

HANDWRITING CRITERIA ANALYSIS OF LOWER PRIMARY SCHOOL CHILDREN

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Abstract

First 'screening' of detecting children with handwriting difficulty is usually done by the school teachers. The evaluation is called global legibility assessment of handwriting which involve a process of assessment based on checklist scores given to the handwriting product. However the global legibility assessment is to suffer from limited accuracy, sensitivity, and reliability. The paper aims is to seek the association of the result produces by global legibility assessment done by teachers and findings made by previous researchers who uses other types of evaluation tools including computerized evaluation tools. One hundred and forty students at the age between six year old to eight years old and six homeroom teachers were involved in this study which takes place at an international school in Putra Height, Selangor, Malaysia. The testing procedure is adapted from Minnesota Handwriting Assessment(MHA) tools where students are required to finish up three near-copying task of a preset sentences. They were given two and half minutes to finish up each task. After the handwritten samples were obtained, the teachers are required to evaluate the students' handwriting based on the given questionnaire. The analysis focus on three aspect: readability, acceptable size and shape of the handwritten product(RASS); size consistency and completion time. Results found that the three handwriting characteristics that were evaluated improved with age and maturity of the children. These results prove that the global legibility assessment done by the teachers are consistent with the previous findings by various researchers. Global methods of assessing are proven to be a reliable source of first stage screening of children with handwriting difficulty.

Keywords: children handwriting, legibility, screening, assessment,

1.0 BACKGROUND

Handwriting is a very important skill that children should acquire due to the fact that they have to spend 31 to 60% of their school day performing handwriting and other fine motor tasks. During their first three years of school, children are expected to acquire a level of handwriting proficiency that enables them to make skillful use of handwriting as a tool to carry out their work at school (Collette, Anson, Halabi, Schlierman, & Suriner, 2017). Children who appear to struggle with handwriting fluency at school should be identified early for intervention.

For decades, evaluations of global legibility are practiced to assess the functional handwriting of children in their natural classroom setting (Weil & Amundson, 1996; Sudsawad, Trombly, Henderson & Tickle-Degnen, 2001; Grindle, Cianfaglione, Corbel, Wormald, Brown, Hastings, & Hughes, 2017). Measurement of global legibility means assessment of the overall ability to read an individual character on the basis of its appearance. Previous studies has documented that global methods of assessing handwriting is an effective method to provides information on how an individual student's performance associates to that of others (Bradfield, 2009). In order to produce structured result, a questionnaire that evaluates specific handwriting components is prepared. The handwriting components are chosen based on the consensus among therapists that assessments should concentrate on letters formation, words alignment, size, spacing and letters slant(van der Merwe, Smit, & Vlok, 2011).

Time is another component that should be look at since it plays an important aspect in development of handwriting legibility. Research and observations done by experts found that handwriting improve with age and schooling (Graham, Weintraub, & Schafer, 1998; Hamstra-Beltz & Blote, 1990; van Hartingsveldt et al. 2011; Katya P. Feder & Majnemer, 2007; Kushki, Schwellnus, Ilyas, & Chau, 2011). At the age of nine years old handwriting task become smooth and consistent (Katya P. Feder & Majnemer, 2007; Rosenblum et al., 2003). Based on previous literature it was also found that children find capital letters easier to write compared to small letters. Lower cases are considered more complex for children since it consists of more combinations of lines and curves (Bissex 1980; Stennet,Smythe,Hardy & Wilson, 1972; Treiman&Kessler ,2004).

The present study proposed to examine the association of the global legibility assessment conducted by teachers with the documented findings of previous research. The findings of this study will be compared to findings from other research that uses various types of evaluation methods. Teachers are expected to fill in a questionnaire that contains demographic information of the students, the handwriting components they need to assess and their global judgement of the children's handwriting capability. The hypothesis that there will be an inconsistent result are also taken into consideration, this is based on discoveries by Rosenblum et al (2003), Case-Smith, Weaver and Holland (2014), and Barnett and O'shaughnessy (2015), inconsistent results and opinion are to be expected if assessment involved humans intervention,

2.0 METHODOLOGY

The research methodology consists of four phase as shown in Figure 1. The first phase involved the process or procedure of collecting the sample handwriting from the children and the evaluation results from the teachers. The second phase involved the process of analyzing the collected data. The teachers' evaluation results were compiled and analyzed; and the scores are calculated and rated in the data processing and analysis phase. The third process synthesizes the result of the analysis.

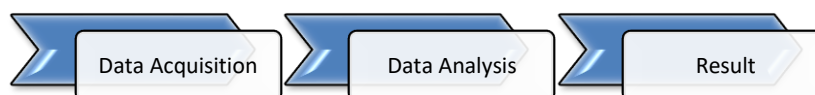


Figure 1. Research Methodology

3.1 Data Acquisition Process

Data acquisition process takes place at an International School at Putra Heights, Selangor, Malaysia on April 2016. The international school is chosen due to the composition of student which comprise of divergence of background, race and country of origin. The test subjects are hundred and thirty one lower elementary students aged from six to eight years old and six teachers. Inclusion criteria are students which are well verse in English and expose to Latin alphabet. While the six homeroom teachers involved as rater comes from various background, experience and trainings. The testing procedures are adapted from Minnesota Handwriting Assessment methods which are widely used by occupational therapist worldwide. The children were required to do near copying of the sentence “The quick brown fox jumped over lazy dogs” in jumbled orders. The words are jumbled up to ensure that the children do not copy based on their memory. The teachers are requested to fill in a questionnaire.

3.1.2 Handwriting Acquisition

The students are required to complete three task and they are given 2.5 minutes to complete each task. The three handwriting tasks are illustrated in Table 1. The completion time of 2.5 minutes are used to analyze the students’ speed in producing handwriting products. The students are told to write neatly and without erasure.

Table 1. Handwriting Tasks

| Task | Activities |
|----------|--|
| Task I | Copy the given preset sentences in uppercase letter in a bounded box |
| Task II | Copy the preset sentences in uppercase letters on provided lines |
| Task III | Copy the preset sentences in lowercase letters on provided lines |

3.1.3 Questionnaire

The teachers are required to fill questionnaire that consist of three sections: demographic data of the children such as their name, age, date of birth and their class names; handwriting components and their overall evaluation on whether the children is considered as having hand writing difficulty or not. The handwriting criteria that are evaluated comprised of readability of the letters and sentences, size consistency, spacing between words, spacing between letters, appropriate letter formation and time completion. Table 2 describes the details of the evaluated criteria, the handwriting components and the ratings involved.

Table 2. Questionnaire to Evaluate Handwriting

| Handwriting Criteria | Component Evaluation | Ratings |
|---|---|---|
| Handwriting is easily read | Readability and shape | Yes= 2, No= 0 and Inconsistent=1 |
| Size is constant in all three phases | Size consistency and size acceptability | Yes(Consistent) = 1 , No(Not Consistent) = 0. |
| Spaces between words is acceptable | Readability | Yes= 2, No= 0 and Inconsistent=1 |
| Spaces between letters is acceptable | Readability | Yes= 2, No= 0 and Inconsistent=1 |
| Appropriate letter formation | Readability, shape and size acceptability | Yes= 2, No= 0 and Inconsistent=1 |
| Time completed each task within 2.4 minutes | Completion time | Completeness is measured based on how many completed alphabet written in a 2.5 minutes. |

3.3 Data Analysis

The students are group according to their age and analyses were conducted by calculating the total ratings and deriving percentage figures. Completion times of handwriting are measured to determine the speed of writings of each student. The completeness (C_{wt}) measurement is calculated based on the following equation:

$$C_{wt} = T_w/T_c$$

where

T_w is total number of alphabet which are completely written within two and a half minutes

T_c is overall total of alphabet

The completion scores are divided into two groups : Score equal to 1 means the students manage to complete the task within the timeframe given and score less than 1 which indicates vice versa.

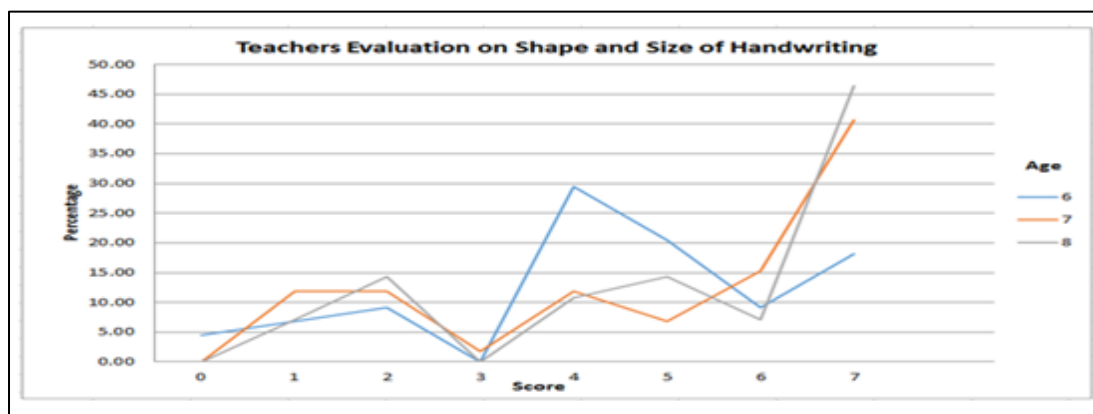
4.0 RESULT AND DISCUSSION

Results are discussed in three sections based on the handwriting characteristics which are readability, acceptable size, consistent size and shape (RASS), consistency and completion time. The discussion and comparison are based on the studies of the prominent researchers in children handwriting area.

4.1 RASS Criteria

Based on gathered information on readability of handwriting, the alphabets acceptability and consistency in terms of size and shape from the questionnaire, a line graph describing the RASS criteria was formed (Figure 2).

Figure 2. RASS Criteria (Teachers Evaluation Analysis)



The line graph illustrates that at the age of 6 years old, higher percentage of students were found not very proficient in producing handwriting products. 4.55 percent of 6 years old students scored 0 point of RASS criteria while 7 and 8 years old students scored 0 percent for 0 point. 40.68 percent of 7 years old students and 46.43 percent of 8 years old students achieved full marks for RASS scoring. As for 6 years old students, only 18.88 percent achieved full scores for RASS. These outcomes support findings done by

previous research (Graham, Weintraub, & Schafer, 1998; Hamstra-Beltz & Blote, 1990; Rosenblum et al, 2003; Katya P. Feder and Majnemer, 2007 and van Hartingsveldt et al, 2011) that indicates that handwriting improved as the children matured in age. The researchers discovered that handwriting legibility improve with age and schooling. Olinghouse & Graham (2009) and Puranik, Lombardino, & Altmann (2008) also discovers that since older children are required to write more in school than younger children, they have an advantage over them in handwriting performance.

4.2 Consistency of handwriting

Past studies (Graham, Weintraub, & Schafer, 1998; Hamstra-Beltz & Blote, 1990; Rosenblum et al, 2003; Katya P. Feder and Majnemer, 2007 and van Hartingsveldt et al, 2011) also revealed that the consistency of handwriting improved based on age. In this study, it was found that 23.68 percent of 6 years old students write in consistent size alphabets all through the handwriting test while the percentage is higher for 7 year old student which is 37.29 percent and 8 year old student which is 39.29 percent. This shows that 8 years old students perform better compared to their younger counterpart. As for inconsistency in handwriting size, it was found that the percentage seems to decline for 12.61 percent at the age of 7 years old from 75.32 percent to 62.71 percent. At 8 years old the difference decline further to 14.61 percent.

Handwriting researchers have found that size of handwriting of a human is influence by a lot of factors such the person's feelings, and environment. In several studies discovered that inconsistency in handwriting existed from early elementary but over time the consistency in handwriting improved as the student progresses to higher elementary class.

4.3 Completion Time of Handwriting

Time plays an important aspect in development of handwriting fluency. Completion time or speed are measured based on completion time writing in uppercase and lowercase letters. For uppercase speed of handwriting, it was found that the majority of students from age 6 to 8 years old manage to complete the task in the time frame given. 97.73 percent of 6 years old students, 89.93 percent of 7 years old students and 89.29 percent of 8 years old students completed on time. While lowercase letters analysis illustrated that 54.55 percent of 6 years old children manage to complete their handwriting tasks in the given time. As for 7 years old children 72.88 percent and 55.56 percent of 8 years old children completed their task on time.

Based on the derived percentage, it was discovered that students writes uppercase letter faster than lower case letters. Across the age, for uppercase letter copying task, it was found that the percentages of completion time for 6 years old are higher than age 7 and age 8. The table also illustrates that incompleteness score for 6 years old students are much lower than the other two age group. Our findings found that classes for age 7 and age 8 years old students comprise of a few Arabic students who came all the way from Iran, Iraq and Syria. These children are expatriate children that are exposed to Arabic characters during their early years and they are not used to write in Latin alphabet.

Besides factors of origins and unfamiliarity with Latin alphabets, the instruction given for the handwriting task was also found to hinder the speed of writing. This study requires students to write neatly without stopping for correction within a time frame given. Rosenblum et al(2003) and Weintraub and Graham

(1998) reported the possibility of the instruction given may have inculcate the feelings of fear and frustration to the children and this may have effected their performance in handwriting.

5.0 CONCLUSION AND FUTURE STUDIES

The present study looks at the global legibility assessment done by teachers on some handwriting task and associates the result with previous research findings that uses other evaluation methods. The result shows that based on overall performance of handwriting, children improved their handwritings skills over time as they matured. However, completion time and consistency of handwriting although developed over the time, shows significance differences in percentage when compared across age. Factors such as instruction given during the task, late exposure to Latin character formation and instruction given during the task are found to influence the results for this study. Outcomes from this study agree with various other studies done previously. Various demographic such as the socioeconomic status of the students family, government initiatives in increasing demands for school readiness, types of preschool the students attended and gender, are suggested for future studies. Based on literatures studies, these factors have great influence in the performance of handwriting among children.

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