Empowerment in Communication: Effects of Training in Lettering on Student-Teachers' Handwriting

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Abstract

Communication is a tool for empowerment and more so in academic achievement of students at all levels of education. Frequently, students are required to hand-write lesson notes and responses in examinations. Legible letterforms and fluent handwriting is fundamental in written communication within the school context in particular. Legibility ensures correct coding and decoding of information presented in written form. Research has shown that in spite of technological advancements in print communication, handwritten works remain important. This is because handwriting has both cognitive and motor benefits to hand-writers enhancing their brain function. This pilot study investigated a sample of 18 student-teachers pursuing a diploma in secondary education that had undergone training in "Lettering" as part of the skills in "Educational Media Practicals and Microteaching" course. The research tool comprised of a card with 12 sentences that respondents were required to copy on half A4 unlined paper. Results showed that training in lettering (a) fairly enhanced correct letterforms and (b) *did not necessarily* transfer into cursive. Therefore, there exists a serious challenge in cursive handwriting. It is recommended that deliberate efforts to teach cursive handwriting for students to train and enhance appropriate muscle memory for automaticity in writing and hand-brain coordination be made.

Keywords

Lettering, Cursive handwriting, letterforms, student-teachers

1   Introduction

Human beings are social beings. As a social being, man lives in the company of others. Therefore, communication as a tool for the process of socialization and academic learning is inevitable. There are different forms of communication: verbal, written and gestural. However, written communication is the most important for its ability to communicate and store this very information for future use.

Written communication involves writing of letters, numbers, other symbols and production of graphics. In the main, words are a combination of letters in the most part, and every piece of written communication (other than mathematics and highly technical sciences) comprises mostly of alphabetic letters. Consequently, it is paramount to every "person" to be able to write these letters (and hence words) and write well (or legibly). Words (or letters by extension) "code" information that is intended for (a) communicating an idea(s) to another person (receiver) who must accurately "decode" the message or (b) merely for storage for later reference. This argument emanates from the sentiments of the National Handwriting Association (2016) who assert that symbols (e.g.,

letters, numerals) are used to store information and communicate it to others. Illegible handwriting means that there is a breakdown in communication. This study, for example, was prompted by problems in reading (and thus scoring) students' handwritten works. Look at the two samples of handwriting in Figure 1 extracted from students' responses to an examination item on "language of mathematics." Although the handwriting demonstrated cursive or joined writing at some points, the letterforms poses serious challenges to the reader (and hence the examiner) of these works.
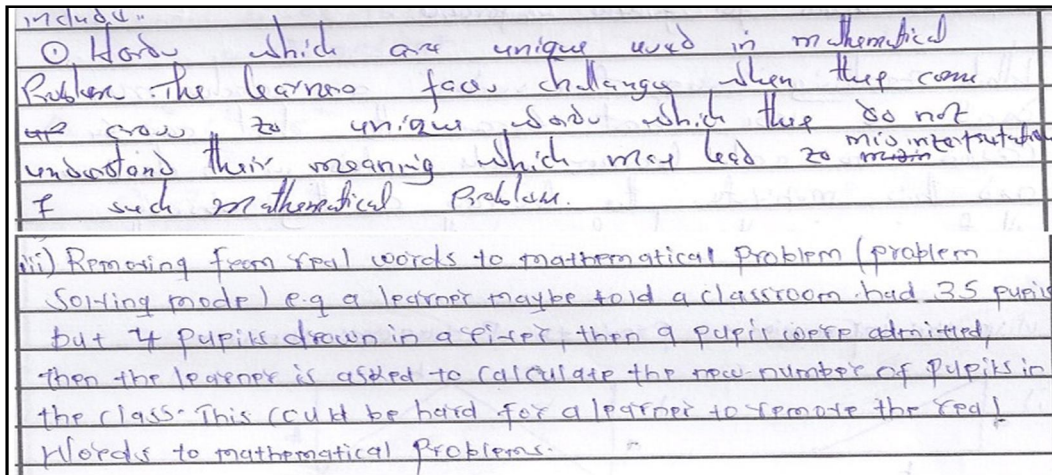

Figure 1 Sample handwriting for two students' responses to a test item

Children learn skills of letter formation and handwriting mainly in formal settings or in schools. Teachers play a significant role in facilitating the proper acquisition of these critical skills by children. Teachers must, of necessity, be adept at these requisite skills themselves in order to impart to the learners. It is without doubt that "one cannot give what he/she does not have." Throughout schooling (and beyond), legible handwriting is a means of communicating ideas during class assignments, homework, projects and written examinations. The success in academic achievement is determined partly by fluent and legibility in learners handwriting which enhance effective and efficient communication. Notice that "a person's ability to communicate in writing is compromised whenever part of text is illegible" (Jones & Hall, 2013, p.34).

2   Literature Review

2.1   *Importance of Handwriting*
Handwriting impacts on several aspects of learners and hand-writers in general. Research has demonstrated that handwriting plays a critical role in a number of human aspects (Jones & Hall, 2013; Graham, 2010; Hetter, 2011; Medwell & Wray, 2007; National Handwriting Association, 2016; Saperstein Associates, 2012) outlined in the following paragraphs.

Foremost, handwriting impacts on reading, writing and language abilities. The interrelationship between oral and written language and the processes that underlie these skills are essential for effective communication. Without consistent exposure to handwriting, students can experience difficulties in certain processes required for success in reading and writing such as retrieving letters from memory, reproducing letters on paper, spelling accurately, extracting meaning from text or interpreting the context of words and phrases. As Graham (2009-2010) puts it, "if children cannot form letters – or cannot form them with reasonable legibility and speed – they cannot translate the language in their minds into written text" (p. 20). The very reason why handwriting has this benefit

is because "handwriting requires careful perception and production of the distinguishing feature of each letter. The act of forming letters through handwriting builds kinesthetic and visual (orthographic) memory, thus helping students to more readily acquire alphabets knowledge" (Jones & Hall, 2013).

Secondly, handwriting has strong bearing on brain functioning. Handwriting has been shown to impact on neurological processes. The automaticity of letter production appear to facilitate higher-order composing processes by freeing up working memory to deal with the complex tasks of planning and organization, revision, critical thinking and regulation of text production. For an exemplar, according to Erhi (2005), cited in National Handwriting Association (2016), and Saperstein Associates (2012), when students are able to fast and easily recognize alphabet letters (irrespective of any slight variation in form) – extracting from text, they are better able to *decode* unfamiliar words and to quickly learn sight words and remember them long term. Jones and Hall (2013) (citing Christensen, 2005) contend that fluent handwriting decreases the cognitive demand of writing because writing letters and words are automated; while lack of handwriting fluency requires writers to consciously attend to their handwriting.

Finally, handwriting is fast becoming a means of interacting with computers (including tablets and smart phone revolution in general). This idea is getting more pervasive because computers have (or can be installed with) handwriting recognition capability apps. Technological innovation is enabling raw handwriting to be read and recognized by computers, facilitating a further means of human-computer interaction.

2.2   *Letter Formation*
Referring to the shape of letters, there are three classes/groups of letters: ascenders or ascending letters (e.g., b d h k), descenders or descending letters (e.g., g j p q) and medials (e.g., a c e i). Moreover, a graphological approach to letter classification is founded on the "hand and finger movements" which results into four groups of letters (Department of Education, 2009):
i)   The anti-clockwise letters: a, c, d, e, f, g, o, q, s, u and y
ii)   The "stick" letters: i, j, l and t
iii) The clockwise letters: b, h, m, n, p and r
iv)   The diagonal letters: k, v, w, x and z.

During training in "lettering", student-teachers were required to demonstrate writing of proper and legible letterforms. Proportionality of letter size: body, head and tail are emphasized; and overall letter shape. Adherence to these characteristics leads to distinctive and recognizable letterforms. Actual writing of these letters follows systematic hand and finger movements that are repeatable to enhance writing speed.

2.3   *Handwriting: Cursive or "joined"*
Fluency in lettering and handwriting through cursive or joined letters (within words) leads to enhanced writing speed. Writing speed enhancement benefits hand-writers, particularly students in classrooms/lectures where work is dictated, in a straight lecture or during timed tests.

Most hand writings are based on the "seven S's" as traits of good handwriting (e.g., Peterson handwriting). The *Seven "Ss"* (McNatt Learning Centre, 2003 – 2014; Department of Education, 2009) are:

1. The *shape* of the letters, or "letterforms," is consistent and written in a way that emphasizes distinguishing features of each letter or character.
2. The *smoothness* of writing depends on a rhythmic alteration between ballistic movements and control points – between quick movements out and downstrokes that slow at the base.
3. The *stops*, or "control points," give writers time to transition into subsequent letterforms.
4. The *slant* of each downstroke (the part of each letterform formed by moving down toward the baseline) should be consistent.
5. The *size* of each letter in relationship to other letters should remain consistent every time the letter is made.
6. The *spacing* of letters, when consistent, reinforces rhythm and size and maintains legibility.
7. The *style* or "neatness," of writing maintains legibility – cursive handwriting.

Research on handwriting "problems" or disability have been conducted to identify children with dysgraphia using scales such as the "Dysgraphia Handwriting Features" presented in Volman, van Schendel and Jongmans (2006, p.453). This scale is based on "Handwriting quality (legibility)" evaluated under 13 features, for instance: letter size – too large for the child's age, irregularities in joining letters, inconsistent letter size, and ambiguous letter forms among others.

3   Materials and Methods

3.1   Research Questions
This study sought to answer the following four questions: Do student-teachers' handwriting:
1. Demonstrate legible and consistent letterforms of each alphabet letter?
2. Allow appropriate word spacing and consistently so?
3. Demonstrate cursive or "joined" letters within words?
4. Provide enough space between lines?

3.2   Sample and Sampling Techniques
A sample of 18 student-teachers pursuing a Diploma course in Secondary Education was used. This sample was obtained through cluster random sampling from a class of "Educational Media Practicals and Microteaching." This class was put (a course requirement) into five groups (taken here as clusters). One cluster was selected at random which had 18 "members", and consequently all of them were included in the study. One sample of a respondent's written text was not used because the respondent drew guiding lines on the unlined paper.

3.3   Instrumentation
The handwriting task consisted of respondents copying a text (12 lines of text or pangrams, except line 8) presented on a printed card (a third of an A4 size paper). Respondents were asked to write in their usual style. They wrote the text on half unlined A4 sheet of paper. The following were the numbered text presented:
1. The quick brown fox jumps over the lazy dog.
2. Six of the women quietly gave back prizes to the judge.
3. Jay began removing six dozen black quilts with petty flaws.
4. Picking just six quinces, the new farm hand proved strong but lazy.
5. We could jeopardize six of the gunboats by two quick moves.
6. Judge Power quickly gave six embezzlers stiff sentences
7. The lazy judge was very quick to pay tax money for the barn.
8. The six men have power to seize the ship quickly.

9. Weekly magazines request help for and by junior executives.
10. I quickly explained that many big jobs involve few hazards.
11. Brown jars prevented the mixture from freezing too quickly.
12. Dave quickly spotted the four women dozing in the jury box.

3.4   Data Analysis

The analysis of sample handwriting was based on four modified features of "Peterson Handwriting" (McNatt Learning Centre, 2003 – 2014) and "Dysgraphia Handwriting Features" (Volman, van Schendel & Jongmans, 2006, p.453). These features are:

1. Letterforms – based on characteristics such as letter distortion, ambiguous letterforms, inconsistent letter shape (with unnecessary parts – e.g., long tails).
2. Word spacing – the average distance between two consecutive words in a line (measured nearest to 1 mm). Recommended: "leave one letter space between words" (Patel & Mukwa, 1992, p.16).
3. Joining letters (within a word or cursive) – how regular/consistent or nonexistent at all.
4. Space between lines – space for ascenders and descenders without overlap or collision of letters. Recommended: "gaps between lines should be only far apart so that ascending and descending characters do not touch" (Patel & Mukwa, 1992, p.16). The irregular lines could be "ascending, descending or fluctuating" (Martins et al., 2013).

4   Results and Discussions

This section will present the results and corresponding discussions on the research questions.

4.1 Research Question One

Does student-teachers' handwriting demonstrate legible and consistent letterforms of each alphabet letter?

To answer this question, two issues were assessed: (a) legibility of (or the ease to recognize) letters and (b) how consistent or repeatable same letterform was used for each letter in a sample text. Table 1 provides a summary showing that on average, 5.7 (approx. 6 out of the 26) letters in a given text were illegible and/or inconsistently written. It is typical, therefore, to expect hand-writers to display irregularity in the alphabet letters 21.9% of the time or in every five letters of the alphabet, one is irregularly written.

Table 1 Occurrence of illegible and inconsistent letterforms

Number of illegible/ Inconsistent letters in text	2	3	4	6	7	9	10
No. of respondents	3	1	4	2	3	1	3

Note: Each respondent had at least one inconsistent letterform

Detailed samples of selected letterforms are presented. Table 2 shows that five ascenders were irregularly or inconsistently written within a text. For example, letter "f" was malformed like a lowercase "t" or the letter "d" was formed from two separate parts. A number of respondents used uppercase "l" within a sentence.
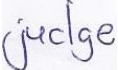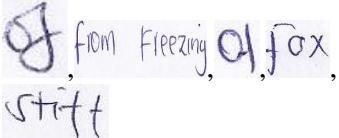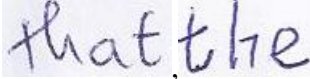
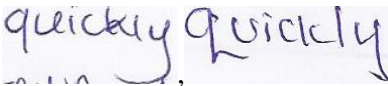**Table 2 Illegible/Inconsistent letterforms for ascenders**
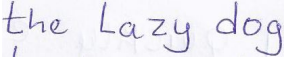
Letter	Tally	Samples	Description
d	2(11.8)		Two parts
f	5(29.4)		• Three parts • "unrecognized" • Like lowercase "t" • Long tail
h	2(11.8)		• Two parts • "unrecognized/curved"
k	11(64.7)		• Two parts distinct • No ascending part
l	4(23.5)		• Uppercase within sentence

Table 3 shows that nine medials were irregularly formed, for example, letter "a" was malformed like a lowercase "u", letter "e" was formed from two parts, sometimes not in contact and letter "n" malformed like lowercase "u".

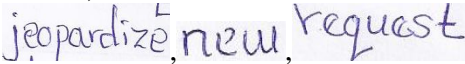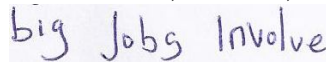**Table 3 Illegible/Inconsistent letterforms for medials**
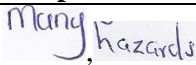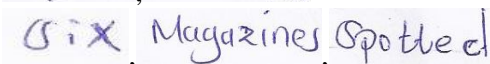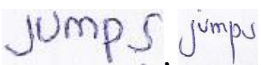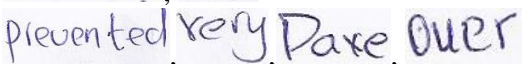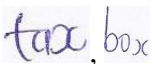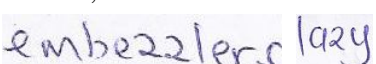
Letter	Tally	Samples	Description
a	1(5.9)		Like lowercase "u"
e	6(35.3)		Two parts
i	3(17.6)		Without 'head/dot' and uppercase
n	1(5.9)		Irregular
s	3(17.6)		• Long tail • Like lowercase "j"
u	5(29.4)		Uppercase "u"
v	4(23.5)		• Like uppercase "u" • Like lowercase "r" • Like lowercase "u"
x	6(35.3)		• Two parts • With Space
z	4(23.5)		Like numeral "2"

Table 4 shows that five descenders were irregular or inconsistently written, for example, letter "p" was formed from two parts and letter "q" was inconsistently used with uppercase within word or in a sentence.

Table 4 Inconsistent letterforms for descenders

Letter	Tally	Samples	Description
g	10(58.8)	*removing big*	Long tail
j	6(35.3)	*judges jumps*	Long tail
p	7(41.2)	*proved Proved*	• Two parts; uppercase
q	3(17.6)	*quickly quick request*	• No tail; uppercase
y	13(76.5)	*quickly pay*	Long tail

4.2   Research Question Two
Does student-teachers' handwriting allow appropriate word spacing and consistently so?

To answer this question, the actual lengths of spaces between consecutive words in six lines of text (i.e., 1, 3, 5, 7, 9 and 11) were measured to the nearest millimeter. One of the respondents aligned the paper vertically and so was excluded from this analysis. It was considered that paper orientation will affect word spacing. Minimum and maximum word spaces (lengths) are also presented in Table 4. Three measures were used to make judgment on the amount of space between words. These were the two broad letters "m" and "w" and two-letter word "by." The measurements shown for "m" and "w" are the average width from the measurements of these letters in the six lines of text. Based on letters "m" and "w", 15 (93.8%) and 100% of respondents allowed too much space between words respectively. In 5 (31.3%) or a third of the respondents, the average word space was enough to fit the two-letter word "by." Generally, it is concluded that respondents allowed too much space between words.

Table 4 Descriptive statistics of word spacing and character width (in mm)

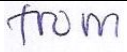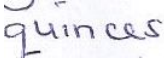| Respondent	Min.	Max.	Mode	Median	M(SD)	"by"	"m"	"w"
ID01	3	7	5	5	4.8(1.1)	6	3.8	3.3
ID02	1	9	4	4	4.0(1.6)	6	**4.5**	3.5
ID03	3	11	6	6	<u>6.4</u>(1.7)	<u>5</u>	3.3	4.0
ID04	2	7	4	4	4.4(1.3)	5	4.0	3.3
ID05	3	11	5	5	<u>5.4</u>(1.6)	<u>5</u>	3.2	3.0
ID06	3	8	4	5	4.8(1.1)	5	3.8	3.2
ID07	3	9	4	5	5.7(1.7)	6	3.8	3.2
ID08	2	6	3	3	3.5(1.3)	4	2.7	2.2
ID09	2	10	5	5	5.5(1.6)	6	3.0	3.3
ID10	2	5	4	4	3.7(0.7)	4	3.2	2.8
ID11	2	7	4	4	4.3(1.1)	5	3.7	3.7
ID12	3	10	5/6	6	5.8(1.8)	7	5.2	4.2
ID13	2	7	4	4	<u>4.1</u>(1.1)	<u>4</u>	3.2	3.2
ID14	2	9	6	6	<u>5.6</u>(1.5)	<u>4</u>	3.8	3.7
ID15	3	10	5	5	<u>5.2</u>(1.3)	<u>4</u>	2.8	2.2
ID16	1	5	3	3	3.1(1.0)	5	3.0	2.8

Notes: Min. = minimum word space, max. = maximum word space. ID01-ID16 = respondents. "by" is length of two-letter word, "m" is average width of lowercase letter "m" and "w" is average width of lowercase letter "w."

4.3 Research Question Three
Does student-teachers' handwriting demonstrate cursive or "joined" letters within words?

The analysis of text for cursive writing revealed that all respondents wrote mostly independent letters that were not joined, except for rare cases where short words were joined. Most often, this joined letters seemed to arose by coincidence – where the word(s) lends itself for such joining – and most inappropriately so. Therefore, no substantial evidence was obtained for cursive handwriting from this sample.

Table 5 Sample of words with joined letters

Sample	Letters joined
from	Three
quinces	Two
the	Three (inappropriately)
four	Four

4.4 Research Question Four
Does student-teachers' handwriting provide enough space between lines?

This question was answered by looking at (a) existence of touching or overlapping letters in consecutive lines of text and (b) the orientation of text lines: ascending, descending or fluctuating to the horizontal.

First, looking for the existence of touching or overlapping letters in consecutive lines in sample texts revealed that each respondent exhibited at least an irregular line spacing. That is, evidence existed in each sample text for insufficient line spacing where letters in consecutive lines touched or overlapped. Figure 2 shows two sample texts showing these irregularities, chosen from respondents' texts that had fairly straight lined text (not ascending, descending or fluctuating).
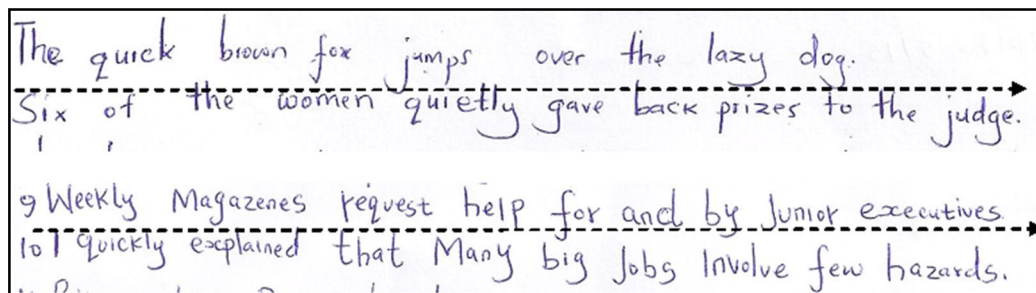
Figure 2 Two sample texts showing touching and/or overlapping lines

For the second analysis, the orientation of text lines to the "horizontal" was assessed. Less than 50% of the respondents demonstrated text with fairly straight lines. However, on the analysis of word orientation to the horizontal, it was found that every sample text had irregular word orientation (either ascending or descending).

Figure 3 shows sample texts which portray specific line irregularity. The first (top most) text shows that the lines tend to descend toward the right. It also demonstrates touching and overlapping text. The middle text shows the case of fluctuating text and finally the bottom text shows ascending lines.
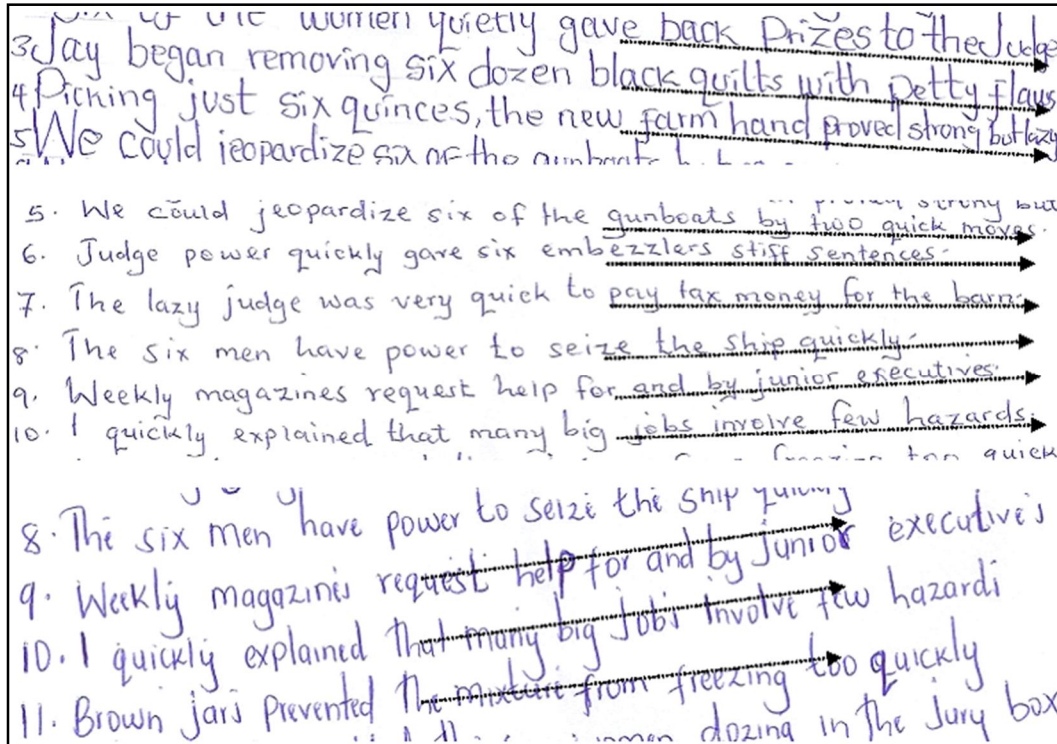

Figure 3 Sample texts indicating descending, fluctuating and ascending lines

5   Conclusion

Despite training in lettering, the following conclusions are deduced from the results of this study.

1. Most (19) alphabet letters were illegibly or inconsistently written in the text. Therefore, these texts can be misread or unreadable leading to communication breakdown where student's work is misread (and misunderstood).
2. The amount of word spaces is too large. The readability of text will be affected by frequent and inappropriate pauses.
3. The text did not demonstrate well-developed cursive handwriting. This implies that the writing speed is adversely affected.
4. In all the text, at least some evidence of insufficient line spacing was evident. A number of text lines were irregular: ascending, descending or fluctuating.

Consequently, it is recommended that training in both lettering and cursive handwriting is necessary. Cursive handwriting was hardly demonstrated and so the need for handwriting sessions in formative and advanced levels of students schooling.

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