

Status of writing readiness of urban school children with poor handwriting

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■ **ABSTRACT** : The present study was designed to identify urban school children with poor handwriting in English and explore their level of writing readiness. A sample of 60 children from grade 3 in the age group of 7-9 years was drawn from two public schools of Ludhiana city with average or above average intellectual abilities. Raven's Coloured Progressive Matrices (Raven, 1965) was used to identify the intellectual abilities of children. Occupational Therapy Screening Test (Lilley, 2006) Set A was used to assess the handwriting skills of the children. Writing Readiness Assessment Tool was used to assess different pre-writing skills. Finding of the study revealed that more than half of the children with poor handwriting skills were found to have poor writing readiness skills followed by average and good level. It was further found that in all the dimensions of writing readiness, major proportion of children had poor level of performance. Out of all the dimensions of writing readiness, 'Moving from freedom to confinement' was found to be poorest skill in children with poor handwriting.

■ **KEY WORDS**: Poor handwriting, Writing readiness, Moving from freedom to confinement

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Handwriting is the main technique for primary school aged children to convey themselves in written form and to reveal their knowledge of learned concepts. It is important to identify at the early stages of development whether children have problems in performing the task of handwriting. In fact, the World Health Organization (2002) referred handwriting complications as one of the drawback since it creates hurdle to school participation, a notable element in the regular developmental activity of the child. Complication with handwriting needs considerable observation as it hinders a child's ability to manage letter development, which further interferes a child's capability and belief as

a compositional writer (Case-Smith, 2002 and Graham *et al.*, 2000). When a child is not capable to conduct the mechanical feature of writing in the young schooling years, he/she grows difficulty with attending to perceptual content. Inadequate handwriting presentation frequently gives a poor academic presentation which finally shows a hindrance in self-confidence (Erhardt and Meade, 2005). Importance of handwriting has also an impact on daily routine for children in all the young age groups. The results of handwriting constraints are substantial and regulated not merely to academic presentation, but as well to a child's self-image, self-esteem, attitude and manners (Jackman and Stagnitti, 2007).

Many children with poor handwriting skills have been found to have poor co-ordination and pre-writing skills. Before beginning the act of handwriting, children need to develop readiness skills for forming letters, such as the comprehensive abilities of various sensorimotor systems, the development of large and small muscles, visual perception, fine motor skills, and in-hand manipulation skills. If children without sufficient development of such readiness skills learn handwriting, they are at risk of developing bad handwriting habits, which may lead to difficulties in developing handwriting legibility. According to many studies there are various factors connected to the issues involved in acquiring readiness skills before starting handwriting (Alston and Taylor, 1987 and Exner, 1992). Among those factors, fine motor skills allow for the demonstration of good handwriting legibility through the ability to control a handwriting tool with speed and accuracy over the course of activities such as fine motor precision, manual dexterity, and in-hand manipulation. As such, fine motor skills are essential for children before developing the repeated behaviour of holding appropriate writing utensils. (Henderson and Pehoski, 2006).

Benbow *et al.* (1992) also listed four prerequisite areas *viz.*, dominant hand use, proper posture and pencil grip, midline crossing with the dominant hand and ability to copy the different shapes. Another significant readiness skill is kinesthetic readiness, which is also an important precursor to handwriting instruction. A foundation in kinesthesia allows reception of ongoing error information from handwriting efforts. This essential information is stored in memory to be recalled when the movement is frequent. While younger children may replace visual for kinesthetic feedback in the early elementary years, the switch to kinesthetic feedback should be made ultimately to produce faster handwriting. If this switch is not made, the increasing demand for writing construction in the later elementary years may result in academic inefficiency. Cognitive readiness which is integral part of writing readiness also affects the handwriting performance of the children. The cognitive skills include attention, perception, memory and language and how they cause the learning of motor skills. However, the part of cognition declines once the skill is acquired and refinement of skill is in development.

Children with drawing experience, especially of geometrical shapes, have been known to learn

handwriting more easily. Beery (2004) emphasized that before the child learns how to write, the basic geometric shapes have to be taught and mastered. In pre-school ages, drawing geometrical shapes develops from simple to complex ones in the following sequence

- Vertical strokes (age 2 year)
- Horizontal strokes (age 2 year 6 month)
- Circles (age 3 year)
- Cross (age 4 year)
- Square (age 5 year) and
- Triangle (age 5 year 6 month).

Failure on visual-motor tests may be caused by underlying motor processes and visual-cognitive deficits or combination of these abilities. It is an vital variable to a child's handwriting skills, particularly when he is tracing, copying or transposing from printing material to manuscript or cursive writing. Apart from visual-motor co-ordination, motor planning, cognitive and perceptual skill as well as accurate processing of tactile and kinaesthetic information have been indicated as prerequisites for handwriting skill acquisition (Maathuis *et al.*, 2010). Very few statistical data are available to understand the interplay between various dimensions of writing readiness and quality of handwriting among primary school children. Therefore, with keeping all factors under consideration, the present study was planned with the following objectives:

- To identify urban school children with poor handwriting
- To assess the gender differences in poor handwriting skills of urban school children.
- To assess the level of writing readiness in children with poor handwriting.

■ RESEARCH METHODS

Sample selection :

The study was conducted in urban public schools of Ludhiana city. Out of four Zones of Ludhiana City, Zone-I was purposely selected for the study. A complete list of all Public schools (affiliated with CBSE) falling in this selected zone was procured from the official website of District Education Officer. In total, six schools were approached by the researcher. Out of these six schools, only two schools ensured full support and gave permission for conduct of the present study. The total sample of the study comprised of 60 children of grade 3 from two public schools of Ludhiana city.

Research tools used:

Occupational therapy screening test (Lilley, 2006):

(I) Set –A was used to assess the handwriting of the selected children on 12 dimensions as described below:

- Correct formation of the lower case letters.
- Correct formation of the upper case letters.
- Correct formation of numbers.
- Proper formation of letters and numbers alignment on line.

- Consistency in size of letters and numbers.
- Consistency in spaces between letters.
- Consistency in spaces between words.
- Use of capital letters.
- Use of margins.
- Reversals. : four categories of reversals were included *i.e.*

- Mirror image b for d
- Inversions p for b
- Inverted reversals p for d, u for n, 6 for 9
- Reversing a letter in isolation e.g. ‘was’ instead of ‘saw’ or ‘45’ instead of ‘54’.

- Readability of writing.
- Time taken to finish written work.

Correct response in each parameter carried one mark. The scores were classified into following levels of handwriting.

Sr. No.	Range of scores	Level of handwriting
1.	9-12	Good
2.	5-8	Average
3.	1-4	Poor

Raven’s coloured progressive matrices (Raven, 1965) :

The coloured progressive matrices was used to screen children with average or above average intellectual abilities. The scale consists of 36 problems divided into three sets of 12. A student’s total score provided an index of his intellectual capacity. It is a performance test. The total raw scores were converted into percentiles and accordingly the students were given

Sr. No.	Percentile	Grade	Level of intelligence
1.	95 and above	Grade I	Intellectually superior
2.	75-95	Grade II	Above average
3.	25-75	Grade III	Average
4.	5-25	Grade IV	Below average
5.	>5	Grade V	Intellectually defective

following grades that indicated the level of their intellectual ability:

Writing readiness assessment tool :

In order to assess the levels of writing readiness in the children, Self-structured Writing Readiness Assessment Tool was used. It was designed to measure laterality, directionality, arm-hand co-ordination, eye-hand co-ordination, ocular control, muscular control, the correction of perseveration and concept of terms such as right- left, up- down, top- bottom, in – out, under-over, beginning–end, tall- short, on- off, big-little, around-across, middle-center. It also included drawing and tracing of vertical lines, horizontal lines, circle and variations of the circle and oblique lines. The rough draft of the tool was sent to two experts in the field of learning disability. After doing minor changes as suggested by the experts, it was once again sent for the approval. The finalized writing readiness assessment tool was pre – tested before employing it for the final testing. A deficit score in any of the sub-skills included in the test indicated difficulties in particular sub-skills of writing readiness. The dimensions measured in the tool are described as under:

- Moving from freedom to confinement measured arm-hand co-ordination, eye- hand coordination and muscular control.
- Drawing and tracing of circle measured tracing and drawing of variations of the circle.
- Drawing of curves measured different variations of curves with right/left orientation.
- Drawing and tracing of horizontal lines measured tracing and drawing of horizontal lines with concept of directionality as straight and horizontal line is important, both for constructing letters and for use as a guideline in space on which letters are to be written.
- Drawing and tracing of vertical lines measured tracing and drawing of vertical lines with concept of directionality with production of shapes by combining different forms of circle and vertical lines.
- Drawing and tracing of oblique lines measured tracing and drawing of oblique lines keeping directionality in mind. Mastery in the oblique lines help a child to write letters such as A, K, N, R, V, W, X, Y, Z.
- Continuity of motions involving curves and straight lines measured tracing and drawing of zig-zag, curling lines, co-ordination of paper and lines. While

creating letters a child needs to use its pencil fluently in all directions.

- Use of transposing markings measured whether the child can copy from paper to paper.
- Clarity of the concept of below, above and on the line measured whether the child has understanding about the concepts such as on the line, above the line, below the line. This helps to judge whether child knows where to write or not.
- Ability to differentiate the size measured whether the child can differentiate between tall and short, big and small, large and small letters and has knowledge of alphabet size while writing.

Scoring:

Each dimension was scored separately. The total score of each dimension determined strength and weakness of the child in that particular dimension. The total scores obtained were classified as below:

Sr. No.	Range of scores	Level of writing readiness
1.	0-12	Poor
2.	13-25	Average
3.	26-39	Good

Pre – testing of the tools:

Pre–testing of the research tools was conducted to have an outlook of the applicability of the tools in the population to be tested. All the research tools viz., Occupational Therapy Screening Test (Set-A), Self–Structured Writing Readiness Assessment Tool and Raven’s Progressive Matrices were pre – tested on 15 students from Grade 3. These students were randomly selected from BVM school, Kitchlu Nagar, Ludhiana. These selected students and the school was excluded from the final sample. The tests were found to be applicable for the particular age group as students were able to perform on all the items without any problem.

Data collection :

The researcher personally visited and approached principals of the six public school of Ludhiana city. Out of these six schools, only two schools had given permission for the study.

The stepwise procedure of data collection is described as follows:

Children with poor handwriting were identified by using Set-A of Occupational Therapy Screening Test-

(English version). The handwriting were assessed on the following 12 dimensions:

- Correct formation of lower case letters.
- Correct formation of upper case letters.
- Formation of numbers.
- Alignment of letters and numbers on line
- Consistency in size of letters and numbers
- Spacing between letters
- Spacing between words
- Use of capital letters.
- Use of margins line.
- Reversals of letter and numbers.
- Readability of writing.
- Time taken to finish written work.

Intellectual ability of the selected children with poor handwriting was assessed by using Raven’s Coloured Progressive Matrices.

Self-structured Writing Readiness Assessment Tool was used to assess the level of writing readiness skills of the selected children. The tool was assessed on following 10 dimensions

- Moving from freedom to confinement
- Drawing and tracing of circle
- Drawing of curves
- Drawing and tracing of horizontal lines
- Drawing and tracing of vertical lines
- Drawing and tracing of oblique lines
- Continuity of motions involving curves and straight lines
- Use of transposing markings
- Clarity of the concept of below, above and on the line
- Ability to differentiate the size

RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Identification of urban school children with poor handwriting :

There are four zones in the Ludhiana city viz., Zone-I, Zone-II, Zone-III and Zone-IV. Out of these four Zones, Zone-I was purposely selected for the study keeping in view easy access to schools as the study involved frequent visits. From Zones-I, a complete list of all public schools (affiliated with CBSE) falling in this

selected zone was procured from the official website of District Education Officer. In total, six schools were approached. Out of these six schools only following two schools ensured full support and gave permission for conduct of the present study.

- Bal Baharti Public School, Dugri Ludhiana
- BVM Senior Secondary School, Chandigarh Road, Ludhiana

There were five sections of Grade 3 in both the schools and each section had more than 40 children. Thirty children were randomly selected from each section and were given Occupational Therapy Screening Test (Lilley, 2006) to assess their handwriting skills. Therefore, in total 300 children (150 from each school) were tested for poor handwriting. However, 118 children from both the schools were found to have poor handwriting. These children were given Raven’s Coloured Progressive Matrices test (Raven, 1965) to assess their intellectual abilities. 98 children were found to have average or above average intellectual abilities. Out of these 98 students, 60 were randomly selected and enrolled as final sample for the study. Hence, the final sample comprised of 60 children of grade 3 from two public schools of Ludhiana city. These selected 60 children were identified as children with poor handwriting for the present study.

Gender differences in poor handwriting skills of urban school children :

The information furnished in Table 1 depicts the gender-wise distribution of urban school children with poor handwriting. It was clearly seen from the table that 63.33 per cent of the boys were found to have poor handwriting skills on the basis of occupational therapy screening test in contrast to girls whose percentage was found comparatively much lower (36.67 %). It also revealed that more number of boys (63.33%) had poor handwriting skills as compared to girls. These findings are strengthened by the claim of Maeland who (1992) while studying handwriting and perceptual-motor skills in children found that mostly boys were identified as

Variables	Children with poor handwriting	
	Frequency (f)	Percentage (%)
Gender		
Boys	38	63.33
Girls	22	36.67

children with poor handwriting. He further stated that the proportion of boys with poor handwriting was larger than expected.

Assessing the level of writing readiness in children with poor handwriting :

Table 2 describes the frequency and per cent distribution of children with poor handwriting across three levels of writing readiness. The overall picture of the table revealed that more than half (56.66%) of the children with poor handwriting had poor writing readiness followed by average level that was found in 28.33 per cent of children and remaining 15 per cent were found to have good level of writing readiness. The results indicated poor writing readiness skills in children with poor handwriting. Similar findings were reported by Kaur (2014) who also revealed that majority of children with poor handwriting performed poorly on writing readiness skills.

Levels of writing readiness	Children with poor handwriting	
	Frequency (f)	Percentage (%)
Good	9	15.00
Average	17	28.33
Poor	34	56.67

Table 3 explains the frequency and per cent distribution of children with poor handwriting across various dimensions of writing readiness. It was found that majority (71.67%) of the students with poor handwriting had poor skill of ‘Moving from freedom to confinement’. It measured arm-hand co-ordination, eye-hand co-ordination and muscular control. 16.67 per cent had average level and 11.66 per cent of children had good level of this sub-skill. Therefore, on the basis of these finding, it can be concluded that majority of the children had difficulties in arm-hand co-ordination, eye-hand co-ordination and muscular control. In favour of this finding, Marr *et al.* (2001) also reported that handwriting readiness is a prerequisite skill for handwriting as it involves small muscle development, tool manipulation, eye-hand co-ordination, basic stroke formation, alphabet recognition and familiarity of written language.

In the next dimension of writing readiness *i.e.* ‘Drawing and tracing of circle’ which measured skill for

tracing and drawing of variations of the circle. Percentage differences were observed in proportion of children across various levels. Fifty per cent of children

Table 3 : Frequency and per cent distribution of children with poor handwriting across various dimensions of writing readiness (n=60)		
Dimensions of writing readiness	Children with poor handwriting	
	Frequency (f)	Percentage (%)
Moving from freedom to confinement		
Good	7	11.67
Average	10	16.67
Poor	43	71.67
Drawing and tracing of circle		
Good	11	18.33
Average	19	31.67
Poor	30	50.00
Drawing and tracing of curves		
Good	7	11.67
Average	25	41.67
Poor	28	46.67
Drawing and tracing of horizontal lines		
Good	18	30.00
Average	20	33.33
Poor	22	36.67
Drawing and tracing of vertical lines		
Good	10	16.67
Average	26	43.33
Poor	24	40.00
Drawing and tracing of oblique lines		
Good	13	21.67
Average	26	43.33
Poor	21	35.00
Continuity of motion involving curve and straight lines		
Good	9	15.00
Average	25	41.67
Poor	26	43.33
Use of transposing markings		
Good	13	21.67
Average	23	38.33
Poor	24	40.00
Clarity of the concept of below, above and on the line		
Good	10	16.67
Average	19	31.67
Poor	31	51.67
Ability to differentiate the size		
Good	7	11.67
Average	25	41.67
Poor	28	46.67

with poor handwriting had low score in drawing and tracing of circle as compared to 31.67 per cent who were found to have average level. Only 18.33 per cent of children with poor handwriting were having good mastery on drawing and tracing.

Similarly in 'Drawing and tracing of curves' dimension, it was seen from the data that 46.66 per cent of the children had poor and nearly equal percentage of children (41.67%) were having average level of skill to draw and trace curves. Only 11.67 per cent of children were in the good level of this skill. Therefore, it can be inferred that children with poor handwriting had poor skills in drawing curves and this had negatively affected their handwriting performance. Maarse *et al.* (1991) also reported that practicing movements such as arcades, clockwise circles, counter clockwise circles and factory rooftops improved handwriting quality.

Further in case of 'Drawing and tracing of horizontal lines', the concept of directionality was assessed. Straight and horizontal lines are important, both for constructing letters and for use as a guideline in space on which letters are to be written. It was clearly seen from the table that 36.33 per cent of the children with poor handwriting were having poor and nearly equal percentage of children (33.33%) had average level of ability to draw and trace horizontal lines. Whereas 30.00 per cent of children showed good command over this sub-skill. Ability to draw and tracing of horizontal lines is important for producing several alphabets and if a child doesn't have this concept, learning to write can be very confusing. For example, the letters "b," "d," "p," and "q," all look alike if the concept of orientation is not clear.

Similarly, in case of 'Drawing and tracing of vertical lines', ability to understand the concept of directionality with production of shapes by combining different forms of circle and vertical lines was examined. Mastery in vertical lines is important to produce the stick letters *i.e.* l, I, t, j and combination is important for clockwise letters *i.e.* m, n, h, b and p. From the data presented in the table it was evident that comparable number of children were found in the average (26.00%) and poor (24.00%) level of performance. Only 16.67 per cent of children showed good performance in this sub-skills.

'Drawing and tracing of oblique lines' which was the next sub-skill of writing readiness measured ability to trace and draw oblique lines keeping directionality in mind. Mastery in the oblique lines help a child to write

letters such as A, K, N, R, V, W, X, Y and Z etc. In this dimension, it was found that 43.33 per cent of the children were found in the average level and 35.00 per cent of children showed poor skills of drawing and tracing of oblique lines. 21.66 per cent of children were found to have good level of this sub-skills. In the next sub-skill of 'Continuity of motion involving curve and straight lines' which measured tracing and drawing of zigzag lines, curling lines and co-ordination of paper and lines, a comparable percentage (43.33 % and 41.67%) of children were found in the poor and average level of this sub skill, respectively whereas, only 15.00 per cent belonged to good category. If the child has difficulty in this pre-writing skill it leads to problem in writing, because if children, in producing zigzag lines or arcades and garlands, have to turn their paper it is an indication that they have a problem with preference of direction.

The next sub-skill 'Use of transposing markings', helps to identify whether the child can copy from blackboard to paper or from paper to paper as this helps them to complete their written assignments. The data regarding this sub-skill depicted that 40.00 per cent of children with poor handwriting had poor skill in the use of transposing markings whereas, 38.33 per cent of children showed average level of performance. However, 21.67 per cent of children performed at good level of this dimension.

One of the important steps in writing readiness is that children must possess the clarity of the concept of below, above and on the line. This dimension measures whether the child has understanding of the concepts such as on the line, above the line, below the line or not. This helps to judge whether child knows where to write or not. The data revealed that the children with poor handwriting were not well acquainted with the formation of alphabets on the given markings on paper as half of the children (51.66%) had shown poor performance on this dimension as compared to 31.66 per cent who had average command over the concept of below, above and on line. Further, it was also observed that only 16.67 per cent of children with good handwriting had clarity of these concepts against, 51.66 per cent of the students who were having poor understanding of the concepts.

The last dimension of writing readiness *viz.*, 'Ability to differentiate the size', which measured the child's ability to differentiate between tall and short, big and small, large and small letters and has knowledge of

alphabet size while writing. Equal percentage (46.67%) of children were found to have average and poor level of performance and remaining 11.66 per cent had good level of ability to differentiate the size of letters.

It was further observed that in all the dimensions of writing readiness, more number of children were found in the poor category of each dimension except in case of 'Drawing and tracing of vertical lines' and 'Oblique lines' where, maximum number of children were found in average category (43.33%). However, it was also observed that out of all the dimensions of writing readiness, 'Moving from freedom to confinement' was found to be the poorest in children with poor handwriting as 71.67 per cent of children were found poor in this dimension. Therefore, it can be concluded from the data that 'Moving from freedom to confinement' dimension was the weakest skill found in the children with poor handwriting. On the similar lines, Amundson (2005) also laid stress on the importance of the mastery of handwriting readiness skills before handwriting instruction is initiated. He explained that children who are taught handwriting before they are ready, they may become discouraged and develop poor writing habits that may be difficult to correct later. To meet the pre-requisites for writing readiness, the integrity of a number of sensory motor systems is also required.

Conclusion :

It can be concluded from the study that percentage of boys with poor handwriting were more as compared to girls. The study further revealed that more than half of the children with poor handwriting skills had poor writing readiness skills followed by average and good level. Further analysis of all the dimensions of writing readiness indicated that major proportion of children had poor performance in writing readiness skills. It was also found that out of all the dimensions of writing readiness 'Moving from freedom to confinement' was found to be poorest in children with poor handwriting. This indicated that majority of the children were having difficulty in arm- hand coordination, eye-hand co-ordination, muscular movement and control in writing.

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13th Year