

THE UNIVERSITY OF
WARWICK



Teaching Handwriting Skills to Children with Autism

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Why handwriting matters

- Handwriting is an important functional skill
- It is a strong predictor of academic success in school and difficulties in handwriting can have an impact on children's self esteem
- Together with reading problems, writing problems lead to the greatest number of referrals to and placements in special education programs (Baker et al, 2003)
- Teaching keyboarding skills instead is not necessarily the answer
- There are numerous additional benefits of systematic handwriting instruction for children who are struggling

Handwriting and children with autism

- Poor handwriting was noted in the original description of Asperger syndrome (Hans Asperger, 1944)
- Recent research indicates that children with autism perform worse on handwriting tasks than do age and intelligence matched controls (Fuentes, et al, 2009)
- Children with ASD show worse quality of forming letters than controls but do not show differences in their ability to correctly size, align and space their letters
- Impairments in multiple domains may contribute to handwriting difficulties. For example:
 - fine and gross motor functions
 - proprioceptive deficits
 - visual bias to focus on details rather than whole or global features

Handwriting Without Tears®

- Developed by Jan Olsen, an occupational therapist
- Teaches letters in a unique order (the first letters taught are capital letters that start with a vertical stroke- “frog jump capitals”, F, E, D, P, B, R, N, M)
- Lower case letters are taught later but still grouped by the type of stroke used to make the letter (e.g., magic c letters, line letters, diver letters)
- Order of skills taught is based on the developmental sequence and developmental principles of handwriting (Kiss, 2007)

Handwriting Without Tears[®]

- Uses a multi-sensory method to teach handwriting and to remediate handwriting problems (Olsen, 2007)
- Program designed for pre-Kindergarten through to sixth grade
- HWT teaches students proper pencil grip, proper posture, correct letter formation, appropriate sizing and placement, and sentence formation (Olsen, 2007).
- This is accomplished through teacher modeling, practice, and hands-on learning opportunities.
- The recommended time frame is 10 min per day on instruction followed by 5 min of practice time (Olsen, 2001).

Research Evidence for HWT- Typically developing children

- Students in first grade classrooms demonstrated statistically significant improvement in the areas of letter size and spacing compared to students receiving traditional handwriting instruction (Owens, 2004). Social validity data was also impressive.
- Students in inner city first grade classrooms showed significant improvements in letter orientation, placement, size and spacing of letters after being on the HWT program (Hape, 2014)
- A 2015 analysis of more than 14, 000 students' handwriting screeners (for printing and cursive skills) completed over three years showed a significant improvement on end of year test scores for those students who had been on the HWT program (Olsen, 2015)

Research Evidence for HWT- Children with ID/ autism

- Two preschool children with ID were taught to write the letters in their name legibly using the tracing and copying procedure from HWT (Thompson et al, 2012)
- Two preschool children with ID were taught to write their name legibly using the chalkboard, wooden letters and worksheet method (using highlight, model and start point on worksheet) (Coussen et al, 2012)
- One preschool child with autism was taught to write the letters of their name using a tracing procedure derived from HWT (Cosby et al, 2009)

Rationale for using HWT

- It provides a comprehensive handwriting program organised into progressive levels of difficulty
- It is suitable for children with no handwriting or very basic emerging handwriting skills
- Its development is informed by extensive research on how children learn to write
- Existing data on the program's use with typically developing children (and emerging evidence with children with ID) show it to be effective.
- It incorporates teaching procedures that are known to be effective for children with autism (e.g., modelling, rehearsal and feedback)

Study aims

- The primary aim of the present study was to investigate the feasibility of adapting the HWT curriculum as a comprehensive handwriting programme for use with children with autism
- To this aim, we developed a detailed teaching manual to ensure fidelity of teaching and systematic instructional procedures were followed with the children
- The second aim was to investigate whether small group teaching using our adapted HWT curriculum would improve the handwriting skills in three children with autism

Participants

- 3 children (2 boys and 1 girl) with a clinical diagnosis of autism attending a state maintained special school for pupils with severe learning disability in the UK
- Ages 11 years, 14 years and 15 years
- Eligibility for the study
 - performing below the level expected for their chronological age in handwriting
 - *Pre-requisite skills*: Sitting willingly at a table to engage in learning tasks for short periods of time (up to 15 min), following simple one-step instructions (e.g., “clap hands”), imitation skills (repeat words, motor)

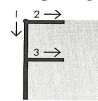
Materials

- **Handwriting without tears manual- autism version**

Replication of certain features from the “HWT teachers guide”:

- Order in which the letters are taught remained the same; e.g., in kindergarten, “frog jump” capitals taught first (F, E, D, P, B, R, N, M).

- Standardised instructional language used to prompt how to write the letter remained the same



“Big Line down + Little Line across + Little line across”

- Teaching plans emphasised a focus on using teacher modeling as one of the main components of teaching

Materials

Replication of certain features from the “HWT teachers guide”..:

- Teaching resources recommended in our manual included the worksheets/ workbooks provided by HWT

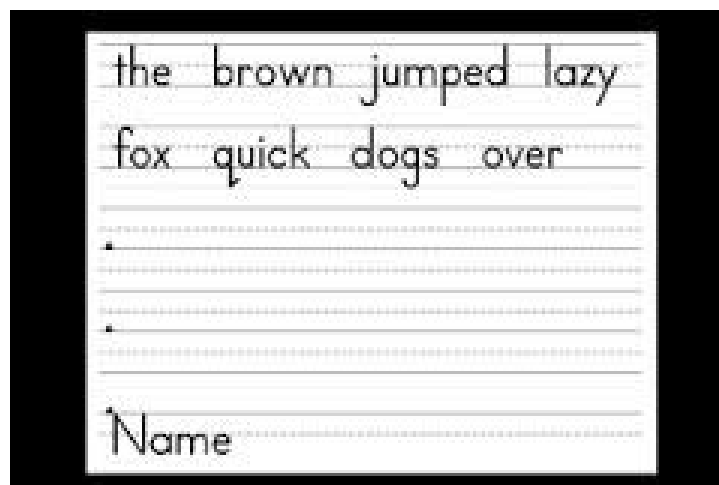


Materials

- **Handwriting without tears manual- autism version (adaptations)**
- Focused on pre-K to grade 2 skills only (i.e., the “printing” curriculum).
- Condensed version of program provided to focus on “printing” and not other more sensory motor activities
 - For example, for pre-Kindergarten omissions included roll a dough letters and playing with wooden letter pieces. For kindergarten omissions included matching wooden pieces to capital letter card
- Prompting and prompt fading suggestions provided
- Task analyses on more complex skills
- Goals for learning operationalised
- Instructions for data collection
- Mastery criterion described
- Generalisation suggestions

Outcome measures

The Minnesota Handwriting Assessment (MHA: Reisman, 1999).



Operational definitions from the MHA

Category	Operational definition
Legibility	The letter must be present Recognisable Does not look like any other letter All parts of the letter are completed
Form	No gaps No extension Correct formation of the letter (e.g., F= big line down, and little line and little line) No extra lines
Alignment	Letter must not rest or above the line (see example)
Size	The letter must not be too big or too small It should not appear to float between the lines

Outcome measures

- **The Minnesota Handwriting Assessment** (MHA: Reisman, 1999).

The MHA measures:

1. 5 quality categories: Legibility, Form, Alignment, size and Spacing
2. Each quality category is scored separately and the manual gives objective and clear criteria of how to score it
3. The MHA has norms for 1st and 2nd grade. For the purpose of this study the norms for 1st grade were used as all students had severe difficulties in handwriting
4. Students performance can be rated as: performing like peers, performing somewhat like peers and performing well below peers

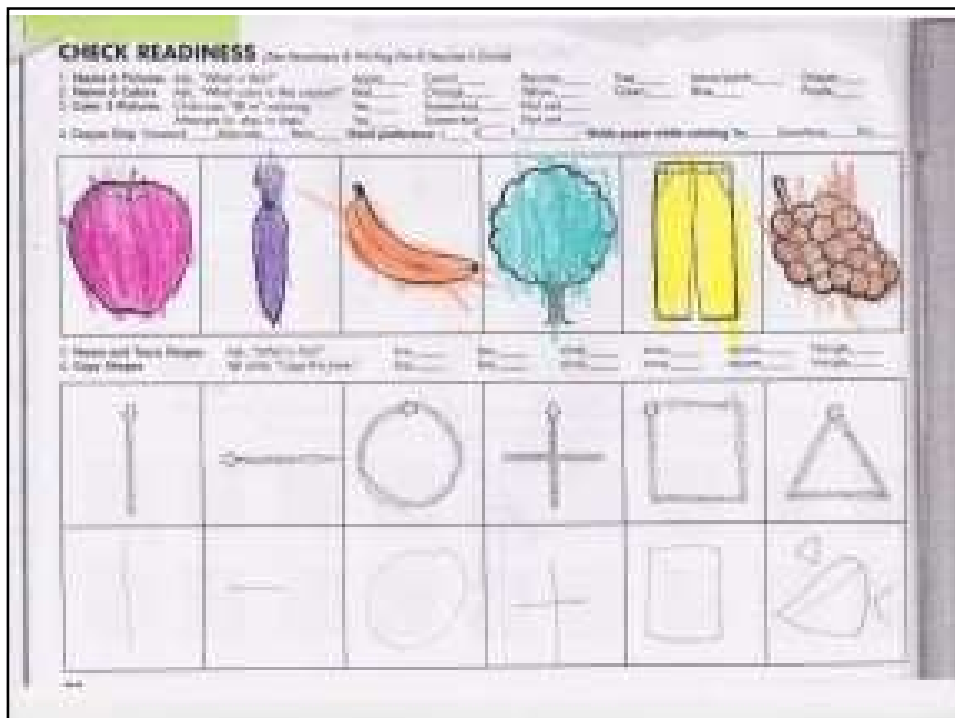
This test was completed at baseline (November, 2015) and again at the end of the academic year (July, 2016)

Initial Assessment

1. HWT Check for Readiness Skills

- Colouring skills
- crayon grip
- holding paper
- trace and copy shapes

2. Probe tests on individual letters



Overview of teaching procedure

- Initial assessment/testing to determine starting point in the adapted Handwriting without Tears® (a-HWT) program
- Group handwriting sessions based on the manual at least 3 x a week for 32 weeks.
- On average, each student received 30-60 min of handwriting instruction a week
- Classroom assistants who normally worked with the children carried out the sessions
- Clear recommendations provided for identifying and using rewards
- Staff trained in an initial one hour session and ongoing overlaps

Ongoing monitoring of intervention

- Classroom assistants took acquisition data regarding children's correct and incorrect performance
- Data was taken retrospectively using criteria from the Minnesota Handwriting Assessment

Trial by Trial datasheet

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Percentage
Legibility	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
The letter is present	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Form	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
The letter is recognisable	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Alignment	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
The letter does not look like any other letter	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Size	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
All parts of the letter are complete	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Total																						
Percentage																						

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Percentage
Legibility	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Correct formation of the letter	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Form	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
There are no gaps	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Alignment	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
There is no extension	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Size	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
There are no extra lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Total																						
Percentage																						

80% correct across four quality criteria needed to "master" a letter





Self monitoring

Does it look like.....?
(legibility)

Is it the same
shape.....?(form)

Is it on the line.....?
(alignment)

Is it the right size.....?
(size)

Name: _____	Date: _____								
Letter: _____									
	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clear	✗	✗	✗	✗	✗	✗	✗	✗	✗
	✓	✓	✓	✓	✓	✓	✓	✓	✓
Shape	✗	✗	✗	✗	✗	✗	✗	✗	✗
	✓	✓	✓	✓	✓	✓	✓	✓	✓
Line	✗	✗	✗	✗	✗	✗	✗	✗	✗
	✓	✓	✓	✓	✓	✓	✓	✓	✓
Size	✗	✗	✗	✗	✗	✗	✗	✗	✗

Teaching steps for self monitoring

1. Using the Self-monitoring (SM) card, the teacher talked the child through each letter, asking the question (e.g., does it look like..?) and discussing with the child whether the child met criteria
2. Using the SM card, the teacher faded verbal input and child asked the questions. Teacher gave feedback after each letter as to whether they agreed/ disagreed with the scoring
3. Using the SM card, the teacher faded verbal input and child asked the questions. Teacher gave feedback when the self monitoring sheet had been completed
4. Self monitoring sheet faded, as child wrote each letter on the worksheet they went through the verbal rules and corrected their letter accordingly
5. Child self corrected on the worksheet without needing to ask the questions

Results

Table 1 Participants characteristics

Participants	Age	N of week in interventions	N of letters mastered	
			Capital	Lower
Craig	11	32	26	26
Leila	15	32	16	2
Trevor	14	32	16	1

Table 2 Minnesota Handwriting Assessment

Participants	MHA Domains	Baseline (November 2015)	Time 1 (July 2016)
Craig	<i>Legibility</i>	24	29
	<i>Form</i>	22	25
	<i>Alignment</i>	4	12
	<i>Size</i>	1	19
	<i>Spacing</i>	12	23
Leila	<i>Legibility</i>	18	27
	<i>Form</i>	16	25
	<i>Alignment</i>	0	0
	<i>Size</i>	1	0
	<i>Spacing</i>	17	25
Trevor	<i>Legibility</i>	19	28
	<i>Form</i>	17	28
	<i>Alignment</i>	6	0
	<i>Size</i>	4	0
	<i>Spacing</i>	18	28

Conclusions

- The a-HWT teaching manual is a tool that can be used to teach handwriting of letters to children with autism
- The self monitoring procedure appears to be a crucial additional teaching strategy
- Small group teaching sessions using the a-HWT teaching manual and self monitoring improved the handwriting skills in three children with autism.

Considerations for future implementation & research

Research is needed to more fully evaluate the a-HWT intervention:

- Over a longer period of time
- With a larger sample of participants
- Including a control group in the study design
- Using individualized teaching sessions rather than group teaching
- Using the Pre-K (readiness) adapted program or developing later stages
- Using the curriculum with different populations (e.g., children with learning difficulties)
- Using a wider range of measures, not just MHA.
- With a more detailed analysis of the effects of the self monitoring intervention
- Using Precision Teaching methodology (e.g., generalizing across “learning channels” from “see-write” to “hear-write” and “think-write”, targeting fluency, etc.)

Wider implications

- Potential utility for increasing the number of children with autism who can acquire basic handwriting skills
- Functional impact of increased handwriting skills and potential for greater academic achievement more generally
- Increase in expectations (for children and teachers/schools)
- Possible effects beyond children’s scores and handwriting sessions

Thank you!!!

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