

Teachers' perspectives on handwriting and collaborative intervention for children with Autistic Spectrum Disorder

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Abstract

Purpose – This study aims to investigate teacher perspectives on teaching handwriting to children with autistic spectrum disorder (ASD) and collaboration with occupational therapists.

Design/methodology/approach – A descriptive design was applied. Purpose-designed surveys were distributed to teachers of children with ASD (aged 4-12 years) in the Republic of Ireland. A response rate of 35 per cent (N = 75) was obtained, with 25 responses analysed using descriptive statistics of closed questions and content analysis of open-ended questions.

Findings – Of 139 children with ASD, 80 (58 per cent) were reported to have difficulties with handwriting. Teachers reported specific difficulties with pencil grasp, letter formation and task concept among the children with ASD. Fourteen (56 per cent, N = 25) respondents did not give handwriting as homework. Teachers valued occupational therapy advice, individualised programmes and ongoing consultation during implementation. Interest in occupational therapy education regarding handwriting was reported.

Practical implications – Occupational therapy collaboration to address handwriting difficulties for children with ASD should include involvement in teacher education, coordination of teacher–parent collaboration and the need for involvement in early intervention provision within an emergent literacy framework.

Originality/value – Handwriting development is challenging for children with ASD. There is limited information on teaching or teacher–occupational therapy collaborative practices to address handwriting difficulties of children with ASD.

Keywords Occupational therapy, Autistic Spectrum Disorder, Teacher, Handwriting

Paper type Research paper

Introduction

Handwriting is a fundamental skill required to participate in school activities enabling students to demonstrate knowledge (Case-Smith, 2002) and an important life skill required, for example, to make shopping lists and sign documents. Previous research has



demonstrated that children with autistic spectrum disorder (ASD) have difficulty with handwriting, in particular with overall legibility and poor letter formation (see [Kushki et al., 2011](#), for review). However, there is limited research on handwriting instruction for children with ASD or the nature of teacher and occupational therapy collaboration in relation to addressing their handwriting difficulties in international literature. This is despite the fact that assessment and intervention for handwriting difficulties is considered a key role for occupational therapists in practice ([Asher, 2006](#)). Given the increasing numbers of children with ASD attending mainstream schools ([Parsons et al., 2009](#)), supporting the development of the occupation of handwriting for this population is likely to become an increasing focus for occupational therapists in practice.

Literature review

Handwriting is a complex motor skill requiring the integration of information from a number of perceptual, motor and cognitive processes to ensure accurate and refined handwriting production ([Schneck and Amundson, 2010](#)). Common characteristics of ASD include difficulties with social interaction and communication and possible language disabilities ([World Health Organisation, 2014](#)) along with motor coordination and motor planning difficulties ([Fournier et al., 2010](#); [Kushki et al., 2011](#)). Handwriting as a form of communication using language and requiring precision motor skill may, therefore, present challenges for children with ASD.

Research investigating the quality of handwriting of children and adolescents with ASD has reported handwriting legibility as poor ([Kushki et al., 2011](#)). In particular, letter formation is consistently reported as poorer than comparison groups of typically developing children ([Cartmill et al., 2009](#); [Fuentes et al., 2009](#); [Fuentes et al., 2010](#); [Hellinckx et al., 2013](#); [Kushki et al., 2011](#); [Myles et al., 2003](#)). Research studies report large letter sizes in handwriting of adults and children with ASD ([Beversdorf et al., 2001](#); [Hellinckx et al., 2013](#)), while other studies report no difference in letter size, but differences in spacing abilities of adolescents with ASD ([Fuentes et al., 2010](#)) when compared with typically developing children/adolescents/adults.

Studies have primarily focused on identifying whether impairments in handwriting performance components in children with ASD can explain or predict their handwriting difficulties. [Hellinckx et al. \(2013\)](#) researched 70 children with ASD and 61 typically developing children aged between 7 and 12 years, and found that children with ASD performed poorer on measures of; visual motor coordination, visual perception, reading, manual dexterity, handwriting quality and speed when compared with typically developing children. The greatest predictors of handwriting performance for children with ASD in this study included visual motor integration and visual perception. Motor skills were found to be significantly predictive of handwriting performance in children with ASD in another study by [Fuentes et al. \(2009\)](#) of 14 children with ASD, suggesting that motor coordination difficulties contribute to poorer quality of handwriting. Additionally, [Hellinckx et al. \(2013\)](#) found that fine motor coordination impacted on handwriting speed. Although no studies were found directly addressing pencil grasp in children with ASD, the coordination of grip and load forces, which are required to have an effective grip, is impaired in children with ASD ([David et al., 2009](#)).

In the Irish Primary School Curriculum, as in most international curricula, demonstrating knowledge through writing is a requisite in nearly all subjects [[Department of Education and Skills \(DES\), 1999](#)]. In the Irish context guidelines for frequency and duration of handwriting instruction and practice are not provided and the focus appears to be on the writing process and not the development of handwriting

skills *per se* [Department of Education and Skills (DES), 1999]. However, recent policy developments in the United Kingdom and Ireland have outlined the importance of direct explicit teaching of handwriting (Department of Education, 2013) in particular for children with special educational needs [National Council for Curriculum and Assessment (NCCA), 2012].

Occupational therapy and teacher collaboration

Occupational therapy/teacher collaboration to address a child's performance areas (such as handwriting) is considered essential to current practice (Bazyk and Cahill, 2015). Indeed, literature from North America is full of references to models of school-based practice as occupational therapists are employed directly by schools. However, in Ireland, occupational therapists are employed mostly by the Department of Health and not the Department of Education. This means that occupational therapists in Ireland typically work in clinic settings and those based in school settings are small in number. There is a lack of infrastructure to support collaborative occupational therapy-teacher practice, despite the need for this collaboration being recognised in policy (Government of Ireland, 2004; National Council for Special Education, 2013). Contemporary research has highlighted the need for occupational therapists to spend time in schools, be involved in meetings, understand the classroom routines/practices and curriculum implementation (Rens and Joosten, 2014; Villeneuve, 2009).

To collaborate effectively with teachers, it is important for occupational therapists to understand their perspectives on handwriting difficulties and investigate appropriate collaborative approaches to inform practice. The purpose of this research is to; examine handwriting teaching practices in ASD specially designated classes, and to explore what support teachers value from occupational therapists to address handwriting difficulties with this population. These findings can inform occupational therapy practice and research not only in Ireland but also internationally.

Methods

This research was exploratory in nature, as there was no other research found which examined handwriting instruction for children with ASD and teachers' views on occupational therapy support for this area of need. A cross-sectional design was used to capture data. A survey was distributed to class teachers of special classes for children with ASD. Information was gathered about their perspectives regarding teaching handwriting to children with ASD and about their experience of occupational therapy support provided in this context.

Participants

The first author worked in the public health service as an occupational therapist in the Republic of Ireland. Occupational therapy input was provided to specially designated classes for children with ASD. These classes typically consisted of six children. The classes were predominantly for children with ASD who had no intellectual disability. However, some children also had a mild intellectual disability and a small number of children had a moderate intellectual disability (specific numbers unavailable). For this research, teachers surveyed were selected from classes where occupational therapy input was provided by occupational therapists within the same service as the first author. Classes where the first author provided input were excluded from the survey. Occupational therapy input for children in the service included; classroom observation, standardised assessments, individual and group intervention with children, occasional attendance at Individual

Education Plan (IEP) meetings, meetings with teachers to discuss children's progress and needs as well as the provision of individualised programmes. Occupational therapists provided home programmes, support and advice to parents also.

Instrumentation

As there was no survey tool found in the literature which would capture the desired information, the first author developed a purpose-specific survey in consultation with the second author. The content of the survey was informed by the literature reviewed. The survey was structured into three sections. The first section focused on demographic information to provide a context for the data. The second section asked respondents to provide information on their teaching practices in relation to handwriting. The final section focused on occupational therapy and teacher collaboration. Refer to the [appendix](#) for sample questions. The survey consisted of both open and closed questions and included Likert scales.

The survey was piloted with two teachers working in ASD classes, who filled in a written feedback form after completion of the survey. Face and content validity was addressed during the process of survey development by the iterative process of reviewing literature on handwriting, autism and collaboration and requesting written feedback from teachers during piloting.

Ethical considerations

The research proposal was submitted to the ethics committee linked with the service responsible for providing clinical input to the ASD classes. The committee deemed ethical approval unnecessary for this research project, as the research did not involve direct contact with children or their families. The exemption was confirmed in writing. To ensure confidentiality, completed surveys were stored securely; accessible only by the researcher and no identifying information was requested in the surveys. Teachers surveyed were informed through a purposely developed information leaflet that their participation was voluntary and were given the option to withdraw at any time. Participants were invited to contact the researcher if they had questions.

Data collection and analysis

Seventy-five surveys were distributed to teachers by occupational therapists providing input to the classes in November 2012. Each teacher was given a pack that included a letter introducing the researcher, information on the nature of the research, a consent form, a survey and a stamped addressed envelope. Twenty-six (35 per cent, $N = 25$) surveys were returned, one survey was excluded, as the respondent taught post-primary school age children. While below 50 per cent can be considered an unacceptable response rate in studies using representative samples ([Mangione, 1995](#), cited in [Bryman, 2012](#)), this study used a purposeful sampling strategy, an approach which can be considered less of an issue than a sample selected on the basis of probability ([Bryman, 2012](#)). Content analysis was used to analyse responses to open questions, while descriptive statistics (frequencies and percentages) were used to analyse closed questions to summarise the information gathered.

Results

Demographic information

Fourteen of the respondents (56 per cent) had been teaching for 7 years or more, and 11 (44 per cent) were teaching for between 1 and 6 years. Thirteen (52 per cent) were teaching in

ASD-specific classes between 1 and 3 years, 12 (48 per cent) were teaching in these classes for 4 years or more. Class numbers ranged from four to eight children. Twenty respondents (80 per cent) taught classes consisting of children of different ages. The children taught ranged in age from 4 to 12 years. Sixteen (64 per cent) respondents taught children aged between 7 and 9 years old.

Handwriting and teaching practices

Thirteen respondents (52 per cent) taught both prewriting and handwriting skills, five (20 per cent) taught handwriting skills, and seven (28 per cent) taught prewriting skills. Teachers who worked on prewriting skills reported that they used a mixture of fine motor play, colouring, messy play and gross motor activities. Twenty-one (84 per cent) respondents used multisensory activities such as; sandpaper letters, Play-Doh and theraputty to develop handwriting skills. Teachers used a variety of methods for handwriting instruction including; modelling letter formation, dot-to-dot worksheets, directional cues, verbal prompting and hand-over-hand assistance. Fifteen teachers (60 per cent) used the “Handwriting Without Tears” [HWT® (Olsen, 2018)] with their pupils.

Teachers’ responses to length of time spent on handwriting instruction and practice daily ranged from 5 to 30 minutes. Of the respondents who answered 11 (48 per cent, N = 23) reported they spent approximately 10 minutes on both handwriting instruction and handwriting practice per day. Eight (35 per cent) indicated that time allotted to handwriting practice and instruction varied. One teacher (4 per cent) cited age and two (9 per cent) cited the child concentration as factors which influenced the time devoted to handwriting. Fourteen (56 per cent) respondents did not give handwriting as homework to their pupils. One respondent who elaborated on this answer reported concern that giving homework may cause the child confusion if different directions and instructions were given between home and school, another indicated they did not give homework as they taught children with moderate to severe intellectual disability, yet another reported that when handwriting homework was given it was “rushed and messy”.

Handwriting difficulties and autistic spectrum disorder

Twenty-four (96 per cent) reported that children in their classes had difficulties with handwriting. Of 139 children, 80 (58 per cent) were reported to have difficulties with handwriting. In terms of specific handwriting difficulties encountered, poor pencil grasp and factors related to overall legibility such as formation, consistency of letter size and placement on lines were cited as the most common difficulties. Refer to [Figure 1](#). Task concept was identified as a challenge by ten teachers (40 per cent).

Teachers indicated that they used a variety of methods to address handwriting difficulties with children with ASD. Please refer to [Figure 2](#).

Nineteen (90 per cent, N = 21) respondents reported that they included specific handwriting goals for children in their IEPs, while two (10 per cent) did not.

Occupational therapy–teacher collaboration

Eighteen (72 per cent) respondents indicated that they referred children with handwriting difficulties to occupational therapy. Five (20 per cent) reported that they did not, but intended to in the future. Common reason for referral to occupational therapy included poor pencil grasp, illegible handwriting, fatigue when writing and slow writing speed. Twenty-two respondents (88 per cent) indicated that the nature of the support they expected from occupational therapy were strategies to deal with handwriting difficulties.

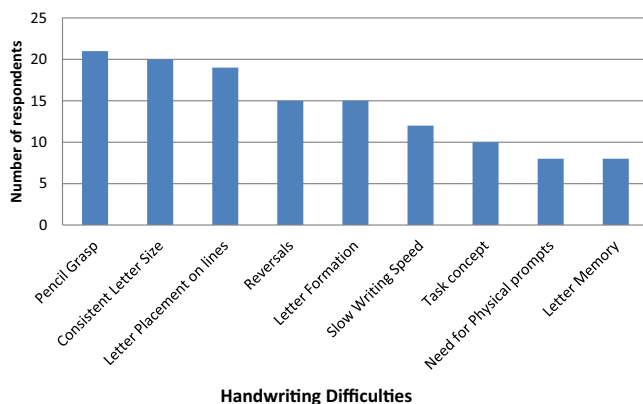


Figure 1.
Challenges to
teaching handwriting

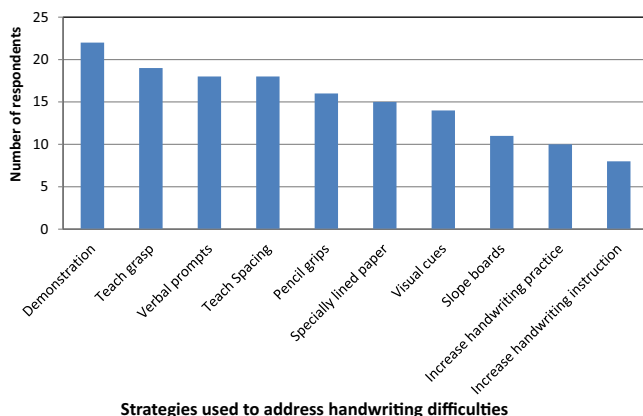


Figure 2.
Strategies used to
address handwriting
difficulties with
children with ASD

Fourteen (56 per cent) also expected direct occupational therapy input with the child when working on handwriting. See [Figure 3](#) for details.

Teachers' value of specific occupational therapy interventions

To identify what, if any, occupational therapy interventions teachers found beneficial they were asked to rate the usefulness of interventions. See [Table I](#) for details. While 19 (95 per cent, N = 20) respondents valued ongoing consultation with the occupational therapist, only 9 (47 per cent, N = 19) found occupational therapy assessment of prewriting/handwriting difficulties “almost always” or “always” useful. Some of the respondents commented on occupational therapy support in general:

“When I began teaching Occupational Therapy support was great & I learned a lot. Great for different ways of teaching same skills. I think new teachers need a lot of support”

and

“[...] support is always beneficial [...]”

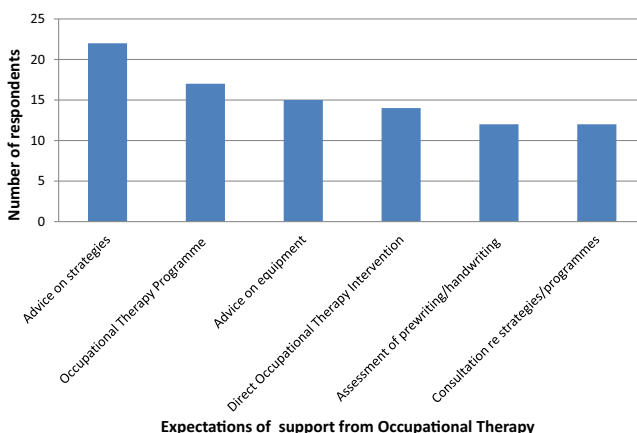


Figure 3. Teachers' expectations from referral to occupational therapy

Occupational therapy input N = 20*	Always – mostly useful	Occasionally useful	Not useful most of the time – never useful
Assessment of prewriting/handwriting difficulties (N = 19)	9 (47%)	9 (47%)	1 (5%)
Occupational therapy intervention with the child (N = 19)	16 (84%)	2 (11%)	1 (5%)
Advice on equipment to help with handwriting difficulties (N = 18)	15 (83%)	2 (11%)	1 (6%)
Ongoing consultation when implementing programmes/advice (N = 20)	19 (95%)	1 (5%)	0
Specific handwriting programmes (N = 19)	15 (79%)	3 (16%)	1 (5%)

Table I. Teachers' value of specific occupational therapy interventions

Note: *This question was not completed by all respondents

Occupational therapy – teacher training and handwriting

Teachers rated their level of interest in attending occupational therapy-led training on handwriting using a rating scale, with 1 indicating they were “not interested” and 10 indicating they were “very interested”. Eleven (44 per cent) indicated that they were very interested in attending training provided by occupational therapists and a further 13 (52 per cent) indicated a moderate to high level of interest (ratings between 5 and 9). Teachers were asked what kind of content they would like as part of any occupational therapy training in relation to handwriting (see [Table II](#)). Twenty teachers (83 per cent, N = 24) indicated that they would be interested in information on motor and perceptual skills underlying handwriting skills and guidance on use of aids to support handwriting performance, e.g. pencil grips.

Discussion

Handwriting difficulties and teaching practices

Approximately half of children taught by the teachers were identified by them as having handwriting difficulties. This confirms previous research which reports on handwriting as

an area of difficulty for children with ASD (Fuentes *et al.*, 2009; Kushki *et al.*, 2011). Poor pencil grasp and overall legibility, including maintaining consistent letter formation, were identified by teachers as specific issues. This concurs with previous literature regarding difficulties with fine motor control and letter formation in children with ASD (Fuentes *et al.*, 2009; Kushki; *et al.*, 2011). Research indicates that handwriting instruction including practice is important. A systematic review by Hoy *et al.* (2011) revealed the importance of handwriting practice as a means to improve handwriting outcomes. Therefore, increasing opportunities for instruction and practice may be important to improve handwriting in children with ASD.

However, teachers reported variable time for handwriting instruction/practice during class time. Teachers cited the difficulties with task concept, concentration and motivation as factors hampering some children's ability to engage effectively in learning in general and in learning handwriting. Research suggests that children with ASD have attention deficits, sensory processing difficulties, in particular auditory filtering difficulties (Ashburner *et al.*, 2008). This possibly will have implications for the amount of practice and instruction children with ASD will be willing or able to engage in. These aspects have not been addressed in relation to handwriting intervention in general or in relation to ASD. Given the language and communication difficulties central to ASD, addressing the areas of task concept, concentration and motivation should be key considerations for intervention in practice.

Approximately half the teachers did not give handwriting tasks as homework, suggesting a lack of parental involvement in handwriting practice. Yet, 19 (76 per cent) reported that specific handwriting goals were included in IEPs which involve parent input. Unfortunately, respondents gave little information about the rationale for the lack of handwriting homework. One respondent to this survey indicated a concern over possible differences between methods used to teach children at home and school which could cause confusion. Given that occupational therapists are concerned with supporting the occupation of prewriting/handwriting in both home and school environments, there could be an important role for occupational therapists to collaborate with teachers and parents to facilitate coordination of intervention for handwriting difficulties across home and school environments. This would support the development of occupation-focused practice in the case of handwriting as advocated by recent authors (Gerde *et al.*, 2014).

The findings of this research do not indicate differences between the instruction methods used by the teachers of children with ASD and those reported to be used by mainstream teachers in research conducted by Graham *et al.* (2008). However, approximately half of the teachers surveyed in this research used the HWT® programme. It is not clear from the teacher responses as to the reason for this. Anecdotal evidence would suggest that the programme is commonly recommended for children with special needs in occupational therapy practice in an Irish setting. Another possible factor is the availability of training for teachers in HWT® by a private service provider within the geographical area of the study. The HWT® programme

Occupational therapy training content N = 24	No. of respondents %
Information on motor and perceptual skills underlying handwriting	20 (83%)
Guidance on use of aids to support handwriting performance, e.g. pencil grips	20 (83%)
Information on specific handwriting programmes	17 (71%)
Information on assessing handwriting difficulties	16 (67%)
Guidance on when to consider using typing to compensate for handwriting difficulties	14 (58%)

Table II.
Teacher perspectives
on occupational
therapy handwriting
training content

contains many aspects that could potentially address difficulties common in children with ASD, such as use of an explicit step by step approach to letter formation, which might address motor planning issues. There is limited single case study research on this programme which indicates its effectiveness with children with ASD (Carlson *et al.*, 2009; Crosby *et al.*, 2009; McBride *et al.*, 2009). Further investigation of the usefulness of this programme with children with ASD could be beneficial.

Occupational therapy–teacher collaboration

Teachers reported valuing occupational therapy advice, programme provision and in particular ongoing consultation during the implementation of programmes and advice. The importance placed on ongoing consultation mirrors much of national and international literature regarding occupational therapy–teacher collaboration (Patton *et al.*, 2015; Reid *et al.*, 2006; Rens and Joosten, 2014). Authors have advocated for increased time to be spent in co-planning and having scheduled meetings to enhance collaborative practices in relation to children with ASD (Hart Barnett and O’Shaughnessy, 2015). Approximately only half of teachers reported occupational therapy assessment to be “very useful” or “useful”. Yet, when asked to comment on possible training, approximately two-thirds of the sample were interested in information in assessing handwriting difficulties. This may indicate that occupational therapists need to focus on in depth sharing of their knowledge on the nature of the handwriting assessment and specific difficulties of the child which impact on handwriting with teachers in practice.

Authors have also recommended that occupational therapists have opportunities to use their knowledge to support teacher continuing professional development (Villeneuve and Shulha, 2012). Teachers indicated a high level of interest in learning more about the underlying perceptual and motor skills of handwriting and the use of aids to help handwriting. Occupational therapists have skills in understanding the performance components of handwriting, developmental profile of children with ASD and activity analysis that could greatly inform teachers in developing assessment and appropriate problem-solving skills in relation to analysing handwriting difficulties of individual children with ASD.

Teachers’ responses in this survey are reflective of challenges to the foundational skills required for handwriting, such as fine motor control (pencil grasp) and consistency in letter formation. Authors have recommended the need for; fine motor control, visual motor integration, targeted work on letter formation and reading skills development to be addressed alongside handwriting difficulties in children with ASD (Fuentes *et al.*, 2009; Hellinckx *et al.*, 2013). Task concept in relation to handwriting was also highlighted as a challenge by the teachers in the present study. These skills typically develop in the preschool years and first year of primary education. Therefore, early intervention is important and collaboration between occupational therapists and early childhood educators and school teachers is key (Hart Barnett and O’Shaughnessy, 2015). This will enable evaluation of the developmental level of children with ASD and improve performance skills. Given the language difficulties of children with ASD, exploration of the links between emergent reading and writing (what is termed as emergent literacy) and how these can be supported would be important for occupational therapists of children with ASD in collaboration with early educators and speech and language therapists. The need for occupational therapists to support children to communicate meaning through their writing has been advocated as an expanded role for therapists in practice (Gerde *et al.*, 2014). Studies of integrating occupational therapy strategies in early school education (kindergarten) have been undertaken with success in improving not just visual motor integration and motor

skills but also letter knowledge and print concepts (Bazyk *et al.*, 2009). Early intervention should also involve collaboration with parents, as parental input has been identified as key to developing literacy skills (including handwriting) in preschool-aged children (Skibbe *et al.*, 2013).

Limitations

The results are context-specific, limited to teachers of children with ASD in special classes within a geographical area, and the sample size is small. Additionally, a non-standardised tool was used to gather information. Therefore, findings cannot be generalised. Given the exploratory nature of the research, no statistical analysis of the data was carried out. Also, it is important to note that only teachers who consider handwriting to be an important issue may have completed and returned the surveys, creating distortion in the findings.

Conclusion

Teachers identified pencil grasp, letter formation/size and task concept as difficulties experienced by children with ASD in relation to handwriting. To address these issues, collaboration between occupational therapists, early educators and parents would be indicated at preschool and primary school level to develop underlying skills required for handwriting and to include a broader focus on emergent literacy. Findings highlight the potential value of collaboration between teachers of children with ASD and occupational therapists that includes education provision by occupational therapists as part of everyday practice. The findings reinforce the suggestions of previous authors of the potential benefit of pre-service and continuing professional education at university level to provide teachers with an in-depth understanding of motor learning (Stevenson and Just, 2014; Wehrmann *et al.*, 2006). Overall findings inform service delivery models for practice in this area. Research exploring the usefulness of HWT® for children with ASD could be beneficial. Further research exploring the implementation and outcomes of occupational therapy–teacher–parent collaboration to address handwriting difficulties for children with ASD is also recommended.

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Sample questions from survey

How do you teach handwriting? (Tick as many as applicable)

- Modelling/demonstrating of letter formation Dot-to-dot worksheets
 Copying letters and words from worksheets Verbal prompting
 Directional cues such as letters with arrows Hand over hand

Other: (please describe): _____

Do you use a handwriting programme to teach handwriting skills e.g. Handwriting Without Tears ®?
 Yes No

If yes what handwriting programme(s) do you use? _____

What types of specific challenges do you encounter when teaching handwriting to children in your specially designated class? (Please tick all that apply)

- Problems grasping the pencil Slow writing speed
 Maintaining consistent letter sizes Letter placement on the line
 Difficulty remembering letters Letter reversals

- Forming letters the wrong way e.g. starting letters from the bottom instead of the top
 Inability to form letters without physical prompts

Other: (Please describe): _____

Do you refer children with handwriting difficulties to Occupational Therapy?

- Yes No

If yes can you describe the types of problems you refer to the OT (Tick all that apply)

- Poor Pencil grasp Illegible handwriting
 Slow handwriting speed Fatigue when writing

Other: _____

Please circle a number below to indicate how useful you have found the following types of OT support in relation to handwriting
 1 = Never useful 2 = Not useful most of the time 3 = Occasionally useful
 4 = Useful most of the time 5 = Always Useful

OT assessment of prewriting/handwriting difficulties 1 ← 2 3 4 5 → Never Useful Always Useful
OT sessions directly with the child 1 ← 2 3 4 5 → Never Useful Always Useful
OT handwriting programme 1 ← 2 3 4 5 → Never Useful Always Useful
OT advice on equipment to help with handwriting difficulties 1 ← 2 3 4 5 → Never Useful Always Useful
Ongoing Consultation with OT when implementing programmes or advice 1 ← 2 3 4 5 → Never Useful Always Useful

How interested would you be in attending training provided by OTs focusing on helping children with handwriting difficulties? (Please circle as appropriate)

