

**"MUSIC, MAESTRO!" A MULTIMEDIA TOOL TO SUPPORT MUSIC  
EDUCATION IN BASIC EDUCATION**

***"MÚSICA, MAESTRO!" UMA FERRAMENTA MULTIMÍDIA PARA APOIO AO  
ENSINO DA MÚSICA NA EDUCAÇÃO BÁSICA***<sup>1</sup>

***"¡MÚSICA, MAESTRO!" UNA HERRAMIENTA MULTIMEDIA PARA APOYAR LA  
ENSEÑANZA DE LA MÚSICA EN LA EDUCACIÓN BÁSICA***

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**ABSTRACT:** The article describes part of the creation and production process of the interactive multimedia book "Música, Maestro!", developed in the doctoral program of the Graduate Program in Media and Technology at the School of Architecture, Arts and Communication at UNESP, seeking to meet the challenges of education in current with remote learning, the Sustainable Development Goals (SDG) of the United Nations (UN), the 2030 Agenda and the Common National Curriculum Basis (BNCC), with regard to quality education and innovation. The resource will be used in the computer labs of the school units, meeting current generations who are attracted to technology, enhancing learning with fun, also favoring multipurpose teachers to work on teaching music, presenting the orchestra's instruments symphony in different instrumental families through multimedia language to 4th and 5th grade students, in a didactic, playful, interactive and accessible way.

**KEYWORDS:** Music teaching. Interactive multimedia book. Instruments of the orchestra. Playfulness. Elementary School.

**RESUMO:** O artigo descreve parte do processo de criação e produção do livro multimídia interativo "Música, Maestro!", desenvolvido no doutorado do Programa de Pós Graduação em Mídia e Tecnologia da Faculdade de Arquitetura, Artes e Comunicação da UNESP, procurando atender os desafios da educação na atualidade com o ensino remoto, dos Objetivos do Desenvolvimento Sustentável (ODS) da Organização das Nações Unidas (ONU), na Agenda 2030 e da Base Nacional Comum Curricular (BNCC), no tocante à educação de qualidade e inovação. O recurso será utilizado nos laboratórios de informática das unidades escolares, vindo ao encontro das gerações atuais, que são atraídas para a tecnologia, potencializando a aprendizagem com diversão, favorecendo, também, aos professores polivalentes para

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*trabalharemos o ensino da música, apresentando os instrumentos da orquestra sinfônica nas diferentes famílias instrumentais por meio de linguagem multimídia aos alunos de 4º e 5º anos do Ensino Fundamental, de forma didática, lúdica, interativa e acessível.*

**PALAVRAS-CHAVE:** *Ensino da música. Livro multimídia interativo. Instrumentos da orquestra. Ludicidade. Ensino Fundamental.*

**RESUMEN:** *El artículo describe parte del proceso de creación y producción del libro multimedia interactivo "Música, Maestro!", Desarrollado en el programa de doctorado del Programa de Postgrado en Medios y Tecnología de la Facultad de Arquitectura, Artes y Comunicación de la UNESP, buscando dar respuesta a los retos de educación hoy con aprendizaje remoto, los Objetivos de Desarrollo Sostenible (ODS) de las Naciones Unidas (ONU), en la Agenda 2030 y la Base Curricular Nacional Común (BNCC), en materia de educación de calidad e innovación. El recurso se utilizará en los laboratorios de computación de las unidades escolares, conociendo a las generaciones actuales que se sienten atraídas por la tecnología, potenciando el aprendizaje con diversión, favoreciendo también a los docentes polivalentes para trabajar en la enseñanza musical, presentando la sinfonía de instrumentos de la orquesta en diferentes familias instrumentales a través del lenguaje multimedia a alumnos de 4º y 5º de primaria de la escuela primaria, de forma didáctica, lúdica, interactiva y accesible.*

**PALABRAS CLAVE:** *Enseñanza de música. Libro multimedia interactivo. Instrumentos de orquesta. Ludicidad. Enseñanza fundamental.*

## Introduction

This article comes from the research started in the master's degree of PPGMiT, Faac UNESP, in which were analyzed the "Media Technology as a Strategy to Support Music Teaching in Basic Education", resulting in the verification that there is a great demand in this area. Thus, in the doctorate of the same program, the goal was to develop an interactive multimedia book, the "Music, Maestro!", to work on music teaching by introducing the instruments of the symphony orchestra to 4th and 5th grade students in elementary school.

For the development of the contents of "Music, Maestro!" we sought support in the Common National Curricular Base (BNCC, 2019) for the teaching of Art, which proposes the skills and abilities to be worked on in Basic Education, guiding teachers, the motivation of students, the production of teaching materials, and permanent teacher training, as can be seen:

Design and put into practice situations and procedures to motivate and engage students in learning; Select, produce, apply, and evaluate teaching and technological resources to support the teaching and learning process; Create and make available guidance materials for teachers, as well as maintain permanent teacher training processes that enable continuous improvement of teaching and learning processes (BRAZIL, 2019, p. 18).

Amongst the competencies for Music for Elementary School in the early years, the BNCC (2019) lists the contexts and practices, the elements of language, notation, musical record; it is noteworthy the materialities and creation process in the skills contemplated in part in the interactive multimedia book "Music, Maestro! " of the skill: "(EF15AR15) Explore diverse sound sources, such as those existing in the body itself (handclaps, voice, body percussion), in nature and in everyday objects, recognizing the constituent elements of music and the characteristics of various musical instruments" (BRAZIL, 2019, p. 202), although due to the complexity of the skill, the cut covers only the characteristics of various musical instruments.

## **Methodology**

This is a descriptive research with a qualitative approach. Descriptive research "starts from principles recognized as true and indisputable and makes it possible to reach conclusions in a purely formal manner, i.e., solely by virtue of its logic" (GIL, 2008, p.

To evaluate the effectiveness of "Music, Maestro!", the Delphi method or Delfos technique was used, which enable a prospection research: "[...] the method is a forecasting technique, designed to know in advance the probability of future events. It is a technique of systematic solicitation and collection of the opinion of experts on a given subject" (COSTA, 2018, p. 78).

For data collection, according to the Delphi method, a Google Forms questionnaire was applied between April and May 2021 in two focus groups of experts, being composed of professionals from Education, Art, Music Education and musicians in the focus group 1 (FG1), and Design, Information Technology (IT) and Media and Technology researchers in the focus group 2 (FG2), in order to assess the elements of functionality, usability and pedagogical content of "Music, Maestro! "based on Nielsen's (1993) heuristic validation, with a focus on user experience. The questionnaires were shared on social networks and contained the access link to "Música, Maestro!", so that voluntary respondents could get to know the multimedia book and register their opinion.

Usability is a quality attribute, which evaluates the degree of ease of interaction of some device or any interface that can be operated by a user. In addition, this term also refers to the methods for improving ease of use during the process of planning an interface. The components that define usability are: ease of learning, efficiency of use, ease of remembering, low error rate, and subjective satisfaction. The system needs to be easy to learn and, once learned to

interact, the user should be able to achieve high levels of productivity after a certain period without using it (NIELSEN, 1993).

### **Education Challenges These Days**

Seeking to meet the UN Agenda 2030, which are the goals of the Sustainable Development Goals (SDGs), regarding the fourth item among the seventeen goals, which is quality education, the interactive digital book "Music, Maestro!" was created to introduce the musical instruments of the symphony orchestra to fourth and fifth grade students of elementary school. A technological resource that uses multimedia language, which involves pedagogical elements with small texts, images, and sounds of musical instruments with interaction, playfulness, and accessibility in order to contribute to the teaching of music in the early years of elementary school. Andersen (2013, p. 25) clarifies that :

Multimedia language is an expression coined to define the combination of verbal, sound and image semiotic systems, in digital media. It is a combination that is not juxtaposed, but that takes place in an integrated way to build meaning. Based on this conceptual notion, we can state that, in multimedia productions, there is a logic of articulation and association of different languages, in order to confer unity and meaning.

There was already a need for research and development of digital technology products for use in education. However, with the global pandemic of Covid 19 and according to the World Health Organization (WHO) protocols, the face-to-face classes were suspended, adopting the remote and hybrid teaching modality mediated by ICTs (Digital Information and Communication Technologies). With this, the emerging need for investments in research, in public policies, in teacher training, and in the development of new instructional environments mediated by digital technologies.

As for the criteria for using digital technology in school teaching activities, Andersen (2013, p. 22) states that: "the work with productions of this nature becomes essential in the classroom, however, it is not a miracle remedy", so the need for research and reflection to make the best use of digital technological resources, which explore multimedia languages in an integrated and creative way, contributing to cognitive development, and states that:

For the development of students' ability to reflect critically and use creativity in digital contexts, the development of teaching projects involving multimedia productions is a unique strategy. These productions require users to understand how different languages can be used to inform and persuade, as well as to understand that the integrated treatment of these different languages

modifies the original meanings, constructing new meaning, informing and persuading in different ways. Thus, teaching projects involving multimedia reading and production becomes an emerging need, for the enhancement of students' skills for full participation in life in society (ANDERSEN, 2013, p. 25-26).

Prensky (2012) believes in the potential of learning based on digital games, because it is motivating and fun, versatile, engaging, adaptable to the subjects of the curriculum, contains information and skills that, if worked on correctly, corroborate learning.

Learning games, according to Novak (2010), are those created to teach while distracting, making reference to playfulness. As an example, there are simulation games. All games of this genre allow players to acquire knowledge about everyday life objects while playing and apply knowledge acquired outside the game.

Novak (2010) states that learning games can be used by all ages, as in the case of several simulation games. To confirm this idea, there are also several games with the purpose of teaching young people and adults at a distance, without the need for a conventional classroom.

The experience of playing is already related to a learning process. All games propose goals to be accomplished in order to reach an objective. The vast majority of games assist this trajectory, allowing players to save their progress and their position in the game at regular intervals, so that they can return to positions where they made decisions that probably led to a defeat (NOVAK, 2010).

Analyzing the programming structure of the interactive multimedia book "Music, Maestro!" it is possible to verify that there is not, overtly, the sense of victory and defeat, but, in this case, the sense of right and wrong. However, considering that this is an educational product, the student will not have contact with demotivating feedbacks like 'you missed', 'wrong answer', terms in red with a loud sound indicating error, but, yes, feedbacks that encourage the student to try again, to rethink their answer, and never be associated to defeat.

Games, whether digital or not, even though their purpose is entertainment, always help in something. As a practical example, games can provide even self-confidence in players and also the development of spatial vision in objects of two or three dimensions, helping in the learning of geometry (VALENTE, 2018).

According to Vygotsky (1989), playing has a great influence on child development. It is through games that the child learns to act, stimulates curiosity, works on self-confidence, provides initiative, stimulates logical reasoning, development of thought, language, and concentration.

Playing can be considered an important educational medium for providing a comprehensive and dynamic development in the cognitive, mental, motor, social, linguistic, and affective areas, in addition to contributing to the construction of autonomy, creativity, responsibility, cooperation, and criticality (SILVA, 2017).

### **Didactic content and narrative elements of "Music, Maestro!"**

The first step in the creation and programming of "Music, Maestro!" was the development of the Game Design Document (GDD), with all the conceptual elements for software development, such as defining the narrative, the script, the images, sounds, and puzzles. Next, a partnership was established with the company The 2nd Floor Studio for the software development, since it was necessary to form a multidisciplinary team with designers and programmers. Next, the code for the interactive multimedia book "Music, Maestro!" was produced.

The narrative of "Music, Maestro!" aims to present the instruments of the symphony orchestra, the different instrumental families: string, wood, wind and percussion, the symphony orchestra, the conductor of the orchestra and the appreciation of a symphony piece in a playful and interactive way. To this end, the multimedia book contains short instructional texts accompanied by the sound of the referred instruments, the ensembles of the different instrumental families, having as mediator the character "*Maestrinho*", created to interact with the student during navigation.

In addition to "*Maestrinho*", the visual identity of the multimedia book was designed with the purpose of contributing to the reader's involvement. For this purpose, the color palette was selected, the design of the interfaces involved elements of musical notation or narrative. The opening, or cover of the multimedia book, the dedication, and the menu contain a short excerpt from Beethoven's Symphony No. 6. The images and sounds of musical instruments are real when they compose the instructional content and designed when they illustrate the interfaces.

The accessibility is done through the narrator's audio to help students who do not yet have reading competence or fluency. We have also thought of students with high abilities, including transmedia narratives<sup>5</sup>, which are elements inserted to contribute to the learning

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<sup>5</sup> The transmedia narrative is considered the result of the articulation of the different parts of a great narrative, all of them complementary and connected to it. Each one is conveyed by the platform that best leverages its expressive characteristics (RENÓ *et al.*, 2011).



expectations, or to involve students who, parallel to their schooling, study music. In this way, to access additional information to the presented content, the student can click on the icon in bulb shape and will be directed to an informative text from the Grove music dictionary (Sadie; Latham, 1994). The icon is not required during navigation: the student may select the contents in any way they wish.

The multimedia book "Music, Maestro!" includes eight learning situations with the four instrumental families, also called orchestral suits: the string family, the woodwind family, the brass family, and percussion. The percussion family was subdivided into two components, the defined or melodic sounding instruments and the non-defined or non-melodic sounding instruments. Chart 1:

Chart 1 – Menu Screen Interface



Source: *The 2nd Floor Studio* (2020)

The musical instruments are presented in different families involving a short informative text, the actual image and a small fragment of the sound of each instrument. The images and audios were taken from free Internet and YouTube databases in order to corroborate with the sensorial integration during learning, exploring, concomitantly, the visual and auditory senses when the student clicks on the image of the individual instruments. A short audio fragment is repeated during the period in which the student develops the reading of that instrument, being closed when the image is closed. Each instrumental family, or chapter, also contains a transmedia narrative, when clicking on the image of the lamp to learn more, and a puzzle with sound feedback as feedback.

The interactive multimedia book "Music, Maestro!" also covers the symphony orchestra and the formation of the suits, the maestro and his function in conducting, the Challenge, and the Grand Finale. The Challenge includes ten fun activities in the form of puzzles as a way to

review content, however, without the intention of measuring learning and scoring student performance.

In the Gran Finale, as in a show, the interface presents the opening of the stage curtain, in which the student will appreciate the performance of the orchestral ensemble through the audiovisual of the concert, featuring the work *Reisado/Batuque/Dança de negros* by the Brazilian composer Lorenzo Fernandez, performed by the Brazilian Symphony Orchestra, available on YouTube. The work was selected with the didactic intention of valorizing the Brazilian composer and for presenting the theme in the instrumental families. At the end of the performance, the stage curtain closes and presents the end credits containing the technical data, that is, the repertoire of "Música, Maestro!", and the names of all those who participated in the production of the multimedia book to the sound of the work *Mourão*, by the Brazilian composer Guerra Peixe.

The choice of repertoire, from the opening with Beethoven's Symphony No. 6, the fragments of each instrument in the four instrumental families, the Gran Finale with the work by Lorenzo Fernandez, and the final credits to the sound of Guerra Peixe, were strategically thought to corroborate with the dynamics of reading and navigation and with the reader's growing involvement.

In the string family, the multimedia book deals with the fretted string instruments, being: the violin, the viola, the cello, and the acoustic bass, with the aforementioned string quartet. The harp as fingered string and the piano as percussed string. Chart 2:



Chart 2 – String Family Interface



Source: *The 2nd Floor Studio* (2020)

The transmedia narrative of the strings family features the violin virtuoso Paganini and a puzzle with the image of the piano. As with the other families, you must click on the red arrow to continue reading and learn about the instruments.

The wood family includes the piccolo, the transverse flute, the oboe, the English horn, the clarinet, the bassoon and the contrabassoon. The memory game with the image of the woodwind instruments, the mouthpiece and the palette was prepared for playfulness. The transmedia narrative presents the definition of aerophones, the explanation of sound production and the vibration of the air column in wind instruments.

The brass family or suit includes the horn, trumpet, trombone, and tuba, always describing briefly the characteristics and sonority of the instruments. The playfulness occurs through crossword puzzles with the names of the brass family instruments. As an element of the transmedia narrative, it presents the definition of metals, the production of sound by vibrating the lips, and the metallic alloys used to manufacture the instruments.

The percussion family is the largest in the orchestra, it has several instruments that appear according to the musical composition, so the multimedia book will present some of them. Percussion instruments are divided into two groups: those that emit definite sounds, of musical notes, and those that do not produce definite sounds. For the instruments of definite sounds it brings the eardrums, the vibraphone, the *marimba*, the xylophone and the *glockenspiel*. The instruments with non-defined or non-melodic sounds include the tam-tam, symphonic bass drum, light box, cymbals, symphonic tambourine, and triangle. The playfulness is a word hunt with the percussion instruments, and the transmedia narrative deals with the term 'metallophones'

In the sequence, the narrative includes the "Symphony Orchestra", the organization of the suits in the ensemble, and the conductor's function in conducting the orchestra, having Regency as an element of the transmedia narrative. The "Challenge" chapter was intended to be playful and as a form of resuming the contents, being one more educational strategy. It includes ten activities such as: organize the rubbed string instruments from high to low; word search; link the image of the instrument to its name; link the image of the instrument to the sound; eliminate the intruding instrument in the family; drag the percussion instruments with defined and non-defined sounds; drag the instruments of each family; organize the orchestra suits.

### **Technical development of the interactive multimedia book "Music, Maestro!"**

Before starting the development process of any technological product, it is necessary to meet with the content developer in order to fine-tune the specific contents and the playabilities that can be executed by the technical team. For this first moment, the content developer, the design and programming representatives, as well as the project manager responsible for developing the product, met. After defining all the steps and contents already selected, the final script was written by the content developer.

The script document is not the 'story' of the game, it is much more than that. The script is one of the documents of great importance in the development of any technological product, be it a game, an 'app', a system, among others, since it presents all the characteristics and information necessary for the production team to execute the project outlined there without major problems, from the narrative that will involve the context of the game to information such as the position of the elements on the screen, description and position of the character, the scenarios, soundtrack, etc.

One of the most important characteristics of this type of text is the self-sufficiency of information, since, in some companies, the scriptwriter is an outsourced person, who is not present in the company, being hired only for that specific task, and even then, at a distance. Therefore, it is necessary that the document speaks for itself, that is, that, even with the professional who wrote it away from the company, the document can be self-explanatory and easy to understand, since it is not possible to consult the scriptwriter all the time to clarify doubts during the development process. Considering the product "Music, Maestro!", the main objective of this work, the script was produced by the content writer herself, duly guided by the development team, after the definitions agreed in the brainstorm meetings, a process in which



Vorbis format, being recorded the complete narrative in a single day in order to ensure the same vocal fluency. The oral narrative, when used, should be activated in all interfaces, but can be turned off at any time, in any interface, by the player, by clicking on the "X".

The player's contact with the audio will be done in 2 ways: 1st Automatic text as the screens advance - like screen titles, character lines, instructions for completing challenges, etc. There is no need to click to hear this text. Or, when the content of the lamp is activated (transmedia narrative); 2nd When passing the mouse - menus, in which there are several items: when clicked, the student passes the mouse over the options and, when passed, the software will sound the name of the button, for example: 'strings', 'woods', etc.

The testing period, before the release, was decisive to ensure a quality product without conceptual errors. To this end, both the technical and content teams reviewed the product to verify that no element was in disagreement with the initial demand, seeking to verify that both the gameplay and the content were easy to understand and could be navigated without difficulty by users.

## **Results and discussions**

Music, Maestro!" was catalogued and registered as a digital book with ISBN 978-65-00-18912-4 by the Brazilian Book Chamber (CBL) in March 2021. The data collection was conducted between April and May 2021, with two distinct focus groups, formed by experts, as mentioned in the methodology, through structured questions to evaluate the functionality and usability of the interactive multimedia book. However, the questions referring to the pedagogical content were directed only to FG1, the specialists in Education, in Art or in Music.

Among the FG1 respondents, 50% are art teachers, 32.4% of them being art teachers with a degree in music (11 people) and 17.6% of them being multivalent art teachers, that is, with degrees in visual arts, dance and theater (6 people); 29.4% of the respondents (10 people) from the administrators' group; 11.8% (4 people) of professional musicians; finally, 8.8% (3 people) of Pedagogues (teachers of the Elementary School for the first years), totaling 100% of FG1 volunteer respondents. As for the work place of the FG1 respondents: 35.3% (12 people) work in Basic Education in public institutions; 23.5% (8 people) in orchestras, music schools or in artistic performance; 17.6% (6 people) in Basic Education in private institutions; 14.7% (5 people) in private Higher Education; 8.8% (3 people) in public Higher Education.

The FG2 obtained 16 respondents, being: 43.8% (7 people) from the Media and Technology area, 25% (4 people) from design, 18.8% (3 people) from IT and 12.5% (2 people) from game programming, working in the job market or in teaching and research.

The questions were elaborated according to Nielsen's heuristics (1993) to assess the questions by the respondents of FG1 and FG2, as follows: Ease of use; Correct functionality; Clarity of information; Self-explanatory interface; Simplicity of navigation; Error tolerance; Navigation time; User focus; Subjective satisfaction.

As for the pedagogical content, only the FG1 respondents were asked about: relevance of the narrative elements; narration as an element of accessibility; playfulness as an element of learning and motivation, and ease of use for multi-skilled teachers. The results of the respondents who were totally satisfied with the questions in "Music, Maestro!" can be seen in Table 1:

**Table 1 – Heuristic Validation of "Music, Maestro!"**

Requirement	GF1 34 respondents	GF2 16 respondents
1)Ease of use	94,1 % (32 people)	93,8% (15 people)
2)Correct functionality	94,1 % (32 people)	81,3% (13 people)
3) Clarity of Information	97,1% (33 people)	93,8% (15 people)
4) Self-explanatory interface	97,1% (33 people)	87,5% (14 people)
5)Simplicity of navigation	94,1 % (32 people)	87,5% (14 people)
6) Tolerance to error	88,2% (30 people)	81,3% (13 people)
7)Navigation time	97,1% (33 people)	81,3% (13 people)
8) Focus on the user	94,1 % (32 people)	93,8% (15 people)
9) Subjective satisfaction	100% (34 people)	87,5% (14 people)
10) Relevance of narrative elements	100% (34 people)	X
11) Narration as an element of accessibility	88,2% (30 people)	X
12)Ludicity as an element of learning and motivation	97,1% (33 people)	X
13) Ease of use by multi-skilled teachers	70,6% (24 people)	X

Source: Prepared by the authors

Table 1 shows the significant positive results obtained through the survey, in which a large percentage of the FG1 and FG2 respondents indicated satisfaction when navigating through "Music, Conductor! Only the thirteenth question for FG1 obtained 70.6% of satisfied respondents and 29.4% of respondents (10 people) chose the alternative "Maybe, it depends on the technological resources of the school unit". Thus, the interactive multimedia book could be validated.

### **Final considerations**

Games are great learning aids, since they are part of children's routine, whether through big companies' consoles, computers, or even mobile devices. Therefore, education must take advantage of this context to interact as much as possible with this student. "Music, Maestro!" can be installed on computers and has the advantage of being offline, without the need for internet in real time. It was also produced to be self-responsive, with its automatic feedbacks, easy-to-understand and execute activities.

The interactive multimedia book "Music, Maestro!" is the result of long years of theoretical research materialized in a product rich in content, easy to navigate, and especially designed, both by the technical and content team, so that the target audience can enjoy all this, complementing their studies in the area of music in a fun, playful, and interactive way.

In this article it was possible to demonstrate a little of the creation and development process of "Music, Maestro! In a general analysis, the product offers contributions to overcome the challenges of contemporary education, in which technology is essential to the development of remote, hybrid, or face-to-face teaching.

For future researches it is thought to elaborate the convergence of the interactive multimedia book "Music, Maestro!" into an application for mobile technologies, as well as to develop new products like this one, addressing other themes relevant to the teaching of music in Basic Education, such as: conventional and non-conventional musical instruments, Brazilian rhythms, Brazilian composers, Brazilian popular music, national rock, musical notation, auditory perception, among others that can help teachers in their teaching practice. In addition to the segmented heuristic validation by experts, it is expected to validate "Música, Maestro!" with elementary school students for whom the product was developed, through a post-doctoral internship.



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