



## Development of Malayalam Handwriting Scale for School Students in Kerala

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### Abstract

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With a view to support instruction, formative and summative assessment and to provide model handwriting performance for students to compare their own performance, a Malayalam handwriting scale is developed. Data from 2640 school students belonging to Malappuram, Palakkad and Kozhikode districts, sampled by taking 240 students per each grade (grades 2 through 9) were used. The scale with 19 quality levels is formulated based on 10 point criteria viz., Shape of the letter, Size of the letter, Space between the letters, Space between the words, Space between the lines, Proportion, Margin, Slanting, Clarity and speed, and Straightness of lines. Reliability and validity of the scale were verified by ensuring the scaled handwritten scripts being identified by five experts as belonging to a particular scale value. grade norms in terms of cumulative percentage of students is provided and gender norms also are indicated. Students, teachers, school counsellors and parents will find the scale useful for improving Malayalam handwriting performance of learners at all grade levels in schools

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Importance of handwriting in education and development of individuals can never be exaggerated. Handwriting is an image of unique personality. Graphic maturity of a writer develops from childhood and continues throughout lifetime with age despite influence of factors like writing-medium like pen, ink, writing material, writing surface, speed of writing, physiological condition including age and illness, and intoxication. Education among other things is to improve students' ability to express in writing and hence cannot be neglected in instruction. Ability to write with reasonable legibility and speed is essential and important; but it is very complex functional task essential for expressing ideas fluently in text form. Absence of fluent hand writing leads students to avoid writing. Surely, other transcription related skills like spelling are important too. This paper reports the development of handwriting scale in Malayalam to provide students, teachers and school counsellors with grade appropriate model handwriting which will prove useful in assessing, giving feedback and directing handwriting and instruction thereof in schools.

#### Why is handwriting important?

There are many reasons for handwriting being especially the responsibility of schools. Handwriting speed continues to increase as until grade 9 (Graham, & Weintraub, 1996). Early handwriting instruction improves legibility, quantity and quality of student writing. Though today's elementary students are increasingly influenced by tablets and computers, they are still required to write on paper for 25 to 60 per cent of their classroom learning time in grades K-5. Compared to this, only 15 to 22 per cent of time is spent on various forms of technology (computers, tablets, interactive whiteboards, etc.). Moreover, technology is not yet readily available to majority of students in countries like India. Children still at the most are living in a hybrid world, than a handwriting world or a digital world (Zubrzycki, p.2). Even beyond early grades, students who took notes by hand versus on a computer have better comprehension of what was being said and had more sustained attention during discussion of texts and concepts (Peverly 2012). Acquiring handwriting is more demanding for a child than the complexity for an adult learning how to type. Learning how to write by hand is a necessary motor exercise as it



helps develop eye-hand coordination motor skills (Saperstein Associates 2012; James and Gauthier 2006; James 2012; Berninger, 2012). Handwriting is a foundation skill that needs to be developed first and will influence students' reading, writing, language use, and critical thinking. Handwriting thus is essential life-long skills and is supportive of even keyboarding (Berninger et al. 2009; Goldberg 2003; Cook 2007).

Handwriting is connected also to an array of other motor, cognitive, and motivational outcomes of interest from educational outcomes. These encompasses visual motor coordination, higher-level cognitive processes, perceptual abilities, tactile and kinesthetic sensitivity, motor planning, spatial organization, temporal control and the integration of written language. Learning how to write by hand is a necessary motor exercise as it helps develop eye-hand coordination motor skills (Saperstein Associates 2012; James and Gauthier 2006; James 2012; Berninger 2012). Handwriting is a foundation skill that needs to be developed first and will influence students' reading, writing, language use, and critical thinking. Handwriting allows students to perform more efficiently the hierarchy of skills required in other subjects, leading to better grades, better test scores, and better academic performance (Peverly, 2012). Teaching handwriting has significant impact in the areas of the brain related to literacy development (Berninger 2012; James 2012). It is clear that handwriting supports students' cognitive development and overall achievement. Handwriting is critical to the production of creative and well-written text (Graham & Harris 2005) and it affects both fluency and the quality of the composition. Christensen (2005) demonstrated how children enrolled in an eight-week handwriting intervention program outperformed their peers in all measures of writing, achieving a 46 per cent improvement in the quality of written text beyond the control group.

Handwriting predicts success in subjects other than languages too as good handwriting help students to write with speed and ease in all subjects (Marr et al. 2003; Feder & Majnemer 2007). Greater writing speed lessens the burden on working memory, enabling children and adults to create good reader-friendly prose (Peverly 2006). Consistent handwriting practice lightens a student's cognitive load. With handwriting practice, the processes involved become less demanding and more automatic, enabling students to devote a higher amount of neurological resources to critical thinking and thought organization. Without practice, students struggle to achieve automaticity and fluency in handwriting and diminish capacity to carry out higher-order skills. When students need less attention on the basics of letter formation, they can better focus on the planning and thought organization for effective composition (James, Karin Harman.2012). And, if children write well, they have improved confidence and self-esteem, increased concentration, improved academic performance and an increased ability to express themselves creatively (Engel-Yeger 2009, Pollock et al, 2009). Moreover, studying becomes harder if one has to invest more effort in reading own script.

#### **Assessment of handwriting in Malayalam and its significance**

Despite the recognition of handwriting as fundamental aspects of literacy and a vital tool of human communication, globally, handwriting is a neglected area not only in school practice, but also in educational research, and especially so in Indian languages including Malayalam. A number of studies have been conducted in western countries in this field. The sponsorship by UNESCO of two monographs of international scope of teaching of handwriting was a significant contribution to the study of handwriting. Very little has been done in India in this direction. An estimated 10-33% of students are struggling to achieve competency in handwriting skill (Karlsdottir & Stephansson 2002, as cited in Feder and Majnemer 2007). Development of handwriting scale is of significance as handwriting impacts the developing brain. When children practiced printing by hand, their neural activity was far more enhanced and "adult-like" than those who had simply looked at their letters (Bounds 2010). Further, communication and collaboration are identified as critical learning skills for the 21st century



(Trilling and Fadel, 2009). Students need to be prepared to do this through a variety of forms. Research literature extensively documents the consequences of poor handwriting on academic performance. Graham, Harris, and Fink (2000) suggest that children who experience difficulty mastering handwriting may avoid writing and decide that they cannot write, leading to arrested writing development. Thus, difficulty with handwriting is a major concern of teachers, counsellors and therapists especially when it seems to interfere with student performance in other areas of schoolwork.

Obviously, handwriting instruction and its assessment is needed to enable students to write letters legibly and efficiently without strain, and with sufficient speed, so that writing becomes fluent and automatic, supporting a sense of pride in their writing. In assessing handwriting, speed and legibility are the two cornerstones of functional handwriting. Adequate writing speed is required to take notes, complete school assignments, and write timed tests. A student's inability to keep pace with their peers can lead to frustration and decreased motivation to complete academic tasks and may prove detrimental on their grades. Handwriting scales in different languages is of significance from an inclusive education perspective as well. Students with writing difficulty show problem in all writing processes, not only in expressing thoughts in writing, but also in terms of extremely poor handwriting or slow handwriting indicating need for help in co-ordination (Paligrini et al 2015). Even in this technology era, handwritten input is becoming increasingly popular with the widespread use of touch screens and the development of handwriting recognition technologies (Qiu, Qiu, Jin, Dai, Zhang, & Li, 2015).

Speed of writing is known to be influenced by age. Handwriting Speeds in letters per minute is 15 to 32 in Grade 1, with approximately 5-letter increase per grade in lower limit and double the lower limit as the upper limit. Legibility comprises several components that can be assessed in a writing sample, including; slant, letter formation, spacing, alignment and size. First three years of the primary school are especially marked for missing letters while writing, and bad handwriting (Desai, 1989). Handwriting legibility can be global legibility, simple and fast method to assess the functional components of handwriting, avoids the use of time-consuming rating scales, while providing a clearer picture of the overall readability of the student's work (Pollock et al 2009). Legibility is more likely to be better on short tasks, while providing a clearer picture of the overall readability of the student's work. On of longer tasks, legibility is more likely to be greatest at the beginning. Based on assessment, children can be given recognition for handwriting that acts as boosters to many other aspects of schooling.

The first handwriting scale, The Thorndike Scale for Handwriting (Teachers college press), was developed by Thorndike (1910). The scale includes handwriting at 15 different quality levels, ranging from very poor, barely legible to beautifully formed writing of a quality that might serve as a model in a penmanship manual. The criteria used in developing this sample included some consideration of beauty or placing or quality as well as absolute clarity and uniformity of lines and form. In 1912, a scale developed by Ayers appeared designed for use in grade 2 through 8 and presented 8 quality levels. His criterion was readability rather than Thorndike's 'general merit'. In 1915 (revised in 1959) Freeman developed a scale for grade level from 1 through 8 on general merit, with the primary emphasis up on legibility and form focusing on spacing, alignment, letter formation, and uniformity in size and slant with 5 quality level at each grade level. Primarily such scales showed stages of 'perfection' to which one can aim. Such scales are helpful as a screening device for locating pupils who need remedial assistance and encouragement.

Few previous attempts were made to study handwriting among students in Kerala. When Students were given two sentences each of seven words length, half the Upper Primary students (51.99 percent) made at least one error each in copying the sentences (Gafoor & Sajiv,

2009). Based on the idea that the effort at improving the handwriting of pupils could be more effective if the teachers are provided with an easy tool to measure handwriting quality, Nair and Joseph George (1967) in the Department of Education, University of Kerala has undertaken a few studies of handwriting. However, this study was in English language. The scale has been developed to provide a suitable device for measuring the quality of handwriting in English of the pupil of standard 5-10. The scale specimens are allotted values ranging from 10-70 with a regular interval of 10. It was found that practice help to improve quality only up to the age group of 16 and no significant gender or locale difference between the quality of handwriting of pupils. Narayana Battathiri conducted a comparative study of quality of handwriting in Malayalam and English, The study, with an intention to compare the quality of handwriting of secondary school in Malayalam and English. There is a high correlation between the quality of handwriting in Malayalam and English.

### **Objective**

This study is to develop a standard handwriting scale in Malayalam to provide a handwriting score for scripts by comparing student's script with the scaled script, along with grade norms in terms of cumulative percentage of students who perform equal or better than the scaled illustrative sample scripts. In doing so, the study will provide an assessment of grade wise performance on handwriting in Malayalam of school students in Kerala.

### **Method**

Descriptive survey method was employed to obtain handwritten samples of select grade appropriate verses from school students of Kerala.

### **Participants**

2640 school students belonging to Malappuram, Palakkad and Kozhikode districts, by taking 240 students per each grade (grades 2 through 9) from Government (7), aided (4) and unaided (1) schools.

### **Procedure**

The exact steps followed in the study are listed below.

1. Selecting appropriate words or sentences/ passage/ lines of the poem from Malayalam text book of first standard to higher secondary
2. Deciding the length of writing material appropriate for each standard/ classes.
3. 240 students sampled from each grade using stratified random sampling
4. Obtaining written scripts from sampled students
5. Ordering the scripts in each grade from lowest to highest quality based on 10 point criteria (Shape of the letter, Size of the letter, Space between the letters, Space between the words, Space between the lines, Proportion, Margin, Slanting, Clarity and speed, and Straightness of lines.
6. Choosing 10 sets of scripts per grade representative of spectrum of handwriting quality from lowest to highest (of that grade)
7. Systematically checking and comparing each of the ten categories (sets) in a given grade with categories in other grades, to arrive at 30 initial categories of handwriting from lowest to highest quality (with each category represented by spectrum of comparable specimens) by uniting comparable handwriting categories across grades.
8. Identify a script from each category that best represent the category (arriving at a 30 sample initial scale).
9. Give the initial scale of 30 scripts to five judges (experts) who reconsidered the order and categories according to merit according to neatness, legibility, and correct alignment
10. Assigning score for each sample based on the individual judgment of expert.



11. Averaging the score given by the experts to obtain the score value of each sample in the initial scale.
12. Reordering the 30 sample initial scale based on the mean value of expert judgement
13. Discard/ sort up initial scale samples which obtained mean values within 0.5 score distance from the integer score
14. Choosing a set of scripts that represent each value in the final scale.
15. Identifying sample scripts for each scale value (within the range of the grade) from among the scripts obtained from the grade
16. Presenting the sample scripts for each scale value (by grade)

## Results

A handwriting scale with 19 quality levels for use in grade 2 through 12 with three illustrative scripts was compiled. The lowest quality level is scored 1 and the highest level is scored 19 (Appendix A). The scale developed based on based on 10 point criteria Shape of the letter, Size of the letter, Space between the letters, Space between the words, Space between the lines, Proportion, Margin, Slanting, Clarity and speed, and Straightness of lines, can be used to rate student handwriting under standard conditions by comparing overall merit against the standard given. In uncertainty, the evaluator may compare the script against the standard on the above 10 criteria. Table 1 shows cumulative percentage of students scoring  $\leq$  to scores 1 to 19 on handwriting scale in Malayalam from grade 2 through grade 12.

Table 1

*Cumulative Percentage of Students Scoring  $\leq$  to Scores 1 to 19 on Handwriting Scale in Malayalam from Grade 2 through Grade 12*

Handwriting score	Cumulative percentage of students scoring $\leq$ to scores by Grades										
	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
1	12.1	12.5	7.5		5.4	0.4	-	-	-	-	-
2	<b>55.4</b>	33.8	22.9	9.2	12.5	5.4	-	-	-	-	-
3	89.6	<b>67.1</b>	<b>51.7</b>	30.8	20	10.4	6.7	4.2	-	-	-
4	100	91.3	73.8	<b>62.1</b>	26.3	16.7	11.7	11.3	3.3	-	-
5	-	100	90.4	71.7	37.9	32.5	19.6	15.8	8.3	5.8	6.3
6	-	-	100	79.2	48.3	37.9	25.4	21.3	17.9	12.5	12.9
7	-	-	-	84.2	<b>55.8</b>	45.4	37.1	31.3	22.9	21.7	23.8
8	-	-	-	89.2	60.8	49.6	43.8	40.4	27.9	30.4	30
9	-	-	-	93.8	65	<b>52.1</b>	<b>53.8</b>	43.8	32.1	36.7	34.6
10	-	-	-	95.4	70.4	57.5	64.2	45.4	47.1	44.6	47.1
11	-	-	-	99.2	77.1	67.1	74.2	<b>48.8</b>	<b>51.7</b>	<b>50</b>	<b>51.3</b>
12	-	-	-	100	83.8	70.8	82.5	57.1	57.1	55.8	56.3
13	-	-	-	-	90	78.8	89.2	64.6	63.3	59.6	64.2
14	-	-	-	-	94.6	84.2	94.2	72.9	68.3	62.9	68.3
15	-	-	-	-	100	95	97.9	81.7	80.8	72.5	79.2
16	-	-	-	-	-	100	100	88.3	85.8	84.2	86.3
17	-	-	-	-	-	-	-	94.2	95	92.1	93.3
18	-	-	-	-	-	-	-	97.5	98.3	97.5	97.9
19	-	-	-	-	-	-	-	100	100	100	100

The HW score of typical student increases from two in grade 2, to eleven in grade 12. Also, dissimilarity in handwriting performance of students amplifies as they move up in school. While there is gradual increase in HW score of students from grade 2 to 5, there is more marked upturn in the handwriting score as students move from grade 5 above. Malayalam handwriting performance of students level off by grade 9, though there is a slight improvement even after grade 9 in handwriting of students who performs poor on the task. Likewise, post grade 8, there is further increase in the handwriting performance of students who did well on the task in lower grades. There is fivefold increase in quality of handwriting of an average student as s/he moves up from grade 2 to grade 11 or 12. The typical handwriting score of grade 2 student is 2, of grade 3 and 4 students is 3, of grade 5 student is 4, of grade 6 student is 7, of grade 7 and 8 students is 9, those of students in grade 9 through 12 are 10. One in five students in grade 5 (after lower primary schooling) has handwriting score typical of students who are below two grades to them. One in five students in grade 8 perform handwriting in Malayalam below or at par with grade 4 students only. There is observable difference in quality of handwriting of boys and girls, especially from grade 6 onwards and hence for better interpretation of scores, mean performance on handwriting of boys and girls at each grade level are also provided along with the scale (Appendix A).

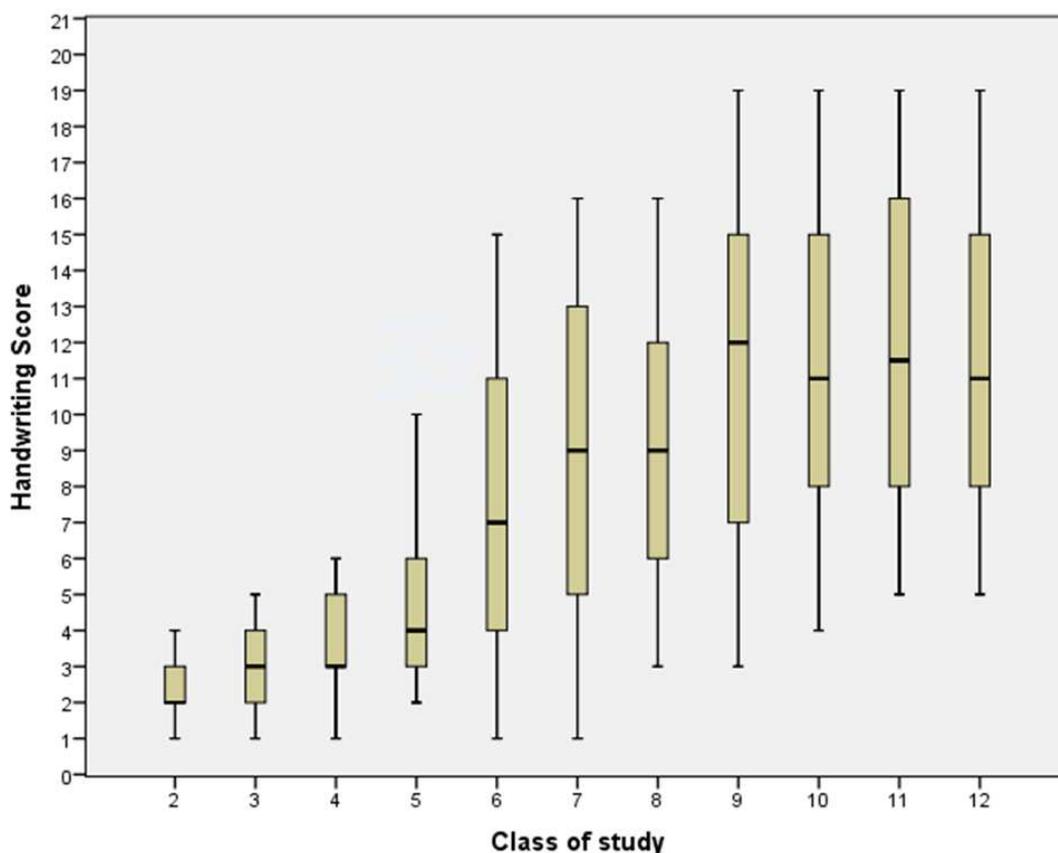


Figure 1. Boxplots showing the distribution of Malayalam handwriting scores of students in grade 2 through grade 12.

### Conclusion

Need for development of a handwriting scale for facilitating the instruction, formative and summative assessment and for providing feedback on where students stand and where they can move with respect to their handwriting. A Malayalam Handwriting scale is developed for scoring handwriting based on global assessment on 10-point criteria for students in grade 2

to 12. To be used by teachers, counsellors, parents and students for providing samples and rating the quality of handwriting production. Using the scale students can be shown where they are at present and how they can progress from there on a continuum to better work. The developed scale can serve, once a minimum standard has been set, as classroom screening device for locating pupils who need remedial assistance and encouragement in handwriting. Those who use the scale need to match the student scripts obtained under standard conditions of writing with the sample writings provided in this scale to obtain the handwriting score of the student. Users can read and interpret the score based on the norms (by grade and gender) provided. It is especially useful with those students who struggle with handwriting to get benefited by planned and explicit instruction on it. Teacher modelling and frequent opportunities for handwriting are important too.

### References

- Ayres, L. P. (1912). *A scale for measuring the quality of handwriting of school children* (No. 113). Russell Sage Foundation. Dept. of Child Hygiene.
- Berninger, V. W., Rutberg, J. E., Abbott, R. D., Garcia, N., Anderson-Youngstrom, M., Brooks, A., & Fulton, C. (2006). Tier 1 and tier 2 early interventions for handwriting and composing. *Journal of School Psychology, 44*(1), 3-30.
- Berninger, V. W., Abbott, R. D., Augsburger, A., & Garcia, N. (2009). Comparison of pen and keyboard transcription modes in children with and without learning disabilities. *Learning Disability Quarterly, 32*(3), 123-141
- Bounds, G. (2010). How handwriting trains the brain. *The Wall Street Journal*. October 5. <http://online.wsj.com/article/SB10001424052748704631504575531932754922518.html>
- Christensen, C. A. (2005). The role of orthographic-motor integration in the production of creative and well-structured written text for students in secondary school. *Educational Psychology, 25*(5), 441-453.
- Crook, C., & Bennett, L. (2007). Does using a computer disturb the organization of children's writing?. *British Journal of Developmental Psychology, 25*(2), 313-321.
- Desai, B., & Mavarkar, A. (2015). H2 factor analysis of handwriting-an approach. *Vignettes of Research 3*(1) 16-25. <http://voresearch.org/documents/2015/3.1/3102.pdf>
- Desai, K.G. (1986). *Diagnosis of Defects in Language Ability of Children Studying in Std. IV and a Tryout of a Remedial Programme for Their Correction, 1986* (Gujarat State School Textbook Board financed) .
- Engel-Yeger, B., Nagauker-Yanuv, L., & Rosenblum, S. (2009). Handwriting performance, self-reports, and perceived self-efficacy among children with dysgraphia. *American Journal of Occupational Therapy, 63*(2), 182-192.
- Feder, K., Majnemer, A., & Synnes, A. (2000). Handwriting: Current trends in occupational therapy practice. *Canadian Journal of Occupational Therapy, 67*(3), 197-204.
- Feder, K. P., & Majnemer, A. (2007). Handwriting development, competency, and intervention. *Developmental Medicine & Child Neurology, 49*(4), 312-317
- Freeman, F. N. (1959). A new handwriting scale. *The Elementary School Journal, 218-221*.
- Gafoor, A. K. Sajeev. T.(2009). July Difficulties In Writing Malayalam Among Upper Primary School Pupils. *GCTE Journal Of Research And Extension In Education, 4* (2), 15-26.
- Goldberg, A., Russell, M., & Cook, A. (2003). The effect of computers on student writing: A meta-analysis of studies from 1992 to 2002. *The Journal of Technology, Learning and Assessment, 2*(1).3-50.
- Graham, S., Harris, K. R., & Fink, B. (2000). Is handwriting causally related to learning to write? Treatment of handwriting problems in beginning writers. *Journal of educational psychology, 92*(4), 620.



- Graham, S., & Harris, K. R. (2005). Improving the writing performance of young struggling writers theoretical and programmatic research from the center on accelerating student learning. *The journal of special education*, 39(1), 19-33.
- Graham, S., & Weintraub, N. (1996). A review of handwriting research: Progress and prospects from 1980 to 1994. *Educational psychology review*, 8(1), 7-87.
- Marr, D., Cermak, S., Cohn, E. S., & Henderson, A. (2003). Fine motor activities in Head Start and kindergarten classrooms. *American Journal of Occupational Therapy*, 57(5), 550-557.
- Nair, A.S. & Joseph George (1967). *Kerala University Handwriting Scale*. Department of Education, University of Kerala.
- Owens, L. L. (1994). Handwriting Without Tears®. *Educational Research*, 78(3), 174-177.
- Pagliarini, E., Guasti, M. T., Toneatto, C., Granocchio, E., Riva, F., Sarti, D., ... & Stucchi, N. (2015). Dyslexic children fail to comply with the rhythmic constraints of handwriting. *Human Movement Science*, 42, 161-182.
- Peeverly, S. T. (2006). The importance of handwriting speed in adult writing. *Developmental Neuropsychology*, 29(1), 197-216.
- Peeverly, S. (2012). The relationship of transcription speed and other cognitive variables to note-taking and test performance. *Handwriting in the 21st Century*. Presented at Handwriting in the 21st Century? An Educational Summit, Washington, DC, January 23.
- Pollock, N., Lockhart, J., Blowes, B., Semple, K., Webster, M., Farhat, L., J. (2009). *Handwriting Assessment Protocol. 2nd ed.* Hamilton: CanChild Centre for Childhood Disability Research, School of Rehabilitation Science, McMaster University.
- Qiu, L., Jin, L., Dai, R., Zhang, Y., & Li, L. (2015). An Open Source Testing Tool for Evaluating Handwriting Input Methods. arXiv preprint arXiv:1506.00176
- Saperstein Associates. (2012). "Handwriting in the 21st Century? Research Shows Why Handwriting Belongs in Today's Classroom: A Summary of Research Presented at Handwriting in the 21st Century? An Educational Summit."  
[http://sapersteinassociates.com/data/2\\_29\\_HW\\_Summit\\_White\\_Paper\\_eVersion.pdf](http://sapersteinassociates.com/data/2_29_HW_Summit_White_Paper_eVersion.pdf)
- Thorndike, E. (1910). Handwriting: Introduction. *The Teachers College Record*, 11(2), 1-3.
- Trilling, B., & Fadel, C. (2009). *21st century skills: Learning for life in our times*. John Wiley & Sons
- Zubryzcki, J. (2012). *Summit to make a case for teaching handwriting*. Education Week. Retrieved from [http://www.edweek.org/education/2012/01/25/18handwriting\\_ep.h31.html](http://www.edweek.org/education/2012/01/25/18handwriting_ep.h31.html).