

**PER CANTUM: A DIGITAL TOOL FOR THE TEACHING OF VIRTUAL CHOIR IN
E- LEARNING**

***PER CANTUM: UMA FERRAMENTA DIGITAL PARA O ENSINO DE CANTO CORAL
VIRTUAL NA EAD***

***PER CANTUM: UNA HERRAMIENTA DIGITAL PARA LA ENSEÑANZA DEL CANTO
CORAL VIRTUAL EN EAD***



Daniel Chris AMATO
São Paulo State University (UNESP)
e-mail: maestrodanielamato@gmail.com



Cynthia Yukiko HIRAGA
São Paulo State University (UNESP)
e-mail: cynthia.hiraga@unesp.br



| 1

How to refer to this article

AMATO, D. C.; HIRAGA, C. Y. Per Cantum: A digital tool for the teaching of virtual choir in e-learning. **Revista Hipótese**, Bauru, v. 8, esp. 1, e022021, 2022. e-ISSN: 2446-7154. DOI: <https://doi.org/10.47519/eiaerh.v8.2022.ID416>

Submitted: 10/03/2022

Revisions required: 05/05/2022

Approved: 01/07/2022

Published: 01/12/2022

Per Cantum: A digital tool for the teaching of virtual choir in e-learning

ABSTRACT: *This work presents a digital tool for the teaching of vocal practices, in particular, for the discipline of Choral Singing, for the careers of degree in music in the modality of E-learning. The work is justified based on the hypothesis that the vocal practice disciplines in music careers in E-learning present certain weaknesses due partly to the lack of exclusive digital tools for this purpose. This study presents the stage of developing a tool of this type based on the technologies available in Brazil, including in the context of Internet access, with average high bandwidth speeds available for the population. This product, called Per Cantum, a virtual environment of choral singing, is simulated to facilitate the learning of singing in a group at a distance, being able to be used in face-to-face courses and the context of leisure.*

KEYWORDS: Virtual choir. Choral. E-learning.

RESUMO: *Este trabalho apresenta uma ferramenta digital para o ensino de práticas vocais, em especial, para a disciplina de Canto Coral, para os cursos de licenciatura em música na modalidade de Educação a Distância (EaD). O trabalho se justifica partindo-se da hipótese de que as disciplinas de práticas vocais nos cursos de licenciatura em música na modalidade EaD possuem determinadas fragilidades devido, em parte, à falta de ferramentas digitais exclusivas para esta finalidade. Este estudo apresenta o estágio do desenvolvimento de tal ferramenta a partir das tecnologias disponíveis no Brasil, inclusive no âmbito do acesso à internet, com velocidades médias de banda larga disponíveis para a população. Este produto, batizado de Per Cantum, simula um ambiente virtual de canto coral visando proporcionar um aprendizado para em cantar em grupo à distância, podendo ser utilizado em cursos presenciais e também no âmbito do lazer.*

PALAVRAS-CHAVE: Coral virtual. Canto coral. Educação a distância.

RESUMEN: *Este trabajo presenta una herramienta digital para la enseñanza de las prácticas vocales, en particular, para la disciplina de Canto Coral, para las carreras de grado en música en la modalidad de Educación a Distancia. El trabajo se justifica a partir de la hipótesis de que las disciplinas de prácticas vocales en las carreras de grado en música en la modalidad a distancia presentan ciertas debilidades debidas, en parte, a la carencia de herramientas digitales exclusivas para tal fin. Este estudio presenta la etapa del desarrollo de una herramienta de este tipo basada en las tecnologías disponibles en Brasil, incluso en el contexto del acceso a Internet, con velocidades de banda ancha promedio disponibles para la población. Este producto, denominado Per Cantum, se simula un entorno virtual de canto coral para facilitar el aprendizaje del canto en grupo a distancia, pudiendo ser utilizado en cursos presenciales y también en el contexto del ocio.*

PALABRAS CLAVE: Coro virtual. Canto coral. Educación a distancia.

Introduction

In contemporary day-to-day life, Digital Technology strongly influences how the individual perceives the world, from his work, education, and even interpersonal relationships. This new culture generates a new society (CASTELS, 2002). The world known to humans has been undergoing a strong structural transformation for at least two decades. It is a multidimensional process, but it is associated with the emergence of a new technological paradigm based on communication and information technologies (CASTELS, 2002, p. 1).

Access to information, previously possible for a few people due to the ease of communication through Digital Information and Communication Technologies (ICT), makes the world smaller and more agile in exchanging information between distant societies. The revolution provided by the DTIC enables the connection between individuals through the world computer network; thus, the most diverse subjects are globally available (MORAN; MASETTO; BEHRENS, 2000). The changes in the behavior of individuals in societies impacted by this revolution can be better perceived in those born in this era of digital technologies, known as digital natives, who are connected at all times to this global computer network (PRENSKY, 2012). This author also points out some peculiar characteristics that this generation presents in the cognitive process of these digital natives¹:

[...] processing information at a higher speed; ease of performing multiple activities in parallel; preference for graphics over text; preference for random rather than sequential access; in addition to being extremely connected, active, and fluent in various technologies (BORDINI *et al.*, 2014, p. 4, our translation).

Henderson Filho (2007) describes that, since the 1960s, the Brazilian Federal Government has applied funds to projects that focus on developing digital technologies to be used mainly in Education. As a result, Music Education has encountered some limitations in effectively reaching its goals².

As far as Music Education is concerned, teacher training in music undergraduate courses offers little musical practice experience, especially vocal practice, as described by Amato, Solti, and Deutsch (2017). This study, backed by Amato's (2017) research, reveals a lower offering in Distance Education (DE) of subjects that deal with vocal practices in music degree courses,

¹ Digital natives: “[...] this term designated to identify people who were born in the era of digital technologies and, today, relate easily with graphics and media and who feel easier to learn when they are in contact with these media” (BORDINI *et al.*, 2012, p. 141, our translation).

² DE Goals: The goals of DE are, in the first instance, the same as those of face-to-face education (PE): to bring knowledge that provides equal opportunities to all, regardless of social class, creed, or gender, for a consistent democracy, with quality education

Per Cantum: A digital tool for the teaching of virtual choir in e-learning

both in private and public institutions, when compared to Face-to-Face Education (PE), leaving in relief some hypotheses. One of them is that these courses in DE do not have a dedicated digital tool that can provide an experience of choral singing close to that perceived in PE. Given this, this paper presents the pillars of a digital tool for choral singing practice under development, entitled *Per Cantum*³, which aims to provide a learning experience of choral singing content in a virtual environment equivalent to that found in the classroom. It can positively impact the learning experience of students of EaD music degrees who, as future music teachers, will teach such practice content with a consistent experience.

Next, the method of work used and its theoretical foundation will be presented, which supports and suggests actions for this tool to be effective in teaching the contents of the discipline of choral singing in undergraduate courses in music in EaD modality. Subsequently, the ideas of the elaboration of the construction of the digital tool are presented, and finally, its operation will be reported, followed by the Final Considerations.

Working Method

Based on the qualitative research method (FLICK, 2009), the working strategies used to prepare this article are: 1. Perception of deficiencies in offering subjects for vocal practices in EaD music undergraduate courses in Brazil; 2. Bibliographical research and virtual consultation about Virtual Choral to elaborate a conception of a Choral Singing simulator for distance learning; 3. Elaboration of the necessary pillars to offer a real experience of Choral Singing in a virtual environment to the undergraduate student; 4. Partnership with a digital platform developer for the construction of the digital tool.

This tool's conception is based on this author's experience, whose performance as a choral conductor takes place in several groups, from children, corporate, religious and institutions, public and private, focused on leisure and academic training. This experience was anchored by a bibliographic base formed by the contents about choral singing, vocal technique, choral conducting, and musical education.

³ *Per Cantum*: From the Latin, Canto para todos.

Daniel Chris AMATO e Cynthia Yukiko HIRAGA

The concept acquired for constructing this tool was informed and discussed with the developers, who, in turn, suggested the initial design from an application (app)⁴, with a function similar to the proposed one, focused on leisure, called Choir Player⁵.

Theoretical framework

Music education advocates, to a great extent, a musical practice. This practice is the expected result from the professional specialist and the one who teaches this knowledge. For DE teaching, mediation by TDIC has a strong presence in the contemporary world. This is due to the cheapening of equipment that accesses the internet, allowing its acquisition by a larger portion of the population. This communication network currently formed contradicts the fictional idea of central domination to be held by a central computer, called Multivax (ASIMOV, 1956), decades before computers took a definitive seat in the daily life of modern societies.

Moreover, the spread of small computers connected by the Internet (FORNARI, 2011) makes possible virtually instantaneous communication and near instantaneous sharing among everyone on the planet. Although the government can provide improvements in the educational field, especially for the lower classes of society, by offering computer equipment and access in schools, "it is not technology that will solve or resolve Brazil's educational problem. It can collaborate, however, if used appropriately, for the educational development of our students" (MORAN; MASETTO; BEHRENS, 2000, p. 139).

There is a need to reevaluate the theories and educational practices for new teaching modalities, such as in DE. This evaluation should be mediated by ICT and can rely on the development of games, among other activities in the virtual environment, such as posting texts, providing Quizzes⁶ and online discussion groups, and enabling videos and audio on digital platforms, for example. These resources of "current technologies are being increasingly used in education, especially in the area of music" (GOHN, 2011, p. 15, our translation). In addition, evolution can be observed regarding the use of this equipment in forming social networks whose access to the world music collection is now in the palm of your hand and impacts contemporary societies even more (GOHN, 2020).

⁴ App: This is an abbreviation for applications. They are software, in other words, programs purchased in virtual stores for mobile devices such as smartphones or tablets. The most common ones are calculators and video players, for example.

⁵ Choir player: This is a free application for mobile devices that makes it possible to study the suits independently or in conjunction with another voice, with or without accompaniment, controlled by the user. It also allows you to control the music's pitch (tone) and speed (tempo).

⁶ Quiz: Currently understood as a simple questionnaire for evaluating knowledge on a given subject.

The games proposed for learning and improving music are effective strategies in PE and DE. The etymology of the word game derives from the Latin word *ludos*⁷, , but it is usually understood by another word, *ludos*, also from Latin. The game can refer to disputes in the sense that sport is appropriated as a substitute for war. In addition, it is associated with a sense of playfulness, imagination, pleasure, and theatrical representation (CABRAL, 1990). The game is formed by rules that will stimulate one player to overcome the other. It must be understood that the game has great value in Music Education for stimulating its participants to undertake efforts to overcome their limits while seeking supremacy, even when it is cooperatively, before the other participants. In the case of Choral Singing, only one team is formed, with one leader, so that everyone is integrated around the same objective: to sing together as well as possible under the command of their leader.

For this purpose, another strategy is deemed necessary that allows the student to enjoy the experience of this activity in a way that he can be evaluated by the teacher/tutor and also make his evaluation, promoting his musical development. Thus, this tool should be conceived as a Choral Singing simulator. Academic records point to the use of simulators in teaching several areas of knowledge, such as medicine (FLORES; BEZ; BRUNO, 2011), physics (BARBOSA *et al.*, 2017; FERREIRA *et al.*, 2016), chemistry (SILVA; NETTO; SOUZA, 2016.), Environmental Engineering (ALENCAR CARVALHO; CARVALHO; SILVA, 2016), Computer Architecture (ULLMANN *et al.*, 2014), of Computer Networks (MARTINS, 2016) in Education (LOPES; OLIVEIRA, 2013). In music, the simulators prevail their use, in practice, in instrumental music (GOHN, 2003; PAIVA, 2015; FICHEMAN, 2004), which further reinforces the possibility of elaborating this tool for Choral Singing, aiming a deepening of musical aesthetic conception (TOMÁS, 2005) and improvement of auditory skills for musical making (SCHAFER, 2011).

The definition of Chorus, in the sense of choir, can be understood as "a group of singers who perform together.

In Portuguese, the noun CORAL is also synonymous with choir, but without a very clear distinction in the use of the two words; in English, the word "choir" is used for groups of ecclesiastical singers, or groups of smaller professional singers, while the word "chorus" is preferred for large, secular groups (SADIE; LATHAM, 1994, p. 225, our translation).

⁷ *Ludos* and *Jocus*: Although both terms may have an intrinsic connection with the Portuguese word 'jogo', they indicate very different meanings. The first indicates fun, and the second competition. In Education, it is usually established with *ludos* and the idea of play in the form of cooperative play in preparing the individual for life in society (CABRAL, 1990).

Daniel Chris AMATO e Cynthia Yukiko HIRAGA

An example of a Choral Singing activity in a virtual environment (Virtual Choir) is the one created and conducted by Maestro Eric Whitacre (USA) (ERIC WHITACRE'S VIRTUAL CHOIR, 2010). Cayari (2016) describes a definition for this contemporary musical training:

A virtual Choir is an ensemble whose performances consist of multitrack recordings. Multitrack is a vernacular term that describes a recording created by layering audiovisual layers. Often the Virtual Chorale contains multiple layered audiovisual tracks to create a performance [...] the term Virtual Chorale can be used to describe all types of mediated vocal performances, including virtual choirs, opera quartets, virtual a cappella vocal groups, and other ensembles of various sizes that may not find any equivalent in traditional musical performance (CAYARI, 2016, p. 4, our translation).

It should be considered that “The fact that the Virtual Choir is positioned on the border between offering a rewarding experience of collective identity, and the remote activity, in differentiated time - going from the preparation to the performance of each participant” (AMATO; FORNARI; SCHWARTZ, 2017, p. 2), still does not fully meet the needs of the teaching of musical content provided in the training of music teachers to act in classroom settings, as provided in the menus of their disciplines.

However, the evolution of activities related to the development of choral singing in the virtual environment has yet to be fully understood and explored, both in academic literature and among practitioners of this musical modality (AMATO; FORNARI; SCHWARTZ, 2017, p. 3, our translation).

The adaptation needed to bring this activity from the field of leisure and entertainment to Education occurs in the evaluation of the record made in the video that must be sent to the teacher/tutor, based on the concept of Sound Objects as described by Roads (2001). This Sound Object will be reproduced and manipulated for the elaboration of a Virtual Chorale, overcoming the barriers of time and space (FORNARI, 2011), enabling the pleasure of remote and asynchronous collective musical making provided by DE.

Although the proposed digital tool seeks to cause a collective vocal experience, one must consider that

[...] innovation is not restricted to the use of technology, but also to how the teacher will appropriate these resources to create methodological projects that overcome knowledge reproduction and lead to knowledge production (MORAN; MASETTO; BEHRENS, 2000, p. 75, our translation).

The choice of a musical repertoire suitable to the reality and level of the students is a variable that can influence the pedagogical result of the chosen strategy. Samuel Kerr, a conductor who conducted the Paulistano Choir of the São Paulo Municipal Theater and was the

Per Cantum: A digital tool for the teaching of virtual choir in e-learning

artistic director of the choirs of the Universidade Estadual Paulista (UNESP) in the 1990s, and a professor of the music course of this institution, used to say that a person sings better when he has an identity with what he sings, with what he knows. Therefore, even indicating a repertoire favorable to the individual's cultural recognition to be used, those responsible for preparing didactic material should focus on noticing, as soon as possible, what degree of musicality and cultural identity their students have so that, in the future, the mandatory contents can be taught with the student's full interest.

In this sense, the teacher needs to have a broad pedagogical knowledge, in addition to the specific contents, allied to the command of the computer language so that the experience of making music is meaningful to his students, aiming to improve his pedagogical practice (PINTO, 2007). This expands the possibility of teamwork, despite being distant from each other, because “it opens new horizons in the field of research and, consequently, in the possibility of learning” (PINTO, 2007, p. 35, our translation). In fact, “information technologies are available in front of us, it is up to us to shape this medium” (ONOFRIO, 2011, p. 29, our translation), especially in a country that needs so much to provide access to quality education.

About the development of the Per Cantum tool

| 8

The development of this digital tool was based, firstly, on the author's experience for several years working as a choral conductor of amateur groups of different ages and in higher education, teaching undergraduate courses in EaD and EP. The initial script and the transmission and evaluation strategy were elaborated with the mediation of digital technologies for use in platforms already established and widespread, such as YouTube⁸ and Moodle⁹, as well as electronic mail (E-mail) and communication applications, such as WhatsApp. This activity, initially practiced while the author was working as a teacher in an EaD music degree, provided a closer look at students' difficulties in learning the contents of vocal practices.

This script of the adopted strategy was elaborated so that it could be used by the digital tool, according to the following needs, in a way that:

- a) Make it possible to send and receive texts;
- b) Allows students to access and post videos and audio (link);

⁸ YouTube is a website for sharing videos uploaded by users over the Internet. The term comes from the English 'you' meaning 'you' and 'tube' meaning 'tube' or 'channel' but is also used in slang for 'television'.

⁹ Moodle: Moodle stands for Modular Object-Oriented Dynamic Learning Environment. Moodle is a free learning support software installed on various platforms that run the PHP language, such as Unix, Linux, Windows, and MAC OS.

Daniel Chris AMATO e Cynthia Yukiko HIRAGA

- c) It could have in its design a Virtual Chorus so that the student could manipulate the independence of each audio of the choral arrangements;
- d) It could culminate in a Virtual Chorale due to the course.

In addition, the pillars above support the tool's design to offer the closest to real choral singing experience possible. The study by Thibeault (2012) and Snelson, Rice, and Wyzard (2012) used the YouTube platform similarly in posting videos of the activities made by the students for teacher evaluation. It is recommended that they be posted as unlisted so the link holder can access them. In addition to serving as a depository of the students' videos, the YouTube platform could be the stage for the results of the finished editing for students to watch, as elaborated by Whitacre (YOUTUBE, 2011). Cayari (2016) points out that the performance for the video to be posted on YouTube differs from that done synchronously and in person, due to the simultaneous interaction between audience and performer, perhaps better or worse, depending on each individual. However, one should consider that online music practices are constantly changing as the Internet becomes more accessible to more people. In this sense, performance should be considered core to both modalities, live (face-to-face) or recorded (EaD), not better or worse. The student's performance will be satisfactory for evaluation after some course stages. It may provide the necessary experience for him to perform both in the virtual environment and the face-to-face one in the future. The presentation of the Virtual Choir aims to establish a post-performance social relationship that may motivate future participation of the members in Virtual Choirs.

In a presential Choral Singing activity, the participant establishes social relations that impact how the group behaves before the interpreted work because they all submit to the conductor's orientations all the time. This does not necessarily happen in the Virtual Chorus because there is no immediate feedback. For this reason, there was the need to insert a video of the conductor instructing the tempo and dynamics adopted, allied to the musical intention obtained from work explained by the conductor's body gesture. In this design, this was considered after having Whitacre's strategy (YOUTUBE, 2011) analyzed, considering the presented result of the song *Lux Aurunque* (ERIC WHITACRE'S VIRTUAL CHOIR, 2010).

For such a result, it was also considered and adopted in this tool, the recordings of the suits posted to be guided to the singers who must show vocal attribution beyond the proposed tempo, pitch, and dynamics. In these videos of separate suits, it was observed that the intention was clearly explained, as the singers will be guided by imitation in the interpretation of music, in search of a result within the same artistic conception adopted by the conductor, as it is

Per Cantum: A digital tool for the teaching of virtual choir in e-learning

suggested in the Choral activities in person. The possibility of transmitting this conception in a non-verbal way establishes 'that' in music is usually called feeling¹⁰, which is the intentional feeling with which the musical work should be executed. The interpretation depends on the intention expressed in the performance. In the case of the Virtual Choir and the presential choir, the difficulty of satisfaction perceived by the members is increased due to the individual variables in a collective activity. However, the sensation of pleasure results from the collective expression of the intention that is printed to work, conducted by the conductor allied to the musical technique.

In time, we reinforce the idea that the actions proposed in this tool, in part, were configured by the user. It is worth mentioning all the advances perceived in the increment that it received in its elaboration:

1. Students can send their written work, images, and videos digitally without having to send them by e-mail and be able to post them on the platform.
2. The possibility for the student to check the choir's result with the Virtual Choir configuration, configured intuitively by the teacher/tutor.

Another condition that may be noted in this adequacy of the Virtual Choir, compared to the strategy used by Whitacre (YOUTUBE, 2016a) to make his Virtual Choir, notably for leisure and contemporary artistic expression, is that this proposed digital tool, as already said, is at the service of Education. For this, it is necessary that the student:

- Be evaluated for the activities you perform;
- Not be excluded from the activity, regardless of the results of their activities delivered;
- Can develop from his musical level;
- Can be motivated to integrate the contents of Choral Singing in his repertoire of activities when he is in the exercise of teaching, whether at a distance or in person.

Initially conceived as a prototype, the tool was created in the form of a web page, accessible through a link made available on the course web page. HTML5 with CCS3 was used for styling. JavaScript with JQuery for the events part of the pages. Finally, the finalization was done by WordPress. The audio was recorded in Wave and transformed into mp3, while the videos can be captured by the students in several formats, but can be transformed to mp4 format, preparing them for posting on the Youtube.com site. The recommended aspect ratio for the

¹⁰ Feeling: From the English verb to feel. In the musical field, it is when a musician manages to execute a work, of whatever genre, in a way that touches his audience, both those considered to be integrated into the style and those who are not..

Daniel Chris AMATO e Cynthia Yukiko HIRAGA

videos is 16:9, so no black lines will appear horizontally or vertically. This care with the posted videos can impact the Virtual Chorus result edition in a depreciative way. The site Youtube.com easily accepts several formats¹¹, so, in this way, they can be watched both on desktop and mobile devices (tablet, smartphone). The teacher and students in doc can post the texts in .docx, .odf, .odt, or .pdf.

The operation

When the student confirms his enrollment in the course, he receives in his e-mail a login and provisional password. With this information, he accesses the graduation page that is in Moodle format. At this point, he logs¹² in and can access the Virtual Choral course through a link. This link will take him to an online page of the course contents.

The music student in DE must have basic computer skills, such as editing texts and recording videos on their equipment, mobile or not, to send to the teacher for evaluation. To remedy this deficiency, a tab with access to Tutorials exists, where basic instructions about the functions requested in the course will be written. If the student does not need this basic information, he can start the course by clicking on the first tab on the left (Body Awareness). He will watch the videos and will be able to exercise his body awareness by practicing daily, described in the daily activities report.

In the second tab, the student will have contact with the contents of basic breathing. It is known that breathing control is essential for several vocal attributions, such as pitch, timbre, and control of intensity and singing dynamics (FUCCI AMATO, 2010). In this tab, videos presented of breathing aimed at controlling air output and diaphragmatic support, all geared toward singing and speaking. The activities should be recorded in the report of daily activities.

The third tab refers to vocal warm-up. At first, the vocal exercises can be common to all suits when worked in the median region of the vocal extension, however, there are two buttons with the option for male and female voices. This option does not necessarily reflect the gender of the student but only which voice he intends to exercise. This has been foreseen in vocal classification since the early days, when only men sang in choirs, either as bass and tenor, sopranists (soprano voice), or countertenors (with contralto voices). On the same tab is an option to classify the student's voice. The student can do this autonomously or by sending a

¹¹ Video upload formats accepted by youtube.com: .MOV, .MPEG4, MP4, .AVI, .WMV, .MPEGPS, .FLV, 3GPP, WebM.

¹² Loga: From the verb Logar, from the English language origin to that which refers to the act of inserting login and password to be received into the system to access the contents.

Per Cantum: A digital tool for the teaching of virtual choir in e-learning

video to the teacher singing female or male voices together with the song of free choice. This way, the expert teacher can indicate a suit for this student to be accommodated without vocal prejudice.

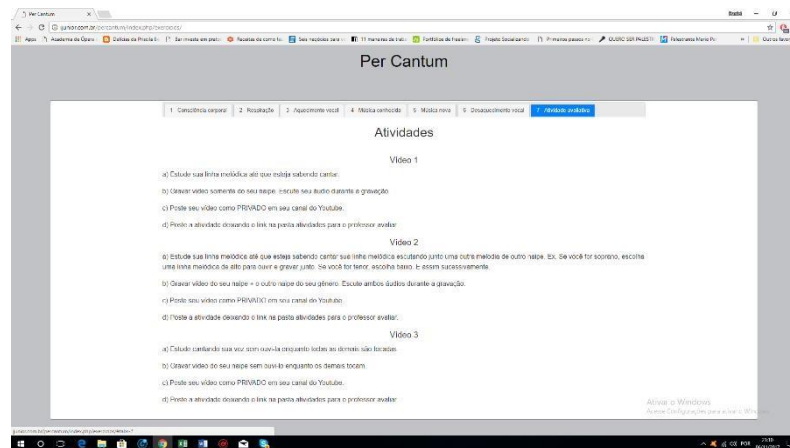
In the next tab, it is necessary to consider that the course is in the intermediate stage because a song that the Virtual Chorale has already studied is presented in the fourth tab. In this fourth tab, the music to be exercised may be presented in sheet music form, in which the choir group sings all the voices, and the student exercises his memory by singing his voice.

In the fifth tab, you have the new music. The student should download the score to be learned. After downloading it, he must familiarize himself with the lyrics. Then, in this tab, several buttons activate or deactivate the suits' audios. The student can learn his suit voice by turning off the other buttons so that he hears only the chosen suit. With the score in hand and watching the video of the conductor conducting, he can learn to sing anchored to the audio guide. Later, the experience of collective music-making can be enhanced when the other buttons are turned on while the student continues singing the voice of his suit. Finally, listening to the other voices while turning off your own is recommended. The student may study more than one voice. At the end of each study, it is highly recommended to warm up, i.e., to put the voice back in the place of speech, whose subglottal pressure and vocal position and height differ from singing, which acts with greater pressure and specific adjustments for the activity. In this sixth flap, a video is proposed, so the student is led in this action.

Finally, the seventh tab asks for the evaluation activities of the content learned by the students. The delivery of daily activities report is an intrinsic part of learning to make music in DE and must be delivered on the requested date, as well as the other activities. Questions can be shared with other classmates and answered in the open forum in the Moodle virtual room. In addition, the teacher will evaluate the results of the videos posted by the students, and, if necessary, new videos will be requested so that they can be used to compose the Virtual Choir, which will be presented at the end of the course. Finally, the student's impressions of the content and strategies presented may serve as an argument for changes in the development of the tool.

Daniel Chris AMATO e Cynthia Yukiko HIRAGA

Figure 1 - Evaluation activities



Source: Prepared by the authors (see appendix A)

Final considerations

Throughout the text, the pillars and characteristics for elaborating a digital tool are under development for teaching the necessary contents for Choral Singing in EaD modality. In this attempt, several observations and recommendations were made, but none were as important as the motivation parameter for learning. The pedagogical strategy, guided by the DTIC, has the main objective of encouraging the student to use the Choral Singing contents in their classroom practices or leisure activities, as several groups cited worldwide already do.

13

Although Choral Singing has very strong roots in the 1930s, with the musical paternity of Villa-Lobos (FUCCI AMATO, 2012), this activity was not common in schools, even in the face of the so-called Music Law in force since 2008 (PENNA, 2012), which already completes ten years of existence and little has proven effective in the promotion of musical groups arising from the regular teaching of music in Brazilian public schools.

For Amato, Solti, and Deutsch (2017), offering the disciplines of choral singing in undergraduate music courses is still precarious, whose hypothesis is the unavailability of digital tools to teach this content. Finally, when enjoyed through digital technologies, this activity moves away from the traditional activity used to bring singers from distant choirs together in situations that are not educational. Thus, due to the distinct parameters and objectives, it is possible to suggest deepening this Virtual Choral activity to verify if it does not compose a new artistic language.

This digital tool was developed as a prototype for presentation in the author's master's degree defense and showed great potential and versatility for teaching the contents of Choral Singing, with possible technology nowadays in Brazil. However, a smartphone version still

needs to be developed. Moreover, it can enhance the choral singing experience in EaD, as well as encourage the formation of several virtual groups such as Accent (YOUTUBE, 2015), The Mormons (YOUTUBE, 2016b), the Carmelite Sisters (YOUTUBE, 2014) or just one man multiplying himself in tracks¹³ (YOUTUBE, 2013), confirming that this phenomenon of entertainment and artistic expression is worldwide, and can be very useful for training teachers to work in EaD.

REFERENCES

ALENCAR CARVALHO, C. V.; CARVALHO, J. V.; SILVA, J. C. VAPD-2D: Simulador para Apoio ao Ensino de Engenharia Ambiental. **Revista Eletrônica TECCEN**, v. 1, n. 2, p. 1-8, 2016. Available at:

<http://editora.universidadevassouras.edu.br/index.php/TECCEN/article/view/220>. Access: 16 July 2021.

AMATO, D. C.; FORNARI, J.; SCHWARTZ, M. G. Um estudo sobre os possíveis impactos emotivos da cooperação remota dos participantes de cantos corais virtuais. **Revista do NICS**, Campinas, n. 18, jan. 2017. Access: 18 jun. 2017. Available at:

<https://revistas.nics.unicamp.br/revistas/ojs/index.php/nr/article/view/204>. Access: 10 Feb. 2021.

AMATO, D. C.; SOLTI, E.; DEUTSCH, S. Ensino de práticas vocais para um corpo virtual. *In*: CONGRESSO INTERNACIONAL DE EDUCAÇÃO FÍSICA E MOTRICIDADE HUMANA, 10., 2017, Rio Claro. **Anais [...]**. Rio Claro, SP: UNESP, 2017.

ASIMOV, I. **A Última Pergunta**. Tradução: Luciano Vieira Machado. Título original: The last question, 1956.

BARBOSA, C. D. *et al.* O uso de simuladores via smartphone no ensino de física: O experimento de Oersted. **Scientia Plena**, Sergipe, v. 13, n. 1, p. 1-13, jan. 2017. Available at: <https://scientiaplenu.org.br/sp/article/view/3358>. Access: 03 nov. 2017.

BORDINI, R. A. *et al.* Processo de Design de um Jogo Eletrônico Para o Aprendizado de Teclado Musical. *In*: SIED: ENPED-SIMPÓSIO INTERNACIONAL DE EDUCAÇÃO A DISTÂNCIA E ENCONTRO DE PESQUISADORES EM EDUCAÇÃO A DISTÂNCIA, 2014, São Carlos. **Anais [...]**. São Carlos: UFSCAR, 2014.

CABRAL, A. **Teoria do Jogo**. Lisboa: Editorial Notícias, 1990.

CASTELS, M. **A Sociedade em Rede**. Lisboa: Fundação Calouste Gulbenkian, 2002.

¹³ Tracks: English word with several translations, however, in this context, it means audio tracks, that is, where each instrument can have its recording done independently so that it can be modified without altering the other instruments recorded on other audio tracks.

¹⁴ In a quick search, it is possible to find several choral singing Apps, such as: choralpractice.com, chorusclass.com, and choirplayer.com.

Daniel Chris AMATO e Cynthia Yukiko HIRAGA

CAYARI, C. **Virtual vocal ensembles and the mediation of performance on YouTube**. 2016. Tese (Doutorado) – University of Illinois at Urbana-Champaign, Urbana-Illinois, 2016.

ERIC WHITACRE'S VIRTUAL CHOIR. **Lux Aurumque**. ERIC WHITACRE'S VIRTUAL CHOIR, 2010. 1 vídeo (6 min). Available at: <https://www.youtube.com/watch?v=D7o7BrlbaDs>. Access: 13 May 2016.

FERREIRA, F. C. *et al.* Simulador computacional para o Ensino de Física: O Sandbox como ambiente de criação. **Anais dos Workshops do Congresso Brasileiro de Informática na Educação**, Porto Alegre, p. 387, 2016. Available at: <http://www.br-ie.org/pub/index.php/wcbie/article/view/6957>. Access: 03 Nov. 2017.

FICHEMAN, I. K. *et al.* Portal Edumusical: Telemática aplicada à Educação Musical. In: Simpósio Brasileiro de Informática na Educação-SBIE, 15., 2004, Manaus. **Anais [...]**. Manaus, AM: UFAM, 2004.

FILHO, H. J. R. **Formação continuada de professores de música em ambiente de ensino e aprendizagem online**. 2007. Tese (Doutorado em Música) – Instituto de Artes, Universidade Federal do Rio Grande do Sul, Porto Alegre, 2007. Available at: <https://www.lume.ufrgs.br/handle/10183/11229>. Access: 09 Mar. 2021.

FLICK, U. **Introdução à Pesquisa Qualitativa**. Tradução: Joice Elias Costa. 3. ed. Porto Alegre: Bookman, 2009.

FLORES, C. D.; BEZ, M. R.; BRUNO, R. O. Uso de simuladores no ensino da medicina. **Revista Brasileira de Informática na Educação**, v. 22, n. 2, p. 98-108, 2011. Available at: https://www.researchgate.net/profile/Cecilia_Flores2/publication/259640775_O_Uso_de_Simuladores_no_Ensino_da_Medicina/links/55e5e8c108aebdc0f58ba9c8.pdf. Access: 03 Nov. 2017.

| 15

FORNARI, J. Um Processo de Criação Computacional Interativa de Notação Musical. **Revista Nomads USP**, v. 1, n. 06, 2011. Available at: <http://vnomads.eastus.cloudapp.azure.com/ojs/index.php/virus/article/view/463/831>. Access: 02 Oct. 2022.

FUCCI AMATO, R. C. **Escola e Educação Musical: (Des) caminho históricos e horizontes**. Campinas, SP: Papirus, 2012.

GOHN, D. M. **Auto-Aprendizagem Musical: Alternativas tecnológicas**. São Paulo: Annablume, 2003.

GOHN, D. M. **Educação Musical a Distância: Abordagens e experiências**. São Paulo: Cortez, 2011.

GOHN, D. M. A realidade das redes sociais: uma discussão acerca da educação musical nas comunidades virtuais. **Revista da Abem**, v. 28, p. 81-93, 2020. Available at: <http://www.abemeducacaomusical.com.br/revistas/revistaABEM/index.php/revistaabem/articloe/view/881>. Access: 28 Sept. 2021.

- LOPES, N.; OLIVEIRA, I. Videojogos, *Serious Games* e Simuladores na Educação: Usar, criar e modificar. **Revista EFT – Educação, Formação e Tecnologias**, Lisboa, v. 6, n. 1, p. 04-20, jul. 2013. Available at: http://educa.fcc.org.br/scielo.php?pid=S1646-933x2013000100002&script=sci_abstract&tlng=en. Access: 15 Sept. 2021.
- MARTINS, A. M. C. **O Uso de Simuladores no Ensino de Redes**: Um estudo de caso no ensino profissional. 2016. Tese (Mestrado em Ensino da Informática) – Universidade Católica Portuguesa, Faculdade de Filosofia e Ciências Sociais, Braga, 2016. Available at: <http://repositorio.ucp.pt/handle/10400.14/20810>. Access: 03 Nov. 2017.
- MORAN, J. M.; MASETTO, M. T.; BEHRENS, M. A. Mediação Pedagógica e o Uso da Tecnologia. In: MORAN, J. M.; MASETTO, M. T.; BEHRENS, M. **Novas Tecnologias e Mediação Pedagógica**. São Paulo: Papyrus, 2000.
- ONOFRIO, R. M. G. **A web como interface no ensino musical**. 2011. Dissertação (Mestrado em Música) – Universidade de Campinas, Campinas, São Paulo, 2011.
- PAIVA, L. L. G. **O uso das tecnologias digitais no ensino e aprendizagem musical**: Um estudo com guitarristas licenciandos em música da UFRN. 2015. Trabalho de Conclusão de Curso (Licenciatura em Música) – Universidade Federal do Rio Grande do Norte, Natal, 2015. Available at: <https://antigo.monografias.ufrn.br/jspui/handle/123456789/1171>. Access: 11 Nov. 2021.
- PENNA, M. **Música(s) e seu Ensino**. 2. ed. revisada e ampliada. Porto Alegre: Sulina, 2012.
- PINTO, M. C. **Tecnologia e Ensino-Aprendizagem Musical na Escola**: Uma abordagem construtivista interdisciplinar mediada pelo software Encore versão 4. 5. 2007. Dissertação (Mestrado em Música) – Universidade Federal de Minas Gerais, Belo Horizonte, 2007. Available at: https://repositorio.ufmg.br/bitstream/1843/ECOAF-7KGPLD/1/texto_tese_pdf.pdf. Access: 18 July 2021.
- PRENSKY, M. **Aprendizagem Baseada em Jogos Digitais**. São Paulo: Editora Senac São Paulo, 2012.
- SADIE, S.; LATHAM, A. **Dicionário Grove de Música**: Edição concisa. Rio de Janeiro: Jorge Zahar, 1994.
- SCHAFER, R. M. **O Ouvido Pensante**. 2. ed. São Paulo: Editora Unesp, 2011.
- SILVA, G.; NETTO, J. F.; SOUZA, R. A abordagem didática da simulação virtual no ensino da química: Um olhar para os novos paradigmas da educação. **Anais do Workshop de Informática na Escola**, Porto Alegre, p. 339, 2016. Available at: <http://br-ie.org/pub/index.php/wie/article/view/6840>. Access: 03 Nov. 2017.
- TOMÁS, L. **Música e Filosofia**: Estética musical. São Paulo: Irmãos Vitale, 2005.

Daniel Chris AMATO e Cynthia Yukiko HIRAGA

ABOUT THE AUTHORS

Daniel Chris AMATO

São Paulo State University – (UNESP), Rio Claro – SP – Brasil. Doctoral degree candidate in Human Development and Technologies, Institute of Biosciences.

Cynthia Yukiko HIRAGA

São Paulo State University – (UNESP), Rio Claro – SP – Brasil. Lecturer at the Physical Education Department. Doctoral degree in Philosophy (UTAS/Australia).

| 17

Processing and publication by the Editora Ibero-Americana de Educação.

Reviewing, formatting, standardization and translation.



APPENDIX A

EVALUATION ACTIVITIES	
Video 1	<ul style="list-style-type: none">a) Study your melody line until you know how to sing;b) Record video only of your suit listening to it during the recording;c) Post this video as private on your Youtube.com channel;d) Send the link on the platform for the teacher to evaluate.
Video 2	<ul style="list-style-type: none">a) Study your melody line until you know how to sing it, listening to another suit's voice;b) Record a video singing your suit while another one is played. It is necessary that the recording be unedited and that you can hear both voices playing;c) Post this video as private on your Youtube.com channel;d) Send the link on the platform for the teacher to evaluate.
Video 3	<ul style="list-style-type: none">a) Study the voice of your suit while listening to the other voices playing;b) Record a video of your suit singing while the others are playing. It is necessary that the recording be unedited and that you can hear the other voices playing;c) Post this video as private on your Youtube.com channel;d) Send the link on the platform for the teacher to evaluate.