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Changing the Approach in Education for Children with Visual Impairment

Zakaria bin Osman Universiti Kuala Lumpur France Institute, Section 14 Jalan Teras Jernang, 43650 Bandar Baru Bangi, Selangor, Malaysia. zakariaosman@unikl.edu.my

ABSTRACT

Reading had always posed a challenge to visually impaired person in the past. However, with the intervention of technology the barrier that was once thought to be a formidable barrier had finally been brought down paving the way to the luxurious world of knowledge which was once only enjoyed by the sighted majority. This paper hopes to discuss how can best these technologies be exploited to make education for the visually impaired free of obstacles and compete in a level playing field with their sighted peers. With existence of assistive technologies, more and more reading materials are accessible to the visually impaired people. The proper management and positive attitude of technology-based users, it would not be impossible to fully exploit these advantages that have been brought by the present technologies to enhance the education possibilities for the future visually impaired children. With the deployment of technology, the task of implementing inclusive education will be made easier in most countries throughout the world. This study, which will mainly rely on library research methodology, hoping to uncover current practises that is being carried out in both develop and developing countries and to brows for present and future technology developments which might be useful in enhancing the education facilities for the visually impaired children. It is hope that this paper will open the discussion towards a new approach to education for the visually impaired children in the very near future.

Keywords: Education, assistive technology, inclusive education.

Introduction

Literacy for the blind had been a the most challenging barrier that had to be overcome over the centuries. All means had been tried to bring literacy to the blind. Efforts were made to carved out Roman letter on wood, shaping Roman letters from wires, embossing Roman letters on hard papers with the use of metal pen and many other ways were experimented. Though these efforts did benefited the blind a little, however it was never an easy task to produce text for practical use. Furthermore, the blind themselves found it tedious and slow in reading the material given having to recognized the shapes of each latter at a time.

However, In 1821 A twelve year old French blind student by the name of Louis Braille developed his ideas for a tactile code system adapted from French soldiers who wanted to be able to read notes in thedark. Louis Braille modified this 12-dot system into 6 dots which could easily be recognized under one's finger tip. Louis started writing using this codes and started teaching others by 1832.¹

This writing system which later came to be known as braille, did not immediately became the writing system for the blindness community. Instead, there were other writing system that were also being promoted. One of which was the Boston line type. This system was developed by Samuel Gridley Howe, the founder of the New England School for the Blind (later Perkins School for the Blind) in Massachusetts.

Since at the time there was no reading medium for people with blindness, Howe developed an embossed simplified angular roman alphabet without capitals which he called Boston line type.^{II}

William Bell Wait, working in New York in the middle 1800's, developed a point code for readers who were blind that used characters which were two dots

high and one, two, three and four dots wide. Working at New York Institute for the Blind, Wait began teaching this system to students and invented a point

writing machine called the Kleidograph which allowed for easy production of text without the use of slate and stylus. New York Point which was then called, was widely used by schools for the blind in the United States in the late 1800's.^{III}

In Europe we came across William Moon of Great Britain. He lost much of his sight in childhood from scarlet fever. After finishing school in the mid 1800's Dr. William Moon experimented with a variety of raised alphabets for teaching reading and writing to blind students. He eventually settled on Moon type, a raised line code based on print letters.^{IV} However, it must be noted that Britain adopted braille writing since 1861 and in fact became the dominant script for the blind in Britain from 1876 onwards.^V

By 1932 Standard English Braille was adopted by the United States of America and Great Britain as the uniform method of reproducing printed material—a century after Louis Braille presented his code.^{VI} Finally the path to literacy for the blindness community was decided and made possible.

From Ink Print to Braille

However, the challenges faced by the blind and visually impaired towards gaining literacy was still far from over. After deciding on the means to literacy, ways and means had to be explored to bring literature and reading materials which on the whole were in ink print and still are in ink print to be translated into braille. For those who pioneered the task of converting ink print materials had indeed face a tremendous challenge. Amongst them was John Robert Atkinson, After blinding himself in a gunshot accident seven years prior, starts the Braille Institute of America with the goal of transcribing hundreds of books into Braille.^{VII} Many had to depend on the stylus and slates to transcribe the materials to braille though some managed to laid their hands on a braille typewriter which had been invented by Frank Haven Hall in May 1892.^{VIII} It was only during the war years of 1943 that a more suitable and a more reliable braille machine known as Brailler came to existence. It was the genius work of David Abraham of the Perkins school who evented this useful tool that in many years to come became the most useful writing tool for the blind throughout the world. Not until the war was over did the Brailler were produced in mass production to meet the demand from all over the world.

Indeed the brailler did enhanced the transcription of braille reading materials such as books, magazines, articles and alike, still large numbers of manpower were needed to accomplished the task to meet the needs of education and a small number of leisure reading materials such as fiction and magazines. The main bulk of the manpower were volunteers who had dedicated their effort and energy to provide a small percentage of literacy to the blind community. In the early stages, not only the work of transcribing ink print copies to braille were a very laborious job having to transcribe word by word, cover to cover, they too had to be creative in making vital decision how to go about formatting the braille copies so that those materials could be understood by the blind readers. There were no uniform guideline whatsoever in the production of braille text in America. Only in 1957 did The National Braille Club of North America held their first conference on braille to discuss and outline the transcription guideline and braille code system.^{IX}

The Making of Duplications

During the early stages, duplication was done by embossing braille print on metal sheets which were made from brass, zinc or iron using a machine known as Braille Stereotypemaker. "...The embossed metal sheets were then covered with tough, heavy paper about twice the thickness of ordinary book paper, and upon this was laid a rubber blanket. The whole combination was then inserted in a press, and pressure applied. When the paper was removed, it was covered entirely with braille printing."^X

However, starting from 1963 the Braille Authority of North America started using thermoform machines to create duplicates of braille master copies and tactile materials such as maps an diagrams on plastic sheets known as braillon sheets for schools and colleges.^{XII} Since then duplication of braille and tactile materials use by the blind in most countries were produced using this technology.

However, with the invention of braille printers commonly known as braille embossers in the 1970S, thermoforming duplication slowly give way to embossed copies which in actual fact brought down the cost of producing braille materials. Today, no more master copies needed to be transcribed into braille before any duplication can be done. Anyone who is capable of using a computer can recopy books or any material using a computer and with the use of braille translation softwares, producing multiple copies of braille materials for the blind is no longer a major problem. More fortunate if the soft copy of the material needed could be obtained, the task of producing braille copies can immediately be done without much difficulties.

A New Paradigm Shift

"...To the layman, as so much of our lives have become contained within a screen, the technological revolution of the past few decades would seem disastrous for the blind community, but in many respects the opposite is true. As technology has advanced so has assistive technology - devices and innovations that make the world more accessible for the disabled, and most importantly, allow them to live more independently.^{XII} True enough. As the technology surge forward every minute of a day, more and more advancement is to be expected in technology making our lives more and more sophisticated and overcoming more and more obstacles in life. As it is true for the majority normal population so more for the disabled groups. In the early 1980S, IBM started developing the speech synthesizer for their staff and later <u>Dr. Jim Thatcher</u> realized the broader accessibility implications, and developed the IBM Screen Reader/2, which was the first screen reader to be compatible with a graphical user interface - the kind of interface that would come to dominate our computers, smartphones, and smart tvs.

The groundwork laid at IBM opened the door for future screen reader technologies like <u>JAWS</u> (Jobs Access With Speech), <u>NVDA</u> (Nonvisual Desktop Access), and <u>VoiceOver</u> for Mac that allow users to interact with what's on the screen, control what is read aloud from the page, and can also read what the user types back to him.^{XIII}

During the same period, refreshable braille displays were also developed. The (RBD) is a kind of keyboard composed of cells that can be refreshed with braille characters to reflect the text on a screen. They are often used in conjunction with screen readers, and like screen readers - first became available to blind consumers in the 1980's.

While early RBDs were simple devices that could translate a single line of text into braille at a time, advances in the field have led to the development of multi-line displays, as well as

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full-screen displays, with more than 10,000 pixels, that can display entire pages in braille at one time. $^{\rm XIV}$

In terms of education, these two development in the accessibility technologies have open up vast resources of reading materials for the blind beyond ones imagination years ago. Students of today can access online newspapers, online magazine, online e-books in online libraries all over the world! Thus, it is a matter of making available all school related materials such as text books, work books, references, and notes both in e-book format and hard copy format. Only then the blind students will be able to enjoy a level playing field to compete and excel in their studies equally with their sighted counterparts.

As reading, writing and counting will remain the fundamental key point in education, reading and writing braille will not be compromise with just listening to speech output. Braille reading will remain a key factor in ones strength in education. In maintaining this priority, the current method of embossing volumes and volumes of braille books and materials should be reconsidered. Not only these stacks of braille books consume a very large space of a school area, the cost of producing them too still remain expensive. From 2011 to 2016 the The Text Books section of the Ministry of Education Malaysia spent approximately RM5,257,825.00 (1,323,178.31 USD) to produce 14 titles of text books for 169 children of 19 primary schools throughout the country that offer programs for the blind.^{XV} This meant that about RM31,111.39 (7,829.46 USD) per student for the period 2011 to 2016 were spent for the production of the text books. This number is expected to rise in the years to come.

Researcher is of the opinion that a thorough consideration should be given to the use of refreshable braille displays as the technology in this field seems promising.

"...I got up and said the Royal National Institute of Blind People (RNIB), the organization I'm the president of, would lead a global effort to cut the price of refreshable braille displays by 90 percent," he recalled. "It was kind of a big deal to say that. Most people thought I was mad."

....On March 23, he unveiled a new 20-cell refreshable braille display at the CSUN Conference in San Diego.

The ground-breaking device has the potential to be manufactured for around \$320, making it a significantly less expensive alternative to refreshable braille devices that are currently on the market, many of which carry price tags between \$1,300 and \$5,000 or more.^{XVI}

The Orbit Refreshable Braille Display or Orbit Reader is one such example that will soon be in the market. Taking this as an example, each student will be equipped with a computer worth 750 USD, a JAWS screen reader worth 1,095 USD and a Orbit Reader worth 320 USD which brings the total to 2,165 USD. Bare in mind that this student will be using this set for the rest of his/her study at a primary school considering no other changes takes place during the period. There maybe some maintenance cost during this period of 6 years. Assuming each year the school might spent about an average of 300 USD, the final total might be about 3,965 USD. This amount is far less than the amount spent for one student from the period 2011 to 2016 by the Text Section Of the Ministry of Education Malaysia. With this tools, the child not only can access 14 titles but countless of reading materials he/she wants.

It must be emphasize that more exciting development in the development of refreshable braille display are currently going on. Take for example the development of full page refreshable braille display known as Holy Braille is currently being research by the School of Information University of Michigan. This project hopes to develop a full page

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refreshable braille display using liquid instead of mechanical moving rods such as the ones use in most refreshable braille displays. This not only offer solutions to full page output, but also tactile graphics that can be access by the reader.^{XVII}

Conclusion

Though this paper had not touch this subject in depth, it is hope that a paradigm shift from producing braille text books to the use of refreshable braille displays will spark a serious discussion and to carry out further research into this idea so as to help our children to go through education with confidence and determination towards achieving success. The researcher of the opinion that by providing this tools, our children will be able to roam the ocean of knowledge without anymore barriers. The achievement in creating an inclusive education for the visually impaired will definitely will be brighter than ever. The researcher would like to stress here that this idea is not meant for Malaysia alone, but the whole South-East Asian nation and even the whole world.

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