

# MUPEB. AN ONLINE COURSE WITH INTEGRATED SOFTWARE FOR PRE-SERVICE MUSIC TRAINING OF NON-MUSIC PRIMARY TEACHERS IN CHILE

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## Abstract

Nowadays, music is a compulsory curricular subject in the Chilean educational system, to which it has been assigned two hours of classes per week. Approximately 102,000 teachers, 56% of the total, are working at Primary Schools. Of these, only 2.25% have formal music instruction. The rest of the teachers lack both specialized music and music didactics training that should occur during their pre-service teacher training in order to successfully offer music classes at the level of Primary Education. Furthermore, there are not enough institutional or private offers of in-service training music courses. Finally, fulltime teachers engage in their profession for 42 hours per week, making it difficult for them to attend extended in-service music courses. As a consequence of these facts, even when music is highly regarded, as in the Chilean Primary education curricular design, it remains unsystematically approached by teachers with neither music training nor an initial formation in music pedagogy. In order to cover this educational shortcoming, we have developed *EducaMus*, an online platform intended to host massive open courses (MOOC) devoted to pre-service music training in the Chilean educational system. At this moment, *EducaMus* includes a software solution for this goal called *In-Service Music Training Course for Primary Education Teachers* (MUPEB). Its construction has followed the model of design science research methodology as a framework, according to its corresponding processes: 1) problem identification, which detects needs and constructs a theoretical framework; 2) construction, responsible for development, analysis, experimentation, and observation; and 3) evaluation, providing for testing and for designing the first public version. MUPEB integrates some associated software –*Cantus*, *Tactus*, *MusiPuzzles*, *EMOLab* and some Flash software modules –which facilitate activities such as singing and tapping rhythms. The novelty of MUPEB consists in the assessment of these music production activities in real-time by the computer. This proves beneficial for the pupils, who get an immediate evaluation of their performance, and for music teachers, as well, because assessment of this kind of tasks is one of the most time-consuming and complicated in music-education. This work in progress describes MUPEB and its components.

Keywords: music education, music technology, open online courses, pre-service music training, b-learning online platform, non-music teachers.

## 1 INTRODUCTION

At present, the music class in the Chilean Primary schools is mainly taught by generalist teachers. Of the total number of teachers working in classrooms, just over 56% (102,000) do so in the General Basic Education. Of these, 2,311 have a degree in music, that is, only 2.25% [1]. Given that the subject of Music in Primary Education must by law be taught by generalists, one might think that there are enough music training subjects in the Primary Teacher degree at Chilean universities to achieve an adequate musical competence. However, this should not be taken for granted, as one can check the general absence of music training in the curricula of the university websites offering this degree. When music training is present the inadequacy or inconsistency between syllabuses and the musical abilities pupils should develop, is evident.

From all of this, it might be deduced there is a necessity for musical education in the Primary Education Teacher career—with both, disciplinary and didactical contents- in order to correctly approach music teaching and learning processes at schools. Also, it can be deduced that some national institutions should systematically cover that necessity through adequate in-service training courses. That is not the reality of Chile, because these courses are scarce, as reported by in-service teachers in a questionnaire of perceptions prepared by the authors of the present work. Time is

another issue that constitutes a huge barrier for in-service training. Chilean teachers have a lot of hours in a workday (more than 42 hours per week) that impedes any in-service training on a face-to-face basis. Finally, the managers of educational centres do not have a proactive attitude towards in-service training.

This paper proposes a software solution (MUPEB) in a platform called EducaMus, which covers the aforementioned necessity, facilitating in-service and pre-service teachers training on a mixed-learning basis, that is: 1) by massive online open courses (MOOC); and 2) by face-to-face seminars. MUPEB, through its associated software, which, constitutes a novelty because: 1) provides music production activities related to procedural music contents; and 2) implements the corresponding real-time assessment.

## 2 COURSE DESIGN

In the design of MUPEB, *OPEN edX* was used, a platform with a non-configurable interface. The project team designing a course with *OPEN edX* organizes the contents, the activities, the interactions and the evaluation system, integrates applications within the *OPEN edX* and calls external applications. MUPEB has adopted the design science research methodology [2], a model in the field of software engineering. The phases of this course have been: 1) identification of the problem, with the detection of needs and the construction of a theoretical framework; 2) construction, development, analysis, experimentation and observation; 3) evaluation through tests (usability, functionality) and 4) the final design of a first public version.

The course has been developed according to three standards designed by the Ministry of Education of Chile [3] for music teacher training, as the main goal of MUPEB has been to create a unified set of educational resources for music training:

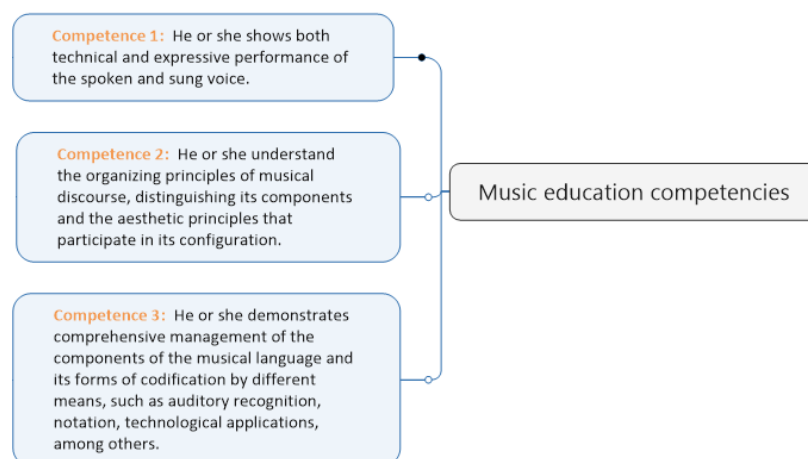


Figure 1. Music education competencies addressed in EducaMus.

### 2.1 Structure of the general-teacher training music course

The novelty of MUPEB included in EducaMus consists of approaching procedural music contents – namely, production and perception of rhythm, melodies and musical structures- and simultaneously the assessment of production activities in real time [4][5]. This is done by means of an associated on-line software called *Cantus*, *Tactus* and *Musippuzles*. This proves beneficial for the pupils, who get an immediate evaluation of their performance, as well as for music teachers, because assessment is one of the most time-consuming and difficult teaching tasks in music-education. MUPEB also includes a minimum of theoretical contents in video format extracted from several Internet resources.

Figure 2. Main interface and table of contents of MUPEB. See the work units at left and the unit's activities at top right.

MUPEB's goals and contents are structured taking into account basic music education competencies defined by Ministry of Education of Chile (fig. 1). So, the course is divided in fifteen work units addressing contents related to rhythm, intonation, structural perception, theory and music reading-writing. They are addressed by three types of activities: perception, production and symbolization.

## 2.2 Activities

As aforementioned, MUPEB has been intended to approach procedural music contents through three kind of activities: perception, production and symbolization. These music activities are evaluated in real-time by algorithms implemented in the integrated software (fig. 3). The goal of this software is to facilitate the training by performing music. Some of them are embedded in the course, while others must be downloaded and locally executed in the students' computers. This associated software, the course core, is described as follow.

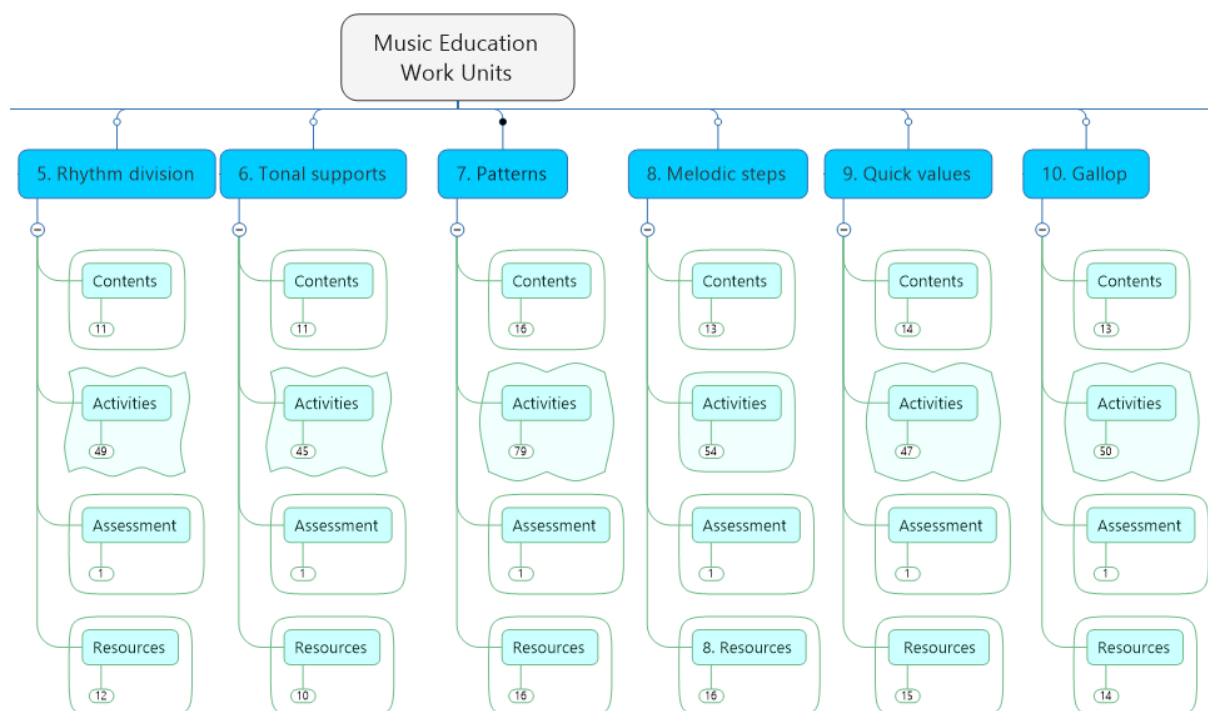


Figure 3. Pedagogical structure of MUPEB.

### 2.3 Rhythm training

*Tactus* is an offline associated software used for rhythm training in MUPEB. This software is a product of a R+D project granted by the Spanish Ministry of Education [4] (fig. 4). *Tactus* is intended to generate rhythm exercises. Students respond to the program by means of the computer's keys. The computer collects the time of responses and confronts them against a proposed ideal model, showing an immediate evaluation and a detailed activity report (fig. 5). Some present music has been implemented for training, acting as an accurate rhythmical base for the student's performance and therefore enriching the learning experience.

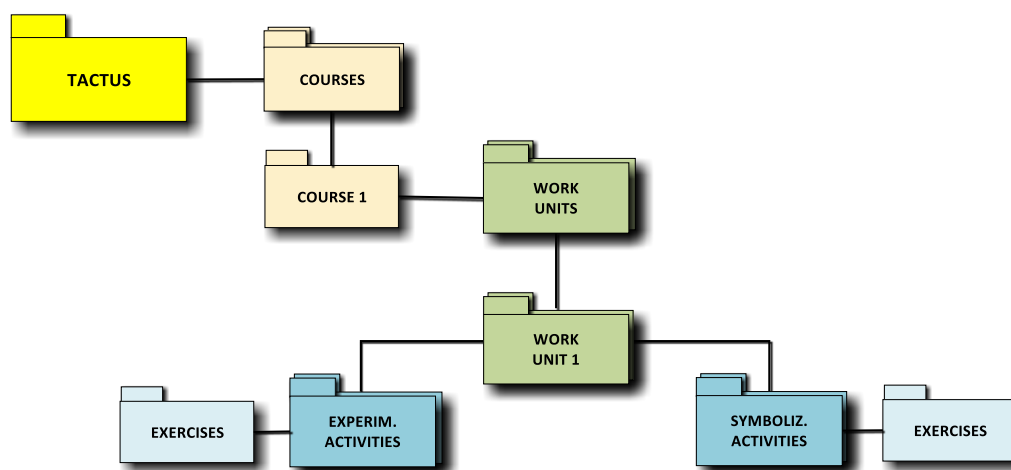


Figure 4. Organization of contents and activities in *Tactus*.

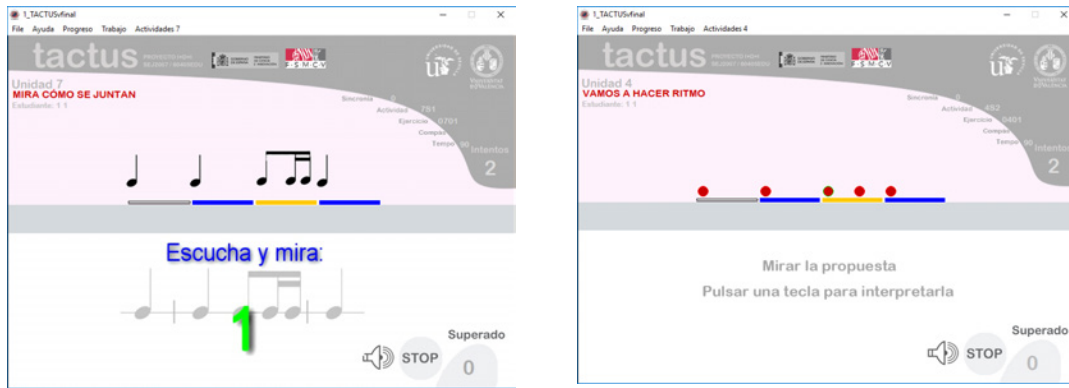


Figure 5. Two activities in Tactus: reading Western notation (left) and reading analogic notation (right).

## 2.4 Vocal intonation training

*Cantus* is an online software intended for vocal intonation training in MUPEB. *Cantus* is a product from a R+D project granted by Valencian Music Societies Federation (FSMVCV) [5], that is structured in five work units (fig. 6). Students choose a unit work and *Cantus* proposes them graduated intonation activities to sing by means of the computer microphone. The students' responses are assessed in real time by computer using a ten-points scale (fig. 7).

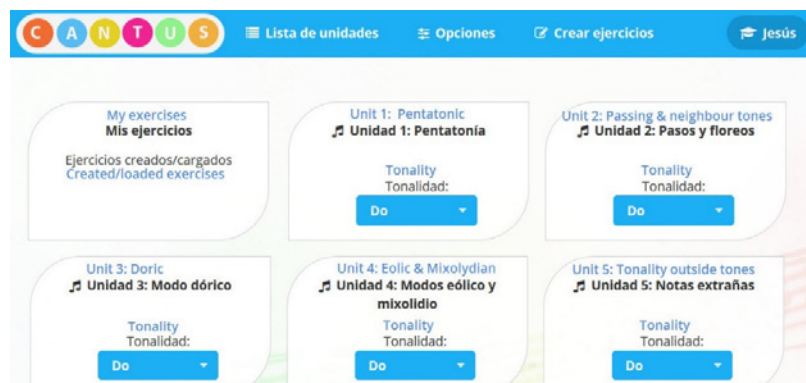


Figure 6. Training activities in *Cantus*. The section *My Exercises* enables the student or teacher to create tailored exercises (English translation in blue text).



Figure 7. Assessment of an intonation activity in *Cantus*. The user's input is shown in blue irregular lines and the computer's model is in black regular lines (English translation in blue text).

## 2.5 Structural perception

*MusiPuzzles* is an online integrated software in MUPEB. It is intended for the perception and discrimination of musical structures. A typical activity of *MusiPuzzles* consists of the next steps: Students choose a four-part song (vocal or instrumental) that has disordered fragments. Students have to manipulate them until the song is completely ordered. Songs are levelled by difficulty according to their number of fragments. Horizontal (melodic) colour segments have correspondence with each structural voice or part, while vertical (harmonic) segments are the polyphonic structures. *MusiPuzzles* provides several buttons to help the students in the task: A general button for hearing the whole song (up, a triangle close to the song title); a button for hearing the partial model of each vertical structural segment (top green buttons in each column); a button for hearing each vertical structural segment reordered by students (bottom blue buttons in each column); 4 buttons for hearing each part (centred, coded in different colours) (fig. 8).

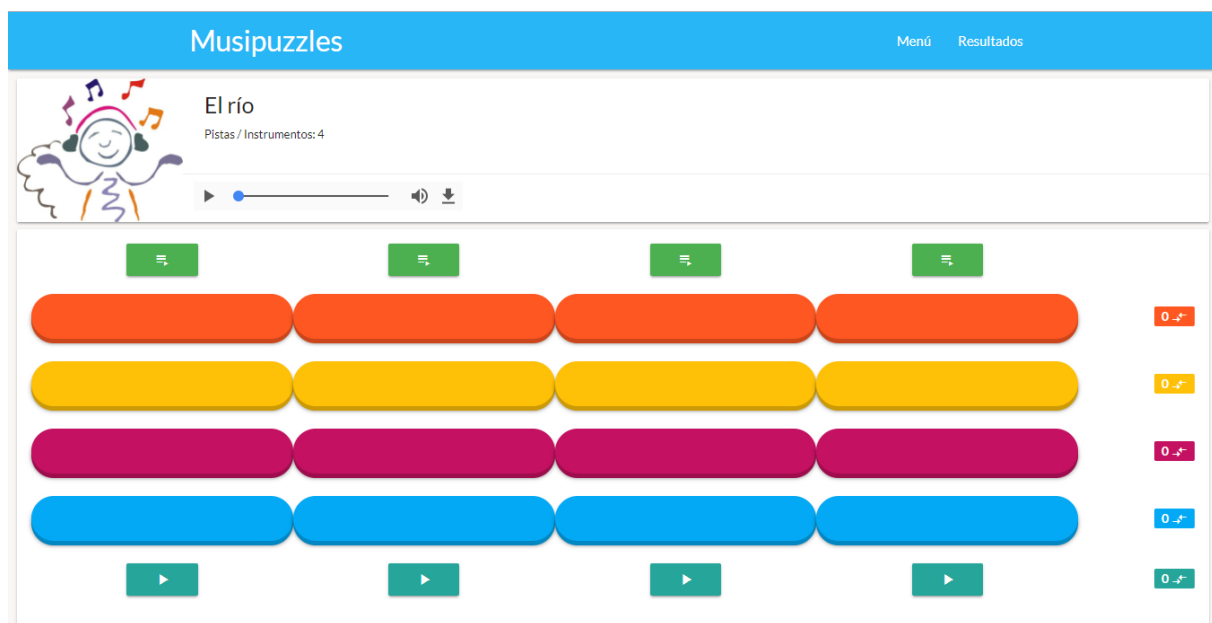


Figure 8. *Musipuzzles*' main interface.

## 2.6 Other software

Some other software is used in MUPEB, which act as didactic artefacts for training by means of activities like:

- Association between individual sounds –also melodic profiles and rhythm patterns- and symbols. This is done using firstly analogic notations and after Western notation.
- Perceptual detection of sound direction.
- Performing of rhythm patterns while any music is sounding.
- Production of isochronous beats.
- Progressive music dictations.
- Matching of events related to a given music parameter.
- Perceptual error detection in given melodic patterns.

*EMOLab* is an offline software that exemplifies this kind of activities. As result of an innovation project [6], *EMOLab* has been developed under the concept of modularity, which means the separation of each specific educative function in a different piece of software (fig. 9).

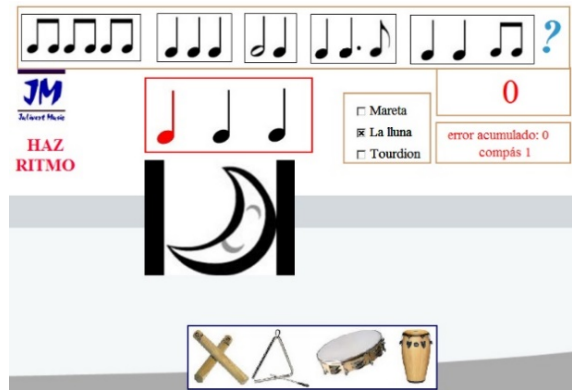
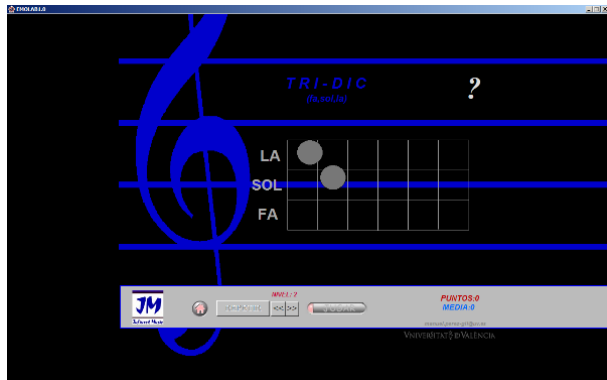


Figure 9. Two modules of EMOLab: Tri-Dic (dictation in analogic notation) (left) and Haz Ritmo (production of rhythm patterns) (right).

Also, other software has been implemented in MUPEB: Calosa (fig. 10), a software for pitch discrimination that purposely doesn't contains any helps in form of visual representations. So, its main goal is to aurally discriminate sounds [7].

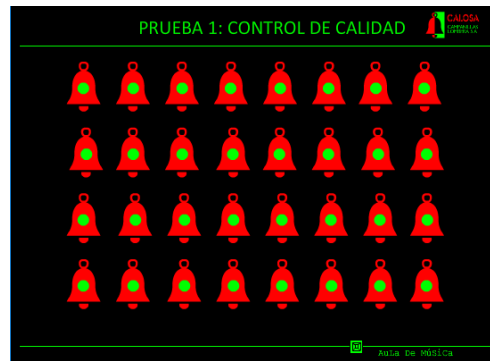


Figure 10. Calosa's main interface. At right, exercise of aural discrimination without any visual help.

Pajarología (Birdlogy) and Sonoline (fig. 11) are preparatory programs devoted to symbolic association of sound and visual representations which have certain degree of isomorphism related to a spatial metaphor [7]. Birdlogy includes discrete patterns of sounds as task stimuli, while Sonoline incorporates continuous sounds (glissandi).

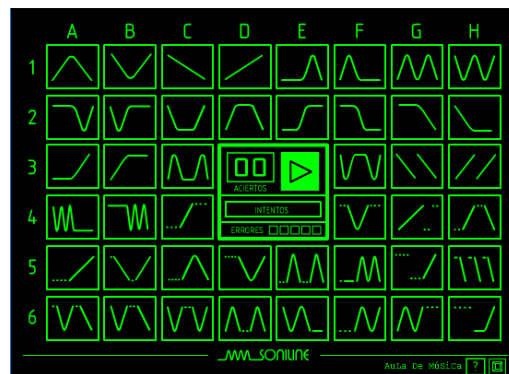


Figure 11. Pajarología (Birdlogy) and Sonoline's main interfaces.



### 3 RESULTS

The present work is still in progress; therefore, it is not possible to advance more conclusive results beyond the description shown here. At the moment, we are collecting course's usability data from music teachers and students by means of test and questionnaires. Also, qualitative data will be gathered by means of focus groups with non-music teachers about their perceptions on music education at schools, in-service music training needs and the significance they assign to MUPEB. Once results be obtained, a more in-deep paper will be published in an international conference like this one.

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