

Learning Aid in Braille and Typography

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Abstract— This paper aims to study the existing braille script, highlight their inadequacies in teaching methods for small children and suggest probable solutions. The project focuses mainly on the use of braille and typography together using the existing braille script. In addition, this study is carrying its importance towards the beneficial development for visually impaired children in our society. Thus providing an educational aid. The main idea behind this project is to derive a piece of hardware to use to teach the visually challenged children for future.

Keywords— Educational aid, Braille and typography, Base material, Readability, Book for learning basic alphabets, research project.

I. INTRODUCTION

Communication occurs when some environmental disturbance (the stimulus) impinges on an organism and the organism does something about it (making a discriminatory response)[1]. In the world of visuals, we have various typefaces for communication but in braille there is no such variety available in spite of new technical devices and special equipment for the blind are developing [2].

The following questions arise in one's mind-

1. Why relate braille and typography with learning?
2. Aren't the new innovative technologies supporting the braille methods of learning alphabets

Developing new way of learning braille with introduction of graphic symbols can fill this lacuna in the field of communication. Typography although not referred with technical aspects considering the visuals still has weight age with basic sans serif letterform learning for blinds. Sans serif letterforms are easy to read than serif letterforms [3].

Typography is the art and technique of arranging type to make written language legible, readable, and appealing when displayed. Various techniques were experimented before the invention of braille script but have unfortunately was not comfortable hence required the braille script [4]. Braille is a system of raised dots on paper that represent the letters of the alphabet that are felt by the fingertips of the blind in order to read printed language [5].

Braille Alphabet																																																																																	
The six dots of the braille cell are arranged and numbered:																																																																																	
The capital sign, dot 6, placed before a letter makes a capital letter.																																																																																	
The number sign, dots 3, 4, 5, 6 placed before the characters a through j, makes the numbers 1 through 0. For example a preceded by the number sign is 1, b is 2, etc.																																																																																	
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Fig. 1 Braille alphabet chart [6].

The study begins with placement of raised dots in a cell that was the germ for symbolizing the alphabets and the above braille alphabet chart as this research project is for the children from grade one to eight.

II. ANALYSIS

A. Learning Methods

The primitive methods of teaching braille are indifferent as the modern ways. Unfortunately, there is no such major change observed with respect to academics. Object identification is a difficult process to follow where discomfort observed for all objects. Both visuals and visually impaired children can grasp familiar objects easily [7].

Providing the path for the further access this current research created a study material a way to teach the blind children from kinder garden up to 8th grade. Combination of braille and graphic symbols is important point.

B. Problems

1. It is Difficult to understand the entire embossed picture.

There is development in the tactile symbol system using external objects along with the word introduction [8]. The below is the use of tactile or tangible symbols no standard vocabulary of tactile symbols.

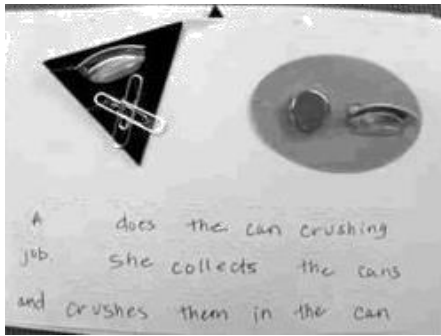


Fig. 2 A book that includes Braille and tactile symbols.

2. Change in the traditional braille slate pattern considering leading and tracking.

Any change in the traditional braille slate pattern can lead to misguide learning and make children difficult to fundamentals of learning the braille script.

The following are the ideal universal measurements.

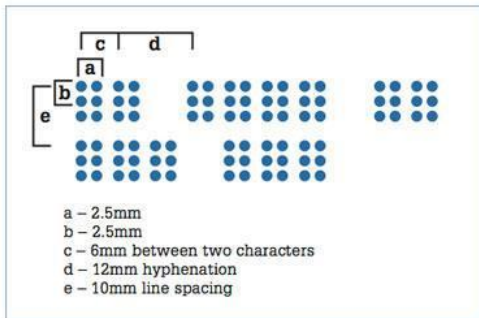


Fig. 3 Universal Braille Dimensions [9].

3. The Space distribution and surface.

A minute change in the space distribution or size can make the child blank with reading and writing ability pace as the measurements are properly studied [10]. The paper used for the braille script is normal paper for academics purpose, becomes blunt over the period of usage.

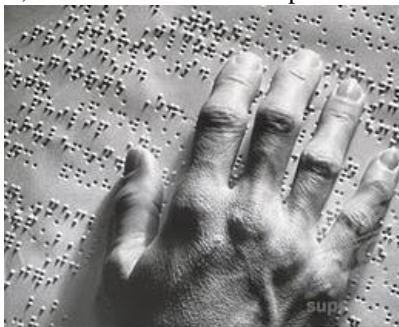


Fig. 4 Reading braille script [11].

C. Statement

As stated above in the problem B(3). The braille paper used during academic education with braille embossed on becomes blunt over the period of usage. Hence to overcome this issue an innovative technology is needed. Along with learning basic alphabets in braille the symbols needs to be taught in new ways in academics. Therefore, to provide easy and comfort for the blinds to identify new symbols and learn an experiment designed below using the existing braille and creating graphic symbols in braille itself.

D. Sampling Unit

Fig. 5 Sampling units to finalize braille symbol proportion along with project approval from the Smt. Kamla Mehta Dadar School For The Blind, India.

Description from the above figure 5 here the ideal universal measurements for word are intact and only symbols spacing are changed.

1. Reverse Metal block with sample sizes of braille dots in symbol.
2. Inverse Nylo sheet with sample sizes of braille dots in symbol.
3. Final output selected sample in red box with readable proportionate dots with proper interspacing in symbol. The above experiment conducted with blind children with their mentors.

E. Base Material with Data Analysis

Aim: To experiment with the reading speed and durability of the designed braille pages.

Subject: Random blind children (boys and girls) from grade one to grade eight

Study material: Fine paper (120gsm) used by majority blind schools, laminated PVC sheet.

Content: Both the pages (fine paper) and laminated with designed page from current research project.

Experiment:

The experiment conducted with children from different grades by giving them same and different designed braille pages. To minimize the error, individual child was not given same page twice, so that he can read the content freshly rather than recollecting it from the prior exercise.

To group of children initially told to read different designed pages of fine paper (120gsm) and laminated PVC sheet.

Experiment conducted for a week with equal time span to minimize the level of interest of individual child considering age difference and grasping power according to their learning grades.

Observations:

1. The fine paper was easy to read during first exposure.
2. Using the fine paper page repeatedly deteriorated the surface quality.
3. There was uniformity in laminated PVC sheet throughout the experiment.
4. Speed for laminated sheet was constant but not the case in fine paper.
5. As the grades increased the speed of reading increased. Result:

From the below chart it can be studied that as we go

towards the higher grades the readability speed increases with uniform results between PVC sheet and fine paper. The children also found PVC sheet easier to understand, as the dots were sharper than fine paper making it more durable.

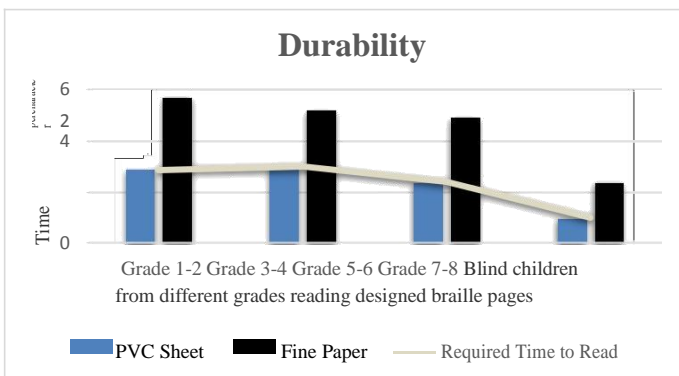


Fig. 6 Experiment on durability of papers

The following experiment is conducted under the guidance of the faculty from Smt. Kamla Mehta School for Blind, India.

Conclusion:

The laminated PVC sheet is more durable and easily readable with speed as compared to fine paper.

III. AIMS AND OBJECTIVES

As mentioned earlier the main aim of this project is to provide educational study material for the children from kinder garden up to 8th grade.

Perception towards this project motivates to derive simple graphic icons that are traditionally drawn. For visuals, we have plenty of study material but there is lack of basic study elements for blinds.

A. Problem Definition

The visual charts are easy to deliver as they are in two-dimensional form but for blinds, they need to be in embossed three-dimensional patterns. The current syllabus teaches the object with sensory learning methodology were the children are made to touch the objects. E.g. A for Apple (realistic apple given to touch)

However, it is not possible in all cases for words such as knife, lion, volcano, etc. Here the key idea is to approach the problem and to find a way out of this by providing a handy and comfortable book with embossed structures.

In this, project an attempt done to develop a structural educational medium to aware the child about the alphabets, words and outer form not proportions.

B. Approach

For smaller objects like apple, flower it was easy to give him for sensory learning but it was difficult for larger objects like airplane, elephant, etc. However, this is a fundamental book to introduce alphabets and words irrespective of the proportions, which we also not see in books for normal child. Therefore, to get a braille symbol each objects vectored in simplest form.

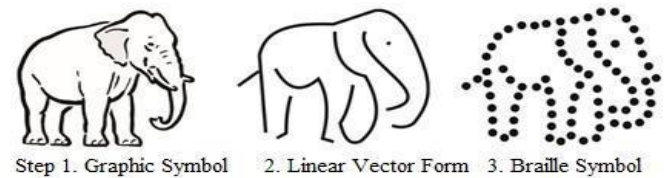


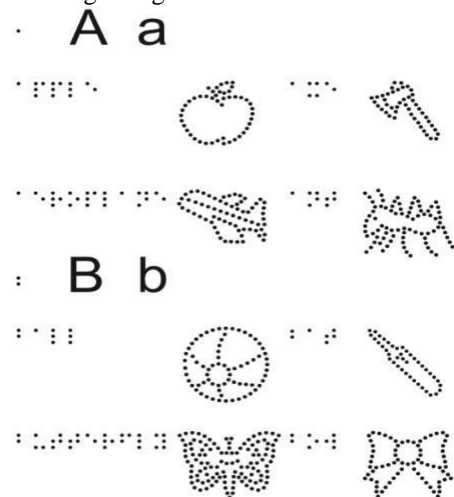
Fig. 7 Process of realistic Elephant converted into simplest graphic with essential characteristics and then into braille symbol.

Following the above process all the alphabets were design with four symbols each.

Another important way of introducing the visual letterforms was a challenge in this project. However, after experimenting with the blind and partial blind it was confirmed that it was providing an ease for the child to understand and differentiate the Roman alphabet with uppercase and lowercase. (Fig. 5)

Below are the contents of a single braille book page from the research project along with actual designed page to the clear concepts.

1. The braille script alphabet A (braille point positioning 1)
2. Roman letter (uppercase and lowercase) for future communication purposes like signature, writing, etc.
3. Word APPLE embossed in braille script followed by healthy spacing to avoid confusion.
4. Symbol of graphic apple with same braille space and measurements testified from sampling unit (2.4).
5. Followed by the next alphabet with proper spacing each page consists of two alphabets. (Two-line space for new beginning followed in academic education).



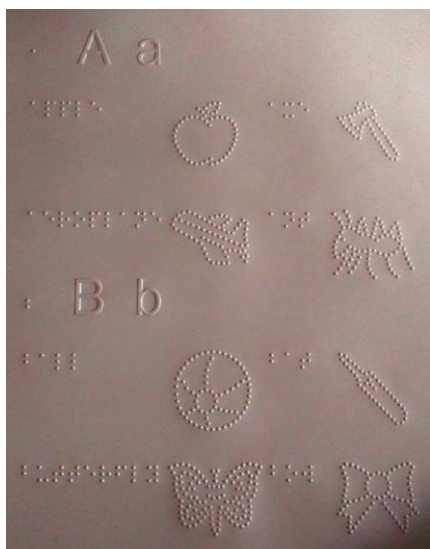


Fig. 8 Final output of designed page in graphic (Top) and implemented (Bottom).

IV. CONCLUSION

1. This basic book from research provides ease for children to learn the alphabets with symbols.
2. Compilation of visual alphabets, provide an introduction and letter identification for future use.
3. It also guides to identify objects and shapes through graphic forms.
4. Sufficient space in the book helps to learn and enhance their sensitivity skills and grasping power.
5. Ideal universal measurements kept intact for writing words, giving same reading pace and convenience for the child.

Braille and Typography together can provide an educational aid, which is testified research for visually impaired children in our society using existing braille script. Therefore, to teach blinds this book is useful which is certified by Smt. Kamla Mehta School for the Blind, India and is currently being used for academic purposes. Thereby making blinds individual learners and can aid them to identify objects on easy platform.

V. FUTURE SCOPE

Book versions can be further developed with word expressions, various strategies can be implementing with respect to tools, mediums, and surfaces.

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