Improving Braille Availability in Canadian Public Libraries

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(French version: Translated by Maryse Lairot)

Electronic copies of this document in French and English are available from https://nnels.ca/braillestudy

Nowhere in history is there an invention as pervasive and influential as the printed word. Print is everywhere, yet we often take its power for granted.

Learning to read and write is the backbone of education, employment and inclusion in society. Audio formats alone are a poor substitute for learning how to spell and communicate in writing -- skills that can only be learned through Braille or print.

Yet less than 5% of the Western world's information is available in an alternative format; and this percentage is significantly lower when assessing the availability of Braille alone.

As a society we do not ask if print still matters; nor do we debate the value of literacy. Therefore, we should not be asking whether braille matters. The real question is, in what ways can we improve access to Braille for those who need it?

Braille Literacy Canada

We do not want to be shut away from the world because we cannot see and so we must work and study to be equal with others, not to be despised as ignorant, or objects of pity. I will do all in my power to help you all attain dignity through knowledge.

Louis Braille (as cited in Belusic, 2009)

Table of Contents

Summary

This study on improving Braille availability in Canadian public libraries was requested by NNELS in 2018 and written by a group of Canadian writers and researchers, led by the Canadian Federation of the Blind. The paper's purpose is to explore how to improve access to Braille for those who need it.

There are 836,000 Canadians with significant vision loss, roughly ten percent of whom read Braille. Less than 5% of books are available in an alternative format, and even fewer are available in Braille. For many, especially those looking for specialized information such as music, math, science and tactile graphics, Braille is limited by where people live, the technology they have, and their ability to pay for software or services.

This study includes a history of Braille and describes the basic process of Braille book production, and how technology has changed this process. It also identifies four main issues and makes five recommendations:

Issues

1. "Born-accessible" ebooks are a challenge for publishers to produce and therefore a challenge for libraries to procure.

2. Braille reading technology is expensive and therefore inaccessible to many.

3. Hard-copy Braille books are not available to all readers who want or need them.

4. Fluency in accessible formats is lacking in libraries.

Recommendations

1. Encourage publishers to publish accessibly and encourage libraries to favour accessible books and platforms in their procurement practices.

2. Request federal funding for refreshable braille displays.

3. Develop a distributed, shared, hard-copy Braille collection for Canadian public libraries.

4. Produce hard-copy, embossed Braille upon reader request.

5. Support Braille and alternate format expertise in public libraries.

This report, written and led by a community of Braille users, provides valuable recommendations for improving public library service for people who read Braille in Canada. By advocating for and implementing these recommendations, public libraries can go a long way toward ensuring equitable access to books for all.

Introduction

Dear Librarian,

My name is Mary Ellen Gabias, and I am the president of the Canadian Federation of the Blind. The following paper is the product of a team of writers and researchers about the current state of Braille availability in Canada. I have had the privilege of leading this dedicated team through the process of evaluating the current situation of Braille in Canada and providing recommendations for the future of Braille in public libraries. The following paper is an invitation to librarians to consider their role in ensuring that Braille is made a part of all library collections in Canada.

I was born in Toledo, Ohio, in June, 1952. Because I was several weeks early, I was placed in an incubator and given high levels of oxygen. It was shortly after my birth that studies were published linking blindness in premature babies with oxygen levels that were too high. If I'd been born five years earlier, odds are that I would have died due to lack of sophisticated incubators. I consider myself very fortunate.

When I was a child, my only option for education was a school for the blind, which was located 120 miles from our home. My parents rallied with several other families of blind children in our area to push the local public school system to provide a class for us. This advocacy resulted in the establishment of a class for blind children in Toledo. I attended that class throughout elementary school and was fully integrated in high school. I graduated in 1970, and I received a B.A. in psychology from Bowling Green State University in 1974.

I met my husband Paul, who is also blind, in 1988 and married him in 1989. We have four children, one daughter and three sons. Our four children are all fully sighted. Our daughter has better than 20/20 vision. Paul and I both became blind due to retinopathy of prematurity. That condition is never inherited.

Paul and I have dedicated much of our lives to advocating for the rights of blind people; I am particularly passionate about their access to books as a means of social inclusion and personal growth. If I had the choice of living for thirty years but never reading another book, or living for ten years with access to all the books I want, I'd have a hard time choosing. Reading is integral to who I am and how I navigate and understand the world around me.

I remember taking home volumes of the Braille dictionary from school because I had nothing else to read. When I was a child, the specialized library for the blind was my only option for getting reading material. My attitude toward books and reading is somewhat like the attitude toward money of someone who grew up during the depression.

As technology improved and grew, so my hopes for being able to access more books in Braille. I got a digital copy of my family cookbook and had it transcribed into Braille. It still sits

on my bookshelf and I still consult it regularly. When our daughter was born we purchased print-Braille children's books, books that can be read by both Braille and print readers. These books allowed me to read story books to my children. When my children were young and everybody was talking about the Harry Potter series, I discovered that National Braille Press (NBP) in the United States had Brailled the books and that I could buy them at the same price as the print version. I read the first four books aloud; then my children were old enough to read on their own, and though I missed reading aloud, it was fun to race through the remaining books together and compare notes on the plot and characters.

I've downloaded Braille and studied literature with my children as they read through certain books in school. Now that my youngest is sixteen, I miss reading to them. I'd be willing, but they will sit still for no more than a few paragraphs. Braille has always provided me a way to read with my family.

The public library is and has been either my best or my only option when I want to read. Audio versions and Braille are generally more expensive than their traditional print counterparts, so libraries still remain the first place I check when I want a book. While it's unfortunately true that sometimes (far too often) the book I want isn't in the library collection, it is really helpful when a librarian becomes a sleuth, looking for ways to get something into my hands and thinking about the different ways that people read. Librarians are readers and a wonderful resource for ideas. Even if I can't walk out the door with something, I almost always learn something of value from a conversation with a librarian.

Libraries began as a means of getting books into the hands of poor people who didn't own their own private collections. They were gathering places for men whose work took them far from home. Immigrant children whose parents spoke little or no English assimilated partly because a library gave them access to more than textbooks. Technology is changing the way you work and the way you think about your profession. As you reinvent yourself, please take the opportunity to include us and the formats that we use as an integral part of the new library equation. Please take this paper and use it to think about the ways that public libraries can ensure access to Braille for blind Canadians.

Mary Ellen Gabias
Kelowna, BC

The Importance of Braille

> I use Braille as a spider uses its web -- to catch thoughts that flit across my mind for speeches, messages and manuscripts.

Helen Keller

How many people read Braille?

There are about 836,000 Canadians with significant vision loss, roughly ten percent of whom read Braille (Engelhart, 2010). Not all of these individuals will want library services, and with the popularization of audio books, fewer still will actually read a book in Braille.

A recent study of patrons of the National Library Service for the Blind and Physically Handicapped (NLS) in the United States found that 86% of its users borrowed digital audio books, contrasted with just 8% of users who borrowed hard-copy Braille (United States Government Accountability Office, 2016). About 3% of its patrons downloaded electronic Braille files from its website, suggesting that a growing number of proficient Braille readers – perhaps as high as 25% –have access to a refreshable Braille display or embosser.

The story is similar in Canada. There are 2 main organizations that offer digital services to the readers with print disabilities, CELA (Center for Equitable Library Access) and NNELS (National Network for Equitable Library Services. DAISY books represented 98% of the digital downloads from the Center for Equitable Library Access (CELA) website, contrasted with a slim 2% for translated Braille files (M. Ciccone, personal communication, February 7, 2018). There are about 27,000 patrons registered with CELA, and the majority are turning to DAISY books for their reading needs. NNELS does not track borrowing by file format so a comparison is not available.

Braille is Literacy

For blind people, Braille is the equivalent of the written word. Braille is a system of raised dots, a six-dot cell in two columns (from top down, dots 1, 2, 3, and 4, 5, 6).
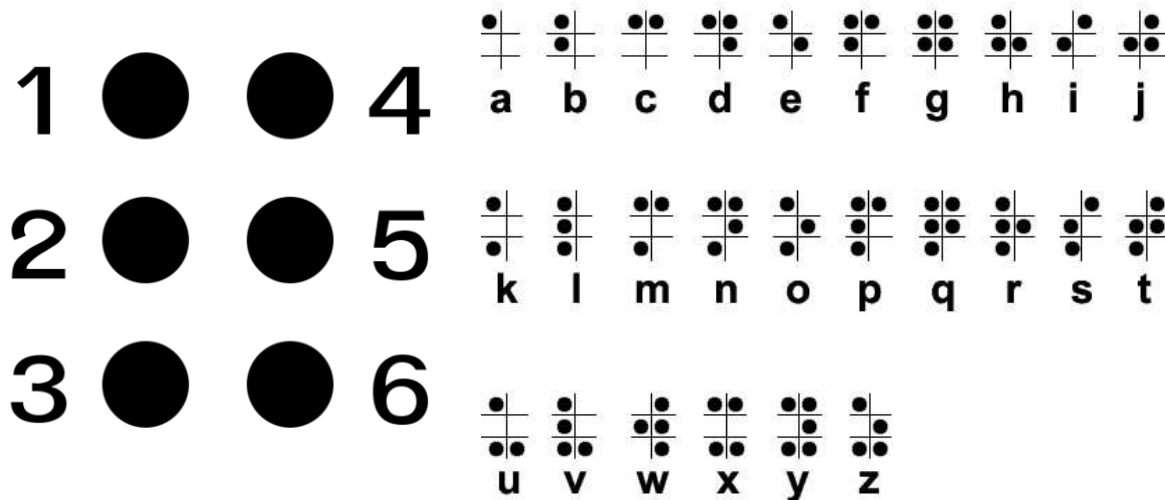
Image 1: Six-dot Braille cell and Braille alphabet

Each combination of these dots produces a different letter of the alphabet which the person with the visual impairment detects under their fingertips. Braille, like print, requires motion to be read: all readers must move along the line; the Braille reader employs hands instead of eyes.

Modern technology has made Braille more available now than at any time in history. Sadly, even though providing Braille has become easier than ever before, Braille literacy rates have declined (Glauber, 2010; National Federation of the Blind, 2009; Sket, 2016). The reasons for this declining literacy rate are outside the scope of this paper, but Brent and Brent (2000) offer one possible cause of this trend:

> All too often, for blind children, the assumption is made that computer technologies, especially those with speech to screen access, are an easier and preferable mode of learning compared to reading and writing hard copy Braille the old fashioned way.

With technology widening the scope of what is possible, providing opportunities for those without sight to have access to Braille can only benefit everyone.

> In times of education cutbacks and strained budgets, school staff can find many reasons why visually impaired students don't really need to learn Braille at all. In its bumpy, tactile form, Braille is very intimidating to the uninitiate; the average classroom teacher does not know how to read or write Braille and therefore trained vision specialists must be brought in to teach it. Consider, however, that Braille, like print, is a code, a written representation of our spoken language. We would never consider substituting a purely oral medium for print reading and writing for our sighted children. These same priorities and expectations must be observed for those who are blind or severely visually impaired. When oral and written communication is balanced rather than having one substituted for another,

technology can become a most empowering and exciting tool, but technology in and of itself cannot be a teacher of literacy. (Brent & Brent, 2000)

While screen reading technology and synthesized speech are tremendously helpful and important, Braille is tied directly to literacy skills such as spelling, punctuation, and correct pronunciation, and so remains the only complete reading and writing system for the blind.

Literacy, given a fair chance to develop, increases equality, opens a world of self-sufficiency, and makes equal employment opportunities much more of a reality (for a bibliography on the importance of Braille, please see Appendix A). Fluent Braille users can read and write quickly and are able to keep pace with sighted readers who employ print. Elizabeth Lalonde (2009), the Executive Director of the Pacific Training Centre for the Blind, writes: "The ability to read and write Braille competently and efficiently is the key to education, employment and success for blind people."

The History of Braille[1]

Braille gets its name from Louis Braille (1809-1852), the Frenchman who lost his eyesight in early life while playing with a sharp tool in his father's saddle-making shop.

Braille attended his village school for a few years, eventually proving his eagerness to learn. He then attended a school for the blind in Paris, a circumstance that made him one of the fortunate blind. It was common for young blind children to remain illiterate, which added to their high rate of poverty. Those who became blind after having learned to read print had no way to replace the print they could no longer see, leaving them functionally (if not technically) illiterate, and subject to both cruelty and pity.

The fortunate few students who were able to attend the Paris school read books with embossed print. The school only had a small number of books in this format, as it was not practical. Embossed letter books were cumbersome and expensive to create, and reading them was slow, since students were required to trace each letter with their fingertips. It was also not possible for a blind person to write because an individual could not easily emboss print letters on paper. Louis felt there had to be another way, a better way.

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[1] The information of this section is taken from Belusic, 2009.

One day, an army captain visiting the school spoke of a system of "night writing" he had invented for soldiers on the battlefield. Louis immediately grasped the concept and refined it to create a reading and writing system.

The new code worried sighted teachers who feared that their jobs might be taken over by blind persons. Like many "new-fangled" inventions, Braille's code was vigorously resisted by governmental authorities. Even the French royalty of that era opposed it. France was not in a position to spend money on revamping the reading and writing system for the blind: what was good for the sighted was good for the blind. Print was "normal"; feeling dots was not!

Braille persisted in teaching and sharing his code. He did so at great risk to himself, since he was by then a teacher at the school and risked being fired if he angered his employer. His was an underground movement until a new school superintendent had the wisdom and humility to recognize that a code invented by a blind man offered significant advantages over the sight-oriented system of embossed print letters.

Since the invention of Braille in 19th century France, opportunities for those without sight have been increasing throughout the world. Braille is used in many countries, with variations of the code adapted for different languages. The system can be employed for everything from reading books and writing personal notes and letters, to labeling items and offering restaurant menus the blind can read themselves.

Braille Variations and Standards

It is extremely important to refrain from thinking of Braille as a different language. For example, like print, French Braille uses the same characters as English Braille. There are some special symbols to indicate accent marks, but the letters used are the same in both languages. For this reason, translation programs work the same way for English and French documents (though not all languages – Inuktitut, for example – are consistent with English and French) and the BRF file that is created is suitable for any Braille display or embosser. It can sometimes be helpful to think of Braille as more of a highly-specialized font, but never a different language.

Uncontracted Braille is considered the most basic form of Braille, but it is the least used. According to GH Accessibility (2011), "Uncontracted Braille is very limited in use, as it is not suitable for most reading material beyond a beginning scope of a Braille reader" (para. 1). This format only contains the 26 alphabetic characters, minimal punctuation, and basic symbols for writing numbers. Contracted Braille is the more advanced and universally-used form of Braille and includes abbreviations and contractions. "Braille readers often learn uncontracted Braille first and then learn contracted, which requires more cognitive processing by the Braille reader to decipher the translation" (GH Acccessibility, para. 2).

Many Braille readers dispute the implication that contracted Braille is more difficult, pointing out that contractions were invented to provide shorter ways to write common prefixes, suffixes, and diphthongs, such as *er*, *ed*, *ing*. After the short period of time spent learning these contractions, their use is not cognitively difficult and speeds both reading and writing.

Contracted Braille has undergone changes over the last decade. The new standard for contracted Braille is called Unified English Braille (UEB) and incorporates print symbols (such as bullet points) that were not in common use when the original contracted Braille system was adopted. Although changes are comparatively minimal and someone who can read the previous contracted code has little problem reading UEB and vice-versa, those who have been reading Braille for twenty years or more appear to have a strong preference for the previous contracted Braille code, English Braille American Edition (EBAE), while those under age 35 or new Braille readers tend to prefer UEB. All Braille readers agree that they would rather have Braille in a less preferred version of contracted Braille than to not have Braille available. There is no need to be concerned about replacing books written in EBAE code with the newer UEB version. Both formats will likely be in common use for a considerable number of years.

The standard of Braille produced is generally irrelevant for electronic books because the text to be read is translated by software on the patron's computer or device before it is sent to the Braille display, and so the user can simply select which format of Braille he or she prefers.

Braille Music

Many blind musicians give up on or never learn Braille music, primarily because there is so little available and new material is so expensive to produce. Transcription services take time, and as a result, blind musicians generally need to learn pieces by ear or not at all.

Learning music by ear is a viable method for beginner musicians. With more complexity, it becomes difficult hearing musical rests and understanding complex musical phrasing. Memorization skills are critical, since it is impossible to play an instrument while hands are engaged in reading the music, but memorization is most effective with a piece of Braille music in hand.

Braille music uses the same 6-dot cell used for literary Braille. Braille music does not employ a staff for denoting pitch; this information is contained in the same symbol that tells the reader whether the note is half, quarter, or eighth (American Foundation for the Blind, 2014).

For those unfamiliar with the process, the idea of reading digital music on a one-line refreshable Braille display seems all but impossible, since comparing the right hand and left hand for piano music, for example, requires constant shifting from one line to the next. With a little practice, the process becomes quite manageable.

Braille music readers around the world look with envy on their American counterparts. The NLS has the world's most extensive catalog of Braille musical works, with approximately twenty-five thousand music scores and other texts in a variety of formats, including embossed Braille and downloadable digital content. Even with the *Marrakesh Treaty* (World Intellectual Property Organization, n.d.) making it theoretically possible for accessible format libraries around the world to share their books, it is likely that only digital content will be shared, since many of the embossed musical documents are one-of-a-kind copies, hand-transcribed for individuals and later donated to the NLS.

Several private companies offer solutions to the Braille music shortage: Dancing Dots (n.d.) sells software (beginning at US$1,595) that enables a user to scan printed music into the computer, convert it to Braille notation, and prepare it to be transcribed using a Braille embosser. Many music teachers who are blind or sighted and who teach both sighted and blind students have found ways to integrate the suite of software into their teaching (Davis, 2017; Lapka, 2016, p. 205).

There are companies in the US and in Canada that will transcribe print music into Braille for a fee, including Jymico in Quebec (http://jymico.com/). Jymico does not use the Dancing Dots software for their transcription and they do not offer the files in electronic Braille. Fees quoted are generally around CA$1.00 for each Braille page for pieces that already exist electronically. Fees are much higher if the music has not already been made ready to emboss (A. Thibeault, personal communication, February 6, 2018).

Math, Science, and Tactile Graphics

Math is another area where a Braille reader can find it more difficult to access materials. This issue tends to be more relevant for schools and post-secondary institutions than for libraries, but well-rounded accessible library collections may require books with mathematical notation so we include this brief discussion of issues facing math and science students for a public library audience.

The increased emphasis on educating blind students for STEM careers (Annis, 2011; Spann, 2014; Villanueva & Stefano, 2017) has led to intense work on the thorny issue of making it easier to acquire up-to-date accessible teaching and learning materials. In the past it could take two to three years for a mathematics or science textbook to be transcribed into Braille. By that time, the book was often obsolete, replaced by a newer edition.

Now Braille math can often be created using Braille translation software such as Duxbury Braille Translator (http://www.duxburysystems.com/dbt.asp), but additional processing is frequently required because of challenges in formatting and notation.

Math equations in Braille look very different to math equations in print. While print equations are often laid out vertically down the page, Braille math equations are presented horizontally and read from left to right.

The conventions and symbols used in math equations cannot be replicated with ASCII character set, nor can they be recognized by OCR software. Consequently, textbooks cannot simply be scanned and "converted". Digital files such as textbooks in EPUB format often have equations in image formats such as JPG to preserve layout for sighted readers. To make math accessible, the equations often need to be recreated manually. If the document is available in Microsoft Word, a program such as MathType or Equation Editor can be used to format the document. Duxbury Braille Translation software can then be used to create Braille equations using Nemeth Braille code, but there are a host of issues with different displays and software, as well as software updates needed to accommodate UEB, which is the standard most familiar to a younger generation of Braille users.

Some students studying simpler mathematics can use a Braille display. The students simply scroll through the math equations line by line. The math does, however, need to be properly formatted in order for blind students and professionals to use it effectively and it needs to be proofread by someone knowledgeable in the Nemeth Braille Math Code.

For some students, the layout of pages in hard-copy Braille helps to visualize the steps of equations. Students new to math or science often benefit from a hard-copy version of the Braille, as well as an electronic copy of the same document. In this way, the student can learn to work with both formats.

The National Federation of the Blind in the United States has been a key supporter of programs that encourage blind students to pursue math and science. Their National Center for Blind Youth in Science is a valuable online resource (http://www.blindscience.org/).

Another helpful resource is the Braille Library and Transcribing Services located in Wisconsin (http://bltsinc.org/) which provides literary and math texts in Braille and has a lending library of about 2,500 hard-copy Braille books. Their library contains some textbooks and some leisure reading. They are willing to lend to Canadians and their textbooks are primarily for K-12 students (A. J. Konkol, personal communication, March 1, 2018).

In post-secondary institutions, most students do not have access to qualified Braille transcribers. They rely on Braille translation software, and, often, the Braille texts provided to students are unreliable and inaccurate (Dunnam, 2016). A student or professional who is trying to access math or science documents that have been improperly transcribed will have a very difficult time learning the material.

Even when books are available in international libraries, Canadians are not always able to access them. For example, libraries in the United States associated with the NLS require that users have U.S. citizenship. We hope the *Marrakesh Treaty* will improve this situation, but it is unlikely that hand-transcribed books will be loaned internationally.

Tactile graphics are another issue entirely, because braille displays are totally inadequate for presenting images. In addition to being limited to one line of rigidly-configured Braille cells, they also cannot show the variety of textures which allow a reader to interpret an image.

According to the Provincial Resource Centre for the Visually Impaired (PRCVI) in British Columbia (PRCVI, n.d.), Canadian and American Braille authorities have developed new guidelines and standards to address some of the issues related to creating tactile graphics. While PRCVI is the main source of school materials for blind students in the BC public school system, comparable programs exist in other provinces (for a list of them, please see Appendix B). According to PRCVI, advances in Braille and graphic-creating software have improved in recent years allowing tactile graphics to be produced in a more standardized way to facilitate interpretation. Copies of the guidelines for producing tactile graphics are on the PRCVI website.

Math and science students in the post-secondary system may receive less support than their K-12 counterparts, and many university campuses have no way of producing tactile graphics.

Students may be offered a tutor who has no experience with such graphics, and will likely need to apply for funding to assist with the production of these materials.

People who simply want to study math and science on their own, outside of any education system, have very little access to what they need in Braille.

The availability of Braille music and math seems to depend largely on where someone lives, what technology they have access to, and their ability to pay for software or services. Music and math are two of the more challenging texts to transcribe into Braille but with changing technologies, we hope transcribing them might become easier, cheaper, and less frustrating in the future.

Overview of Braille Production

> Unless you've grown up using braille, you may not realize that braille technology has been in the electronic world for many years. Braille is far more than dots on paper! Many computer or tablet users who have an acquired vision loss may not even be aware of the value or use of braille in the technology we use every day.

Steven Kelley (n.d.)

Mechanical Braillewriters first appeared in 1892, but before the invention of the Perkins Brailler, they were expensive, fragile, and unreliable. When Dr. Gabriel Farrell took over as head of the Perkins School for the Blind of Watertown, Massachusetts in 1931, he was determined to create a portable, durable, and inexpensive Brailler. He commissioned David Abraham, a woodworker who taught manual trades at the school, to design and engineer the project. The venture was funded by the Perkins School's subsidiary, Howe Press, at a substantial financial risk. By the time the first run of units was produced, Howe Press had expended more than half of its capital on the project (Seymour-Ford, 2002).

Mr. Abraham spent around 15 years engineering the Perkins Brailler, and his skill and perfectionism showed. After its release in 1951, the company could barely keep up with demand. It was quite simply the best and most reliable Brailler on the market, and set the standard for fifty years (Seymour-Ford, 2002).

The Perkins Brailler is the Braille equivalent of the manual typewriter. It was the tool most used by those wishing to emboss a document of any length. The Perkins Brailler made it practical for sighted volunteers to transcribe single copies of textbooks and other large documents for the use by blind students or library patrons (Omvig, 2005, p. 33).

At the turn of the 20th century, when the printing press was producing the literary works of L. Frank Baum and Jack London, a similar press was being modified at the Canadian Printing House for the Blind to produce the first books in Braille (Stark, 2017). The Braille impressions for each page were stamped into a zinc plate, which was then fitted onto a rotating barrel on the printing press. The paper was pressed against the zinc plate as the barrel rotated, transferring the impressions of the raised dots to the paper (Advameg, n.d.). The numbers of copies of any particular Braille document were so small compared to print equivalents that Braille books always were, by definition, rare books.

The advent of affordable computing has been the single most significant advance in Braille production since the code was invented. Blind computer programmers quickly realized how easily a dot matrix printer could be modified to produce Braille they could use to proofread the programs they wrote. By the middle of the 1970's the LED 120 was released and became the first "work horse" computerized Braille embosser (Gerven & Taylor, 2009).

Braille translation software was paired with embossers and refreshable Braille displays, thus making it possible for someone with no knowledge to create Braille copies of print documents. It was no longer necessary for a transcriber to study the Braille code for several months,

though trained transcribers continue to play a vital role in adapting technical content for Braille production. Computer software programs and Braille embossers have replaced the Perkins Brailler as the transcriber's primary tools.

The process of Brailling books is far simpler than it used to be. As desktop computers and laser printers have revolutionized the production of documents for people who read print, they have also done so for blind people who read by touch.

How to Make a Braille Book

There are five basic steps to producing a Braille book, a process that can be completed now in hours instead of days.

Digitize: First, the Braille producer must obtain or create an electronic version of the book. In the past, each page had to be painstakingly scanned or typed into a computer. Now, with publishers increasingly willing to share their electronic files with alternate-format producers, less scanning and typing is typically required to create an electronic document. In addition, one electronic format can often be converted to a more useful one using an office computer program or an online solution such as Robo Braille (http://www.robobraille.org/) by Sensus.

Formatting: Once digitized, the electronic book now needs to be laid out in a way that makes sense on a Braille page. Blank lines are used to separate sections or chapters, titles are centered to offset them from the text, and special symbols are used to indicate capital, bold or underlined text. This process is not usually difficult or time-consuming, but recent advances in digital book formats may someday allow this step to be automated. The new EPUB 3 format, for instance, allows Braille formatting considerations to be added to the document as the publisher is laying it out for print production. If the publisher chooses to use these imbedded accessibility features, their documents are born accessible right from the start (we'll explain more about this idea in the next chapter).

Embossing: When a book is ready to print, it is translated into a specified standard of contracted Braille and sent to an embosser for production. This procedure is akin to printing a Word document with a dot matrix printer. The Braille printer hammers thousands of tiny dots onto heavy-weight paper which is always used so that dots remain easy to feel even after having been handled by many readers. Braille embossers are more expensive (and quite a bit noisier) than an average laser printer. Most books can be embossed in a couple of hours.

Cutting and Collating: The pages that form the book are then separated from each other and collated. Because each book is printed in its entirety, this is not a difficult or time-consuming task. Some high-end Braille embossers operate on huge rolls of paper, cutting their own pages as they are produced. Otherwise, there are a couple of Braille-safe burster machines that can automate the process; supervision ensures the mechanical collators and bursters do not mash the dots as they handle pages.

Binding: The book can now be finished in a number of ways. Some books are bound with a wire coil or twin loop, others are saddle-stitched and bound in a conventional hard-cover book format. Most publications are held together by a 19-ring plastic comb, and finished with vinyl covers. Whatever the method, it is important to remember that Braille books are

much larger than their print equivalents. Charles Dickens' *David Copperfield* may be a healthy paperback in print, but it stands almost two feet tall in Braille and is commonly divided into twelve or more volumes. During the binding phase, therefore, large books are separated into manageable stacks and bound into individual volumes.

Book Formats for Braille Readers

In the past, no Braille book would ever have been released to a reader before it was first embossed and meticulously checked by a certified Braille proofreader. This standard has relaxed a great deal with the advent of electronic books and the accuracy of modern computer programs. Today, many Braille producers forgo the time-consuming step of hard-copy proofreading, relying instead on their readers to point out any serious errors. For most fictional titles, this is sufficient. Unless the work is unusually complex, such as a math or science textbook, the copy produced by computer with the work of a trained transcriptionist should not need to be proofread in Braille.

There are three main book formats for Braille readers: printed text, electronic text, and accessible DAISY. When a reader requests a book in hard-copy Braille, and it has not been produced before, the producer will need to transcribe it from another format. Consequently, Braille producers generally offer four separate services. If an organization such as NNELS contracts with a Braille producer, any electronic files produced as part of the process should be made available back to the organization or library for inclusion in their digital collection.

> **Print to Text.** From a hard-copy print book, the producer scans each page, converts images to electronic text using optical character recognition (OCR), and then proofreads the text to remove any recognition errors. To expedite scanning, the spines of books are frequently cut away so that the pages can be fed through an automatic document feeder.

> **Text to DAISY**. All text-DAISY books can be read using text-to-speech software, which essentially turns every title into an audio book. Furthermore, the text can be read line-by-line with a refreshable Braille display. If a producer can obtain a book in in EPUB or PDF format, the first step in its journey to becoming a DAISY title involves converting the file to Microsoft Word. There are many options for conversion, but a free eBook management program called Calibre (http://calibre-ebook.com/) usually works well. Once the book is in Word format, the real work begins.

> In order for a DAISY book to be easily navigated and understood in its proper order and context, headings and styles are applied throughout the text in the form of object anchors. Alt tags such as image descriptions can increase the readability of the book – and greatly enhance its overall accessibility.

> There are a number of ways to imbed these anchors in the finished book, but the tools built right into Microsoft Word are not difficult to use. Once the document is tagged, marked up, and properly formatted, it can be saved into the DAISY XML format. The final step generates additional navigation files, optionally synthesizes its text into

computer-generated audio recordings, and then packages all the files neatly into a single DAISY archive ready for a reader.

DAISY to BRF. To produce a Braille Format (BRF) file, the producer needs a DAISY-formatted copy of the book. This can be in the form of a DAISY archive or a properly-formatted XML or EPUB 3 file. The producer lays the document out in plain text, using the headings and levels indicated in the DAISY book, then translates it to the format of Braille requested by the client. Most if not all producers now support both EBAE and UEB, and some also work with uncontracted Braille.

Many producers do not work with the DAISY format, which is unfortunate because DAISY is an internationally-recognized standard for aiding the navigation of books by print-disabled readers. Digital Accessible Information SYstem (DAISY), or Accessible EPUB (DAISY Consortium, n.d.), is a technical standard that allows books to be quickly navigated in a sequential and hierarchical manner, and offers powerful indexing and bookmarking features. To skip a chapter in a hard-copy book, the reader flips back to the table of contents, locates the appropriate page number, then flips forward to the desired section. When reading a DAISY book, however, all the user has to do to skip a chapter is press a single button.

Downloadable DAISY books are distributed to patrons as a single compressed archive, making them easy for libraries to store and quick for users to download. If a DAISY file is generated during the Braille production process, that book can then be made available to the wider audience of readers who enjoy electronic books. In Appendix C, we summarize pricing quotes from Canadian Braille producers. For this summary, and in the interest of full inclusion, we have listed companies who perform direct text to BRF translation. Though the finished output will not be in the DAISY standard, there is still a demand for electronic Braille files, which can be read directly on a Braille display. Ideally, books would be available in both DAISY and BRF format.

Hard-Copy Production. To produce hard-copy Braille, the producer will need a translated copy of the book in electronic Braille. This is usually referred to as a BRF. The producer sends the prepared file to one or more embossers, collating the output into individual volumes. The book is then bound, packed in a box, and mailed directly to the recipient.

This concludes our overview of the basic steps that are usually taken to prepare a Braille-readable edition of a book. The task is often lengthy and complex, so it is frequently contracted out to third-party transcription companies. If the purchasing process were modified to place a requirement on publishers and vendors to provide electronic files that port well to accessible formats, libraries could save a great deal of time and money.

Issue 1: Libraries Procuring Books "Born Accessible"

There are differing opinions about the usefulness and pleasure of reading electronic Braille. Some prefer the compactness of electronic files compared to the bulk of paper volumes; they also value using less paper. Others feel that nothing can replace the experience of holding and reading a physical book. Hard-copy Braille books are still popular and "the only way to go" for many readers. Regardless of how people read Braille, the degree to which books are born accessible has a strong influence on how many books are available in Braille.

Publishers typically make electronic books available to libraries to purchase in one of three formats: EPUB, PDF, and MP3. Books in the older EPUB 2 are still far more common than EPUB 3, despite EPUB 3 being unique among the common formats: it allows the author or publisher of the work to embed accessibility features right into the document (Garrish, 2012). If some of these features are embedded when the book is prepared for publication, the time required to create a well-laid-out DAISY version is dramatically reduced.

About 70% of publishers release their books in EPUB 2, and a number still produce books in PDF format. PDF is particularly problematic. Occasionally, a book packaged in PDF format will contain images of the text on each page, rather than the text itself. In such cases, the images must all be converted to text using optical character recognition (OCR). Each page of the document is extracted into an image (JPEG or TIFF), run through OCR software such as Tesseract (http://github.com/tesseract-ocr/tesseract), and appended to the end of the book. This procedure can be automated somewhat by custom scripts and software, but the output must be cleaned up by hand to correct interpretation errors.

One of the specifications in the DAISY standard is to include images for the benefit of sighted readers, including those with mobility and comprehension impairments. In the case of PDF documents, each individual image usually has to be extracted by hand. PDF is a pain. EPUB files, on the other hand, are actually an archive of a great many smaller files, which live in a standard set of directories. A free, open-source application called eCanCrusher (http://www.docdataflow.com/ecancrusher/) can open these directories in order to copy their image files into a new project. Some manual work is still required: for example, images must be described for the benefit of blind readers.

There is one more format popular with book vendors, and that is MP3. Unlike PDF and EPUB, this digital format is audio-only and does not contain the text of the book. Therefore, it cannot be read on a refreshable Braille display or embossed in hard-copy Braille. MP3 is often co-released with a print or electronic book so it is very rarely the only format available.

EPUB developments have the potential to revolutionize the future of Braille in Canada. A library model offering integrated services to all patrons, regardless of their ability to read print, can become a reality. The untold cost of building, maintaining, and keeping current a vast selection of books in hard-copy Braille format can become a thing of the past, as it is no longer crucial that popular titles be immediately transcribed and embossed on paper. What is imperative, however, is that librarians be educated to purchase materials that are – or can easily be made – accessible.

Properly-designed titles released in the new EPUB 3 format are digital documents, and – if the standard is used properly – are immediately accessible to all. There are no production, storage or distribution costs, books don't wear out, and there are absolutely no barriers to access. Sighted readers can choose a device that best suits them, audio readers can select a synthetic voice they enjoy, and Braille readers are not limited to a small number of publications in the format of Braille they prefer.

Unfortunately, while EPUB 3 is the most promising publishing format for accessibility, few EPUB 3 files utilize the full accessibility specification and so do not achieve their potential for rich navigation. Footnotes and sidebars are rarely coded properly to make them skippable, and image descriptions are usually non-existent. Because publishers frequently outsource EPUB production or use an automated process, most have not fully embraced the new accessibility features of EPUB. What is more, because most of their staff do not come from accessibility or coding backgrounds, they may not fully understand the importance of modifying their publication process. For this reason, most mainstream EPUB books still require vast amounts of remediation to make them truly accessible, necessitating their conversion to Word and, ultimately, DAISY XML (Dugas, 2017; Kasdorf, 2018).

The DAISY Consortium has designed and made available Ace by DAISY, an open-source tool anyone can use to check the accessibility of EPUB files (http://daisy.github.io/ace/). This tool has enormous potential, as it can help to ensure that all EPUB books are formatted correctly and consistently. It is still early days, and further refinements and community support will make it easier to install and use Ace. As it becomes more powerful and easier to use, its importance should continue to grow. One consistent tool for use across sectors would be extremely helpful, not just for alternate format producers, but for publishers as well. As books come from publishers "born accessible", the work of making them available in DAISY or electronic Braille will be greatly reduced – or eliminated altogether.

It would be worth asking publishers from whom electronic files are being procured if the books have been checked in this manner. Governments could assist the adoption of fully accessible coding by incorporating its use as a requirement for receipt of funding in projects intended to support Canadian publishing.

Recommendation 1: Encourage publishers to publish accessibly and encourage libraries to procure accessible books and platforms.

To summarize, PDF documents that contain images of text are the most important to avoid. PDF and EPUB files that contain regular text are about equal on the scale of accessibility. Books in EPUB 3 format that have appropriate headings and object anchors placed to conform with accessibility guidelines, on the other hand, are the most desirable. Audiobooks in MP3 format lack specific low-level navigation and are not suitable for patrons who want to read the book in Braille, or who are deaf or deafblind.

If publishers properly place accessibility anchors as they transition to providing books in the EPUB 3 format, the idea of specifically and separately producing and offering titles in alternate format may eventually become a thing of the past. If a book is laid out correctly in

EPUB 3, fully utilizing the DAISY 4 standard, there is no longer a need to convert it to the specialized DAISY 3 format at all. After checking it quickly for errors and performing the most minor clean-up work, it could be simply left as is. Offered in EPUB 3, such books would be fully accessible to print, audio, and Braille readers right out of the box. For legacy devices or hard-copy Braille readers, the conversion to DAISY 3 or BRF could be a simple task that can be performed by computer, with no human intervention at all, in seconds. This would be an important step toward making public library collections accessible to everyone.

Libraries can use their purchasing power to encourage publishers and push electronic text platforms toward full accessibility. Doing so automatically increases the titles available to people with print disabilities.

For the first time, we find ourselves at the threshold of a world where blind and sighted readers could read and navigate the very same book with ease. Accessible ebooks on accessible lending platforms can be read by everyone.

Issue 2: Braille Reading Technology

An online digital collection is affordable to run and maintain, and it costs relatively little to keep a collection current and relevant to readers. Electronic books have opened up a whole new frontier for libraries and readers alike, and only minor modifications are required to include blind Canadians in this model.

One way to include many Braille readers is to ensure they have access to a refreshable braille display. A refreshable braille display is an electro-mechanical device for displaying Braille characters, usually by means of round-tipped pins raised through holes in a flat surface ("Refreshable Braille Display," n.d.). Typically, Braille displays only show a single line of Braille at a time, so they have a button that can be pressed to move to the next line. This makes the technology significantly smaller than a traditional hard-copy Braille book. Despite their compact size, refreshable Braille systems are capable of storing thousands of documents at a time. A Braille display can even be connected to a computer or smart-phone via Bluetooth, to provide instant access to iBooks, Kindle, and similar commercial services, in addition to books in Daisy format.

Harvey (2017) calls the refreshable Braille displays "truly mechanical marvels," and describes how they work:

> The tiny nylon pins that make the Braille dots are only spaced 2.2 mm apart, and they must all be able to raise and lower independently. Each of the 160 dots on a typical 20-cell display is connected to its own lever, which is raised up and down by a crystal that expands under electrical current and contracts when the current is removed. They refresh in a fraction of a second – much less than the time that it takes to move a finger from the end of the line back to the beginning. Though they

are small, they must be reliable and durable enough to be read hundreds of thousands of times.

Historically, this technology has been quite expensive, but advancements such as the Orbit Reader 20 aim to put the price tag below $1,000 (Chong, 2017). Currently, the most affordable unit may be the BI14 from Humanware (n.d.), retailing for just a little over $1,300.

In 2015, the NLS in the United States hired a consultant to examine the potential of providing Braille through refreshable Braille displays. The report, which explored purchasing low-cost Braille displays and lending them to patrons who wanted one, found that the alternate approach was likely to cost roughly half that of a traditional hard-copy lending system (United States Government Accountability Office, 2016, 2016, p. 24). In addition to drastically cutting costs, this delivery method allows readers to access materials almost instantly, without waiting days or weeks for mail delivery.

Recommendation 2: Federal Funding for Refreshable Braille Displays

A Canadian federal government allocation of $6.5 million could be used to purchase and distribute refreshable Braille devices to people who need them. These funds would allow for the purchase of up to ten thousand units at an estimated cost of $650 each. Estimates suggest that ten thousand devices represent the upper limit of demand.

Local public libraries could make requests on behalf of borrowers and the machines should be made available on long-term loan through libraries. In effect, borrowers would be able to retain devices permanently, but would agree to return them to public libraries when those devices would no longer be needed.

A federal commitment of half a million dollars annually could be used for repair, replacement, or new users of refreshable Braille devices. A borrower needing a repair or replacement returns the machine to their public library and receives a replacement device while repairs are being made.

Issue 3: Hard-Copy Braille

For a number of reasons, a small percentage of blind Canadians still prefer to read physical, bound Braille books on printed paper. Others may choose to read primarily with electronic Braille or digital audio, but find reference works, cookbooks, and books containing a lot of mathematical or scientific notation are best read using hard-copy embossed Braille (J. Dixon, personal communication, February 26, 2018). This complicates the delivery model, but serving patrons with hard copy Braille remains crucial for any inclusive library service.

Michael Ciccone (personal communication, February 7, 2018) of CELA reflects the general view of Braille production when he says:

While we expect use of Braille to rise as Braille displays become more affordable … it will always be a small portion of overall circulation. We feel the inclusion of Braille in our collection is a requirement if we are to serve the blind community. The numbers may be low, but the need is high.

Historically, agencies that offered materials in alternate format would produce, store and maintain a vast collection of Braille volumes. These volumes were expensive to produce, bulky to store, and heavy to ship, but there was no other option. Today, as the majority of Braille readers turn to electronic books, a new delivery method is surfacing. There is still a need for embossed Braille books, but they no longer need to be shipped back to libraries or stored. Instead, those wanting a physical Braille book could receive a copy produced on-demand, and be given the option of keeping, recycling, or returning the book to the local library.

If most or all digital titles in a library's collection were available in embossed Braille on demand, it would be a tremendous service improvement for both the library and its patrons. There would be no wait-list for popular items, and the library would not have to maintain a large physical collection of oversized Braille volumes.

A program of one-way Braille can be provided in a number of ways, but contracting the services of a few third-party organizations seems to be the most viable option. In this way, the initial cost and logistics of setting up and staffing a Braille production plant can be avoided. Moreover, utilizing more than one qualified producer helps to decentralize production and build capacity across the country while adding redundancy to the network. If one producer becomes overloaded or suffers a catastrophic equipment failure, other producers can easily step in and help to carry the load.

Due to the small number of patrons expected to take advantage of such a service, it would be important to share the cost on a national, provincial, or regional level. It would not be reasonable, for example, to expect a small rural library to pay for repeated requests for embossed Braille books from a particularly avid Braille reader.

There are four distinct costs associated with setting up and running a Braille production program:

1. Electronic files for the books that need to be produced must be acquired and made ready for Braille embossing. This is a one-time requirement, as once they are ready, files can be used to produce a limitless number of copies. As ebooks (particularly EPUB 3 files from publishers) become more accessible, the cost for this step decreases sharply.

2. Specialized equipment must be purchased and set up to produce and finish the books in the desired method. A good entry-level embosser costs about $5,000, and produces Braille on continuous-feed Braille paper. A machine to separate and collate each stack will cost about the same. The manual machine to assist in binding the pages into volumes can be purchased for under $1,000.

3. It is important not to overlook regular servicing and maintenance of the machines. Like any other piece of equipment, maintenance must be done regularly and professionally, and its need is roughly equivalent to demand. The numbers from the internal documentation of the Braille Superstore suggest that ten to twenty percent of paper costs should be budgeted for machine repairs. The paper itself is thicker, so costs quite a bit more than regular letter-writing paper. A box of 1,000 sheets can be found for about $40, and should afford enough paper to produce 2-3 books for adults. Spines and covers for finishing are not expensive, and a dollar per volume should meet most needs nicely.

4. Once the electronic file is ready, the majority of the time required to produce a Braille book is in the production phase, and most embossers can be left unattended without concern. The embosser in the above example prints at the rate of around 250 pages per hour. A Braille page holds less text than a print one, but most books for adults are printed in two or three hours at this speed. Once a book has been produced and, provided the proper collating and binding equipment is available, a well-trained individual should be able to collate and bind an average-size book for adults in about twenty minutes.

It is reasonable to conclude, therefore, that a basic Braille production program could be launched with an equipment investment of $11,000. Once an electronic file is ready, the average cost of producing each book (when the electronic file is ready) should be around $30.

Perhaps what makes this model of printing on demand so compelling is its ability to scale and meet current demand without the risk of over-investing. The policy of file sharing, however, is critical to its success. Regardless of which producer(s) are selected for a particular transcription task, the files generated will immediately benefit all Canadians who read electronic books in alternate formats. Even if embossing is not immediately required, these companies can be called upon to transcribe current books into a more accessible format. When the costs are established up front, it becomes much simpler to project a budget, and educate librarians on which materials are feasible to transcribe and emboss.

A directory of Braille producers in English speaking countries found in Appendix D, while likely incomplete, is miniscule when compared to any list of print production facilities. There are two reasons this discrepancy is not a problem. First, Braille publishers tend to make whatever they produce available across borders; this has been the case even before the enactment of the Marrakesh Treaty. Second, a number of home-based enterprises, often run by blind individuals, have sprung up to meet the need for limited production small runs of shorter documents, so there are actually quite a number of options.

For the purposes of comparison, the list of pricing quotes in Appendix C examines the cost and time involved in producing *Anne of Green Gables* in Braille. Remember, Braille books are much larger than print ones, and only one size of text is used in Canada. In order to assess cost structures and delivery timelines, each producer was thus asked to quote on a book spanning 500 Braille pages, which is the approximate length of L. M. Montgomery's famous

work. Typically this book would span four volumes, though the size of individual volumes varies slightly by producer.

The estimates in Appendix C do not take into account the cost of mailing the embossed book to the patron's home, as it is expected that producers will utilize the free "Literature for the Blind" mailing privilege offered by Canada Post (http://www.canadapost.ca/tools/pg/manual/PGlitblind-e.asp). While this is an additional cost to the federal government, it is important to remember that the book will only be shipped once. When compared to the traditional method of warehousing pre-produced Braille titles, therefore, this method represents a cost savings of as much as 50% to the national postal system.

It is also important to remember that the quotes in Appendix C are estimates, based on producing a single copy of a single book. Prices and timelines may vary depending on the complexity of the text being transcribed, and on the size and frequency of those requests.

Finally, we have endeavored to indicate which producers are owned and operated by blind entrepreneurs. It is our opinion that people who are fluent Braille readers have a grasp of Braille layout, production and quality that those who primarily read print cannot appreciate. In addition, libraries or NNELS may prefer to award production contracts to disabled individuals to help them be more fully employed, if it makes sense from a cost and delivery standpoint to do so.

If a patron requests hard-copy Braille books somewhat regularly, it is unlikely that she or he will want to keep every single one. Though many will choose to pass Braille books along to friends, or to another reader through a book-sharing, this will not always be possible. A simple system could allow for the return of hard-copy Braille, again without causing storage and shelving problems for local libraries. Using a system similar to that developed for keeping track of materials returned to other branches within a library system, any library receiving a returned Braille book could report its location to a national database.

If a library receives a request for an embossed Braille book, the first step could be to check the database for an existing copy before sending the book to be embossed. If every library would commit to shelving several, perhaps up to ten, Braille books, the storage burden would not be too great for any individual library. Requests could easily be met by mailing the book to the borrower using the free mailing service offered by Canada Post. Any titles that do not circulate frequently could be donated to a blind school overseas, placed in a free recycling area of the local library, or recycled.

With a small collection available in every local library, everyone – from the librarians to the patrons they serve – would get a better idea of how Braille books work. An incredible number of sighted people are fascinated by the Braille system, and welcome the chance to handle and touch the pages of a Braille book. And perhaps more Braille readers would learn about what public libraries have to offer.

There is one more important aspect of hard-copy Braille to consider. Young children who are blind or have a blind parent are introduced to the world of books through a format called print/Braille. With print/Braille books, Braille pages are interleafed between print pages so that both can be read simultaneously. The finished volume contains both print and Braille text, along with illustrations (Braille Literacy Canada, n.d.). Because this format is labor-intensive to produce, it is not cost-effective to give these books away when they are requested. Print/Braille books are not significantly larger than children's books in print, and they can be read by Braille and print readers alike. Local libraries can acquire a reasonable collection of print/Braille books without encountering shelving and storage problems. If print/Braille titles were readily available in local libraries, it is likely that they would be borrowed frequently to introduce Braille to sighted children. What a wonderful way to promote the education and inclusion of the next generation!

Recommendation 3: Embossed Braille Available by Request

A distributed system for the production, distribution, and storage of embossed Braille has become feasible due to computerized production and modern library database systems. Because of its resiliency, as well as its tendency to increase capacity, a distributed system is more efficient and cost effective than a traditional hub system. Canadian libraries are in a unique position to pioneer a 21st century model.

Public libraries must have means of providing embossed Braille to readers in order to be an inclusive service for all people with print disabilities.

To keep wait times at a minimum, libraries should have the option of having a Braille copy of a book embossed at the request of a borrower.

Because readers are distributed unevenly across the country and small libraries cannot be expected to bear the entire cost of embossing books (particularly if an avid reader lives within their service area), the library network as a whole should share the cost of embossing books.

Public libraries can develop relationships with many Braille producers, particularly those who are blind or have print disabilities, and contract with those producers to provide embossed Braille to those who request it.

Embossed Braille books can be shipped directly from the producer to the borrower using "Free Matter" mailing.2

Borrowers are encouraged, but not required, to return embossed Braille books to their local public library.

Recommendation 4: Distributed, Shared Braille Collections for Public Libraries

Permanent housing of an embossed Braille collection in a central location is costly and inefficient. Instead, a distributed model would allow those costs to be shared among libraries.

A national interlibrary loan program for embossed Braille and print/Braille books should be developed by public libraries to allow the most extensive possible circulation of existing hardcopy Braille books among public libraries.

Public libraries should have an inventory system for tracking embossed Braille books. An interlibrary loan system, again using "Free Matter" for shipping, would allow books to be shared anywhere they are requested in Canada. Any library that has received more embossed Braille than it can store may share with another library that has room.

All public libraries are encouraged to house at least some Braille books, even if they circulate very rarely, so that people are familiar with them and aware that the public library is a source of Braille material.

All public libraries are encouraged to maintain a collection of print/Braille books for children, since these take up little more room than their print equivalents.

Issue 4: Accessible Format Fluency in Libraries

In order to understand Braille use in public libraries across Canada, it is important to consider the varying perspectives and experiences of the public librarians who work directly with blind and visually impaired patrons. When speaking to individuals who work in departments such

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2 Canada Post (n.d.). Literature for the Blind. Retrieved from https://www.canadapost.ca/tools/pg/manual/PGlitblind-e.asp

as accessibility services, it is clear that there are differences of opinion concerning the importance and collecting of Braille.

For the Toronto Public Library (TPL), CELA is the best Canadian source of hard-copy Braille library materials (E. Sutter, personal communication, February 5, 2018). TPL does not formally collect Braille, although each location varies: the North York Central Library, for example, has a very limited collection of children's Braille as part of the International Board on Books for Young People's (IBBY) collection of Books for Young People with Disabilities (J. Demers, personal communication, January 30, 2018).

The Rimbey Municipal Library in Alberta has access to Braille but in very small quantities (Jean Keetch, personal communication, February 13, 2018). As a member of the Parkland Regional Library, Rimbey is able to access the regional collection of Braille, but it contains only eight Braille books. Keetch acknowledges that there is "a huge hole in the collection when it comes to print/Braille," and has ordered a dozen books to add to the collection. However, she states that most vision-impaired adult patrons make use of DAISY discs, not Braille. Even so, Keetch wishes it were easier for libraries to access Braille books, despite there not being a large demand.

CELA has approximately one thousand embossed Braille books available in their collection. These books are available to libraries that contract with CELA; however, these books are not available to lend to non-CELA libraries.

Michael Ciccone (personal communication, February 7, 2018), Executive Director of CELA, explains that CELA is "transitioning to […] 'one-way' Braille. Those wanting hard copy or 'embossed Braille' in the future will receive a copy produced on-demand and they will be asked to recycle it rather than return it (or keep it). This will be a tremendous service improvement because there will be no more waiting list for physical items, including magazines." Ciccone states that the 3,400 print/Braille books in the CELA collection will continue to be available for circulation.

Heather MacKenzie at the Halifax Public Library (HPL) explained that joining joined CELA in April 2017 added to HPL's Braille collection of 225 items (personal communication, February 22, 2018). HPL's items are mostly for youth and young adult readers (including 172 print/Braille picture books, easy readers, and fiction titles such as *Harry Potter*). By becoming members of CELA, HPL was able to increase the number of items that patrons are able to borrow, particularly for adult users. Library statistics indicate that 261 Braille items have circulated through CELA since December 2017, more than the in-house Braille collection circulates. MacKenzie writes,

I think that even with CELA, we would continue to provide our own in-house collection of Braille, as it is very much youth-focused, so it is a nice complement to the more adult CELA collection. We have, and continue to do, a lot of community promotion of our services to people with print disabilities, so are gradually getting the word out that those Braille items are available.

According to Courtney Novotny (personal communication, February 20, 2018), the Fraser Valley Regional Library (FVRL) has relatively low demand for Braille in their library system. However, within the FVRL system is a small collection of Braille picture books, housed at the Sardis Library, which was donated through a local organization. Additionally, Novonty states that they strongly promote the use of refreshable Braille devices and downloadable files from NNELS to use with Braille devices – the only difficulty with this approach is that most library customers don't have access to this kind of technology (see chapter on Braille Reading Technology): "We know that with a refreshable Braille display, nearly anything can be read in Braille, so when these devices come down in price, that will make a big difference for current and future Braille readers. There also seems to be a disconnect for many visually impaired customers using technology. There are great workarounds using technology that open up ways to read nearly anything, but it is difficult or too expensive for many people to access these workarounds at this time."

The struggle for many libraries is being able to justify the purchase of additional Braille, when there seems to be a relatively low customer demand for it. Noushin Naziripour (personal communication, February 12, 2018) at the Yukon Public Libraries states that their library has no Braille books due to low demand and limited space, but that CELA and NNELS are available when needed. According to Alexandra Yarrow (personal communication, February 14, 2018) at the Ottawa Public Library (OPL), "One barrier to incorporating new Braille material at OPL is having a solid justification for expanding a collection with low circulation stats and lack of customer interest. This also becomes a 'self-fulfilling cycle,' since people don't see Braille or expect us to have it, they don't come here seeking it, and therefore our small collection languishes."

Another issue, according to Carolyn Minor (personal communication, February 15, 2018) at the Winnipeg Public Library, is that "We do not have an accurate picture of how many customers require access to Braille material through the Library." Furthermore, many library patrons who have lost vision later in life cannot read Braille and prefer DAISY and other audiobooks.

Making changes to existing collection processes is not simple, often requiring executive leadership and extensive work among departments. According to A. Yarrow (personal communication, February 14, 2018), "Roughly three years ago we had a discussion to add a small deposit Adult Braille collection. In that meeting we reviewed the success of the current Braille collection, the community's need for adult Braille, and outside resources the library could offer customers that had Braille books. Unfortunately, due to low usage of existing collections, it was not possible to move forward with an Adult Braille book collection at that time."

Shannon Swekla (personal communication, March 2, 2018), who works as the outreach and access services coordinator at the Saskatoon Public Library, described her library's pilot project to create fifteen Braille books from existing titles on a Perkins Brailler, mostly aimed at young children and beginner readers. The Saskatoon team determined that the project wasn't sustainable, so the library focused instead on other alternate formats.

Another major obstacle for providing blind and vision impaired patrons with access to Braille is also the least talked about: many librarians and managers simply feel uncomfortable and unsure of how to go about addressing the unique needs of those with print disabilities. Not wanting to express this discomfort aloud, it is difficult to address it head-on. Sabina Iseli-Otto (personal communication, March 9, 2018) states: "One of the points I try to get across in every workshop I give to library staff is that having an accessibility librarian is valuable, and doesn't involve knowing everything: it means someone looking at the world through an 'accessibility lens' and thinking about library programs and services in terms of who *cannot* access them and being open to new ways of doing things to improve access. There's no course in 'accessible librarianship' so the role has more to do with orientation and curiosity than formal education."

Library schools rarely teach about accessible librarianship – and if so, it is done in passing – so students and future librarians are rarely acquainted with how best to provide these services, rendering them uncomfortable and unsure of what to do when patrons *do* come into the library requesting formats such as Braille. As S. Iseli-Otto (personal communication, March 9, 2018) reiterates, "with few opportunities to learn about this topic, and in an environment where it's often safer to pretend to be an expert than a learner, a lot of people who *should* know about this accessible formats feel discouraged from learning more."

In a recent article discussing accessibility and library school curriculum, Mulliken & Djenno (2017) state that "while overall the participants were knowledgeable supporters and champions of accessibility, approximately half had limited knowledge about current web accessibility technology, legal requirements, and policy" (pp. 43-44). While this article is focused primarily on web accessibility rather than Braille, the attitudes and knowledge bases of the interviewed professors teaching in library school departments demonstrates a surprising lack of knowledge and awareness, even among those faculty that expressed an interest in accessibility issues.

The Crane Library: The University of British Columbia's Little Gem

In a world of uncertainty, the seemingly-small Crane Library embodies the true meaning of information access and could serve as a model for public library service, and alternate format production. The library's clients and their needs have dictated technological changes, and the University of British Columbia has allowed the Library to grow and become an important part of campus life, fulfilling a necessary service to its staff and students.

Some history: prior to 1968, the University of British Columbia did not offer an official service of alternate format production. However, the service was being provided informally, with volunteer guides and tutors assisting students and staff with vision and/or learning disabilities to obtain alternate format versions of course materials. In 1968, the family of Charles Crane donated his personal collection of Braille books to the university, and a permanent space was secured in Brock Hall. Charles Crane was a deafblind student of the University in the 1930's, and an avid reader. His collection ranged "from everything from how to make lentil soup to the collection of Shakespeare, to Jungian analysis, to an arbourist encyclopedia…" (Montgomery,

2014). The more than 10,000 volumes formed the foundation of the library's alternate format collection.

The Crane Library caters to UBC students, faculty, and staff with print disabilities. They can request any course materials be provided in the alternate format of their choice (Grant, 2011).

The Library's collection has grown since the initial donation of Braille books, and now consists of:

- Sound recordings: 7,736 titles;

- Braille: 2,168 titles;

- E-text: 531 titles; and

- Large Print: 25 titles (A. Krumins, personal communication, March 22, 2018).

The Crane Library currently holds the largest collection of embossed Braille titles in Canada. The technology has also changed with the times, from reel-to-reel tape recorders to a digital recording studio (Montgomery, 2014), which is manned by about 90 volunteers and 15 student assistants (D. Ng, personal communication, March 13, 2018). All Braille production is contracted out, and in the past has included math textbooks with tactile graphics. For students requiring e-text with mathematical equations, they have been able to produce in house HTML with MathML embedded for certain exams that require it. However, textbook production would be beyond their capability and they would probably recommend Braille be used instead. No one has yet asked for any music to be transcribed into Braille, but the staff would simply look for an appropriate production company when it was requested. Their clear mandate is to fulfill their clients' individual alternate format needs. Although production is primarily driven by the content required by their clients, they do produce some general interest materials and collaborate with other educational producers on larger projects (A. Krumins, personal communication, February 28, 2018).

The Crane Library is a member of the Canadian Association of Educational Resource Centres for Alternate Formats Materials, and materials are shared widely through this mechanism. On a smaller scale, Crane coordinates loans to the public through the public library system. The Crane Library has a resource sharing agreement with NNELS (J. Mee, personal communication, March 13, 2018). In addition to providing access to each other's collections the Crane Library also completes some amount of audio narration of titles requested by NNELS patrons from across Canada. The Crane Library volunteers narrate the titles and the digital files, which are then sent to NNELS when they are complete, as well as being added to the Library's own collection for future use. This typically occurs later in the term and in the summer (D. Ng, personal communication, March 15, 2018; A. Krumins, personal communication, March 22, 2018).

The Library is funded by the University to provide alternate format materials for both the Vancouver and Okanagan campuses. The Library has three dedicated and cross-trained

employees: a Production Coordinator, a Program Assistant, and a Collection Coordinator. They meet daily to ensure production is meeting their timelines. Over the years they have seen dramatic fluctuations between audio and e-text due to the nature of the clients' needs and the courses they choose. Regardless of the format that is trending for that term or year, they are sufficiently staffed to manage the demand (D. Ng, personal communication, March 13, 2018).

The Crane Library has grown from a single personal donation of Braille books to both a university and public library which shares alternate format publications across the country, in the manner of a regular print library. To repeat: this seemingly-small library embodies the true meaning of information access and could serve as a model for public library service, and alternate format production.

Recommendation 5: More Braille and Alternate format Expertise in Public Libraries

Accessible formats and library service ought to be a mandatory part of every library-related instruction curriculum, including library and information schools, library technician programs, and any others.

Provinces and territories can encourage and develop policies and standards for accessible library service.

Public libraries should work with communities of Braille and other alternate-format readers to determine service options.

Closing Comments from NNELS

When the idea for this study first arose, we did not know what the recommendations would be. We knew there was an unmet need in public libraries to offer Braille to readers who need it, and we knew we wanted to present an opportunity for public libraries to own or develop their own collections. Third-party subscriptions are an option for supplementing library collections, but we believe that a subscription or private payment should never be the only way to read a book in any format.

The ideas from this team of Braille readers writing about Braille are compelling in their simplicity and clarity. First, work to make books accessible at the point of publishing so that they are available to the most readers. Then, ensure that people who need a refreshable Braille display have access to one since the cost of delivering electronic books is so much lower than the cost of producing hard-copy Braille. Next, contract with some of the many Braille production companies in Canada, with a preference for those run by people who are blind or have print disabilities, to produce one-off hard-copy Braille books for the readers who request it. Finally, put a little Braille in every library, and make sure Braille readers know these books are there. Sharing books is what libraries already do so well. Finally, find ways to make sure that library staff in all libraries know as much as the ones who were interviewed for this paper.

Thank you to the people and organizations who answered questions and helped with details, and apologies to those we are unintentionally neglecting to thank here: Michael Ciccone (Centre for Equitable Library Access), Jonathan Demers (Toronto Public Library), Judith Dixon (National Library Service), Jen Goulden (Braille Literacy Canada), Jean Keetch (Rimbey Municipal Library), Aaron Konkol (Braille Library and Transcribing Services), Arthur Krumins (Crane Library), Heather Mackenzie (Halifax Public Library), Janet Mee (Crane Library), Carolyn Minor (Winnipeg Public Library), Noushin Naziripour (Yukon Public Libraries), Dickson Ng (Crane Library), Courtney Novotny (Fraser Valley Regional Library), Elizabeth Sutter (Toronto Public Library), Shannon Swekla (Saskatoon Public Library), Anne-Julie Thibeault (Jymico), and Alexandra Yarrow (Ottawa Public Library).

Thank you to all of the writers for careful thought and hard work, to the exceptional Lilith Lee for tireless research and formatting, and to Mary Ellen Gabias and Kim Johnson for exemplary leadership and project facilitation.

This report was written with support from the Government of Canada's Social Development Partnerships Program - Disability Component. We thank them sincerely for the opportunity to focus on this topic and develop these ideas.

The NNELS Team

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Appendix B: Provincial Educational Resources and Braille Producers

K12

1. **Accessible Resource Centre – BC (ARC-BC)**
   URL: http://www.arc-bc.org/help/contact.aspx
   Email: arc@prcvi.org
   Tel.: 604-266-3699
   Fax: 604-261-0778
   Address:
   106-1750 West 75th Ave
   Vancouver, BC
   V6P 6G2

2. **Alberta Education**
   URL: http://education.alberta.ca/supports-for-visual-impairments/description-of-services/
   Email: edc.ssvi@gov.ab.ca
   Tel.: 780-427-4681
   Toll Free in Alberta: 310-0000
   Fax: 780-427-6683
   Address:
   8707-51 Avenue
   Edmonton, AB
   T6E 5H1 (Temporary address)

3. **Alternate Format Materials Library (AFMNL)**
   URL: http://cmaf.gov.nl.ca/Home.aspx
   Email: AlternateMaterials@gov.nl.ca
   Tel.: 1-709-729-5097
   Fax: 1-709-729-1400
   Address:
   Department of Education and Early Childhood Development
   P.O. Box 8700
   St. John's, NL
   A1B 4J6

4. **Manitoba Education and Training**
   URL: http://www.edu.gov.mb.ca/k12/afs/
   Fax: 204-948-2421
   Address:
   Main Floor Library – 1181 Portage Avenue
   Winnipeg, MB
   R3G 0T3

5. **Provincial Resource Centre for the Visually Impaired (PRCVI)**
   URL: http://www.prcvi.org/services.aspx
   Email: info@prcvi.org
   Tel.: 604-266-3699
   Fax: 604-261-0778
   Orders Fax: 604-269-0495
   Address:
   #106-1750 West 75th Ave
   Vancouver, BC
   V6P 6G2

6. **Saskatchewan Alternate Format Library / Saskatoon Public Schools, Curriculum Materials Centre**
   URL: https://www.spsd.sk.ca/division/SAFM/Pages/default.aspx
   Email: AFMrequests@spsd.sk.ca
   Tel.: 306.683.8329 or 306.683.8140
   Address:
   Saskatoon Public Schools
   310 - 21st Street East,
   Saskatoon, SK,
   S7K 1M7

7. **Service national du RÉCIT en adaptation scolaire**
   URL: http://www.recitadaptscol.qc.ca/
   Email: chouinardj@csdm.qc.ca
   Tel.: 514-596-6636 poste 7165
   Address:
   3700 rue Rachel est
   Montréal, QC
   H1X 1Y6

8. **W. Ross Macdonald School**
   URL: https://pdsbnet.ca/en/schools/w-ross-macdonald/programs-and-services/services/blind-low-vision-resource-services-and-outreach-programs/
   Online Contact Form: https://pdsbnet.ca/en/schools/w-ross-macdonald/contact-us/?school=W.%20Ross%20Macdonald
   Toll Free: 1-866-618-9092
   Tel.: 519-759-0730
   Address:
   350 Brant Avenue,
   Brantford, ON
   N3T 3J9

K-12 & Post-Secondary

1. **Alternative Education Resources for Ontario (AERO)**

URL: http://alternativeresources.ca/Aero/Public/ProductionServices.aspx
Email: aero@alternativeresources.ca
Tel.: 519-759-2522
Address:
350 Brant Avenue
Brantford, ON
N3T 3J9

2. **Atlantic Provinces Special Education Authority (APSEA)**
   URL: http://www.apsea.ca
   Email: apsea@apsea.ca
   Tel.: 902-424-8500 (Voice/TTY)
   Fax: 902-423-8700
   Address:
   5940 South Street Halifax, NS
   B3H 1S6

3. **Canadian Association of Educational Resource Centres for Alternate Format Materials (CAER)**
   URL: http://caercanada.ca

Post-Secondary

1. **Centre for Accessible Post-secondary Education Resources (CAPER-BC)**
   URL: http://caperbc.ca/about-us/contact-us/
   Email: caperbc@langara.bc.ca
   Toll Free: 1-855-729-2457
   Tel.: 604-323-5639 (Lower Mainland)
   Address:
   Langara College
   100 West 49th Avenue
   Vancouver, BC
   V5Y 2Z6

2. **The National Education Association of Disabled Students (NEADS)**
   URL: http://www.neads.ca/
   Email: info@neads.ca
   Tel.: 613-380-8065
   Tel.: 613-526-8008 (TTY)
   Fax: 613-369-4391
   Address:
   Rm. 426, Unicentre
   Carleton University
   Ottawa, ON
   K1S 5B6

United States

1. Access-USA | http://www.access-usa.com/Services/Braille_1.htm

2. Accessibility Solutions Group, LLC | http://accessibility-solutions-group.com/braillesolutions/

3. AccessLinx | http://www.accesslinx.com/?page_id=77

4. Alabama Instructional Resource Center for the Blind | http://aidb.org/alabama-school-for-the-blind/instructional-resource-center-aircb/

5. All-Braille | http://www.allbraille.com/

6. Alternate Text Production Center | http://www.atpc.net/

7. Altmediaedg | http://www.altmediaedg.com/about.php

8. AMAC Accessibility Solutions and Research Center | http://www.amacusg.org/

9. Amanuensis Braille | http://www.amanuensisbraille.com/transcription_services.php

10. American Action Fund for Blind Children and Adults | http://actionfund.org/products

11. American Printing House for the Blind, Inc. | http://www.aph.org/

12. American Red Cross | http://www.redcross.org/local/new-jersey/programs-services/community-services/braille

13. Anamosa, Iowa Prison Industries | http://www.iaprisonind.com/store/pg/182-Braille-Transcription.aspx

14. Antelope Valley College, Office for Students with Disabilities | http://www.avc.edu/studentservices/osd/alternativemedia

15. Associated Services for the Blind and Visually Impaired | http://www.asb.org/index.php/alternative-formats/braille-division

16. Atlanta Braille Volunteers | http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Special-Education-Services/GIMC/Pages/Braille%20Volunteers/Atlanta-Braille-Volunteers.aspx

17. Audio & Braille Literacy Enhancement | http://www.ablenow.org/services/braille-services/

18. Bach to Braille | http://bach2braille.com/

19. Baruch College Computer Center for Visually Impaired People | http://www.baruch.cuny.edu/ccvip/services_products.htm#brailleservices

20. Bibles for the Blind | http://www.biblesfortheblind.org/aboutus.shtml

21. Blindness Support Services Inc. | http://www.blindnesssupport.com/braille.html

22. Boston University Disability Services | http://www.bu.edu/disability/related-resources/alterative-text-resources/

23. Braille Association of Mid-Florida | http://www.bmfl.org/homePublic.php

24. Braille Bibles International | http://www.braillebibles.org/Braille.html

25. Braille Boutique | http://www.brailleboutique.net/

26. Braille Connection LLC | http://www.facebook.com/jmacd772/

27. Braille Enterprises | http://www.brailleenterprises.com/

28. Braille Geek | http://braillegeek.com/

29. Braille Group of Buffalo | http://braillegroup.org/

30. Braille Institute | http://www.brailleinstitute.org

31. Braille It | http://www.brailleit.com/

32. Braille Library & Transcribing Services | http://bltsinc.org/index.html

33. Braille Music and More | http://www.braillemusicandmore.com/braille-services.html

34. Braille Plus | http://www.brailleplus.com/

35. Braille Plus, Inc. | http://brailleplus.net/

36. Braille Publishers | http://www.braillepublishers.com/

37. Braille This, LLC | http://braillethis.com/

38. Braille Transcription Project of Santa Clara County, Inc. | http://www.brailleproject.net/services/

39. Braille Transcription Services | http://www.mi-braille.org/transcription-services.php

40. Braille Works | http://brailleworks.com/braille/

41. Bureau of Education and Services for the Blind, State of Connecticut | http://www.ct.gov/besb/cwp/view.asp?a=2847&q=331414

42. California Medical Facility and Volunteers of Vacaville | http://www.cdcr.ca.gov/Facilities_Locator/CMF.html

43. Carolyn's Braille Services | http://cmbrailleservices.com/braille-services/

44. Cat's Meow Braille Transcription | http://www.catsmeowbraille.com/

45. Center for Braille and Narration Production, Missouri Department of Social Services | http://dss.mo.gov/fsd/rsb/

46. Central Washington University, Central Access | http://www.cwu.edu/central-access/format-options

47. Cleveland Sight Center | http://www.clevelandsightcenter.org/programs-services/braille

48. Clovernook Braille Printing House | http://clovernook.org/braille-printing-house/

49. Columbia Basin College, Disability Services | http://www.columbiabasin.edu/index.aspx?page=851

50. Columbia Lighthouse for the Blind | http://www.clb.org/programs-services/

51. Contra Costa College, Alternative Media | http://www.contracosta.edu/student-services/disability-services/alternative-media/

52. Contra Costa County Office of Education Braille Center | http://www.cccoe.k12.ca.us/stsvcs/speced/central.html#vi

53. Dancing Dots | http://www.dancingdots.com/main/index.htm

54. Delaware Department of Health and Social Services, Division for the Visually Impaired | http://dhss.delaware.gov/dhss/dvi/materctr.html

55. Education Service Center, Region 20 | http://www.esc20.net/page/bhrs_braille.Home

56. Gallaudet University, OSWD Services | http://www.gallaudet.edu/office-for-students-with-disabilities/applying-for-services-from-oswd/oswd-services

57. George Mason University, Assistive Technology Initiative | http://ati.gmu.edu/accessible-text/

58. Georgia Instructional Materials Center | http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Special-Education-Services/GIMC/Pages/Transcribers/Transcriber_Home.aspx

59. gh, LLC | http://www.ghbraille.com/services/braille-overview

60. GMR Transcription | http://www.gmrtranscription.com/braille-transcription.aspx

61. Hadley Institute for the Blind and Visually Impaired | http://www.hadley.edu/brailling.asp

62. Handid Media Systems | http://www.handid.org/

63. Heartland Area Education Agency | http://www.heartlandaea.org/management-and-support-services/creative-services/

64. Hope Braille | http://hopebraille.com/

65. Horizons for the Blind | http://www.horizons-blind.org/?page_id=1074

66. Humboldt State University, Student Disability Resource Center | http://disability.humboldt.edu/servicesavailable-media

67. Idaho Educational Services for the Deaf and the Blind | http://www.iesdb.org/index.php/resources

68. IERC Braille Project | http://www.patinsproject.org/projects/braille-transcription

69. Independent Living Resources | http://www.ilr.org/transcriptionservices.shtml

70. International Christian Braille Mission, Inc. | http://icbminc.org/services.shtml

71. Iowa Department for the Blind | http://blind.iowa.gov/library/student-resources#IMC

72. Jewish Braille Institute | http://www.jbilibrary.org/about_jbi

73. Kansas Braille Transcription Institute | http://www.kbti.org/services.html

74. Kentucky School for the Blind | http://www.ksb.kyschools.us/Content/36

75. Liberty Braille | http://libertybraille.com/

76. Library of Congress, National Library Service for the Blind and Physically Handicapped | http://www.loc.gov/nls/about/faq/#q16

77. Lighthouse International | http://li129-107.members.linode.com/services-and-assistance/lifestyle-independence/print-access-center/#brail

78. Lilac Services for the Blind | http://lilacblind.org/services/braille/

79. Long Beach City College, Alternate Text Production Center | http://www.lbcc.edu/post/alternate-text-production-center

80. Lutheran Braille Workers | http://www.lbwinc.org/

81. Massachusetts Accessible Instructional Materials Library | http://www.aimlibrary.org/braille-student-eligibility/

82. Metrolina Association for the Blind | http://www.mabnc.org/accessible-document-services/braille-large-print-audio-cd-services

83. Miami Accessible Media Project | http://www.patinsproject.org/projects/miami-accessible-media

84. Michigan Braille Transcribing Fund | http://www.mi-braille.org/transcription-services.php

85. Michigan State University Resource Center for Persons with Disabilities | http://www.rcpd.msu.edu/programs/media-access

86. Midwestern Braille Volunteers | http://www.mbvol.org/about-us/

87. Minnesota State Services for the Blind | http://mn.gov/deed/ssb/braille/braille/braille.jsp

88. Missouri Southern State University, Student Disability Services | http://www.mssu.edu/student-affairs/disability-services/

89. Mohawk Valley Braille Transcribers | http://www.cabvi.org/mohawk-valley-braille-transcribers/

90. Mt. San Antonio College, Accessibility Resource Centers for Students | http://www.mtsac.edu/access/services/altmedia.html#braille

91. Multimedia Transcription Service | https://www.hipcilnj.org/multimedia-transcription-service/

92. National Braille Association | http://www.nationalbraille.org/

93. National Braille Press | http://www.nbp.org/ic/nbp/business/index.html

94. New Mexico School for the Blind and Visually Impaired Instructional Resource Center | http://www.nmsbvi.k12.nm.us/IRC.html

95. NIMAS Master | http://www.nimas.pub/

96. North Dakota Vision Services/School for the Blind | http://www.ndvisionservices.com/services/braille-access-center

97. Oklahoma Library for the Blind and Physically Handicapped | http://olbph.org/dir/AIM

98. Opus Technologies | http://www.opustec.com/index.html

99. Oregon Textbook & Media Center (OTMC) | http://www.wesd.org/Domain/57

100. Oshkosh Correctional Institution Braille Program | http://www.ceanational.org/phorum/read.php?18,5114 ; http://www.wbay.com/content/news/Learning-character-Oshkosh-inmates-transcribe-works-into-Braille-468668333.html

101. Pennsylvania Association for the Blind | http://www.pablind.org/braille-embossing/

102. Perkins Library | http://www.perkins.org/stories/magazine/putting-braille-on-the-menu

103. Pima Community College, Access and Disability Resources | http://www.pima.edu/current-students/disabled-student-resources/services/index.html

104. Precision Braille Plus | http://www.facebook.com/pg/precisionbraille/about/

105. Prose and Cons Braille | http://csi.nebraska.gov/products/braille-products

106. Region 4 Braille Services | http://www.esc4.net/braille

107. Seedlings Braille Books for Children | http://www.seedlings.org/about.php

108. SeeingWithTheHeart | http://www.seeingwiththeheart.net/

109. South Carolina School for the Deaf and the Blind | http://www.scsdb.org/domain/63

110. South Dakota Department of Corrections | http://doc.sd.gov/adult/industry/shop/braille.aspx

111. Southern Illinois University, Disability Support Services | http://disabilityservices.siu.edu/guidelines-and-forms/text-conversion.php

112. Spellbound Braille | http://www.spellboundbraille.com/

113. State Services for the Blind, Minnesota | http://mn.gov/deed/ssb/braille/braille/braille.jsp

114. TechACCESS of Rhode Island | http://www.techaccess-ri.org/rimac/

115. TechAdapt | http://www.techadapt.com

116. Temple Beth El Braille Bindery | http://www.tbeonline.org/braille-bindery

117. Temple Sisterhood Braille Group | http://www.fdlrscrown.org/Special%20Places%20Files/TSBGSP.asp

118. The League | http://www.the-league.org/services/braille-services/

119. Transcribing Mariners | http://www.tmbraille.com/

120.   University of California – Irvine Disability Services Center |
       http://www.dsc.uci.edu/services_accommodations/index.html

121.   University of Illinois at Urbana-Champaign, The Division of Disability Resources &
       Educational Services | http://www.disability.illinois.edu/academic-
       support/accommodations/text-conversion#top

122.   University of Michigan Center for the Visually Impaired |
       http://ssd.umich.edu/article/braille-text-printing

123.   Utah State Instructional Materials Access Center | http://www.usimac.org/Braille.html

124.   Visual Aid Volunteers, Inc. | http://www.vavf.org/about-us/

125.   Volunteer Braille Services | http://www.vbsmn.org/transcription.html

126.   Washington State Braille Services Team |
       http://www.wssb.wa.gov/wp/departments/bac/

127.   Washington State School for the Blind, Ogden Resource Center |
       http://www.wssb.wa.gov/wp/departments/orc/

128.   West Virginia Correctional Industries Braille Program |
       http://wvcorrectionalindustries.com/index.php/braille.html

129.   Wisconsin Braille | http://www.wisbrl.org/bookproj.html

130.   Xavier Society for the Blind |
       http://www.xaviersocietyfortheblind.org/index.php/site/services/

Australia

1.   Access Able Braille Enterprises | http://www.facebook.com/accessablebraille/

2.   Braille House | http://braillehouse.org.au/services/

3.   Queensland Government |
     http://education.qld.gov.au/studentservices/learning/disability/statewideservices/index.
     html#top

4.   Read How You Want |
     http://www.readhowyouwant.com/Braille/Format/BrailleFormat.aspx

5.   Royal Society for the Blind | http://www.rsb.org.au/print-alternative-services

6.   South Australian School for Vision Impaired |
     http://www.sasvi.sa.edu.au/alternative_print.htm

7. Statewide Vision Resource Centre | http://svrc.vic.edu.au/about/services/

8. Visability | http://www.visability.com.au/choose-your-service/leisure-sport-recreation/braille-audio-production/

9. Vision Australia | http://www.visionaustralia.org/business-and-professionals/print-accessibility-services

Ireland

1. Association for Higher Education Access & Disability (AHEAD) (states that colleges usually offer Braille transcription service) | http://ahead.ie/commonsupports

2. Irish Prison Service | http://www.irishprisons.ie/prisoner-services/work-and-vocational-training/

3. National Braille Production Centre | http://www.braille.ie/aboutus.html

4. NCBI | http://www.ncbi.ie/our-services/library-media-centre/making-print-accessible/

New Zealand

1. BLENNZ | http://www.blennz.school.nz/school-centres-and-services/visual-resources-centres/

2. Blind Foundation | http://blindfoundation.org.nz/how-we-can-help/daily-life/braille/our-braille-services/

Scotland

1. Royal Blind Scottish Braille Press | http://www.royalblind.org/accessible-media

South Africa

1. Blind SA | http://blindsa.org.za/braille/

2. Pioneer Printers | http://pioneerprinters.org.za/

3. South African Library for the Blind | http://salb.org.za/about-us/

United Kingdom

1. 1 Day Data | http://www.1dd.uk/accessible-formats.html

2. A2i | http://a2i.co.uk/services/braille/

3. AA Transcription Services Limited | http://www.aatranscriptionservices.co.uk/

4. All Formats Transcription Services | http://www.allformats.org.uk/braille-transcription.asp

5. Bradbury Fields | http://www.bradburyfields.org.uk/home/transcription.aspx

6. Braille Guild | http://www.wdco.org/site/Braille-Guild/

7. Braille Translations | http://www.brailletranslations.co.uk/

8. Connect | http://iwanttoconnect.co.uk/transcription-and-digital-accessible-formats/braille-transcription-services/

9. Disability Resource Team | http://www.disabilityresourceteam.com/general_info.php

10. ECom Communications | http://www.e-comcommunications.co.uk/braille/braille.html

11. Henshaws | http://www.henshaws.org.uk/what-we-offer/training-services-for-business/17926-2/

12. Kirklees Transcription Service | http://www.kirklees.gov.uk/beta/libraries/kirklees-transcription-service.aspx

13. Pia | http://www.pia.co.uk/en/services/braille

14. Royal National Institute of Blind People | http://www.rnib.org.uk/rnib-business/transcription-services

15. Swansea University Transcription Centre | http://www.swansea.ac.uk/library/using-the-library/sutc/

16. Techno-Vision Systems Ltd. | http://www.techno-vision.co.uk/braille-bureau/

17. Torch Trust | http://www.torchtrust.org/smartweb/literature/literature

18. UK Association for Accessible Formats | http://www.ukaaf.org/braille/

19. Vision Support Trading | http://www.vstrading.co.uk/services-view/braille/

20. XL Braille | http://www.xlbraille.co.uk/braille.html

Appendix C: Pricing Quotes from Canadian Braille Producers

Table 1 Canadian Braille Producers and Their Costs

Company name	Braille Masters	Braille Superstore	Crawford Technologies	National Braille Factory	Point Par Point	Terra Reproductions	T-Base
Print to text	Too expensive	Paperback $400, Hardcover $500 (one week or less)	Not offered	Out-sourced at $25 an hour	$250 (5 business days)	Not offered	$3,250 (2-3 weeks)
Text to DAISY	Not offered	$100 (same day)	$1,135 (10-15 business days)	Not offered	$300 (5 business days)	Not offered	Too dependent to quote

Company name	Braille Masters	Braille Superstore	Crawford Technologies	National Braille Factory	Point Par Point	Terra Reproductions	T-Base
Text to BRF3	$500 (Word 2 days, PDF 5 days)	n/a	n/a	n/a	n/a	$125 (5-10 business days)	n/a
DAISY to BRF	Not offered	$100 (same day)	$3,215 (10-15 business days)	Not offered	$350 (5 business days)	Not offered	Too dependent to quote
Production	$500 (one business day)	$100 (one business day)	$150 (10-15 business days)	Too dependent to quote	$175 (5 business days)	$375 (5-10 business days)	$170 (1-2 days)
Note	Blind entre-preneur, im-	Blind entre-preneurs,	Clean-up of a 167-page OCR	Small company,	Produces Math and music	n/a	n/a

3 Only companies that do not support DAISY were invited to give a quote for this category because a BRF file generated from a DAISY file is much better for electronic navigation and appeals to the widest range of audiences.

Company name	Braille Masters	Braille Superstore	Crawford Technologies	National Braille Factory	Point Par Point	Terra Reproductions	T-Base
	mediate customer service, capable of producing 150,000 pages per month	immediate customer service	document: $835 (10-15 business days)	very slow customer service	Braille, Very slow customer service		
URL	http://www.braillemasters.com/	http://www.braillebookstore.com/Braille-Printing	http://www.crawfordtech.com/services/document-accessibility-services	http://www.braillefactory.com	http://www.point-par-point.com	http://www.terrareproductions.com/	http://www.tbase.com/services-overview/
Email	info@braillemasters.com	Info@BrailleBookstore.com	info@crawfordtech.com	info@braillefactory.com	info@point-par-point.com	sales@terrareproductions.com	info@tbase.com
Tel.	519-432-8319	800-987-1231	866-679-0864	604-522-7187	450-442-4212	877-731-9571	800-563-0668
Province/City	Ontario	Vancouver	Toronto	Vancouver	Quebec (FR)	Ottawa	Ottawa

Appendix D: Directory of English-Language Braille Producers

1. **Accessible Printing**
   URL: http://www.accessibleprinting.com
   Email: info@accessibleprinting.com
   Tel.: 1-877-389-ABLE (2253)
   Address:
   283 Danforth Avenue
   Unit 415
   Toronto, ON
   M4K 1N2

2. **Alberta Education**
   URL: http://education.alberta.ca/supports-for-visual-impairments/description-of-services/
   Email: edc.ssvi@gov.ab.ca
   Tel.: 780-427-4681
   Toll Free in Alberta: 310-0000
   Fax: 780-427-6683
   Address:
   8707-51 Avenue
   Edmonton, AB
   T6E 5H1 (Temporary address)

3. **Alternative Education Resources for Ontario (AERO)**
   URL: http://alternativeresources.ca/Aero/Public/ProductionServices.aspx
   Email: aero@alternativeresources.ca
   Tel.: 519-759-2522
   Address:
   350 Brant Avenue
   Brantford, ON
   N3T 3J9

4. **Braille It**
   URL: http://www.brailleit.ca
   Email: mike@brailleit.ca (Mike Hambly)
   Tel.: 403-266-6840
   Toll Free: 1-877-402-5463
   Cell: 403-561-4701
   Fax: 403-202-5967

5. **Braille Jymico**
   URL: http://jymico.com/services/braille/
   Email: info@jymico.com
   Tel.: 1-877-272-4553

Address:
4545, 1re Avenue,
Québec, QC
G1H 2S8

6. **Braille Masters**
   URL: http://www.braillemasters.com/
   Email: info@braillemasters.com (Terry Hoddinott)
   Tel.: 519-432-8319

7. **Braille Superstore**
   URL: http://www.braillebookstore.com/Braille-Printing
   Email: Sales@BrailleBookstore.com
   Toll Free: 1-800-987-1231
   International: +1 250-753-3062
   Address:
   33222 Lynn Ave.
   Abbotsford, BC
   V2S 1C9

8. **Camp Bowen Books**
   URL: https://campbowen.ca/books
   Email: books@campbowen.ca
   Toll Free: 1-844-MYBOWEN (692-6936)
   International: +1 604-947-0021
   Address:
   Unit 208
   1720 West 12th Ave.
   Vancouver, BC
   V6J 2E6

9. **Canadian Braille Press**
   URL: http://www.canadianbraillepress.com/
   Online Contact Form: http://www.canadianbraillepress.com/contact-us.php
   Tel.: 613-822-4774
   Address:
   5793 Leitrim Rd.
   Carlsbad Springs, ON
   K0A 1K0

10. **Canadian Braille Services**
    URL: http://canbraille.ca/services.htm
    Email: info@canbraille.ca (Joan Billesberger)
    Tel.: 604-984-4249
    Address:

533 East 7th Street
North Vancouver, BC
V7L 1S2

11. **CNIB**
URL: http://www.cnib.ca/en/services/CLAP/Pages/default.aspx
Email: **info@cnib.ca**
Tel.: 1-800-563-2642
Address:
1929 Bayview Ave
Toronto, ON
M4G 3E8

12. **Crawford Technologies**
URL: http://www.crawfordtech.com/services/document-accessibility-services
Email: sales@crawfordtech.com
Tel.: 416-923-0080
Toll Free: 1-866-679-0864
Fax: 416-923-8897
Address:
60 St Clair Avenue East
Suite 1002
Toronto, ON,
M4T 1N5

13. **Curriculum Support Centre Manitoba, Alternate Format Collection & Services**
URL: http://library.edu.gov.mb.ca/cgi-bin/koha/pages.pl?p=afabout
Email: iruafc@gov.mb.ca
Tel.: 204-945-7835
Toll Free in Manitoba: 1-800-282-8069 ext. 7835
Address:
Manitoba Curriculum Support Centre
Main Floor - 1181 Portage Avenue
Winnipeg, MB
R3G 0T3

14. **Fanshawe College**
URL: https://www.fanshawec.ca/student-life/student-services/accessibility/alternate-format
Email: accessibility@fanshawec.ca
Tel.: 519-452-4282
Fax: 519-453-2826
Address:
Room F2010, London Campus
1001 Fanshawe College Blvd.
London, ON N5Y 5R6

15.   Frontier Computing
URL: http://www.frontiercomputing.ca/pages/brailleitnow
Email: BrailleItNow@frontiercomputing.ca
Tel.: 416-489-6690
Toll Free: 1-888-480-0000
Fax: 416-489-6693
Address:
1 St. Clair Ave. West, Suite 202
Toronto, ON
M4V 1K6

16.   Institut Nazareth et Louis-Braille (INLB)
URL: http://www.inlb.qc.ca
Email: info.inlb@ssss.gouv.qc.ca
Tel.: 50-463-1710
Toll Free: 1-800-361-7063
Address:
1111, rue St-Charles Ouest
Longueuil, QC
J4K 5G4

17.   McMaster University
URL: http://library.mcmaster.ca/las/alternate-formats
Email: liblas@mcmaster.ca
Tel.: 905-525-9140 ext. 26058
Fax: 905-546-0625
Address:
Mills Memorial Library, Room L212/C
McMaster University
1280 Main St. W.
Hamilton, ON
L8S 4L6

18.   Manitoba Education and Training
URL: http://www.edu.gov.mb.ca/k12/afs/
Fax: 204-948-2421
Address:
Main Floor Library – 1181 Portage Avenue
Winnipeg, MB
R3G 0T3
Alternate Format Circulation Services
Email: sharon.mckenzie@gov.mb.ca (Sharon McKenzie)
Tel.: 204-945-7835
Toll Free in Manitoba: 1-800-282-8069 ext. 7835
Post-Secondary Alternate Formats
Email: judy.mcconnell@gov.mb.ca (Judy McConnell)

Tel.: 204-945-8157
Toll Free in Manitoba: 1-800-282-8069 ext. 8157
Media Production Services
Email: jordan.barker@gov.mb.ca (Jordan Barker)
Tel.: 204-945-7833
Toll Free in Manitoba: 1-800-282-8069 ext. 7833

19. **National Braille Factory**
    URL: http://www.braillefactory.com
    Email: info@braillefactory.com
    Tel.: 1-877-8-BRAILL
    Tel.: 604-522-7187

20. **National Network for Equitable Library Service (NNELS)**
    URL: http://nnels.ca/about-productions-nnels
    Email: support@nnels.ca (or coordinator@nnels.ca if you don't need support)
    Tel.: 1-888-848-9250

21. **Point Par Point**
    URL: http://www.point-par-point.com
    Email: info@point-par-point.com
    Tel.: 450-442-4212
    Address:
    1311, chemin de Chambly
    Longueuil, QC
    J4J 3X1

22. **Provincial Resource Centre for the Visually Impaired (PRCVI)**
    URL: http://www.prcvi.org/services.aspx
    Email: info@prcvi.org
    Tel.: 604-266-3699
    Fax: 604-261-0778
    Orders Fax: 604-269-0495
    Address:
    #106-1750 West 75th Ave
    Vancouver, BC
    V6P 6G2

23. **Queen's University, Adaptive Technology Centre**
    URL: http://queensu.ca/atc/library-accessibility-services/alternate-format-services
    Email: accessibility.services@queensu.ca
    Tel.: 613-533-6467
    Fax: 613-533-6284
    Address:

Student Wellness Services
146 Stuart Street
Kingston, ON K7L 3N6

24. **T-Base**
URL: http://www.tbase.com/services-overview/
Email: info@tbase.com
Tel.: 1-800-563-0668
Address:
885 Meadowlands Drive E., Suite 401
Ottawa, ON
K2C 3N2

25. **Tactile Vision Graphics**
URL: http://www.tactilevisioninc.com/
Email: info@tactilevisioninc.com
Tel.: 416–735–0181
Address:
1550 Caterpillar Road,
Mississauga, ON
L4X 1E7

26. **Terra Reproductions**
URL: http://www.terrareproductions.com/
Email: sales@terrareproductions.com
Tel.: 613-731-9571
Toll Free: 1-877-731-9571
Fax: 613-731-0478
Address:
2000 Thurston Drive Unit 35
Ottawa, ON
K1G 4K7

27. **University of British Columbia, Disability Resource Centre**
URL: http://students.ok.ubc.ca/drc/alternate-format.html
Email: drc.questions@ubc.ca
Tel.: 250.807.8053
Address:
Okanagan Campus
UNC214 - 3272 University Way
Kelowna, BC
V1V 1V7

28. **University of Ontario**
URL: http://studentlife.uoit.ca/student-accessibility-services/students/alternative-format-texts-and-course-materials.php

Email: studentaccessibility@uoit.ca
Tel.: 905-721-3266
Address:
2000 Simcoe Street
North Oshawa, ON
L1H 7K4

29. **University of Victoria**
    URL: https://www.uvic.ca/services/cal/programs/alternate/index.php
    Email: alttext@uvic.ca
    Tel.: 250-472-4311
    Address:
    Campus Services Building, Room 150
    Victoria BC
    V8P 5C2

30. **Vision Impaired Resource Network**
    URL: https://virn.ca
    Tel.: 204-975-9340
    Address:
    Main Floor – South Tower
    320 Sherbrook St.
    Winnipeg MB
    R3B 2W6

31. **Western University, Student Development Centre**
    URL: http://www.sdc.uwo.ca/ssd/alternative_format_text.html
    Email: ssd@uwo.ca
    Tel.: 519-661-2147
    Address:
    Western Student Services Bldg., Rm 4104
    London, ON
    N6A 3K7

About the Authors

Michelle Creedy has used Braille all her life. She learned it in South Africa where she attended a school for the blind. At this time, she is an educational assistant at a high school where she uses Braille each day for teaching, labeling, and taking notes. She also uses a Braille Sense as well as the Braille screen input on her iPhone.

Mary Ellen Gabias is a lifelong Braille reader and advocate for libraries and Braille literacy. She lives in Kelowna, BC, with her university professor husband Paul, who is also blind, as well as her two youngest children. Before leaving the paid work force to raise her family, she worked in rehabilitation and advocacy. She has been actively involved in advocating for improved library service for blind individuals since 1976. She has been the volunteer president of the Canadian Federation of the Blind since 2012.

Holly Hoffman is currently completing her last semester of the University of Alberta's Master's in Library and Information Studies program. She also works as a Library Experience Facilitator at the Calgary Public Library.

Kerry Kijewski and her brother were both born blind, but Kerry had enough vision to read large print when she was growing up. Even so, her parents and teachers gave her the best of both worlds because they believed in the value of Braille, starting with her mother learning it and having it around from the very beginning. This allowed Kerry to know Braille all her life and it has enriched her experience and given her a tool to appreciate communication, writing, and reading ever since. She believes braille is a vital gift to the blind community, without which she would not be a writer.

Marcia Yale was born totally blind and started elementary school at the Ontario School for the Blind, where she learned to read and write Braille. She was an avid reader all through school and beyond, making good use of the CNIB library. However, once she discovered the availability of audio books she stopped reading Braille, that is, until she finally received her first Braille display—now she pairs it with her iPhone and is so happy to be able to truly read. Reading Braille is so different than listening to a book—it's a much more visceral experience.