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INFLUENCE OF WRITING INSTRUMENT ON THE HANDWRITING OF STUDENTS OF AN EDUCATIONAL INSTITUTE

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ABSTRACT

The present study aims at identifying the influence of writing instrument on the handwriting of students of an educational institute. Seventy-five students belonging to the age group 18 yrs. to 25 yrs. were selected for the study and five writing samples written with five different instruments (pen) were collected from each student. The samples were analyzed using stereomicroscope, hand magnifying glass and protractor to study the variations and it was found that the writings from Ball pen and Gel pen reveal no such significant difference but when the two compared with the writings from Fountain pen, a significant difference was observed. The line quality in case of Ball pen was found to be good whereas in that of fountain pen medium line quality was observed. In case of ball pen 56% samples had medium speed, 30% had fast and 13% had slow but in case of fountain pen 44% samples having medium speed, 10% having fast and 45% having slow speed.

Keywords: *Handwriting, Writing Instruments, Natural Variations Pen.*

I. INTRODUCTION

Handwriting acts as a major and principal factor in criminal activity and has been the topic of expert knowledge[7] and natural variation cause error in duplication of mental image produced in brain on paper because of its predictable nature which incomprehensibly gives an authenticity to handwriting[19].

Handwriting characteristic of an individual are distinctive way that are different from otherswriting. Hand writing examination is done to establish identity of person, to compare writing samples, and to determine forgery or disguise.

Handwriting characteristic are divided into two groups as:

1 Class characteristics
2 Individual characteristics

Class characteristics: - Class characteristics are those which exclude a group of persons having same writing characteristic. Class characteristic are not sufficient to establish authenticity of question document.

Individual characteristic: - Those characteristic which varies person to person and is used to compare from questioned to normal handwriting and capable to establish authenticity of question document .

External factor (writing instrument, writing surface) cause some degree of variation in handwriting. Mechanism of writing instrument and composition of writing ink and size shape, thickness of paper and its composition revealed certain identifying characteristic in handwriting.

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Writing instruments: A writing implement or writing instrument is an object used to produce writing. Most of these items can be also used for other functions such as painting, drawing and technical drawing, but writing instruments generally have the ordinary requirement to create a smooth, controllable line.

II. REVIEW OF LITERATURE

Black D.A. (1966):- Studied fiber tip pen characteristic, its mechanism and other description and how affect hand writing. He concluded that there are often marked differences in evidences of pen action or operating characteristics from one brand pen to another which alone would permit an opinion that two different pens were used, even if the shade of ink were identical.

1. [Jacques mathyer (1969) studied the influence of writing instrument on handwriting and signature and concluded that general characteristic of pencil and pen writing by the same individual are same but shading, pen pressure, line quality was not exactly same.
2. O. Hilton (1983):- Stated the significance of writing instrument on handwriting and suggested that an expert must know about variables produce by different types of writing instrument and give right opinion.
3. J F Masson (1985):- Conducted a study about whether the individual writers change their handwriting with writing instrument. Handwriting with different writing instrument exposed the suitability of comparing ballpoint pen writing with questioned felt tip writing, with definite curb.
4. De Angelis (1997): - Accompanied a study to reveal the effect of writing surfaces and author's position on handwriting and concluded that writing surfaces and position affect appearance and line quality of persons' hand writing.
5. Moran (1999): - Concluded that identifying details can be changed with type of writing instrument but still some repeated features used can establish authenticity of writer.
6. Nadege et al. (2011):- Mentioned how review factors influence the handwriting performance of adult. He collected electronic database and concluded that factors that influence the handwriting are age gender and pen pressure.
7. Sharma et al. (2015):- Examined handwriting under unusual circumstances such as on a table, wall, in a moving bus, on a thigh. They observed natural variation Vis- a- Vis unusual handwriting samples, other individualities were also observed like pen pressure, base line and tremors.
8. Upadhaya et.al (2018):- Studied the effect of different writing surface and writing instruments on signature and stated that characters are same as handwriting and examined various characteristics like slant, loop, angle and strokes.

Objective of the Study

Appendix A. To collect the writing sample from students, having the age between 18 to 25 years.
Appendix B. To analyze the data using particular tools (stereomicroscope, hand magnifying glass, protector, divider etc.)
Appendix C. To study the influence of writing instruments on person's handwriting.

III. MATERIAL AND METHOD

Material Required: Five variables of writing instruments, having different nib size, shape and ink such as ball point pen, gel pen, fiber tip pen, fountain pen, and pencil were collected as:

Figure 1. 5 Ball point pens of Bozon Company

Figure 2. 5 Gel pens of Elko's velo Gel Company

Figure 3. 5 Fiber tip pen of Rorito

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Figure 4. 5 Pencil of Apsara

Figure 5. 2 Fountain pen

Tool for data analysis:

- **Stereo microscope**: - Stereo microscope also called dissecting microscope is an optical microscope which uses low magnification power and gives 3D image formation of sample using reflected light rather than transmitted light. There are two types of magnification of stereo microscope. One is fixed magnification and other is pancratic magnification.

In this study fix stereo microscope having magnification of 40X was used to analyze samples

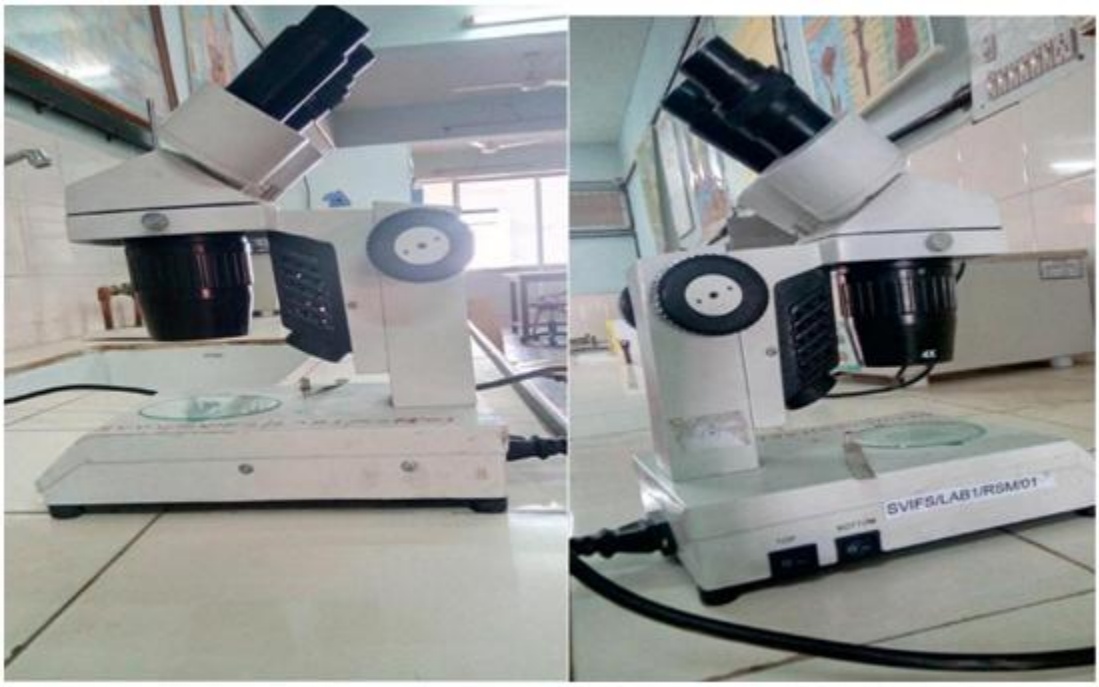

Figure2: Stereomicroscope

- **Hand magnifying glass:** - Magnifying glass was used to enlarge image and better view. Depositions of ink and line quality of Handwriting were examined.
- **Protector: -** Protector was used to identify angle of word or slant whether is forward, upward and straight.

IV. METHODOLOGY

Seventy-five handwriting samples of students of Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore between the ages of 18-30 years were collected.

All the demographic characteristics were recorded and writing sample was given to each individual.The samples were taken in sitting posture keeping smooth support media constant on A4 size print paper. All the individuals were made to write with five different types of writing instruments in order to check the variability in handwriting repeatedly five times.

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V. RESULT

Seventy-five samples were collected and examined for different characteristic such as line quality, slant, and speed. These factors were subdivided into three types and were assign numerical value 1,2 & 3 depending upon the characteristics of handwriting as:-

Numerical Value → / Character ↓	1	2	3
Line quality	1=Good	2=Medium	3=Poor
Slant	1=Straight	2= Rightward	3=Leftward
Speed	1=Fast	2=Medium	3=Slow

All the variables were analyzed under these three categories and the result was tabulated. After analysis of all the writing samples collected from different writing instruments and writing surfaces, the numerical result was achieved to check difference in the entire characteristic, due to effect of writing instrument and writing surface by using standard deviation, frequency and mean of writing samples. All the statistical analysis was performed in MS excel (2010).

Table 1

Variables → / Characteristic ↓	Ball pen	Gel pen	Pencil	Fiber tip pen	Fountain pen
1.Line Quality	1.0133	1.0933	1.0666	1.0533	1.5866
2.Slant	1.7333	1.7466	1.7333	1.760	1.7466
3.Speed	1.8266	0.6171	1.7866	1.973333	2.3467

Table 1: Showing mean of the data collected (Line quality, slant, and speed with different writing instruments keeping posture & support media and writing surface constant)

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Table-2

Variables → / Characteristic ↓	Ball pen	Gel pen	Pencil	Fiber tip pen	Fountain pen
1.Line quality	0.1154	0.2928	0.3001	0.2262	0.6999
2.Slant	0.6224	0.6171	0.6003	0.5890	0.5948
3.Speed	0.644589	0.716599	0.722109	0.752892	0.667657

Table 2: Showing standard deviation of the data collected (Line quality, slant and speed with different writing instruments keeping posture & support media and writing surface constant)

Table 3

Variables Characteristic	Ball pen	Gel pen	Pencil	Fiber tip pen	Fountain Pen
1.Line quality	1=74	1=68	1=71	1=71	1=52
	2=1	2=7	2=3	2=4	2=19
	3=0	3=0	3=1	3=0	3=4
	1=27	1=26	1=26	1=24	1=25
	2=41	2=42	2=43	2=45	2=44
	3=7	3=7	3=6	3=6	3=6
	1=23	1=28	1=29	1=22	1=8
	2=42	2=34	2=33	2=33	2=33
	3=10	3=13	3=13	3=20	3=34

Table-3: Showing Frequency distribution of the data collected (Line quality, slant and speed with different writing instruments keeping posture & support media and writing surface constant)

From Table 1, it is clear that the mean of line quality achieved in case of ball pen is 1.01(≈1), and in case of fountain pen, it is found 1.6 (≈2). This means that the average line quality is good in case of ball pen but it is moderate in case of fountain pen. From

Table 3, frequency distribution of 1,2,3 in case of ball pen is 74,2,0 (1=good,2=medium,3=poor) that means 98.6% samples having good line quality and 1.3% sample having medium line quality and no sample had poor line quality. But in case of fountain pen, frequency distribution of 1, 2,3 is 54,19,4 (1=good,2=medium,3=poor) that means 69.3% of samples had good line quality, 25.3% of samples had moderate line quality and 5.3% of samples had poor line quality. Line quality in case of gel pen, fiber tip pen and pencil was good (≈1).

Slant: In case of ball pen, gel pen, pencil, fiber tip pen and fountain more than 50% samples had rightward slant

Speed: In case of ball pen 56% samples had medium speed, 30% had fast and 13% had slow but in case of fountain pen 44% samples having medium speed, 10% having fast and 45% having slow speed.

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VI. DISCUSSION

Moran (1999) in his study concluded that identifying details can be changed with type of writing instrument but still some repeated features that are used in establish authenticity of author. Another study was conducted by Afreen Tarannum et.al (2015), in which it was found that handwriting of individual remains unchanged due to change in writing instrument and surfaces. But from the present it is clear that there is variation in handwriting due to different writing instruments which can be clearly seen in case of writing from ball pen and that from fountain pen. The differences in line quality, slant and speed provides a basis for natural variation in handwriting which are influenced by certain factors like change in the writing instrument.

A study was conducted by Sharma et al. (2015) and they examined handwriting under unusual circumstances such as on a table, wall, in a moving bus, on a thigh. They observed natural variation about special and unusual hand written samples, pen pressure was found more in case of samples written on thigh without any support media and tremors in case of moving bus. But in present study, line quality, speed and slant have been affected by different writing instruments as other factors like posture, support media and writing surfaces are kept constant.

VII. CONCLUSION

On the basis of statistical analysis, it is concluded that there are significant difference in line quality, slant and speed due to different writing instrument

When compared in different writing instruments keeping writing surfaces, support media and posture constant, Ball pen provided the best result in line quality with 1.01(≈1), followed by fiber tip pen with 1.09, 1.06,1.05 in case of gel pen, pencil, respectively however the fountain pen provided 1.6 (≈2) which is medium kind of line quality. Speed in case of ball pen is fast and gel pen, pencil and fiber tip pen are medium as compared to fountain pen, which provided slow speed. This can be due to less use of fountain pen than ball pen and other writing instrument. The line quality, slant and speed also affect by size and shape of nip of pen.

Thus, it can be concluded that handwriting is influenced by the writing instruments to a greater extent. This is because of the natural variations encountered in the handwriting. The characteristics that help in differentiating a person's handwriting are found to be line quality, slant and speed.

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