

# A survey to investigate how South African Occupational Therapists in private practice are assessing and treating poor handwriting in foundation phase learners: Part I Demographics and Assessment Practices

Joanne van der Merwe, BScOT, M OT  
Private Practitioner

Neeltje Smit B OT, B Hons OT, MBA  
Senior Lecturer, Division of Occupational Therapy, Faculty of Health Sciences, University of Stellenbosch

Betsie Vlok M OT  
Lecturer, Division of Occupational Therapy, Faculty of Health Sciences, University of Stellenbosch

## ABSTRACT

Poor handwriting can have a myriad of negative effects on a learner's academic performance and emotional well-being. Appropriate assessment and early remediation of handwriting difficulties are of paramount importance in minimising these effects.

This study explored, by means of a telephonic survey, the assessment practices used by South African occupational therapists in the remediation of handwriting difficulties in Foundation Phase learners. The findings show that a wide variety of informal and formal assessment methods are used. With regards to standardised performance component assessments, the Developmental Test of Visual Motor Integration (VMI) and the Developmental Test of Visual Perception-2<sup>nd</sup> edition (DTVP-2) were the preferred assessment tools. The limited use of standardised handwriting assessments is an area of concern in the light of the importance attached to providing objective evidence of the benefit of intervention on functional skills. Use of the DTVP-2 for handwriting referrals may need to be reviewed as available research has shown no significant correlation between handwriting ability and Perceptual Quotient scores on the DTVP.

**Key words:** Assessment, Foundation Phase, Handwriting

## Introduction

Handwriting can be viewed as a functional skill of paramount importance for school-going children considering that writing tasks constitute up to 60% of their school day<sup>1</sup>. It is the means through which learners are most often expected to demonstrate their knowledge of curriculum content. Illegible handwriting can have far reaching consequences for the learner who needs to use handwritten notes from which to study and can create barriers for the educator who is required to mark examination papers. It is widely accepted that early intervention for handwriting difficulties should take place due to the negative impact of poor handwriting on higher-order writing processes such as planning or content generation, motivation to engage in school activities, over-all academic achievement and emotional or psychological development<sup>2-8</sup>.

Zwicker<sup>9</sup> reported that, according to available research, handwriting problems are prevalent in up to 25% of typically developing children which may explain the fact that handwriting difficulties are one of the most common referrals received by occupational therapists<sup>10-13</sup>. Of particular concern within the South African context is the fact that South African school children are reported to be at a high risk for HIV infection which has been shown to affect areas of the central nervous system responsible for visual-spatial processing, attention and memory storage<sup>14</sup>, all of which have an impact on handwriting performance<sup>15,16</sup>. This, coupled with the contention raised by Fleish (in Paton<sup>17</sup>) that South Africa is in the midst of an educational crisis due partly to a failure of primary schools to facilitate writing fluency in learners, suggests that South African occupational therapists are in a prime position to address handwriting as a barrier to learning, academic achievement and emotional well-being. Early intervention for handwriting difficulties is recommended in the literature<sup>2-8</sup>, as is the importance of a comprehensive assessment in developing an effective intervention plan<sup>2</sup>.

Only one study, conducted in Canada<sup>18</sup>, could be found on the assessment practices of occupational therapists for handwriting referrals in particular. No studies could be found that explored assessment practices within the South African context. One

of the aims of the current study was thus to investigate South African occupational therapy assessment practices pertaining to handwriting remediation in Foundation Phase learners in order to motivate therapists to evaluate and/or expand their current practices.

## Literature Review

The reported underlying causes of handwriting problems are diverse and include factors both intrinsic and extrinsic to the learner. Extrinsic factors are reported to include inefficient teaching methods, insufficient time dedicated to formal handwriting instruction, and less than optimal ergonomic or environmental factors<sup>19</sup>. Intrinsic factors, believed to originate early on in a child's development, include deficits within a variety of motor, sensory, cognitive and psychosocial performance components<sup>9,10,15,16</sup>. If a learner is experiencing difficulties with handwriting, a comprehensive assessment of the learner's handwriting performance, as well as the intrinsic and extrinsic factors impacting on performance, is recommended. This will guide the therapist in developing the most effective treatment programme for the learner.

### Assessment of Handwriting Difficulties

#### Factors impacting on handwriting performance

Handwriting performance can be defined as the quality and quantity of written text produced across various task demands, which is influenced by performance components intrinsic to the individual as well as ergonomic and environmental factors. The factors which impact on handwriting performance and which are considered important to assess include: (1) handwriting legibility components; (2) handwriting speed; (3) handwriting domains; (4) ergonomic factors; (5) environmental factors; and (6) intrinsic performance components<sup>2,10,16,18,20</sup>. Each of these factors is graphically summarised in Figure 1 and discussed in greater depth below.

Handwriting **legibility components** are described as including letter formation, alignment, spacing, size and slant<sup>2,16,19,20-23</sup>. Research findings indicate that letter formation and spacing appear to be the most significantly related to overall text legibility<sup>20,24,25</sup>.



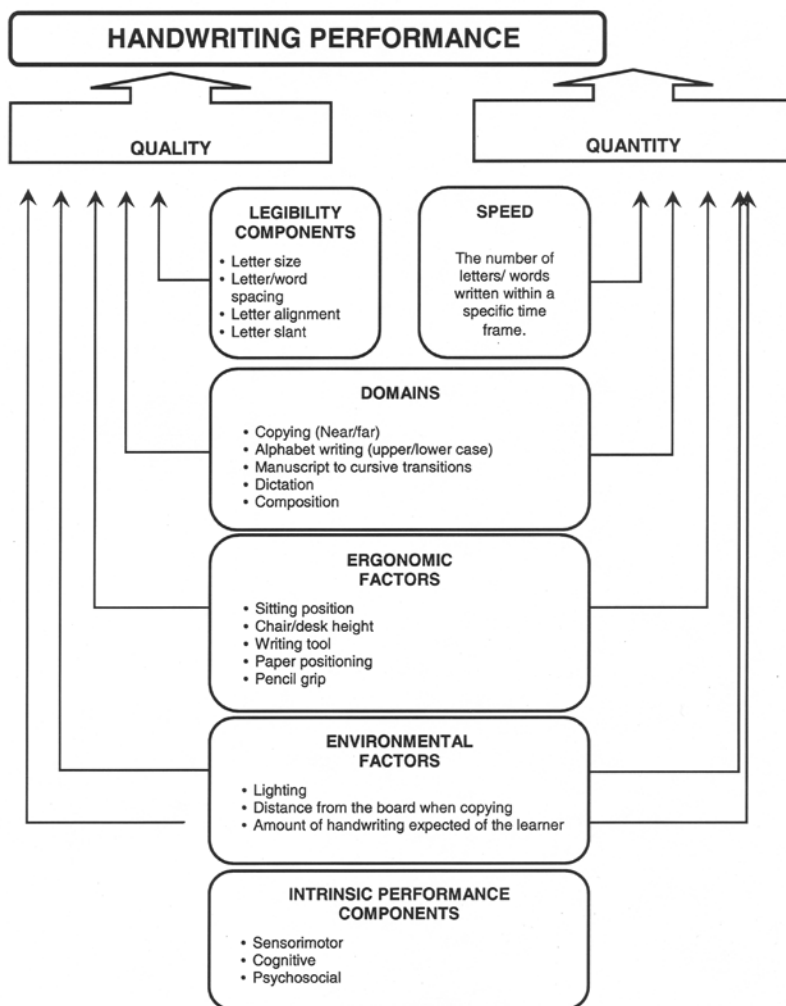


Figure 1: Factors impacting on handwriting performance

**Handwriting speed** is usually measured by counting the letters or words that are written within a specific time frame and then comparing the score against age or grade norms. No significant relationship between handwriting speed and legibility has been found<sup>26-28</sup> which suggests that although a learner's handwriting may be legible, timeous task completion may still be problematic as a result of slow handwriting speed.

The **domains** of handwriting include dictation, far-point copying, near-point copying, manuscript to cursive transition, upper- and lower-case letter writing, composition and endurance<sup>2,29</sup>. Assessing handwriting using a variety of domains is preferable as each domain may rely more heavily on certain intrinsic performance components than others, for example dictation would demand more from an individual's phonological coding ability than would a copying task. A learner's handwriting performance may thus vary across the different domains, as evidenced by a study conducted by Graham et al<sup>20</sup> who found that the overall legibility of text produced by both good and poor handwriters varied across three different writing tasks, namely copying, composing and alphabet writing from memory.

Sitting position, chair and/or desk height, type of writing implement, paper positioning, and pencil grip are the **ergonomic factors** most often cited in the literature as important to consider when assessing handwriting performance<sup>2,16,29,30</sup>. Examination of some of the literature available on the effect of pencil grip, writing tool, paper type, paper positioning, desk height and desk slant shows that these factors have not conclusively been proven to have a significant impact on handwriting performance<sup>31-37</sup>.

**Environmental factors** such as lighting, distance from the blackboard when copying, and the amount of handwriting expected of the learner, are important to take into account in assessing handwriting quality and quantity according to Feder and Majnemer<sup>16</sup>. However, research on the effect of most of these environmental factors appears to be extremely limited. A study conducted by

Dennis and Swinth<sup>33</sup> was the only study found where the effect of an environmental factor was explored. The results indicated that letter legibility of fourth-grade learners was better on a short versus a long written task.

A comprehensive assessment of the **intrinsic performance components** (sensorimotor, cognitive and psychosocial) which can affect handwriting performance is crucial to the selection of an effective treatment strategy.

The *sensorimotor components* highlighted as the most important for handwriting performance include postural control; upper-extremity stability; muscle tone; kinaesthesia; visual perception; motor planning; tactile, proprioceptive and visual systems; activity tolerance; bilateral integration; visual-motor integration; in-hand manipulation; finger function; and fine-motor coordination<sup>12,38-43</sup>. Whilst research on the relationship between many of these components and handwriting quality has shown non-significant or conflicting results<sup>27,31,37,40,42,44-47</sup>, visual-motor integration<sup>12,27,39,40,44,48,49</sup>, in-hand manipulation skills<sup>27,40,42,48,50</sup> and visual perception<sup>27,42,44,50</sup> have consistently been shown to be a significant factor in handwriting quality in a number of studies.

*Cognitive components* of handwriting performance are described as including attention span; visual, verbal and motor memory; orthographic processes and sequencing<sup>12,19,38</sup>. Studies have shown that poor attention is significantly related to slow handwriting speed and poor legibility<sup>42,44,51</sup>. Medwell and Wray<sup>(52:p12)</sup> related handwriting automaticity (the ability to form letters and words with accuracy and efficiency without conscious thought) to the concept of orthographic-motor integration which they defined as "the ability to call to mind and write letter shapes, groups of letters and words efficiently and effectively without allocation of cognitive attention". The idea that orthographic and memory processes may actually have a greater impact on handwriting speed and quality than a learner's motor skills, especially for beginner writers, has been supported by some authors<sup>15,31,53</sup>.

The learner's self-concept, interests, and motivation are considered to be *psychosocial components* related to handwriting performance<sup>10,38</sup>. Landy and Burridge<sup>19</sup> suggest that writing failure has a cyclical nature whereby poor letter production leads to frustration, which increases tension resulting in writing failure, thus contributing to a diminished self concept. The learner may de-value writing skills in order to protect themselves psychologically and withdraw from writing tasks which further perpetuates poor letter production. Motivation to engage in writing tasks is thus progressively diminished. A study on second and third grade learners conducted by Engel-Yeger et al<sup>54</sup> found that learners with lower self-efficacy had both poor handwriting processes and products. Self-efficacy was defined as "one's internal belief about one's ability to successfully perform a given task"<sup>54:2</sup>.

### Handwriting assessment measures

The following methods are highlighted in the literature as essential for gaining information regarding a learner's handwriting difficulties: (1) examination of work samples; (2) interviews with the teacher and parent; (3) educational and clinical record reviews; (4) direct observation of the child in the natural setting; (5) measurement of handwriting performance; and (6) assessment of related performance components<sup>2,12,16,38</sup>.

The more informal assessment measures, such as teacher interviews, can provide pertinent information regarding the causes and effects of a learner's poor handwriting, however, the use of standardised tests has been advocated as a more objective means of both measuring handwriting performance and evaluating the effectiveness of intervention<sup>2,18</sup>.

Standardised handwriting assessments usually measure the overall legibility of the written text and/or handwriting legibility components through the use of the various handwriting domains (see Figure 1). Handwriting speed is also often assessed.



Table I: Summary of handwriting assessment measures

	CHES-M/ CHES-C	DASH	DHA	DRHP	ETCH-M/ ETCH-C	MHT	THS	TOLH
Population tested	Grade 1-8	9-17 years	Grade 3-8	Grade 3+	Grade 1-6	5-11 years	5-11 years	7-18.5 years
Norm (N) / Criterion (C) Referenced	N	N	C	C	C	N	N	N
Manuscript test	X (CHES-M)	X			X (ETCH-M)	X	X	X
Cursive Test	X (CHES-C)	X	X		X (ETCH-C)		X	X
Speed	X	X			X	X		
HANDWRITING DOMAINS	Near-point copying	X		X	X	X	X	
	Far-point copying			X	X			
	Alphabet writing			X	X		X	
	Manuscript to cursive			X	X			
	Dictation			X	X		X	
	Composition				X	X		X

CHES-M = Children's Handwriting Evaluation Scale-Manuscript; CHES-C = Children's Handwriting Evaluation Scale - Cursive; DASH = Detailed Assessment of Handwriting Speed; DHA = Denver Handwriting Analysis; DRHP = Diagnosis and Remediation of Handwriting Problems; ETCH-M = Evaluation Tool of Children's Handwriting - Manuscript; ETCH-C = Evaluation Tool of Children's Handwriting - Cursive; MHT = Minnesota Handwriting Test; THS = Test of Handwriting Skills; TOLH = Test of Legible Handwriting; (Sources: Amundson<sup>2</sup>; Feder & Majnemer<sup>55</sup>).

Table II: Calculation of sample size per province

	G	WC	M	FS	L	NW	NC	KZN	EC	TOTAL
Number of therapists listed with BHF with contact numbers	474	270	42	55	12	35	17	140	32	1077
PLUS : Additional contact numbers retrieved from OTASA listings	37	13	5	8	4	5	1	5	2	80
<b>Total number of potential respondents per province</b>	<b>511</b>	<b>283</b>	<b>47</b>	<b>63</b>	<b>16</b>	<b>40</b>	<b>18</b>	<b>145</b>	<b>34</b>	<b>1157</b>
MINUS: Number of therapists contacted who were excluded from the survey as they did not meet the inclusion criteria	127	59	10	10	1	7	4	21	5	244
<b>"Number of contactable therapists presumably meeting the inclusion criteria and thus forming the target population"</b>	<b>384</b>	<b>224</b>	<b>37</b>	<b>53</b>	<b>15</b>	<b>33</b>	<b>14</b>	<b>124</b>	<b>29</b>	<b>913</b>
<b>***Sample size required per province</b>	<b>68</b>	<b>40</b>	<b>7</b>	<b>9</b>	<b>3</b>	<b>6</b>	<b>2</b>	<b>22</b>	<b>5</b>	<b>162</b>

\* G = Gauteng; WC = Western Cape; M = Mpumalanga; FS = Free State; L = Limpopo; NW = North West; NC = Northern Cape; KZN = KwaZulu Natal; EC = Eastern Cape

\*\* This number may still include therapists who do not meet the inclusion criteria and thus do not form part of the target population, as not all therapists were contacted.

\*\*\* CONFIDENCE % = 95;  $\alpha$  = 5.00%; Cp = 7%

Table I provides a summary of the handwriting assessment measures referred to most frequently in literature<sup>2,55</sup>.

O'Mahony et al<sup>56</sup> caution against using standardised tests normed on a different population to that being tested as cultural factors may impact on what can be considered normal performance. Steinhardt et al<sup>57</sup> developed the Writing Rate Information Test (WRIT) in response to a perceived need for a South African test providing writing speed norms for Grade 1 to 7 learners.

Whilst assessment of the quality and quantity of the learner's handwriting product is necessary to determine where the learner is experiencing difficulties, assessment of the underlying intrinsic performance components provides vital information on why the learner is experiencing these difficulties. A wide variety of standardised assessments are available for the purposes of measuring both handwriting and intrinsic performance components, but their use by South African occupational therapists for the evaluation of handwriting difficulties has never been documented.

The aim of this study was thus to investigate the assessment practices of South African occupational therapists working in private practice with Foundation Phase learners experiencing handwriting difficulties.

## Methodology

A survey research design was selected for this study. Telephonic informed consent was obtained from all respondents prior to administration of the questionnaire.

## Participants

The study population consisted of South African occupational therapists working within the private sector with learners in the Foundation Phase. A list of the occupational therapists registered with the Board of Healthcare Funders of Southern Africa (BHF) was obtained and cross-referenced with the Directory of Occupational Therapists in Private Practice obtained from the Occupational Therapy Association of South Africa. Proportionate stratified random sampling was used to select participants from each of the nine South African provinces.

Table II reflects the calculations subsequently used to determine the target population and subsequent sample size. As reflected in this table, the sample size was adjusted accordingly when contacted therapists did not meet the inclusion criteria of the study.

Sampled respondents were eligible to participate in the survey if they had a 3-year diploma from the Vona du Toit College of Occupational Therapy or Bachelors degree in occupational therapy from a South African university; worked full- or part-time within the





private sector with Foundation Phase learners; had a minimum of two years experience in working with Foundation Phase learners; and treated on average at least two learners for poor handwriting per month.

### Data collection

A four-part, telephonically administered questionnaire was designed to collect data on demographic factors, assessment methods, treatment practices and progress evaluation methods based on a review of handwriting literature. Both English and Afrikaans translations of the questionnaire were developed. The questionnaire was piloted on ten occupational therapists randomly sampled from the study population. The final version of the questionnaire consisted of multiple-choice, dichotomous, three-point unipolar rating scale and open-ended questions. The rating scale questions required the respondent to identify how frequently ('always', 'occasionally' or 'never') they utilised various assessment, treatment and progress evaluation variables. The questions relating to assessment practices focused primarily on the frequency with which respondents: (1) used specific informal assessment methods, (2) assessed handwriting domains and legibility components, (3) considered ergonomic and environmental factors impacting on handwriting performance, and (4) assessed specific intrinsic performance components. The standardised tests and informal activities used as part of the assessment procedure were also explored.

### Data analysis

Responses from the survey were coded for analysis by a qualified statistician. Descriptive statistics were computed and summarised in the form of frequency percentages. Measures of central tendency were used to describe mean years of experience. A maximum likelihood chi-square analysis, known as the G-test, was used to explore the relationship between demographic variables (tertiary institute qualification and provision of school-based therapy) and the use of assessment methods and standardised tests. The therapist's years of experience was analysed against the assessment methods utilised and the intrinsic performance components assessed to investigate any relationship between the variables using non-parametric ANOVA (the Mann-Whitney or Kruskal-Willis test).

### Ethical approval

Ethical clearance for the study was obtained from the Committee for Human Research at Stellenbosch University.

## FINDINGS

In summary, a total of 784 therapists were contacted telephonically of which 363 could not be directly reached for a variety of reasons such as disconnected telephone lines, change of employer, emigration, and so forth. Fifteen of the therapists contacted declined to participate and 244 did not meet the inclusion criteria of the study. A total of 162 occupational therapists participated in the survey.

### Demographic data

The participants in this survey had a mean of 13 years (SD=7.5) experience working with Foundation Phase learners. Fifty nine percent reported treating eight or more learners for handwriting difficulties on average per month. The most common populations served were learners with learning disabilities (25%), varied case load (17%), developmental delay (16%), sensory integrative dysfunction (15%) and Attention Deficit (Hyperactivity) Disorder (13%). The institution through which the respondents received their degree or diploma is represented in *Table III*.

Therapists providing private occupational therapy on school premises on a full- or part-time basis made up 61% of the respondents, whilst the remaining 39% only provided services from their practice premises.

### Factors assessed that impact on handwriting performance

The findings regarding the assessment of handwriting legibility components, speed, domains, ergonomic factors and environmental factors are comprehensively presented in *Table IV*.

Table III: Institution through which respondents received their degrees/diplomas

Total =100%, n=162	
Institution	%
University of Pretoria	28
University of the Free State	16
University of Stellenbosch	15
University of the Witwatersrand	14
University of Cape Town	11
University of Kwazulu Natal	10
University of the Western Cape	4
University of Limpopo	<1

Table IV: Assessment of handwriting performance components

Total = 100%, n = 162			
	Always (%)	Occasionally (%)	Never (%)
<b>LEGIBILITY COMPONENTS</b>			
Formation	92	7	1
Spacing	92	7	<1
Size	87	11	2
Alignment	85	14	1
Slant	57	30	13
<b>SPEED</b>			
Handwriting Speed	84	14	2
<b>DOMAINS</b>			
Near-point copying	79	19	2
Lower-case alphabet writing	78	18	4
Far-point copying	35	40	25
Dictation	32	48	20
Upper-case alphabet writing	21	58	21
Manuscript to cursive transition	9	64	27
<b>ERGONOMIC FACTORS</b>			
Way in which paper is positioned	88	9	3
Type of writing tool used in the school setting	73	23	4
Chair and desk height in the school setting	64	25	11
<b>ENVIRONMENTAL FACTORS</b>			
Positioning of the learner in the classroom	57	34	9
Amount of handwriting expected of the learner	53	33	14
Paper type	35	31	34
Lighting in the classroom	32	41	27



In terms of the **legibility components** most often assessed with every handwriting referral, >80% of the therapists assessed letter formation, alignment, spacing and size. Letter slant was 'always' assessed by only 57% of the therapists. Writing speed was assessed by >80% of the therapists.

Of the **handwriting domains** used for assessment purposes, near-point copying (79%) and lower-case alphabet tasks (78%) were the two most frequently assessed domains with every referral.

The way in which the learner positioned their page on the writing surface was the **ergonomic factor** most frequently evaluated with every referral (88%). Other ergonomic factors 'always' assessed by >50% of the therapists included the writing tool used by the learner in the school setting (73%) and the height of the chair and desk in the school setting (64%).

With regards to **environmental factors**, the position of the learner in the classroom (57%) and the amount of handwriting expected of the learner in the school setting (53%) were the only two factors "always" evaluated by more than 50% of the respondents.

The findings relating to the assessment of **intrinsic performance components** are presented in Table V. Most of the sensorimotor components were assessed by >80% of the therapists with every handwriting referral. Visual motor integration was the only component assessed by all of the therapists. Of the cognitive components explored, attention span (98%), sequencing (83%) and visual memory (73%) were most commonly included in the evaluation. Two of the psychological components explored, namely self-concept and motivation, were evaluated at every referral by 81% and 88% of the therapists respectively. The learner's interests were assessed by 72% of the therapists.

Table V: Intrinsic performance components assessed

	Total = 100%, n = 162		
	Always (%)	Occasionally (%)	Never (%)
<b>SENSORIMOTOR COMPONENTS</b>			
Visual motor integration	100	-	-
Sitting posture	99	-	<1
Postural Control	99	<1	-
Bilateral integration	99	1	-
Motor planning	98	2	<1
Visual perception	97	3	-
Oculomotor control	97	2	<1
Proprioception/Kinaesthesia	91	8	<1
Vision	84	7	9
In-hand manipulation	84	15	<1
Tactile system	74	24	2
<b>COGNITIVE COMPONENTS</b>			
Attention span	98	2	<1
Sequencing	83	14	3
Visual memory	73	22	4
Motor memory	56	27	17
Auditory memory	36	46	17
<b>PSYCHOSOCIAL COMPONENTS</b>			
Motivation	89	9	2
Self-concept	81	18	1
Interests	72	23	5

### Assessment measures utilised

The frequency with which respondents used *informal assessment methods* is presented in Table VI. The four most frequently used

Table VI: Use of informal assessment methods

	Total = 100%, n = 162		
	Always (%)	Occasionally (%)	Never (%)
Observation in the therapy environment	98	1	<1
Parent interview/questionnaire	94	5	1
Teacher interview/questionnaire	74	24	2
Examination of work samples in the school books/files	70	30	<1
Review of school reports/records	53	46	<1
Classroom observation	19	56	25

methods with every handwriting referral included observation in the therapy environment (98%), parental interviews or questionnaires (94%), teacher interviews or questionnaires (74%) and examination of work samples in the learner's school books or files (70%).

Thirty six percent of the therapists indicated that they utilised *standardised handwriting assessments*. Of these therapists, the most frequently utilised assessments were the WRIT (43%) and handwriting speed tests (40%). Seventy nine percent of the therapists reported that they use an informal handwriting checklist for assessment purposes.

The five most commonly used *standardised performance component tests* were the Developmental Test of Visual Motor Integration (VMI) (91%), Developmental Test of Visual Perception-2<sup>nd</sup> edition (DTVP-2) (85%), Test of Visual Perceptual Skills (TVPS) (47%), *Southern California Sensory Integration Tests (SCSIT)/ Sensory Integration and Praxis Test (SIPT)* (38%) and the Goodenough-Harris Draw-A-Person Test (25%). Sixty four percent of the therapists also reported using Ayres' clinical observations as a standardised assessment of the performance components of handwriting despite the fact that this is not a standardised measure.

### Relationships between variables

Significant differences were found using the Mann-Whitney U test in comparing the years of experience of therapists who 'always' versus 'occasionally' reviewed work samples ( $p < 0.03$ ) and school reports/records ( $p < 0.05$ ) as part of their assessment. The therapists who 'always' used work samples in their assessment had a higher mean years of experience (13.8 years) than therapists who did this 'occasionally' (11.7 years). Therapists who 'always' used school reports/records also had a higher mean years of experience (14.8 years) than those who did this 'occasionally' (11.6 years). No significant differences ( $p < 0.05$ ) were found between the years of experience and the frequency with which the therapist used teacher interviews, parent interviews or classroom observation as an assessment measure for handwriting referrals.

Analysis of the relationship between years of experience and the intrinsic performance components assessed only revealed a significant difference between years of experience and whether a therapist 'always' versus 'occasionally' assessed visual memory (Kruskal-Wallis test  $p < 0.05$ ) and self concept (Kruskal-Wallis test  $p < 0.01$ ). The mean years of experience of therapists who 'always' assessed visual memory and self concept was computed as 14.1 years and 13.9 years respectively, as opposed to the mean years experience of 10.5 years for those who 'occasionally' assessed visual memory and 9.7 years for those 'occasionally' assessing self-concept.

Therapists who qualified from the University of Kwazulu Natal used standardised handwriting assessments more frequently than



therapists who qualified from the other universities ( $p=0.005$ ). No significant differences were found between the university and the standardised intrinsic performance component assessments used.

## Discussion

This study aimed to explore the assessment methods used by South African occupational therapists in private practice with Foundation Phase learners experiencing handwriting difficulties. The discussion that follows focuses primarily on the factors which respondents assessed and the assessment measures they utilised.

### Factors assessed that impact on handwriting performance

The results of this South African study revealed that participants pay relatively greater attention to the *legibility components* of letter formation and spacing with every referral than to size, slant and alignment. This is in accordance with research findings that letter formation and spacing are the most significantly related to overall text legibility<sup>20,24,25</sup>. The focus on intervention for Foundation Phase learners may have influenced the results, as correct letter formation is of paramount importance for beginner writers<sup>22</sup>.

The therapists primarily use the domains of near-point copying (79%) and lower-case alphabet writing (78%) in their assessment. The use of a wider variety of domains is actually preferable as a beginners' handwriting performance may differ across the different domains depending on the strength of the underlying intrinsic performance components on which they rely<sup>20</sup>. It was surprising to note that only 35% of the therapists 'always' used far-point copying as part of their assessment, as beginner writers are often expected to copy from the board in class. The fact that the respondents indicated more frequently that they would use the domains of dictation, manuscript to cursive transitions, upper case alphabet writing, and composition 'occasionally' rather than 'never' suggests that the assessment is tailored to the grade level of the referred learner, as it could be postulated that these domains are of greater relevance to learners in the higher grades.

In contrast to a study of Canadian occupational therapists remediation and evaluation of handwriting problems<sup>18</sup>, the therapists in this South African study routinely included environmental, ergonomic, psychosocial and cognitive factors in their assessment. This discrepancy may be due to differences in the survey format used, a greater appreciation of the importance of a holistic approach to effective intervention in the past decade or a difference in the case loads and time available for assessment in the two studies. It appears that the majority of South African therapists consider the vast range of factors which can have an impact on a learner's handwriting performance during their assessment.

The fact that therapists with more years of experience were significantly more likely to 'always' explore the learner's visual memory and self-concept as part of their assessment may reflect a greater appreciation of the impact of visual memory within different handwriting domains, and self-concept as an important motivational factor in handwriting performance as a therapist gains experience.

### Assessment measures utilised

#### Informal methods

South African therapists appeared to gather information from a variety of relevant sources as part of their assessment of handwriting performance. Handwriting referrals would most likely be initiated by an educator as it is within the academic environment that a child formally begins learning to write. It would thus have been expected that the percentage of therapists who 'always' make contact with the educator or review school work samples would have been even higher than the reported 73% and 70% respectively, especially considering that the educator is primarily responsible for teaching handwriting<sup>58</sup>. The fact that therapists with more years of experience tend to include the review of work samples and school reports/records more frequently as part of their assessment, may be indicative of an increasing appreciation

of the importance of obtaining information relevant to the learners context as a therapist gains experience.

### Standardised handwriting assessments

The use of standardised handwriting assessments by 36% and informal handwriting checklists by 79% of the South African therapists is considerably more than the 10% and 14% respectively of Canadian therapists surveyed by Feder et al<sup>18</sup>. It also reflects a difference between South African and Australian occupational therapists. The results of an Australian survey<sup>59</sup> revealed that handwriting was listed by 83% of the respondents as an area of assessment but none of the respondents reported using a standardised handwriting assessment. It must, however, be acknowledged that of the 58 South African therapists who indicated they utilise standardised assessments, 83% of these reported use of handwriting speed tests rather than assessments aimed at formally evaluating the quality of the handwritten product. This reflects the results of another survey of Australian paediatric occupational therapists<sup>60</sup> where the Handwriting Speed Test was one of the six most frequently used standardised handwriting assessments, but no standardised handwriting quality assessment featured in the results.

It has been suggested that treatment should focus first on legibility components before speed is addressed particularly in beginner writers<sup>20</sup> and a number of studies have found no statistically significant correlation between handwriting legibility and speed<sup>26-28</sup>. The more frequent use of speed tests in this survey suggests that, of the 36% of therapists who use standardised handwriting tests, the referrals may relate to a learners' inability to complete written work timeously rather than for illegible handwriting. This was not, however, explored in the study.

In terms of the assessment of handwriting speed, although only 36% of the therapists surveyed indicated that they use standardised handwriting assessments, 84% of the total therapists surveyed indicated that they 'always' assess handwriting speed. This suggests that therapists may be more concerned with evaluating a learner's improvement in relation to their own base-line performance (obtained on initial assessment), rather than comparing the learner's performance against peer or grade norms.

The high percentage of therapists using the WRIT<sup>56</sup> (43%) may reflect the fact that it is the only handwriting assessment based on the performance of South African learners and costs considerably less than other commercially available assessments. The fact that the WRIT was developed in Kwazulu Natal may also explain why therapists who qualified from the University of Kwazulu Natal were significantly more likely to make use of a standardised handwriting assessment. A number of the therapists surveyed indicated that they were unaware of the availability of standardised handwriting assessments which may also be a reason for the low frequency of use and may indicate a need for tertiary institutions to include this in the curriculum.

### Standardised intrinsic performance component assessments

In terms of the use of standardised intrinsic performance component assessments, the popularity of the VMI in this study is consistent with the results of three studies conducted in Australia<sup>59-61</sup> and one in Canada<sup>18</sup> which explored the tests used by paediatric occupational therapists. There are considerably more studies supporting the notion that visual-motor integration (as measured on the VMI) is significantly related to handwriting legibility and speed<sup>12,27,39,40,44,48,49</sup>, than studies which have found a weak correlation between VMI scores and handwriting performance<sup>42</sup>, which supports the use of this assessment measure for handwriting.

The DTVP-2 is used far more frequently in South Africa than in Canada<sup>18</sup> or Australia<sup>59-61</sup>, where either the Motor-Free Visual Perception Test (MVPT) or TVPS were reported as the most frequently used assessments related to the measurement of visual perceptual skills. Research investigating the relationship between visual perceptual skills and handwriting performance seems to suggest that the TVPS may be a better assessment to use than the DTVP-2. The TVPS has shown a moderate to strong correlation





to handwriting legibility/speed in three studies<sup>42,44,50</sup>, whilst Yost and Lesiak<sup>62</sup> found no significant correlation between handwriting ability and Perceptual Quotient scores on the DTVP.

Another difference noted with regards to the use of standardised assessments was the fact the Bruininks-Oseretsky Test of Motor Proficiency (BOMP) was utilised by 74% of Canadian therapists<sup>18</sup> in comparison to the 7% of therapists in the South African study. The SIPT/SCIST was the most commonly utilised assessment related to motor functioning by South African therapists. Although sensory integration was utilised by 50% of the Canadian therapists as a treatment approach for handwriting, only 18% reported use of the SCIST/SIPT for assessment purposes in comparison to 38% of the South African therapists. This discrepancy may be due to the fact that the current study focused solely on private practitioners whilst only 12% of the respondents in the Canadian study were private practitioners. The SIPT/SCIST is an expensive and time-consuming test to administer and private practitioners may have more time and financial resources at their disposal than therapists working in the public sector.

In summary it appears as if South African therapists prefer different tests of visual perceptual and motor abilities than therapists from other countries, however this conclusion needs to be viewed with caution considering the difference in the study populations surveyed with regards to work setting.

## Limitations

The survey method relies only on verbal descriptions of how the respondents say they assess poor handwriting and the study's reliability and validity is thus reliant in part on the integrity of the respondents. Although stratified random sampling was used, many of the therapists sampled could not be reached which may have influenced the results.

## Conclusions and Recommendations

This survey explored the assessment and treatment practices of South African occupational therapists in private practice in the remediation of handwriting difficulties in Foundation Phase learners. This paper, provides the results pertaining to the demographics and assessment practices of the respondents.

The majority of South African therapists appear to use a wide variety of informal assessments methods and explore sensorimotor, cognitive, psychosocial and ergonomic components of handwriting in their assessment. A preference for the use of the VMI and DTVP-2 as standardised performance component assessments was evident. Therapists may want to review their assessment practices with regards to the limited use of a variety of handwriting domains and standardised handwriting assessments, as well as the use of the DTVP-2 for handwriting referrals, in light of available research. The limited use of standardised handwriting assessments may indicate a need for tertiary institutions to include this in the curriculum.

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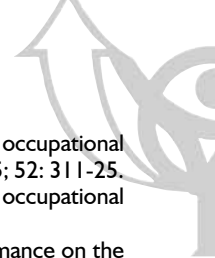
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**Corresponding Author**  
**Joanne van der Merwe,**  
E-mail: [mj3@telkomsa.net](mailto:mj3@telkomsa.net)

