

Teachers' Perception about Assessment of Handwriting among Hearing Impaired Children

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Abstract

Handwriting is considered one of the fundamental tools to assess the academic performance of students in schools. The quality of students' handwriting greatly influences their academic success. The study was designed to identify the variables to measure the quality of handwriting. Teachers completed a questionnaire that utilized a 5-point Likert Scale. The sample was comprised of 60 primary school teachers who teach children with hearing impairments. The collected data rendered results using means, frequencies, standard deviations, independent sample t-test, one-way ANOVA test and chi square through SPSS (Statistical Package for Social Sciences) 16. An analysis of variance was conducted to compare the views of quality handwriting between various institutions, which showed a significant difference in views about legibility. Furthermore, evaluation determined whether the female and male teachers of the hearing impaired students at the primary level provided equal responses on all the variables the data analyzed.

Key Words: Assessment, Quality of handwriting, Hearing Impairment

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Introduction

Handwriting is an essential tool for communication that helps children develop cognitive and motor skills. During the pre-school and kindergarten years, children begin to understand writing is meaningful (Naidoo, Engelbrecht, Lewis, & Kekana, 2009). Many researchers have stated that learning how to write by hand is a necessary early motor exercise for other cognitive and physical skills. It helps to develop eye-hand coordination skills and boosts brain development at a greater rate among young children (Berninger, 2012; James & Gauthier, 2006). Many researchers have found that better handwriting is an indicator of higher academic achievement. Those students who took notes by hand showed good comprehension of the material and a longer attention span during the discussion (Mueller & Oppenheimer, 2018; Peverly, 2012).

Handwriting developed independently in the old civilization as well as in recent. It is the mark of culture, education, communication and equally essential for the culture of each individual in the past and present. It is the sensory experience that connects the cognitive and physiological activities for the development of fine motor skills (Levine, 2003). Handwriting is an important task used to communicate feelings and thoughts using written code. It required full participation from the students in the school activities because children spend up to half of their time in paper and pencil activities on daily basis (Kushki, Schweltnus, Ilyas, & Chau, 2011).

Handwriting is an important activity not only for school-age children but also for all age groups who belong to any kind of culture and capacity (van Drempt, McCluskey, & Lannin, 2011). Accurate formation of the letters and numerals is the key component of motor learning and handwriting practice (Asher, 2006). When the child's fine motor skills are developed with the help of cognition, this will increase their writing speed and output (Graham & Harris, 2005; Graham & Weintraub, 1996). Six handwriting elements are letter formation, slant, size, spacing, alignment and neatness (Graham, Berninger, Weintraub, & Schafer, 1998). These are common factors for all the students including the students with hearing impairments. According to the students, they may devote themselves more attentively to complete the complex task and improve written language when their handwriting becomes more automatic and fluent. Handwriting has its significance due to writing fluency and quality, and it is important for primary and intermediate students (Graham, Berninger, Abbott, Abbott, & Whitaker, 1997).

Children with hearing impairments have different accesses to sound based on their hearing level. If the access to sound is impaired, then their

access to spoken language is also affected. History has shown that students with hearing impairments have difficulty with handwriting and develop writing skills at a slower rate than their normal-hearing peers. Handwriting develops gradually from pre-speech gestures. Children acquire their language from hearing and later use it in their handwriting. The students with hearing impairments cannot do this.

This study was conducted with teachers at special schools because teachers are the best source for communicating information about their students. Teachers can easily understand the handwriting and are knowledgeable about handwriting legibility as well as the day to day development of the students' handwriting. In Pakistan, students begin learning and studying handwriting at an early school level.

The current study was designed to explore components of legibility which are important in the Pakistan schools for students with hearing impairments.. The main objective was to identify the legible components of handwriting for children who have hearing impairments. The research question was based on identifying essential components of the handwriting legibility for children with hearing impairments.

Methodology

The current study was descriptive in nature and data were collected through the survey method.

Participants

Sixty teachers of students with hearing impairments were selected from Lahore district using a purposive sampling technique. The age range of the students was 11 to 14 years old. All the students had severe to profound degree hearing loss. Some students had hearing aids, and some did not.

Instrument for Evaluation of Handwriting

A structured questionnaire based on a 5-point Likert Scale [Excellent (5), Good (4), Average (3), Fair (2), Poor (1)] was used to collect specific information about handwriting legibility of the students with hearing impairments according to the objectives and research questions developed.

The handwriting assessment incorporated observation of technique, style and legibility of handwriting. Techniques and styles include correct and consistent pencil holding, posture while writing and the formation of the letters. Handwriting legibility involves the readability of letters, as well as spacing within and between the words. Nevertheless, quality of the writing production such as legibility, neatness, uniform size and

spacing is most commonly measured in writing activities that oppose measuring handwriting automaticity and fluency, in whole speed and accuracy (Abbott & Berninger, 1993; Tucha, Tucha, & Lange, 2008). Table 1 shows the important variables for assessing the handwriting legibility of the students with hearing impairments.

Table 1
Variables for Legibility of Handwriting of Students with Hearing Impairment

No	Statements	Variables
1	Copying ability affects handwriting	Copy
2	Written letters are of acceptable size in all the directions	Dimension
3	Written letters are of consistent size	Size
4	Shapes of the words are appropriate	Shape
5	Spacing within words is adequate	Spacing
6	Writing pressure is too hard	Pressure
7	Handgrip is troublesome	Grip
8	Sitting posture during handwriting	Posture
9	Straight back and head up during the writing	Straightness
10	Words are facing suitable directions	Direction
11	Appropriate lighting in the work area	Lightening
12	Place words on the baseline	Baseline
13	Irregular letter formation	Irregularity
14	Appropriate letter formation	Formation
15	Consistency in writing quality	Consistency
16	Style of pencil grasp during handwriting	Grasp
17	Secureness the paper in one place	Paper
18	Suitable seating position during the writing	Seat

The measurement of percentage, frequencies, mean and standard deviation (SD) was used to quantify the appropriate sitting posture, hand gripping, and legible components of handwriting for students.

Data Collection

Data were collected by the researchers. The researchers personally distributed the questionnaires in various schools and explained the

purpose of the study. After a week, the researchers collected the questionnaires through school administration.

Data Analysis

Data collected from the questionnaires yielded descriptive statistics about the variables. Inferential implications were then derived and recorded. Statistical significance of the data was determined through descriptive statistics by using Statistical Package for the Social Sciences (SPSS) 16. The researchers used frequencies, mean values, standard deviation, Independent- Sample t-test, One way ANOVA and Chi Square Goodness of Fit Test for analyzing the results.

Results and Discussion

The purpose of the study was to explore the components of handwriting legibility and teacher awareness of those components in the handwriting of students with hearing impairments. Handwriting is a writing which is done using pen and paper (Rooney, 1999). The operational definition of handwriting is writing by hand including all types of alphabetic practice, print, pre-writing exercises, and any form of pen or pencil or paper that is used to strengthen the cognitive and motor skills.

Table 2
Analysis of teachers' responses

No	Variable	Excellent	Good	Average	Fair	Poor	Mean \pm S. D
1	Copy	27(45.0)	33 (55.0)	0 (0.00)	0 (0.00)	0 (0.00)	4.45 \pm 0.50
2	Dimension	10 (16.7)	40 (66.7)	8 (13.3)	0 (0.00)	2 (3.3)	3.93 \pm 0.78
3	Size	7 (11.7)	30 (50.0)	21 (35.0)	0 (0.00)	2 (3.3)	3.67 \pm 0.82
4	Shape	8 (13.3)	30 (50.0)	22 (36.7)	0 (0.00)	0 (0.00)	3.77 \pm 0.67
5	Spacing	3 (5.0)	32 (53.3)	25 (41.7)	0 (0.00)	0 (0.00)	3.63 \pm 0.58
6	Pressure	0 (0.00)	23 (38.3)	26 (43.3)	8 (13.3)	3 (5.0)	3.15 \pm 0.84
7	Grip	2 (3.3)	22 (36.7)	29 (48.3)	6 (10.0)	1 (1.7)	3.30 \pm 0.77
8	Posture	4 (6.7)	35 (58.3)	12 (20.0)	3 (5.0)	6 (10.0)	3.47 \pm 1.05
9	Straightness	2 (3.3)	25 (41.7)	17 (28.3)	9 (15.0)	7 (11.7)	3.10 \pm 1.09
10	Direction	9 (15.0)	29 (48.3)	16 (26.7)	0 (0.00)	6 (10.0)	3.58 \pm 1.08
11	Lighting	0 (0.00)	21 (35.0)	21 (35.0)	9 (15.0)	9 (15.0)	2.90 \pm 1.05
12	Baseline	6 (10.0)	21 (35.0)	28 (46.7)	3 (5.0)	2 (3.3)	3.43 \pm 0.87
13	Irregularity	0 (0.00)	10 (16.7)	40 (66.7)	2 (3.3)	8 (13.3)	2.87 \pm 0.85
14	Formation	0 (0.00)	20 (33.3)	35 (58.3)	4 (6.7)	1 (1.7)	3.23 \pm 0.65
15	Consistency	1 (1.7)	22 (36.7)	36 (60.0)	1 (1.7)	0 (0.00)	3.38 \pm 0.56
16	Grasp	3 (5.0)	25 (41.7)	22 (36.7)	10 (16.7)	0 (0.00)	3.35 \pm 0.82
17	Paper	0 (0.00)	26 (43.3)	26 (43.3)	6 (10.0)	2 (3.3)	3.27 \pm 0.78
18	Seat	9 (15.0)	32 (53.3)	18 (30.0)	1 (1.7)	0 (0.00)	3.82 \pm 0.70

Table 2 shows all the variables were equally important for good handwriting. Copy from whiteboard has a higher mean of 4.45. The standard deviation of two variables such as straight back and feet on the floor while writing is 1.147 which is higher than the other variables. The results of this study revealed the majority of teachers agreed that legible components of handwriting have equal importance for good handwriting.

Table 3
Analysis of different responses on the different variable of Handwriting

Variables	df	Chi-Square	Sig
Copy	1	0.6	p > 0.05
Dimension	3	57.87	p < 0.01
Size	3	32.93	p < 0.01
Shape	2	12.40	p < 0.05
Spacing	2	22.90	p < 0.05
Pressure	3	25.20	p < 0.01
Grip	4	53.83	p < 0.01
Posture	4	59.17	p < 0.001
Straightness	4	27.33	p < 0.001
Direction	3	20.93	p < 0.001
Lighting	3	9.60	p < 0.05
Baseline	4	46.17	p < 0.001
Irregularity	3	5.87	p < 0.001
Formation	3	49.47	p < 0.001
Consistency	3	58.8	p < 0.001
Grasp	3	21.2	p < 0.001
Paper	3	32.20	p < 0.001
Seat	3	35.33	p < 0.001

The above table indicates there is no significant difference between female and male teachers' responses on different given variables. It shows the variables are playing their role in the development of legible handwriting of the hearing impaired students.

An independent sample t-test was conducted to compare male and female responses. On average, there was no significant difference among the males (M = 69.80, SE = 5.33) compared to females (M = 64.91, SE = 1.01), $t(58) = 1.28$, $p > 0.05$ for legibility of handwriting. The results showed that gender does not have effect on the perception of the legible components of handwriting. An Analysis of Variance (ANOVA) was conducted to compare the effects of handwriting between institutions. A

statistically significant difference exists between the mean numbers of words $F(2, 57) = 11.68, p < 0.001$. An ANOVA was also conducted to compare the effects of handwriting on age. No statistically significant difference appeared between the mean numbers of words $F(2, 57) = 0.03, p > 0.05$.

The standardized loading based on the correlation matrix was used with a pattern matrix. The test of the hypothesis showed that four factors are enough for the degree of freedom. The null model objective function was 171. The objective function was 1,437. Chi square of the degree of freedom for the null model was 101. The standard function was 4.36. The root mean square of residential (RMSR) was 0.06 and df corrected root mean of the residual was 0.08. The harmonic number of observations was 60 with empirical chi square was 72.94 with a probability < 0.98 . The total number of observations was 60 with Likelihood Chi Square was 214.24 with probability $2.9e-10$. Tucker Lewis Index of factoring reliability was 0.64, RMSEA index = 0.162 and the 9 % confidence interval was 0.112, 0.163, BIC = -199.29, Fit based upon off diagonal values = 0.07

Table 4
Factor Analysis of the Construct

Variables	MR 1	MR 2	MR 3	MR 4	h2	u2	Communality
Copy	-0.26	0.35	0.62	-0.03	0.55	0.45	2.0
Dimension	0.31	0.0	0.64	0.11	.67	0.33	1.5
Size	0.32	0.04	0.82	0.10	0.86	0.14	1.3
Shape	0.16	0.29	0.48	0.17	0.49	0.51	2.2
Spacing	0.19	0.42	0.43	-0.08	0.42	0.58	2.5
Pressure	0.05	0.08	-0.03	0.87	0.80	0.20	1.0
Grip	0.74	0.10	-0.1	-0.11	0.49	0.51	1.1
Posture	0.78	-0.02	0.16	0.27	0.89	0.11	1.3
Straightness	0.50	-0.11	0.34	0.07	0.48	0.52	1.9
Direction	-0.42	-0.12	0.77	0.04	0.63	0.37	1.6
Lighting	0.54	-0.13	0.17	0.29	0.56	0.44	1.9
Baseline	0.17	-0.30	0.67	0.16	0.65	0.35	1.7
Irregularity	0.35	-0.13	-0.09	0.69	0.68	0.32	1.6
Formation	-0.24	0.29	0.29	0.26	0.33	0.67	3.9
Consistency	0.07	0.90	-0.05	0.06	0.82	0.18	1.0
Grasp	-0.31	0.24	0.10	0.65	0.59	0.41	1.8
Paper	0.06	0.51	0.02	0.26	0.41	0.59	1.5
Seat	-0.35	0.34	0.25	0.19	0.35	0.65	3.4
SS Loading	3.31	2.02	3.53	2.36			
Proportion Variance	0.17	0.11	0.19	0.12			

Cumulative Variance	0.36	0.59	0.19	0.48
Proportion Explained	0.29	0.18	0.31	0.21
Cumulative Proportion	0.61	1.00	0.31	0.82

A principal component analysis was conducted on 18 items with promax rotation and four factors were seen sufficient. Factor 1 (MR 1) may be named Positioning and contained five items including Grip, Posture, Straightness, Lightening and Seat. The factor 2 (MR 2) may name Shapes as and contained 3 items i.e. Formation, Consistency and seat. The factor 3 (MR 3) may be named as Legibility and contained 7 items i.e. Copy, Dimension, Size, Shapes, Spacing, Direction and Baseline. The factor 4 (MR 4) may be named Corrections as and contained 3 items i.e. pressure, irregularity and Grasp. It is in line with the previously formed questionnaire but with its own dimensions (Graham et al., 1998; Jameel & Nabeel, 2017).

Conclusions

The results of this study revealed that all the respondents think all three portions of the questionnaire are important for good handwriting. Findings also revealed the participants believe sitting posture, handgrip and the legibility of the components are essential for good handwriting. Handwriting legibility found that children wrote more legibly while copying than creating, and that legibility declined when children were encouraged to write quickly. The study also revealed that Positioning, Shapes, Legibility and Corrections factors are important components of handwriting legibility.

Recommendations

Based on the results and conclusions of the study, the researchers put forth the underlying recommendations. Handwriting is an important skill in the student's life. Teachers may assign home tasks to their students in order to improve the efficacy and sense of mastery of the components of handwriting legibility. In addition, parents should give children proper time and attention in order to improve their handwriting particularly in the actual legible components of handwriting. Furthermore, the teachers and parents should select attractive ways to enhance handwriting capabilities of the students so they can become skilled in good handwriting. Future researchers may aspire to replicate this study with a larger population.

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