

# A survey to investigate how South African Occupational Therapists in private practice are assessing and treating poor handwriting in foundation phase learners: Part II Treatment and Evaluation 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

*Handwriting is a functional skill of paramount importance for school-going children. Difficulties with this skill can result in poor academic performance and emotional distress which can potentially lead to school drop-out. These negative effects can be prevented by early remediation of handwriting difficulties.*

*This is the second part of a two-part paper describing a telephonic survey of 162 South African occupational therapists working with Foundation Phase learners to remediate handwriting difficulties. Part 1 describes demographic data and assessment practices. Part 2 provides a description of the treatment and progress evaluation practices of the respondents.*

*Seventy two percent of the respondents treated learners individually and 67% utilised home programmes with every referral. The majority of therapists applied an eclectic treatment approach, with sensory integration and psychosocial principles/techniques being most frequently used (<95%). The most popular means of evaluating progress were work sample comparisons (97%), review of treatment notes (94%), teacher interview/questionnaire (74%) and discussion with the learner (73%). The limited use of home programs may indicate an avenue for future research.*

**Key words:** Evaluation, Foundation Phase, Handwriting, Treatment, Occupational Therapy

## Introduction

Part one of this paper<sup>1</sup> discussed the prevalence, causes and consequences of poor handwriting and presented literature pertaining to the assessment of handwriting performance. The factors (both extrinsic and intrinsic to the learner) which impact on handwriting performance were discussed, as were methods of assessing handwriting performance and intrinsic performance components of the individual referred to the occupational therapist.

The study results reported in Part I showed that South African occupational therapists in private practice use a wide variety of informal and formal assessment methods and show a preference for certain standardised *performance component* assessments, the Developmental Test of Visual Motor Integration (VMI) and Developmental Test of Visual Perception-second edition (DTVP-2)

being the two most popular standardised assessments utilised<sup>1</sup>. Standardised *handwriting* assessments were utilised by only 36% of therapists, of which 84% used handwriting speed tests. The limited use of standardised handwriting assessments by the respondents (36%) was highlighted as a cause for concern considering the increasing level of importance being attached to providing objective evidence of the benefits of therapeutic intervention for functional skills.

Early intervention for handwriting difficulties is recommended as poor handwriting has been shown to have a negative impact on many aspects of a learner's performance within the academic setting<sup>1</sup>. The effective treatment of handwriting difficulties relies on the development of a treatment program based on the results of a comprehensive assessment of the factors which impact on





handwriting performance. A graphical summary of these factors is presented in part one of this paper<sup>1</sup>.

Studies on the handwriting treatment practices of occupational therapists have been conducted in Canada<sup>2</sup> and America<sup>3</sup> but no studies could be located exploring the treatment practices of South African occupational therapists. The second part of the study thus aimed to explore occupational therapy intervention practices which included treatment and progress evaluation for handwriting remediation in Foundation Phase learners. It serves as a source of information regarding handwriting intervention practices within the South African context and a motivation for therapists to evaluate and/or expand their current practices.

## Literature Review

There are five main treatment approaches of relevance to the improvement of handwriting performance, namely the neurodevelopmental, acquisitional, sensorimotor, biomechanical and psychosocial approaches<sup>4</sup>. An eclectic approach, that is a combination of two or more of the aforementioned approaches, is also utilised. A brief synopsis of the main contributions of each of these approaches to the remediation of handwriting difficulties is provided below, along with research findings on their effectiveness in the remediation of handwriting difficulties.

### Neurodevelopmental treatment approach

The neurodevelopmental approach uses neurological and normal development principles to target inefficient postural responses and movement patterns<sup>4,5</sup>. The focus of treatment for fine motor

difficulties addresses postural control, muscle tone, upper limb stability and hand function. Considerable attention is given to postural and limb activities designed to prepare the learner for tasks such as handwriting. Neurodevelopmental Therapy (NDT) is based on this approach.

Berninger et al<sup>6</sup> investigated the effect of neurodevelopmental training on the handwriting performance of Grade 1 learners. The results of the study indicated that the inclusion of neurodevelopmental training in the intervention programme resulted in greater improvement in handwriting legibility than if the learners only practised handwriting. Neurodevelopmental training had no significant effect on handwriting speed. These results should, however, be interpreted with caution as there were only 14 participants in the study.

### Acquisitional treatment approach

The acquisitional or teaching-learning approach draws from motor learning theories and focuses on handwriting instruction and practice<sup>4,5,7</sup>. It is also referred to in the literature as the cognitive approach, teaching-learning approach or motor learning approach<sup>2,4,5,8</sup>. This approach is aimed at facilitating the learner's progress through the three phases of learning a new motor skill namely the cognitive, associative and autonomous phases<sup>4,8</sup>. Letter formation is addressed in the cognitive phase where vision is thought to be the main control mechanism for fine motor movements. In the associative phase letter alignment, spacing and slant are addressed and proprioceptive feedback becomes more important than visual feedback for fine motor movements. The learner is then expected to reach the autonomous phase when handwriting becomes automatic and

Table 1: Studies on the effectiveness of the acquisitional approach

Study	Sample	Approach used	Treatment duration	Session structure	Results
Berninger et al. <sup>17</sup>	Grade 1	Comparison of 5 different acquisitional approach techniques	20 min. session twice weekly. Total = 22.5 sessions	Groups of 3	Visual cue + memory retrieval treatment found to be most effective in improving writing accuracy, quality and compositional fluency. All five experimental groups improved more than the control group.
Christensen <sup>15</sup>	Grade 8 & 9	Acquisitional	20 min. daily for 8 weeks	Groups of 5-6	Intervention group scored 70% higher on the measure of orthographic-motor integration, and 46% higher on the measure of written text quality, than control group.
Jones & Christiansen <sup>11</sup>	6 – 7 years	Acquisitional	10 min. per day for 8 weeks	Whole class, small group or individual	Intervention groups letter formation and written expression scores (significantly poorer than control groups at pre-test) measured as equal to control group's level at post-test
Jongmans, Linthorst-Bakker, Westenberg & Smits-Engelsman <sup>12</sup>	Primary school learners	Aspects of Acquisitional	30 min. twice a week for 9 weeks  Total = 9 hours	Individual	Intervention group's handwriting quality improved more than control groups. Control groups speed improved more.
	Grade 2 – 6	Aspects of Acquisitional	30 min. twice a week for ± 6 months	Group	Significant improvement in handwriting quality in comparison to control group.
Marr & Dimeo <sup>13</sup>	6 – 11 years	Acquisitional	60 min. per day for 2 weeks	(Not described)	Lower- and upper-case alphabet writing showed significant improvement. Near- and far-point letter copying, dictation and composition improved but not significantly.
Sudsawad, Trombly, Henderson & Tickle Degnen <sup>16</sup>	Grade 1	Acquisitional	30 min. per day for 6 consecutive school days	Groups of 3	No significant impact on the handwriting legibility.
Zwicker & Hadwin <sup>14</sup>	Grade 1 & 2	Acquisitional vs Multisensory (sensorimotor)	30 min. once a week for 10 weeks  Total = 5 hours	Individual	Grade 1 acquisitional group: Marginal but not significant improvement in comparison to the multisensory & control groups. Grade 2 acquisitional group: Greater improvement than multisensory & control groups.





higher-order elements of writing, such as content planning, can be given more attention. The principles of practice, repetition, feedback and reinforcement are used in addressing poor handwriting through techniques such as letter modelling, tracing, stimulus fading, copying, composing and self-monitoring<sup>4,7,9</sup>.

Table I provides a summary of studies measuring the effect of using an acquisitional approach for the remediation of poor handwriting<sup>10-17</sup>. This approach has generally resulted in improvements in handwriting quality, but not speed.

### Sensorimotor treatment approach

The sensorimotor approach involves the use of controlled sensory input to facilitate efficient sensory integration in order to produce a desired motor output<sup>4,9</sup>. Proprioceptive, kinaesthetic, vestibular, tactile, visual, auditory, olfactory and/or gustatory senses are used in the treatment of handwriting difficulties<sup>10,18</sup>. Users of this approach may or may not include the practise of handwriting in their intervention program<sup>4,10</sup>. If handwriting is practiced, the focus is usually on the use of writing tools, surfaces and positions that tap into the different sensory systems, for example vibrating pens or writing in sand. Sensory Integration (SI) Therapy incorporates the use of principles and techniques used within the sensorimotor approach. Use of a multisensory or sensorimotor approach was not found to improve handwriting in studies conducted by Denton et al<sup>10</sup> or Zwicker and Hadwin<sup>14</sup> (see Table I).

### Biomechanical treatment approach

The biomechanical approach traditionally focuses on enhancing range of motion, strength, endurance and addressing ergonomic factors<sup>4</sup>. In the context of handwriting intervention, ergonomic factors such as sitting posture, paper position, pencil grasp, writing tool type and paper type are given primary attention. Compensatory or bypass strategies form an integral part of this approach and include, for example, the use of pencil grips, foot rests or lined paper with a dashed middle guideline<sup>18,19</sup>.

Research exploring biomechanical strategies for handwriting remediation, including the use of particular pencil grasps, various writing tools and paper type, has not conclusively proven the effectiveness of these strategies<sup>19</sup>.

### Psychosocial treatment approach

The psychosocial approach to handwriting intervention focuses on a learner's self-control, coping skills and social behaviours<sup>4</sup>. Positive and social reinforcement of legible handwriting are extensively used within this approach, for example presentation of a certificate for handwriting improvement<sup>4,20</sup>. The use of meaningful and purposeful writing experiences such as writing a party invitation also features strongly. Small group therapy is used to provide the opportunity to address social skills within a handwriting intervention group, for example through the use of competitive games for the development of

hand function skills. Opportunities for appropriate peer evaluation and support of written work are provided. Handwriting clubs are often used within this approach. The goals of these clubs generally focus on handwriting improvement as well as improvement in the social skills required to engage effectively in group work<sup>4,20</sup>.

### Eclectic treatment approach

The use of an eclectic approach (a combination of two or more of the approaches mentioned above) has been shown to have a positive effect on poor handwriting. Studies using a combination of the biomechanical, sensorimotor and acquisitional approaches within treatment have shown a significant improvement in handwriting legibility of foundation phase learners<sup>9,10,17,20</sup>. Table II provides a summary of studies using an eclectic approach for ease of comparison.

### Methodology

Ethical clearance for the study was obtained from the Committee for Human Research at Stellenbosch University. A detailed account of the methods used in this study is presented in part one of this paper<sup>1</sup>. Therefore, only a brief summary is included here.

### Participants

The study population consisted of South African occupational therapists (n = 162) working within the private sector with learners in the Foundation Phase. Proportionate stratified random sampling was used to select participants from each of the nine South African provinces to enhance the external validity of the results.

### Data collection

A four-part questionnaire was designed to collect data on the handwriting assessment and intervention practices of occupational therapists. The content, format and administration of the questionnaire were based on a literature review, discussions with the researcher's study supervisors and feedback from a pilot study to enhance the face and content validity, as well as the reliability, of the questionnaire. This paper presents findings from the questions that sought to elicit data on the treatment practices of respondents which included questions on the frequency with which the respondents used: (1) home programmes, (2) commercial handwriting programmes, (3) treatment approaches, and (4) specific methods to monitor and evaluate progress. The questionnaire was administered telephonically by the researcher once informed consent was obtained from the participants

### Data Analysis

Responses from the survey were coded and captured on an Excel spreadsheet for analysis by a qualified statistician. Descriptive statistics were computed and summarised in the form of frequency percentages which were rounded to the nearest unit for reporting purposes. Maximum likelihood chi-square analysis, known as the

Table II: Studies on the effectiveness of an eclectic approach

Study	Sample	Approach used	Treatment duration	Session structure	Results
Case-Smith <sup>18</sup>	7 to 10 years	Combination: Biomechanical Sensorimotor Acquisitional	+ 30-35 min. for $\pm$ 16 sessions over a period of 7 months Total = $\pm$ 9 hours	95% treated individually 5% small group	Legibility significantly improved.
Denton, Cope & Moser <sup>10</sup>	6 – 11 years	Eclectic (Acquisitional, Psychosocial, Sensorimotor) vs Sensorimotor	30 min. four times a week for 5 weeks  Total = 10 hours	Individual and small group	Eclectic group: Handwriting improved. Sensorimotor group: Handwriting performance declined. No significant difference between either group and control group.
McGarrigle & Nelson <sup>21</sup>	Grade I	Combination: Sensorimotor, Biomechanical Acquisitional	Six 80 min. over 6 weeks	Groups of 2- 5	Significant improvement in copying skills and handwriting legibility in comparison to control group.
Peterson & Nelson <sup>9</sup>	Grade I	Combination: Biomechanical Sensorimotor Acquisitional	30 min. twice a week for 10 weeks Total = 5 hours	Group of 5 learners	Significant improvement in letter spacing, alignment and size. Letter formation not significantly improved.





G-test, was used to explore the relationship between demographic variables (tertiary institute qualification and provision of school-based therapy) and the use of handwriting programmes, treatment approaches and methods of evaluation. Relationships between the therapist's years of experience and use of handwriting programmes, treatment approaches and evaluation methods were investigated with non-parametric ANOVA (Mann-Whitney or Kruskal-Willis test) as the population was not normally distributed.

## Findings

A total of 784 therapists were contacted 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 of this survey had a mean of 13 years (SD=7.5) of 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%).

### Treatment practices

#### Practical considerations

Learners were routinely treated on an individual basis by 72% of the respondents, whilst 25% used a combination of individual and group therapy. Three percent saw the learners in groups only. Learners were routinely scheduled for one session per week by 88% of the respondents whilst 8% schedule two sessions per week. The duration of the sessions was not explored.

#### Use of a home programmes

A home programme was always included in the treatment plan by 67% of the therapists, occasionally by 28% and never by the remaining 5%. The content of the home programmes used was not explored.

#### Use of handwriting programmes

Twenty one percent of the respondents indicated that they always use a specific handwriting programme as part of their interven-

tion programme, whilst 29% indicated they occasionally use such programmes. Of the respondents that always or occasionally make use of handwriting programmes, 91% indicated that they develop their own programme depending on the learners needs. No one commercially-available handwriting or fine motor programme was used by a significant number of therapists.

#### Treatment approach used

Three of the five treatment approaches (biomechanical, acquisitional and psychosocial) were represented on the questionnaire by three items each in an effort to prevent any uncertainty regarding the principles/techniques used within these approaches. The term 'sensory integration' was substituted for 'sensorimotor' in the survey as all of the principles and techniques used within the latter are incorporated within sensory integration therapy. The neurodevelopmental and sensory integration approaches were not broken down into explanatory items as these were presumed to be widely understood by therapists. Some of the respondents expressed a reluctance to indicate that they utilised neurodevelopmental and/or sensory integration principles/techniques as they had not completed post-graduate courses in these areas.

Table III indicates the items representing the various treatment approaches and the percentage of respondents who indicated they always, occasionally or never use the item in treatment. The psychosocial approach principles/techniques were 'always' used by  $\geq 75\%$  of the respondents; 68% of the respondents 'always' used sensory integration principles/techniques; 65% 'always' used the acquisitional techniques of letter modeling, tracing, stimulus fading and copying; and 50% 'always' used the acquisitional technique of self-monitoring. Neurodevelopmental principles and techniques were used more frequently on an 'occasional' (51%) than 'always' (42%) basis. The items representing the use of a biomechanical approach to handwriting remediation were also used more on an 'occasional' (an average of 61% across the three items) than an 'always' (an average of 31%). The item which received the most 'never' responses was the acquisitional technique of using dictation and/or composing whilst practising handwriting.

In order to facilitate comparison with other studies exploring the use of various approaches in the remediation of handwriting difficulties, the 'always' and 'occasional' responses for each of the items were collapsed to determine the percentage of therapists who make use of each separate item, without regard for the frequency of use. This enabled comparison between therapists who do or do

Table III: Use of treatment approach items on an always, occasional or never basis

QUESTIONNAIRE ITEM		Total = 100%, n = 162		
		Always (%)	Occasionally (%)	Never (%)
Neurodevelopmental principles/techniques		42	51	7
Sensory Integration principles/techniques		68	30	2
Biomechanical Approach	Adaptive devices such as pencil grips or thick-barreled pencils.	35	62	3
	Adaptations to the paper position or type of paper used to write on.	32	64	4
	Adaptations to the learner's chair or desk height in the school.	26	59	15
Acquisitional Approach	Handwriting practice using letter modeling, tracing, stimulus fading and copying	65	31	3
	Handwriting practice using dictation and/or composition.	24	56	20
	Self-monitoring techniques	50	38	12
Psychosocial Approach	Increasing the learners motivation to write by providing choices within treatment	79	16	5
	Increasing the learners awareness of the importance of legible handwriting.	75	20	5
	Explicitly encouraging parent/educators to praise the learners attempts to write neatly	84	11	5





not use each item. The percentages of the three items representing each of the biomechanical, acquisitional and psychosocial approach were then averaged to indicate which of the five approaches were most frequently utilised. Sensory integration principles/techniques were the most popular, being utilised by 98% of therapists, followed by the use of psychosocial (95%), neurodevelopmental (93%), biomechanical (92%) and acquisitional (88%) principles/techniques.

### Progress evaluation methods

The most popular means of evaluating progress with every learner treated for poor handwriting was the use of comparisons between previous and present work samples (97%), followed by review of treatment notes (94%), interview with the educator (74%) and discussion with the learner (73%). Sixty two percent of the therapists 'always' re-tested the intrinsic performance components underlying handwriting' using standardised tests, whilst only 27% 'always' re-tested with standardised *handwriting* assessments. With regards to the use of parental feedback regarding progress, only 57% of the respondents 'always' used this method in evaluating progress.

Of the 36% of the therapists who indicated they use additional means of evaluating progress, 41% indicated that they reassess handwriting informally, 33% indicated that they review the learner's school report or tests, and just over 20% used either observed improvement in fine motor function or informal re-assessment of the intrinsic performance components as a means of evaluating progress made in therapy.

### Relationships between variables

Relationships between variables were seen as significant at the  $p \leq 0.05$  level. Therapists who graduated from the Universities of Cape Town and Kwazulu Natal were more likely to use adaptation of paper positioning in their treatment on an occasional rather than always or never basis ( $p < 0.01$ ). There were no other significant differences between the institution of qualification and the frequency with which treatment approaches were used.

A significant difference was found in comparing years of experience with whether a therapist always versus never evaluated progress using discussion with the learner (Kruskal-Wallis  $p < 0.02$ ). Therapists who indicated they always used discussion with the learner as a means of evaluating progress had a higher mean years of experience (13.8 years) than those who indicated they never used this method (6.0 years).

No significant differences were found between therapists who provided therapy on school premises and those who did not with regards to the handwriting programmes or treatment approaches that they used. No significant difference was found between years of experience and the treatment approach utilised by respondents.

### Discussion

The second part of this survey aimed to explore the treatment practices and progress evaluation methods used by South African private occupational therapists working with Foundation Phase learners who experience handwriting difficulties.

#### Treatment practices

Seventy two percent of the respondents indicated they treat learners referred to them for poor handwriting on an individual basis. It has been suggested that small group therapy may actually have a number of benefits, one of which is the maintenance of interest and motivation to engage in repetitive actions, such as the actions often required for developing hand skills<sup>22, 23</sup>. A game-like, and thus presumably a more fun, atmosphere is more easily achieved within the context of a small group than one-on-one with the therapist according to Exner<sup>22</sup>. Palisano and Murr<sup>23</sup> concur that group therapy can assist with the maintenance of motivation, but maintain that it is more suited to facilitating fluency of a present skill, rather than the acquisition of a new skill. They maintain that individual therapy is indicated where the child still needs to learn a skill. Another benefit of small group therapy is the ability to target social skills within the context of a handwriting group. This may be an avenue worth exploring for learners when difficulties with peer-interaction also manifest as a symptom of their diagnosis, over-and-above hand skill problems<sup>4, 22</sup>.

Despite the fact that 88% of the therapists saw their clients for only one session per week, only 67% of therapists indicated that they always develop a home programme as part of their intervention plan. Considering the emphasis on incorporating parents as an important team member not only in the context of paediatric therapy services<sup>24-27</sup>, but also within the educational system<sup>28, 29</sup>, it had been expected that home programmes would have been utilised more frequently with every referral as a means of actively involving parents in the therapy process. In the current study, many of the respondents informally commented that compliance with the execution of home programmes was often problematic. Dunst and Dempsey<sup>27</sup> maintain that joint action is an important feature of parent-professional partnerships which can facilitate the empowerment of parents, lead them to seek further opportunities to participate in the therapy programme, and improve therapeutic outcomes. This, in conjunction with the fact that early intervention for handwriting difficulties is strongly recommended<sup>4, 6, 11, 30, 33</sup>, indicates that it would be preferable if therapeutically-relevant activities could be carried out at home in order to improve the factors impacting on the learner's handwriting within the shortest possible time frame.

The use of an eclectic approach to handwriting remediation was evident in this study which mirrors the results of the Canadian study<sup>2</sup>. Considering the number of studies which have shown positive results with the application of an eclectic approach to handwriting difficulties, it can be assumed that South African therapists are effectively targeting the factors impacting on a learners difficulties by tailoring their intervention according to the needs of the learner.

The three most common populations served were reported as being children with a learning disability (25%), developmental delay (16%), and sensory integrative dysfunction (15%). This may account for the fact that sensory integration principles/techniques were utilised most frequently (98%) by the respondents, as sensory integration therapy is often cited as a means of addressing the functional implications associated with these diagnoses<sup>20, 34, 35</sup>. The use of the different sensory systems in addressing poor handwriting was found to be as popular in both an American<sup>3</sup> and a Canadian<sup>2</sup> study. Woodward and Swinsh<sup>3</sup> found that 92% of the American school-based therapists they surveyed indicated use of a multisensory approach to handwriting remediation. In the Canadian study conducted by Feder, et al<sup>2</sup>, 90% of the respondents, from a range of work settings, indicated use of the sensorimotor approach in remediating poor handwriting. Efficacy studies on the impact of sensorimotor intervention on poor handwriting have not however shown the use of this approach to be effective<sup>10, 14</sup>. The duration of treatment used within these efficacy studies must however be considered as they focused on short-term treatment of  $\leq 10$  hours<sup>10, 14</sup>.

The fact that biomechanical principles and techniques were indicated as being used more frequently on an 'occasional' (an average of 62% across the biomechanical items) rather than 'always' (average of 31% across the items) basis may be due to: (1) environmental/ ergonomic adaptations being made only when necessary; (2) biomechanical factors not being considered a primary reason for the learner's poor handwriting; or (3) a greater tendency to focus on the intrinsic rather than extrinsic factors impacting on handwriting performance.

The results of this study showed that 65% of the respondents 'always' use the acquisitional approach techniques of letter modelling, tracing, copying, whilst 50% always use self-monitoring in their treatment of handwriting. Handwriting is considered to be a skill that requires formal instruction and sufficient practice in order to become automatic<sup>7, 33</sup>. Alston and Taylor (cited in Zwicker<sup>14:15</sup>) also report that "motor skills are resistant to change and the need for them to be developed accurately in the early stages of development is very important for handwriting". This, coupled with the fact that an acquisitional approach to handwriting intervention has had positive results in a number of studies<sup>11-17</sup>, suggests that South African therapists should be encouraged to use this approach more frequently with foundation phase learners. The comparatively far less frequent use of the domains of dictation and composition in practising handwriting on an 'always' basis (24%) in comparison





to letter modelling, tracing, and copying (65%) may be due to the survey's limited focus on intervention with learners in the foundation phase, where dictation and composition are used less frequently within the classroom environment than copying tasks.

Inferential statistics suggest that private occupational therapists across South Africa generally make use of similar treatment approaches irrespective of their years of experience, the institution from which they graduated or whether therapy is provided on a full-or part-time basis on school premises.

### Progress evaluation practices

In terms of the way therapists evaluate the progress made through intervention, it appears that more attention is given to informal methods of evaluation rather than re-assessment with the use of standardised tests. This may be due to the fact that standardised tests can often not be re-administered within six months of the initial assessment and are sometimes lengthy with regards to administration time required. It may also be that therapists make use of standardised assessments primarily as a tool in their decision-making with regards to the treatment strategy required for effective handwriting intervention. There may also be more emphasis placed on obtaining evidence of functional improvement rather than improvements in the intrinsic performance components underlying handwriting. This notion is supported by the fact that the most common method of evaluation used was the comparison between past and present work samples (97%).

In part one of this paper<sup>1</sup> it was reported that 70% of the respondents always reviewed work samples in the learner's school books as part of their assessment, yet 97% indicated they always compare work samples to evaluate a learner's progress. Therapists may be using work samples generated within their therapy sessions to evaluate progress more often than they use evidence generated directly from within the school context, although this was not formally explored. According to Humphry and Case-Smith<sup>(36:144)</sup>, "(s) kills demonstrated in therapy translate into meaningful functional change only when the child can generalise the skill to other settings and demonstrate the skill in his or her daily routine." This suggests that evidence of handwriting improvement within the classroom itself should be the preferred measure of establishing the effectiveness of intervention.

In part one of this paper<sup>1</sup> it was reported that 94% of respondents indicated they 'always' use parent interviews or questionnaires in their initial assessment, yet in the second part of this study only 57% of the respondents indicated they 'always' use feedback from the parent to evaluate progress. It appears that therapists are far more inclined to use parental feedback in developing a handwriting intervention program than in evaluating the effectiveness of the program. Parent-professional collaboration in goal-setting and evaluation of intervention is being increasingly promoted in America and Australia as a means of obtaining better therapeutic outcomes<sup>27,37</sup> and this may indicate a need for South African therapists to evaluate their current practices with regards to including parents in monitoring progress.

The reason for the significant difference found in comparing years of experience with whether a therapist 'always' versus 'never' evaluated progress using discussion with the learner is unclear. It may indicate that with greater years of experience a therapist may be more appreciative of the importance of gaining feedback from the learner about their own perceptions of the changes in their handwriting performance, as a means of enabling the learner to feel part of the therapy process rather than merely a recipient of the service.

### Limitations

The survey method relies only on verbal descriptions of how the respondents say they treat poor handwriting and the study's reliability and validity is thus reliant in part on the integrity of the respondents.

### Conclusions and Recommendations

Part two of this survey explored the treatment practices of South African occupational therapists in private practice in the remediation of handwriting difficulties in Foundation Phase learners.

Learners are most frequently seen once a week on an individual basis. Fifty percent of the respondents use a specific handwriting programme as part of their intervention programme but no one commercially-available handwriting or fine motor programme was used by a significant number of therapists. Principles and techniques of the psychosocial approach were most frequently used with every referral, followed by those of the sensory integration, acquisitional, neurodevelopmental and biomechanical approaches. No significant difference was found between years of experience and the treatment approach utilised by respondents.

The use of an eclectic approach, which has shown positive results in efficacy studies, was favoured by the respondents for the remediation of poor handwriting. Sensory integration and psychosocial principles/techniques were used most frequently with every referral, however empirical research on the effectiveness of these approaches is either extremely limited or has not shown positive results. Therapists should consider the more frequent use of the acquisitional approach with foundation phase learners, considering the number of studies which have shown this approach to be effective for beginner writers. A limited use of home programmes and inclusion of parental feedback in progress evaluation may indicate a need for greater parent-therapist collaboration to ensure efficient and effective remediation of handwriting difficulties, and indicate an avenue for future research.

Occupational therapists are encouraged to reflect on their current treatment practices for handwriting remediation with foundation phase learners in the light of the survey results and the literature presented on the effectiveness of the various treatment approaches.

### Acknowledgements

I would like to acknowledge the assistance of the Board of Healthcare Funders of South Africa and OTASA in providing the contact details of therapists in private practice, and the invaluable assistance of Prof. D. Nel (University of Stellenbosch) in the statistical analysis of this study. I would also like to thank all of the participants who took part in the pilot and final survey.

### References

1. Van der Merwe JL, Smit N, Vlok B. A survey to investigate how South African occupational therapists in private practice are assessing and treating poor handwriting in foundation phase learners: Part One Demographics and assessment practices. *SAJOT*, 2011; 41: 3, published in this Journal.
2. Feder KP, Majnemer A, Synnes A. Handwriting: Current trends in occupational therapy practice. *Can J Occup Ther*, 2000; 67(3): 197-204.
3. Woodward S, Swinth Y. Multisensory approach to handwriting remediation: Perceptions of school-based occupational therapists. *Am J Occup Ther*, 2002; 56(3): 305-12.
4. Amundson SJ. Prewriting and handwriting skills. In: Case-Smith J, editor. *Occupational therapy for children*. 5th ed. Missouri: Elsevier Mosby, 2005: 587-614.
5. Law M, Missiuna C, Pollock N, Stewart D. Foundations for occupational therapy practice with children. In: Case Smith (Ed.), *Occupational Therapy for Children*. 5th ed. Missouri: Elsevier Mosby, 2005: 53-87.
6. Berninger V, Rutberg J, Abbott R, Garcia N, Anderson-Youngstrom M, Brooks A, et al. "Tier 1 and tier 2 early intervention for handwriting and composing." *J School Psychol* [Internet]. 2006; 44: 3-30. <[http://www.sciencedirect.com/science?\\_ob=PublicationURL&\\_to=ckey=%23TOC%235814%232006%2399559998%23617198%23FLA%23&\\_cdi=5814&\\_pubType=J&\\_auth=y&\\_acct=C000050221&\\_version=1&\\_urlVersion=0&\\_userid=10&md5=60c1a5a78f5a92472ac4264f375951a](http://www.sciencedirect.com/science?_ob=PublicationURL&_to=ckey=%23TOC%235814%232006%2399559998%23617198%23FLA%23&_cdi=5814&_pubType=J&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=60c1a5a78f5a92472ac4264f375951a)> (25 Jul 2009).
7. Zwicker JG. "Effectiveness of occupational therapy in remediating handwriting difficulties in primary students: Cognitive versus multisensory interventions" [thesis]. Canada: University of Victoria; 2005. <<https://dspace.library.uvic.ca:8443/bitstream/1828/49/1/Zwicker%20thesis.pdf>> (15 Dec 2010).
8. Bonney M. Understanding and assessing handwriting difficulty: Perspectives from the literature. *Aust Occup Ther J*, 1992; 39(1): 7-15.
9. Peterson CQ, Nelson DL. Effect of an occupational intervention on printing in children with economic disadvantages. *Am J Occup Ther*, 2003; 57(2): 152-60.





10. Denton PL, Cope S, Moser C. The effects of sensorimotor-based intervention versus therapeutic practise on improving handwriting performance in 6-11 year old children. *Am J Occup Ther*, 2006; 60(1): 16-27.
11. Jones D, Christensen CA. "Relationship between automaticity in handwriting and student's ability to generate written text." *J Educ Psychol* [Internet]. 1999; 91(1): 44-9. <[http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=9&sid=4b587a06-783b-4fe0-82f1-4736931742e5%40sessionmgr13&vid=2&bquery=\(JN+%22Journal+of+Educational+Psychology%22+AND+IK+%2219990301+00091+00001%22\)&bdata=JmRiPXBkaCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI](http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=9&sid=4b587a06-783b-4fe0-82f1-4736931742e5%40sessionmgr13&vid=2&bquery=(JN+%22Journal+of+Educational+Psychology%22+AND+IK+%2219990301+00091+00001%22)&bdata=JmRiPXBkaCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI)> (3 Dec 2010).
12. Jongmans M, Linthorst-Bakker E, Westenberg Y, Smits-Engelsman BCM. Use of a task-oriented self-instruction method to support children in primary school with poor handwriting quality and speed. *Hum Mov Sci*, 2003; 22(4-5): 549-66.
13. Marr D, Dimeo SB. Outcomes associated with a summer handwriting course for elementary students. *Am J Occup Ther*, 2006; 60(1): 10-5.
14. Zwicker JG, Hadwin AF. "Cognitive versus multisensory approaches to handwriting intervention: A randomized controlled study." *OTJR*, 2009; 29(1):40-8. <<http://proquest.umi.com.ez.sun.ac.za/pqdlink?RQT=572&TS=1295101277&clientId=57290&VType=PQD&VName=PQD&VInst=PROD&PMID=39316&PCID=41761631&SrtM=0&SrchMode=3&aid=1>> (9 Nov 2010).
15. Christensen CA. "The role of orthographic-motor integration in the production of creative and well-structured written text for students in secondary school." *Educ Psychol* [Internet], 2005; 25(5): 441-53. <[http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=9&sid=91174cb4-8608-4c3b-a92d-a235b7f9772d%40sessionmgr11&vid=2&bquery=\(JN+%22Educational+Psychology%22+AND+DT+20051001\)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI](http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=9&sid=91174cb4-8608-4c3b-a92d-a235b7f9772d%40sessionmgr11&vid=2&bquery=(JN+%22Educational+Psychology%22+AND+DT+20051001)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI)> (2 Dec 2010).
16. Sudsawad P, Trombly CA, Henderson A, Tickle-Degnen L. Testing the effect of kinaesthetic training on handwriting performance in first-grade students. *Am J Occup Ther*, 2002; 56(1): 26-33.
17. Berninger V, Vaughan KB, Abbott RD, Abbott SP, Woodruff Rogan L, Brooks A, Reed E, Graham S. Treatment of handwriting problems in beginning writers: Transfer from handwriting to composition. *J Educ Psychol* [Internet], 1997; 89(4): 652-66. <[http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=9&sid=1842f60c-ce1e-4f33-b84e-8e6166f5203f%40sessionmgr12&vid=2&bquery=\(JN+%22Journal+of+Educational+Psychology%22+AND+IK+%2219971201+00089+00004%22\)&bdata=JmRiPXBkaCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI](http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=9&sid=1842f60c-ce1e-4f33-b84e-8e6166f5203f%40sessionmgr12&vid=2&bquery=(JN+%22Journal+of+Educational+Psychology%22+AND+IK+%2219971201+00089+00004%22)&bdata=JmRiPXBkaCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI)> (10 Dec 2010).
18. Case-Smith J. Effectiveness of school-based occupational therapy intervention on handwriting. *Am J Occup Ther*, 2002; 56(1): 17-25.
19. Weil M, Amundson SJ. Biomechanical aspects of handwriting in the educational setting. *Phys Occup Ther Pediatr* [Internet], 1993; 13(2): 57-66. <<http://ejournals.ebsco.com.ez.sun.ac.za/Issue.asp?IssuelD=374224>> (18 Nov 2010).
20. Keller M. "Handwriting club: Using sensory integration strategies to improve handwriting." *Intervention in School and Clinic* [Internet], 2001; 37(1): 9-12. [http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=18&sid=14b9da1a-88df-4fef-ade3-36341edf0d30%40sessionmgr12&vid=2&bquery=\(JN+%22Intervention+in+School+%26+Clinic%22+AND+DT+20010901\)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI](http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=18&sid=14b9da1a-88df-4fef-ade3-36341edf0d30%40sessionmgr12&vid=2&bquery=(JN+%22Intervention+in+School+%26+Clinic%22+AND+DT+20010901)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI) (9 Oct 2010).
21. McGarrigle J, Nelson A. Evaluating a school skills programme for Australian Indigenous children: A pilot study. *Occup Ther Int*, 2006; 13(1): 1-20.
22. Exner CE. Development of hand skills. In: Case-Smith J, editor. *Occupational therapy for children*. 5th ed. Missouri: Elsevier Mosby, 2005: 304-56.
23. Palisano RJ, Murr S. "Intensity of therapy services: What are the considerations?" *Phys Occup Ther Paed* [Internet], 2009; 29(2): 107-12. <<http://informahealthcare.com.ez.sun.ac.za/toc/pop/29/2>> (18 Nov 2010).
24. Novak I, Cusick A. "Home programmes in paediatric occupational therapy for children with cerebral palsy: Where to start?" *Aust Occup Ther J* [Internet], 2006; 53(4): 251-64. <[http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=18&sid=5a757d81-bc3f-4d09-9b32-d9603a178a63%40sessionmgr15&vid=2&bquery=\(JN+%22Australian+Occupational+Therapy+Journal%22+AND+DT+20061201\)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI](http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=18&sid=5a757d81-bc3f-4d09-9b32-d9603a178a63%40sessionmgr15&vid=2&bquery=(JN+%22Australian+Occupational+Therapy+Journal%22+AND+DT+20061201)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI)> (20 Oct 2010).
25. Rone-Adams SA, Stern DF, Walker V. Stress and Compliance with a Home Exercise Program Among Caregivers of Children with Disabilities. *Pediatr Phys Ther*, 2004; 16(3): 140-8.
26. Cantu C. "Occupational therapy at home: Helping Parents Follow Through with Home Programs." *Excep Parent* [Internet], 2003; 33(12): 28-9. <<http://proquest.umi.com.ez.sun.ac.za/pqdlink?RQT=572&TS=1295104553&clientId=57290&VType=PQD&VName=PQD&VInst=PROD&PMID=23148&PCID=8757921&SrtM=0&SrchMode=3&aid=1>> (16 Nov 2010).
27. Dunst CJ, Dempsey I. "Family-professional partnerships and parenting competence, confidence and enjoyment." *Intern J Disability Dev and Educ* [Internet], 2007; 54(3): 305-18. <[http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=18&sid=27427105-366a-47de-a149-d53986a2e26d%40sessionmgr15&vid=2&bquery=\(JN+%22International+Journal+of+Disability%2c+Development+%26+Education%22+AND+DT+20070901\)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI](http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=18&sid=27427105-366a-47de-a149-d53986a2e26d%40sessionmgr15&vid=2&bquery=(JN+%22International+Journal+of+Disability%2c+Development+%26+Education%22+AND+DT+20070901)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI)> (20 Oct 2010).
28. Department of Education. Education White Paper 6: Special Needs Education. Building an inclusive education and training system. Pretoria, SA. July 2001. <<http://www.info.gov.za/whitepapers/2001/educ6.pdf>> (20 Oct 2010).
29. Milak DA. Windows of opportunity for at-risk children through pre-school early intervention. Thesis Masters project Brandon University, 2001 [Internet]. <[http://web.ebscohost.com.ez.sun.ac.za/ehost/resultsadvanced?hid=18&sid=d825cbc1-2fde-4501-952e-f42c2eb4f91e%40sessionmgr12&vid=2&bquery=\(ERIC+ED457962\)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI](http://web.ebscohost.com.ez.sun.ac.za/ehost/resultsadvanced?hid=18&sid=d825cbc1-2fde-4501-952e-f42c2eb4f91e%40sessionmgr12&vid=2&bquery=(ERIC+ED457962)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI)> (16 Dec 2010).
30. Graham S, Harris KR. "The role of self-regulation and transcription skills in writing and writing development." *Educ Psychologist* [Internet], 2000; 35(1): 3-12. <<http://web.ebscohost.com.ez.sun.ac.za/ehost/pdfviewer/pdfviewer?hid=9&sid=ec6ec141-a026-4348-8abb-2b944b3808a4%40sessionmgr11&vid=3>> (10 Dec 2010).
31. Graham S, Weintraub N. "A review of handwriting research: Progress and prospects from 1980 to 1994." *Educ Psychol Rev* [Internet], 1996; 8: 7-87. <[http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=9&sid=7a017fe2-4e55-4e67-bc13-7b5c5ea78a71%40sessionmgr15&vid=2&bquery=\(JN+%22Educational+Psychology+Review%22+AND+DT+19960301\)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI](http://web.ebscohost.com.ez.sun.ac.za/ehost/results?hid=9&sid=7a017fe2-4e55-4e67-bc13-7b5c5ea78a71%40sessionmgr15&vid=2&bquery=(JN+%22Educational+Psychology+Review%22+AND+DT+19960301)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI)> (3 Dec 2010).
32. Groff P. "Handwriting, and its relationship to spelling." *J Simplified Spelling Society* [Internet], 1995; 19(2): 22-5. <<http://www.english-spellingsociety.org/journals/j19/handwriting.php>> (15 Dec 2010).
33. Pontella K. "Handwriting: An exploration of foundational skills." [Ph.D. dissertation]. Dissertations & Theses: The Sciences and Engineering Collection. <<http://proquest.umi.com/pqdlink?did=1632844891&Fmt=14&VType=PQD&VInst=PROD&RQT=309&VName=PQD&TS=1294770418&clientId=79356>> (3 May 2009).
34. Schaaf RC, Miller LJ. "Occupational Therapy using a sensory integrative approach for children with developmental disabilities." *MRDD Research reviews* [Internet], 2005; 11: 143-8. Available from Academic Search Premier. <[http://web.ebscohost.com.ez.sun.ac.za/ehost/resultsadvanced?hid=18&sid=400c4157-1aff-420e-82a6-7134aad394e1%40sessionmgr14&vid=2&bquery=\(MRDD+Research+reviews\)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI](http://web.ebscohost.com.ez.sun.ac.za/ehost/resultsadvanced?hid=18&sid=400c4157-1aff-420e-82a6-7134aad394e1%40sessionmgr14&vid=2&bquery=(MRDD+Research+reviews)&bdata=JmRiPWFwCZ0eXBIPTEmc2I0ZT1laG9zdCIsaXZI)> (21 Nov 2010).
35. Parham LD, Mailloux Z. Sensory integration. In: Case-Smith J, editor. *Occupational therapy for children*. 5th ed. Missouri: Elsevier Mosby, 2005: 356-411.
36. Humphry R, Case-Smith J. Working with families. In: Case-Smith J, editor. *Occupational therapy for children*. 5th ed. Missouri: Elsevier Mosby, 2005: 117-59.
37. Hanna K, Rodger S. Towards family-centred practice in paediatric occupational therapy: A review of the literature on parent-therapist collaboration. *Aust Occup Ther J*, 2002; 49(1): 14-24.

This study was completed in partial fulfillment for the M OT at the University of Stellenbosch. □

#### Corresponding Author

Joanne van der Merwe

E-mail: mj3@telkomsa.net

