

The Musibaille Project – Enabling the Inclusion of Blind Students in Music Courses

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Abstract. The Musibaille Project was created to address the difficulties to include blind students in music courses in Brazil. The strategy of this project involves the development of powerful software for Braille music edition, building of an online library of Braille music and the application of intensive courses on music transcription, both for blind and non-blind people. This project is producing an extraordinary effect on revitalizing Braille Music in this country, with hundred of teachers and students already trained.

Keywords: Assistive technology, Education of blind, Braille Music.

1 Inclusion of Visually Disabled Students in Brazil: New Challenges for Music Teaching

In Brazil, the inclusion of visually impaired students in conventional classrooms is recent [1]. However, within certain limits, the use of computers and adaptive technologies, some of them created especially for use in the Brazilian context, associated with the specific training of teachers, enabled to overcome many difficulties in teaching, especially those associated with reading and writing in a common context. We highlight here the DOSVOX system [2], used extensively in this country, which offers good support for the disciplines where the production and consumption of alphabetic writing is enough, but offers little support for disciplines with strong emphasis on mathematical representations and almost nothing related to music teaching.

In this context, a simplistic alternative would be the use of Braille Music by the students with visual impairments inside the classroom. This technique was developed from 1829 by Louis Braille, who adapted the technique he developed to transcribe texts, to write music. Through this technique a musical text of any complexity can be transcribed to a tactile format, using an encoding with 6 points similar to Braille marking, easily learned by a visually impaired person [3]. However, generally speaking, teachers and other students have absolutely no knowledge about this technique.

It is important to note that many programs exist to support Braille transcription of music scores¹, which make use of the following means (not necessarily all): direct typing in Braille, typing in a Midi Keyboard in real time and automatic transcription of digital music formats, in particular Music XML and MIDI. However, in addition to being too expensive for a broad use (as in the case of teaching in elementary public schools) they have not been created with an inclusive perspective. The interface for these programs is either intended for operation by a sighted person that produces the transcription for consumption by blind people, or is made solely in Braille, isolating the seer colleague.

In addition to this, it is very difficult to obtain Braille Music scores in Brazil [4]. There are few places with trained personnel to do transcriptions, and if a person wishes to obtain a single work not yet transcribed, he may have to spend hundreds of dollars, either in the import process, or to pay the price charged by a specialized institution to transcribe it.

Today, almost all the Music teachers in the public schools are seers and have no knowledge of Braille, and their refusal to teach to blind students is very common, as they think that is impossible for them to teach the contents of sheet music effectively. In addition, it is also very difficult to include blind musicians in regular music schools. There are several good blind musicians in Brazil, but almost all musicians have no classical training, and a big amount is not able to read Braille, even in its literary format.

2 The Musibaille Project

The Musibaille Project [5] aims to create conditions that make possible the music learning for people with visual impairments, equivalent to those of sighted peers. The strategy of this project is based on:

- Creating free software for teaching and editing Braille Music, also able to perform automated mid-sized transcripts.
- Creating and publishing an Internet Online Library, containing the major works of music education and including an extensive set of Brazilian music.
- Training for music teachers and art educators nationwide.

The heart of the project is the Musibaille software (fig. 1) that is distributed free of charge as part of a kit that contains instructional material on CD and in Braille. The software is designed to be operated by both blind and sighted people and embeds a voice synthesizer and a small screen reader to be independent of other products, increasing the possibilities of its use.

¹ Tocatta and GoodFeel in U.S, DaCapo in Germany and Braille Music Editor (BME) in Latin America, are the more well known programs to transcribe Braille Music. In Brazil, this transcription is almost always done textually, via a free Text to Braille editor-translator (Braille Fácil) – but this system doesn't produce any sound feedback.



Fig. 1. Musibraille Splash Screen and Logo

3 The Musibraille Software

In Musibraille (Fig. 2) music information can be simultaneously displayed in Braille and in conventional musical notation, listened as musical sounds and translated to speech synthesis. During the creation and edition many operations can be performed, promoting insertion, deletion, modification and movement of musical symbols, operations that are somewhat similar to the functions offered by a conventional text editor.

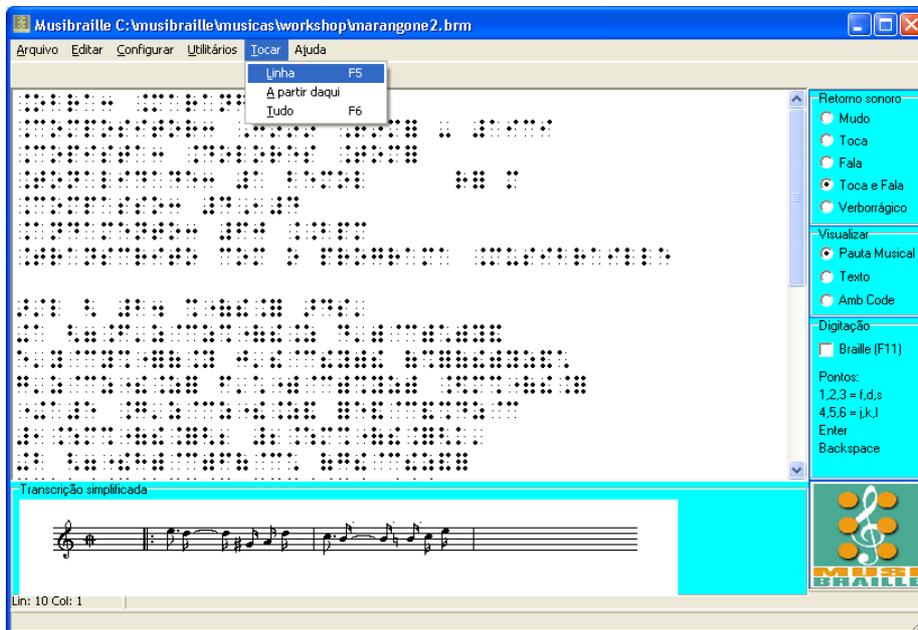


Fig. 2. Musibraille Music Editor – main window

Concurrently with entering music – which includes typing directly in Braille - some consistency tests are performed, ensuring a reliable transcription. When typing you can hear the musical notes created or even name the pictures created in the Braille score. This probable overload of sound feedback can be lowered by choosing some “economic styles” of sound return.

The software also provides an interactive dictionary of music symbols (Fig. 3) and some functions to help exploring Braille symbols. Thus, a seer or a novice teacher can use the software to learn Braille Music interactively. It’s even possible to produce a complete score directly clicking on the desired symbols in the dictionary. A virtual music keyboard (Fig. 4) can optionally be simulated on the screen, allowing easier input for people that are not familiar with Braille notation.

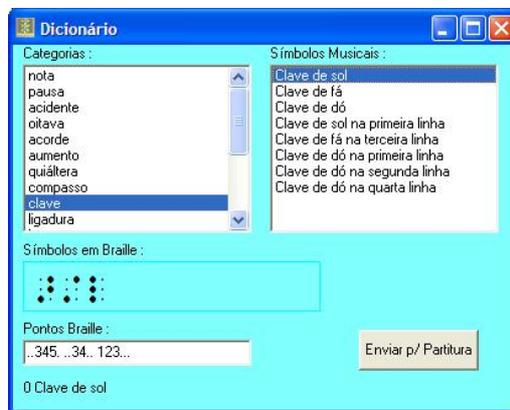


Fig. 3. Braille Music online dictionary

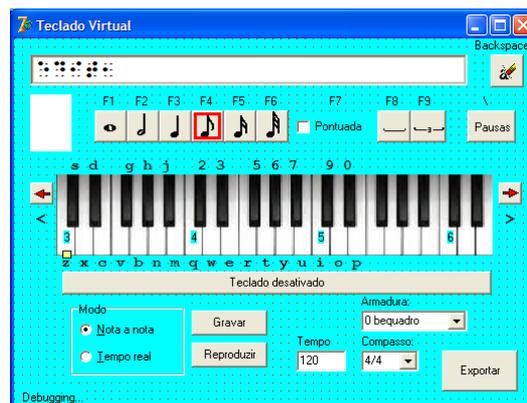


Fig. 4. Virtual Keyboard for music entry in the Musibraille Program

The accepted file formats were chosen to allow exchanges with various programs, both for input and for processing data Braille to other systems. Input can be done by alphanumeric keypad, Simulated Braille keyboard for Midi files or printing standard Braille (BRL) or Music XML.

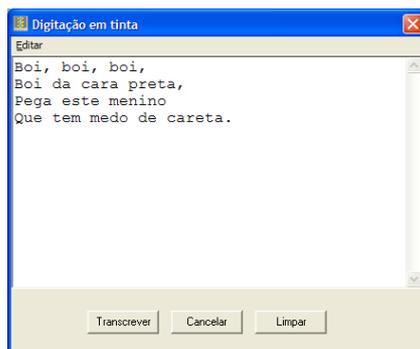


Fig. 5. Text to Braille editor-converter

Texts (lyrics for example) are typed normally on a specialized text editor (Fig. 5) that automatically converts and paste them to the Braille music score. It's also possible to get an inverse translation of a text written in the score.

The output can be generated in Midi and Music XML in music sheet or in Braille printer, or targeted for printing with Microsoft Word. The Braille text can be produced in various types of Braille embossers, and can also be transcribed into conventional musical notation, possibly in large printing for consume by partially sighted people.

4 Socio-Technical Characteristics of the Musibraille Program

The design of the Musibraille program had a strong pedagogical orientation that allows the dissemination of Braille music culture in a country with continental dimensions like Brazil, associated to the characteristics of its music teachers [6]. Thus it becomes possible for a non blind musician (a teacher, probably), without previous literacy in Braille, to be able to read and write Braille music with minimal human guidance. It's also easy to create interesting strategies to teach the basic music concepts (notes, durations, tempo, etc.) using the simultaneous feedback that Musibraille produces: sound, notes with conventional notation and Braille Music symbols.

The program also has facilities for self-assessment and online help with examples that could be copied to the software and experimented. The training also can be done either in conventional classrooms or distance learning. Being easy to use and focused on learning is one of its greatest strengths, and what make it different from similar systems.

The quality of the feedback is important: each musical symbol entered can be displayed in real time together with:

- the voice synthesis of the symbol name;
- the associated musical sound;
- the graphical representation.

This feedback must also be very precise to enable that Braille generation is done safely, even in situations in which the coding becomes ambiguous (as in Braille, depending on the context, the symbols may have different meanings).

A lot of schools where the software is installed have equipment with several years of use. To be disseminated to all schools, the software must keep the computational complexity under control, being able to offer a good performance even on very modest computers.

An innovative characteristic of the software is the inclusion of some features designed to give full access to the blind user, in particular a built-in speech synthesizer and a small built-in screen reader.² The reason for these inclusions is the fact that not all schools have this kind of pre-installed facilities. Thus, having our software installed on a particular computer means that, within certain limits, a reasonable (and free) screen reader will also be available to any user. We must also emphasize that our screen reader was specifically built to adapt well to the characteristics of Braille music editing feedback. In the classes we have conducted, the feedback of this screen reader is superior in quality and accuracy, when compared to the feedback of some professional screen readers.

The program was compiled with Borland Delphi 6/7, and was built with 45 modules, that represent circa 12000 lines of code. The source code is available free of charge for academic institutions directly from the authors. The software is free and downloadable directly from the Musibraille Project's homepage.³

5 The Musibraille Online Library

There are two main ideas behind the creation of this library:

1. Generate and make available on Internet a fair amount of educational music scores and texts related to music education, so that a blind student can have immediate access to them, making easier its interaction with teachers in conventional schools of music.

² The LianeTTS voice synthesizer, distributed together with Musibraille, is unique to Portuguese. However, Musibraille is capable of producing speech synthesis using any SAPI 5 synthesizer, and therefore it is normally easy to use Musibraille's screen reader with other languages. It is also important to mention that the screen reader is aimed to be used in the Microsoft Windows environment only, and that when Musibraille is run in other environments, it becomes not operational.

³ <http://www.musibraille.com.br>

2. Provide a set of Brazilian music in various styles and origins that could be consumed by blind people all over the world (which of course includes Brazilian musicians).

This library contains Braille music, ready to edit and print. The musical texts are available in a form that is suitable to the Musibraille program, but being computationally represented directly in the American Braille Code, can be easily read by other systems (which include direct printing to the main Braille printers). Almost all texts are copyright free or have permission to copy (with a few exceptions, accessed through passwords).

To date, the Musibraille Library has a collection of 600 scores, almost all transcribed by us or one of our students. The collection includes mainly basic classical material (in particular studies for instruments), many Brazilian folk songs, and some non-classical music from Brazil and other countries. It also includes many scores of João Tomé, an important blind Brazilian composer (patron of the library).

6 Evaluation of the Project

The project has been implemented in eight Brazilian states, and more than 500 people have been trained, including teachers and students, both seers and blind in inclusive classrooms, somewhat provoking the revitalization of Braille Music in Brazil. The ease of learning and speed of transcription allowed each student in each course of two days, to generate around five musical transcriptions, which is a very positive result for people without prior knowledge of Braille Music. The transcripts could be automatically published on our public digital library, from the software itself.

The evaluation of this project shown:

- Much improved educational prospects in basic education courses, enabling the integration of blind and seer children in classes of musical initiation.
- Increase the quality and quantity of sheet music available for conventional musical education for blind people.
- Better education training of classical musicians.
- Integration of blind and non-blind musicians, mediated by this software.

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⁴ Thanks to Natalia Luna for carefully reviewing the English language of this text.

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⁵ Translation: From Braille to Dosvox – differences in the lives of Brazilian blind people.

⁶ Translation: Reading music at your fingertips: challenges and ways of teaching Braille music in the perspective of students and teachers.