing, the 2009 DAP Kindergarten listing, the 2013 CSEFEL Inventory of Practice, and the identified autism-specific foundational practices. Sorting of these practices according to the EYLF organisers (*Belonging, Being, Becoming*) resulted in 163 practices (34 within *Belonging*, 29 within *Being*, 100 within *Becoming*) being retained. Progressive editing and refinement produced 31 practices (10 within *Belonging*, 9 within *Being*, 12 within *Becoming*) for validation.

Content Validation

The content validity of the 31 practices in Prototype 1 was established using the method outlined by Polit et al. (2007). The calculated I-CVIs for 6 of the 31 practices were 0.8, and the I-CVIs for the remaining 25 practices were 1.0. In summary, all practices had an I-CVI above the threshold of .78 which met the criterion for *excellent* content validity established by (Polit et al., 2007).

The average (S-CVI/Ave) scale content validity of each organiser was calculated. The first organiser, *Belonging*, had a S-CVI/Ave. of 0.94. *Being*, had a S-CVI/Ave. of 0.96 and the third organiser, *Becoming*, had a S-CVI/Ave. of 0.98. According to Polit et al. (2007), S-CVI/Aves are considered acceptable if above the threshold of 0.9. The S-CVI/Aves for all organisers were, therefore, above the recommended threshold. Next, the average scale content validity index was calculated for the EY-MoP. The overall S-CVI/Ave. (0.96) was above the 0.9 threshold.

These results provide sufficient evidence to establish the content validity of the EY-MoP as the model was “composed of items that had I-CVIs of .78 or higher and an S-CVI/Ave of .90 or higher” (Polit et al., 2007, p. 467). Further, analysis of comment data showed that 12 practices had one or more comments from the expert practitioners, and these qualitative data were considered in the redesign of the EY-MoP and the construction of Prototype 2.

First Redesign of the EY-MoP (Prototype 2)

As part of the redesign of the EY-MoP, the project team reviewed the 31 practices for clarity and feasibility. Of the 12 practices flagged during content validation, five practices (four from *Belonging*; one from *Becoming*) remained unchanged, six were reworded (four from *Belonging*; one each from *Being* and *Becoming*), and one practice from *Being* was divided into two distinct practices. As a consequence, the second prototype of the EY-MoP comprised of 32 practices (10 within *Belonging*, 10 within *Being*, 12 within *Becoming*).

Social Validation

Social validity of the practices was established by the method used by Beamish (2008) and Odom et al. (1995). In total, 277 teachers responded to the social validity survey, but 147 responses were discarded as they did not contain data beyond demographics. An additional response was discarded as practice ratings directly contradicted comments, indicating that the respondent misread the answer options. A total of 129 (47%) responses, therefore, were made available for analysis.

Table 2 presents the demographics of responding teachers. All but one teacher was female. The poor response rate from male teachers was lower than expected

Table 1
Format of Practice Brief

Component	Function
The practice	Re-statement of the practice within the EY-MoP
How does it help?	Outline of the issue/s to which the practice responds as well as the rationale for practice use
What is it?	Definition of practice elements
How does it work?	A description of what is involved with practice use
How do I do it?	Implementation checklist
It works better if?	Key criteria for success
It does not work if?	Watchpoints for unsuitable (or undesirable) situations
How will I know it is working?	Ways to check the desired result has been achieved
Where can I go to find out more?	3-5 high-quality external, online readings or resources
Australian Professional Standards for Teachers (APST)	Identification of 1-3 APSTs that relate to practice use

as 20% of Australian primary school teachers are male (McGrath & Van Bergen, 2017). Most of the respondents (58.9%) were aged between 30-49 years, with 19.4% aged under 30 years. The majority of respondents were located in either Queensland or New South Wales (40.3% and 38%, respectively), with only 14.7% from Victoria. In line with the geographical distribution of the Australian population (ABS, 2016), 51.9% of respondents lived in a metropolitan area, 38% in a regional area, and 10.1% in a rural or remote area. The majority of respondents taught in government schools (63.6%) and held a Bachelor degree (64.3%). Respondents' years of teaching experience were evenly distributed across the range from 2 to 20+ years (see Table 2). Likewise, years of experience teaching students on the spectrum was evenly spread, with 31.8% teaching this student cohort for 2-5 years, 26.4% for 6-10 years, and 27.1% for 11-20 years. On the other hand, most respondents had only been teaching the first year of school for 2-5 years (34.9%), with 14.7% having taught this year level for less than a year. Further demographic data indicated that in relation to teaching students on the spectrum, 58.9% of respondents felt their knowledge was high or very high, and 57.8% felt the same about their confidence. In summary, this sample of respondents comprised mid-career teachers working in government schools with considerable experience teaching students on the spectrum and self-reporting high levels of knowledge and confidence in this specialised area.

Quantitative survey responses were analysed using the method outlined by Odom et al. (1995). Results for level of agreement and mean ratings are presented for individual practices (see Table 3) and each organiser (see Table 4). In addition, international benchmarks were applied to levels of agreement (i.e., the percentage of respondents agreeing that each practice is recommended for use with this student cohort).

Table 3 displays the level of agreement for individual practices. Levels of agreement for 29 of the 32 practices were over 90%, with nine practices receiving levels of 95% or higher. The remaining practices ($n = 3$) fell below the 90% threshold by less than 1%. These results show that all practices within the EY-MoP met the stringent 80% international benchmark for agreement (Beamish et al., 2014; Williams et al., 1990).

When numerical values were assigned to agreement categories (*strongly agree* = 1 to *strongly disagree* = 4), mean ratings provided a complementary view of how respondents rated individual practices. Mean ratings across all practices ranged from 1.2 to 1.7, with 13 practices receiving a mean rating of 1.4 and 9 practices receiving a mean rating of 1.5.

When practices are viewed according to organisers, aggregated results show a similar pattern. Table 4 displays levels of agreement and mean ratings for each organiser. The levels of agreement for organisers of *Belonging* and *Being* were 94.33% and 94.49% respectively, with the level of agreement for *Becoming* being slightly lower at 92.00%. Mean ratings follow a similar pattern. An almost equal mean rating was given to the organisers of *Belonging* (1.44) and *Being* (1.45), while the organiser of *Becoming* received a higher mean rating of 1.56.

Content analysis of comments ($n = 145$) revealed that teachers viewed practices in a favourable manner. For example, practices were “well worded and easy to comprehend,” “feasible and sustainable,” and “equally as important as each other.” Further, several teachers indicated that “all of these practices will benefit a student with autism when implemented well.” Some teachers did suggest, however, that support and training were required for effective implementation and ongoing use of these practices to occur.

Table 2
Detailed Characteristics of Responding Teachers

Characteristic	Count	Percent
Age		
Under-30	25	19.4
30-39	40	31.0
40-49	36	27.9
50-59	21	16.3
Over-60	6	4.7
Sector		
Catholic	16	12.4
Government	82	63.6
Independent	30	23.3
Highest qualification		
Bachelor Degree	83	64.3
Graduate Certificate	7	5.4
Graduate Diploma	15	11.6
Master Degree	22	17.1
Doctoral Degree	1	.8
Years teaching experience		
Less than 1 year	3	2.3
2-5 years	28	21.7
6-10 years	30	23.3
11-20 years	30	23.3
More than 20 years	34	26.4
Years teaching 1 st year of school		
Less than 1 year	19	14.7
2-5 years	45	34.9
6-10 years	13	10.1
11-20 years	14	10.9
More than 20 years	12	9.3
Years teaching students on the autism spectrum		
Less than 1 year	6	4.7
2-5 years	41	31.8
6-10 years	34	26.4
11-20 years	35	27.1
More than 20 years	11	8.5

Second Redesign of the EY-MoP (Prototype 3)

Both quantitative and qualitative results were considered in the redesign of the EY-MoP and the construction of Prototype 3. A review of results, however, confirmed that individual practices did not require further refinement. As mentioned earlier, the redesign of the second prototype of the EY-MoP revolved around the development of a practice brief for each practice in the model. At the same time,

Table 3
Level of Agreement with Practices

Number of practices	% Agreement (strongly agree + agree)
9	95.0% - 100.0%
20	90.0% - 94.9%
3	89.1% - 89.9%

abbreviations for the practices were developed. Table 5 presents these abbreviations along with an example practice, in full, from each organiser. As a part of this development, further editorial review was undertaken in relation to the scope and clarity of the practices. This process led to 12 practices being reworded and six practices being combined and refined to form three practices. As a consequence, the third prototype of the EY-MoP comprised 29 practices (10 within *Belonging*, 9 within *Being*, 10 within *Becoming*), each with a supporting practice brief.

DISCUSSION

The aim of this research was to design a Model of Practice for primary school teachers working with young children on the autism spectrum in their first year at school. DBR was purposely used as it is a methodological approach “designed by and for educators that seeks to increase the impact, transfer, and translation of education research into improved practice” (Anderson & Shattuck, 2012, p. 16). This paper reports the progression of the design cycles involving practice generation from the literature, content validation by experts, and social validation by classroom teachers, which resulted in the design of the third EY-MoP prototype. This prototype comprises a framework of 29 practices, each with a supporting practice brief. These practices and briefs constitute the EY-MoP to be field tested at a later date.

The EY-MoP is grounded in authentic practice, with each of the 29 practices within Prototype 3 being both empirically-supported and endorsed by teachers. The identification of practices from published literature ensured practices had empirical-support while expert content validation ensured the practices embedded in Prototype 1 maintained the intention and the integrity of the source

Table 4
Level of Agreement and Mean Ratings for Each Organiser

Practice	Percentage agreement	Mean rating
Belonging	94.33%	1.44
Being	94.49%	1.45
Becoming	92.00%	1.56

Table 5
Abbreviated Practices Embedded Within Prototype 3 with Examples

Practice abbreviations		
Belonging	Being	Becoming
Interact with every student	Engage with students	Assess student knowledge
Provide feedback on learning and behaviour	Model positive interactions	Provide systematic instruction
Actively supervise class	Teach friendship skills	Monitor student learning
Provide an accessible classroom	Model emotional literacy	Assess student learning
Provide an organised classroom	Teach self-regulation ^b	Teach self-help skills
Give clear directions	Teach social problem solving	Teach communication skills ^c
Reinforce rules ^a	Use Peer-Mediated Instruction	Teach speaking and listening skills
Consistently use routines	Conduct an ABC analysis	Teach reading
Consistently use schedules	Modify environment to reduce behaviour	Teach writing
Prepare students for transitions		Teach numeracy

Note. An example practice from each organiser:

Belonging: ^a Teachers establish, teach, and reinforce class rules, and consistently follow through with natural and logical consequences.

Being: ^b Teachers foster self-regulation in students by providing systematic instruction.

Becoming: ^c Teachers ensure students have access to and are systematically taught an effective means of communication, including alternatives to spoken language.

material. Social validation of the practices embedded within Prototype 2 established the level of teacher agreement (endorsement) with these practices.

In this research, teacher endorsement of practices exceeded expectations. All practices, as well as each organiser (*Belonging*, *Being*, *Becoming*), met the stringent benchmark of 80% for agreement (Williams et al., 1990). The high level of agreement is consistent with that reported in both national and international social validity studies (see, for example, Beamish, 2008; Beamish et al., 2014; McLean et al., 2002; Odom et al., 1995). This strong endorsement confirmed the ecological relevance of these practices to the Australian context. While the validation of these practices by the field supports their authenticity, it also increases the likelihood of teachers using the EY-MoP as social validity is a key factor influencing real-world implementation by end-users (Callahan et al., 2016). The EY-MoP thus meets criterion as a legitimate tool in Australia (Beamish et al., 2014).

Previous Australian research suggests that teachers are more likely to use practice-based tools when the number of practices embedded within them is limited to fewer than 40 (Beamish, 2008; Beamish et al., 2014). The EY-MoP, therefore, is more than just a listing of 29 practices. It is an organisational framework, which should prove to be a manageable tool for busy Australian teachers. Field testing this framework also should uncover the potential of the EY-MOP to be a viable tool for supporting teacher decision

making related to the adjustment of the learning environment and curriculum for young students on the spectrum.

To date, this research has produced a third prototype of a validated Model of Practice, which is composed of authentic yet generic practices, with each practice being augmented by a practice brief that details sequence and orchestration. Production of this practice model provides an example of how DBR method and MoP design principles can work in partnership to effectively guide and inform successive data-driven improvements to the model. Likewise, production of this model also demonstrates how researchers and teachers can collaborate to design a contextually relevant local tool with the potential to inspire teacher use and practice change.

This research sought to design a Model of Practice for primary school teachers that supports their decision making related to the education of young school-age students on the spectrum. As such, this validated tool should help to address the widely acknowledged gap between what is known about the effective education of students on the spectrum and real-world teaching practice (Cook & Cook, 2013; Guldberg, 2017).

Nonetheless, two key limitations related to the social validation of practices are acknowledged. The first limitation involves a bias in the sample of teachers who participated in the social validation. While the number of teachers who completed the online validation survey was commensurate with teacher samples in comparative

Australian research (e.g., Beamish & Bryer, 1999 with 88 teachers; Beamish, Meadows, & Davies, 2012 with 86 teachers), this survey was only open to teachers from Queensland, New South Wales, and Victoria. This meant that only those teachers from the eastern states of Australia were invited to participate in the social validation activity. As each state and territory is responsible for its individual public education system, variations occur in how teachers select educational practices to support the delivery of the Australian Curriculum to all students. Therefore, the views expressed by teachers in this project should not be taken to be representative of teacher views from other Australian states and territories.

The second limitation is related to the type of data collected for social validation. Previous research seeking to socially validate practices (see, for example, Beamish, 2008; Beamish et al., 2012; McLean et al., 2002; Odom et al., 1995) has collected data on both the level of practice agreement as well as current level of practice use. The collection of data on level of practice use is important as it supports the feasibility of each practice in the real world (Beamish et al., 2014). It follows that while the practices within the EY-MoP have been strongly endorsed by Australian teachers, their use within the classroom has yet to be established. Data collection on frequency of practice use will form part of the field testing and evaluation of Prototype 3 in future research. An initial trial of the EY-MoP will look at teacher use of practices and practice briefs in early years classrooms. The trial will explore not only what enables and inhibits implementation of the practice model but also the potential of the model to foster teacher decision making related to the adjustment of the learning environment and curriculum for young students on the spectrum.

CONCLUSION

This paper reports on the design of the first Australian Model of Practice for primary teachers of students on the spectrum in the first year of school. This work is timely as a growing number of students on the spectrum are enrolling in primary schools and teachers are increasingly expected to provide high-quality early childhood education to all students (O'Connell, Fox, Hinz, & Cole, 2016). At this stage, the EY-MoP promises to be a flexible and highly portable tool with a design that supports pedagogical decision making and improved professional practice. The field testing of the EY-MoP (Prototype 3), in partnership with teachers, should provide preliminary evidence of the applicability of this tool in Australian early years classrooms and help to bridge the current research-to-practice gap.

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CORRESPONDENCE

Correspondence: Annalise Taylor, School of Education and Professional Studies, Griffith University, Mt Gravatt Campus, 176 Messines Ridge Road, Mt Gravatt, QLD 4122, Australia. Email: annalise.taylor@griffithuni.edu.au.