Mobile application and technology as a motivational support to the learning process of Art/Music [1]

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Abstract – The use of information and communication technology (ICT) in education is a relevant research question. With the improvement of technology, the use of mobile phones by the students is more and more common in the classroom, enabling an appropriate environment for mobile learning (m-learning). This paper analyzes how Art/Music students in Brazilian context of technical high schools education can be motivated in auxiliary research with these technologies support to build and optimize their own Art knowledge. Its approach is how the teachers can use applications as an useful help in the teaching and learning process.

Index terms: art, music education, m-learning, motivation, technology

Tecnologias e aplicativos móveis como suporte motivacional no processo de aprendizagem de Artes/Música

Resumo - O uso das tecnologias de informação e comunicação (TIC) na educação é uma questão relevante para a pesquisa atual. Com a melhoria da tecnologia, o uso de smartphones pelos estudantes é cada vez mais comum em sala de aula, permitindo um ambiente adequado ao chamado m-learning, aprendizagem através de redes móveis. Este artigo analisa como os estudantes de Arte/Música no contexto da educação técnica das escolas de ensino médio brasileiras, podem ser motivados a pesquisa complementar através dessas tecnologias de modo a construir e otimizar seu próprio conhecimento artístico. A pesquisa visa apresentar uma perspectiva de como os professores de Arte/Música podem usar aplicativos como uma ajuda útil no processo de ensino-aprendizagem.

Termos para indexação: arte, educação musical, m-learning, motivação, tecnologia

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Introduction

Recent changes in Brazilian educational rules brought through the law 11.769/2008 (BRASIL, 2008) which prescribes music classes to all basic schools in Brazil. Based on the challenges of law enforcement and excellence in musical education, the Federal Institutes included in its staff teachers with specific training in Music.

In this context of technical and technological education, other challenges are being added such as innovation in educational resources and methods, to better communicate with the local art and media productive sector and to support the students in their needs as a young generation. Magalhães (2012) talks about the challenges of internet use in educational context, to supply youth generation´s educational necessities. Tools like Mobile Learning (M-Learning), Distance Learning (EaD), the use of as many recent technologies as possible, especially in the Information and Communication Technology area - ICT - can promote autonomous research, besides the development of didactic resources.

About the contemporaneity and importance of m-learning as a field of Education, Ally and Prieto-Blázquez (2014) say that this is probably the most important area of educational research nowadays, and bring with it challenges and reflections.

Based on these reflections, the problem of this research is how to motivate Federal Institute of Education, Science and Technology of Tocantins - Palmas Campus' students of Art/Music discipline to learn better as well motivate teachers to use more technological and didactic tools to improve the teaching and learning process, through the efficient and effective use of information and communication resources. Franchi and Blanco (2016) warn to the fact that some Brazilian state laws forbid the use of smartphones. The authors bring the idea that, instead of it, teachers and schools must pay attention to the unbounded possibilities to use technology in musical learning processes, giving many chances to better explore rhythm patterns, timbre, and other sounds properties, since technologies are part of youth lives and how they spend a lot of time.

This paper presents the experience of producing a mobile application using current and publicly available technologies to support teaching and learning process of the Art/Music discipline, offered as an integral part of student's training in the integrated modality of technical education, at the Federal Institute of Tocantins.

The aim is to make the contents of the musical subject more attractive to the students, exploring the technological aspect as a tool of support and motivation for the learning of the content presented in the classroom, as an attempt to provoke the students to deepen their

art/musical knowledge through audio and video examples, additional theoretical basis, fixation exercises of contents and creativity, and complementary research. Camacho (2017) ponders the relevance of motivation as a fundamental aspect to teaching and learning process in such a way that students develop a positive attitude towards the process. In this way, the technology used in the classroom is essential and helps in the development of the student´s music skills.

Silva (2016) analyzes the use of technology in music education and points to the fact that it involves a group of other knowledges that could help the students to obtain a better musical practice in performance with other lines of appliance, regarding the Art as an area of knowledge.

In order to address this subject and report on the experience, this paper is divided into the following topics: materials and methods, results and discussion, conclusions, acknowledgements, and references.

Materials and Methods

This experiment is called an action research characterized as "a type of research based on empirical research, designed and in close association with the resolution of a collective problem, in which researchers and participants are involved in a cooperative manner." (SCHMITT; MEDEIROS, 2014, p.163 - translated by the authors). It was proposed aim to seek innovative solutions to the problems related to musical education, using technology to reach the improvement that encompasses a greater creative interaction between teacher and students. Also is the awakening of students to a more effective participation in and out of class, the expansion of possibilities in terms of research and practice in Music, the aid in learning and deepening of contents given in the classroom, the effectiveness of the students' attitude in the teaching and learning process in Music, the interdisciplinarity between Music and other areas of knowledge, starting with IT, provide an approximation of technical education to the local productive sector of culture.

This implies a paradigm shift that involves an open environment of collaborative education, because the teacher of the discipline stops developing his classes only through the exhibition of contents, using paper and pen, magnetic board, computer and multimedia projector, group dynamics and classroom socialization, to also use mobile devices and networks, favoring this kind of environment in the educative context, allowing greater interactivity with students, which can induce them to deepen their musical knowledge,

through research, fixation exercises and artistic creativity. This will help once "in this fast changing world, different stakeholders will have to work together to develop new educational models to cater for new generations of learners who will be using mobile technologies that do not exist as yet." (ALLY; PRIETO-BLÁZQUEZ, 2014, p.145).

This paper results from the need to confront learning problems presented by the current generation of adolescents, here called youth generation, who from the first decade of life had contact with contemporary technologies and media, and with the future generation, which is already considered according to Comazetto *et al.* (2016) as the "virtual generation". This research points out that educational institutions and professionals who work in it have the challenge of producing more collaborative content to be applied through virtual environments, which, is not only incorporate technology in the classroom but also innovate in pedagogical practices.

This research was developed in the graduation course of Telematics. The research group worked based on common meetings realized at the laboratory of computer science of the Federal Institute of Tocantins and virtual meetings that occurred alternately per week.

Since the course is based on the Problem Based Learning (PBL) methodology, the first part of each meeting was dedicated to solve problems presented to the research group by a tutor and the second part to search solutions to proposed issues. Virtual meetings used tools like Wconf, Youtube, WhatsApp, Gmail, Google Family (Classroom, GDrive, Hangouts, Docs - documents, spreadsheets, presentations, forms) and Overleaf.

In order to provide students and teachers with technological tools to support teaching and learning process, the research was directed to create an app capable of applying content related to Art/Music subject in digital format available through smartphones, tablets, computers and other kind of media with internet browser. It was necessary to develop an application compatible with various smartphone platforms currently used for centralization of the content and ordering in didactic form defined by the teacher of the discipline.

Many kinds of functionalities were created in the application to enable its use in or out of class, such as quiz resolution. The digital contents formed by texts, images and videos were presented by the teacher in the classroom and accompanied by students through their own smartphones. In classes where some students don't have their own smartphones, it was allowed to form doubles during the class (Fig. 1).

Figure 1 - Students forming doubles to appreciate musical examples.

Note: By The Authors, 2017

Quizzes, texts and complimentary videos were attached for the use out of classes, to the students by themselves (Fig. 2).

To develop the application were used: a computer with Internet access, a *Publisher* type subscription of the *AppSheet* tool to provide the system, *Google Drive* for digital content storage (PDF, Images and etc.), *YouTube* for video sharing, *Google Sheets* to manipulate the content offered in the application, and these smartphone devices for testing: Asus Zenfone 3, Iphone 5, Iphone 7 and Samsung Galaxy J5 Prime.

Figure 2 - Student using *Ritornello App* in Art/Music class to appreciate a musical example.

Note: By The Authors, 2017

To apply the experiment in the classroom, a WiFi router was used to provide internet access to students and their own devices to interact with the content applied by the teacher. This router (Fig. 3), called "Tadeu", had a software constructed appropriately and integrated to its functioning by another research group linked to Federal Institute called Network Applied Research Group - NARG. The software´s gains are: (1) WiFi signal flashing, (2)

optimized management of users connections, (3) continuity of moving user´s connections and (4) stability.

The device and its operating program was created to promote a better network signal capture and received. It is a WiFi Router, an equipment with two standard 802.11 WiFi interfaces and a 100Mb Ethernet interface, with a system developed by the research group applied to computer networks of the Palmas Campus, which allows seamless and democratic access to the Internet using a wireless connection.

Figure 3 - "Tadeu" - wifi router used in the experiment.

Note: By The Authors, 2017

The experiment was repeated by 9 times with different classes (Fig. 4) of approximately 25 students of 3 differents Art teachers. At the end of each class the students were submitted to an anonymous evaluation questionnaire to guarantee that the students could answered the questions without pressure feeling and feel free to express their real user experience (UX). The questionnaire had questions regarding the teaching tool used and how was the grade of students' satisfaction with the use of new technologies applied. This step of data collection was always accompanied by another member of the group research that was not an Art teacher.

Figure 4 - Experiment in an IT class technical course - 2nd grade.

Note: By The Authors, 2017

To achieve a satisfactory result it was defined that the confidence interval of the research would be at least 95%. To reach this level of confidence it was necessary to define the minimum sample size. Considering that the size of the selected population (students of the Art/Music discipline) was 160 persons, a total of 115 individuals were asked to answer the questions. The equation to arrive at this result is described in 1, what is called *sample*:

$$a = \left(\frac{\gamma \ x \ 1,96}{\varepsilon} \right)^2 \qquad (1)$$

Where:

a = *sample*

γ = *standard deviation*

1,96 = trust level

ε = *estimated error*

The collection of the research was done through an electronic form *Google Forms* at the end of each class through the application itself (*Ritornello App*) that was developed during the research.

After data collection, the result was tabulated by each question showing the percentage of marking for each alternative and the standard deviation and the sample error were calculated, reaching the *variance* as in 2:

$$S^2 = \Sigma \left(\frac{Xi \ - \ X}{n-1} \right) \qquad (2)$$

Where:

S^2 = *variance*

$\sum$ = *sum*

X_i = *value of element*

X = *average of elements*

n = *number of elements*

At the end the standard deviation of each item was calculated to obtain the *standard deviation* as is described in 3:

$$S = \sqrt{S^2} \tag{3}$$

Where:

S = *standard deviation*

S^2 = *variance*

With the tabulated results, a joint study was carried out for debugging the values and understanding the final result, which will be explained in more detail in the subsequent item.

Results and Discussions

In order to optimize the learning of the Arts/Music subject, through the efficient and effective use of information and communication resources, it is concluded that it is essential for the education area to follow the innovations in technology and communication to reach students in the contemporary world, its challenges as pointed by Chen (2018) like equipment setup, technical support, and financial burdens, and the new culture that presents itself.

According to Silva (2016) to do this, research is needed on the use, new applications and implementation of technology tools that accompany this process of contextualizing education to the new times. Expositive classes, magnetic frames with brushes and group dynamics, for example, can and should be used, but other resources need to be added to the educational dynamics, since especially educators working in High School are dealing with a generation already born in the digital age or exposed to it as early as the first decade of life. Farley et al. (2015) add that the use of *Apps* can provide support and increased knowledge to students both in and out of the classroom. In this case, the use of *Apps* can also allow the teachers access to some excellent complementary educational materials through mobile tools.

The results of this research were obtained through the interpretation of data collected by

an evaluation questionnaire developed in *Google Forms* and applied at the end of each class, when all the students could answer through the *App Ritornello* itself, after the presentation of the contents scheduled to that class. The total questionnaires answered were 115, with 10 multiple choice questions (Table 1), each one with 5 options, with the student selecting only one option in each one of them.

The questions involved topics such as the coherence between the contents of the *Ritornello* platform and the teaching plan of the Arts/Music discipline, their facilitative and complementary nature, the effectiveness of the evaluations of the contents given in class, through the quizzes in the *App*, the frequency of the *App* use by the students out of classes and about the user experience, encouragement of academic motivation and degree of educator-student interaction, navigability and the influence of the *App* in artistic creativity of the students.

Table 1 - *Ritornello* evaluation questions.

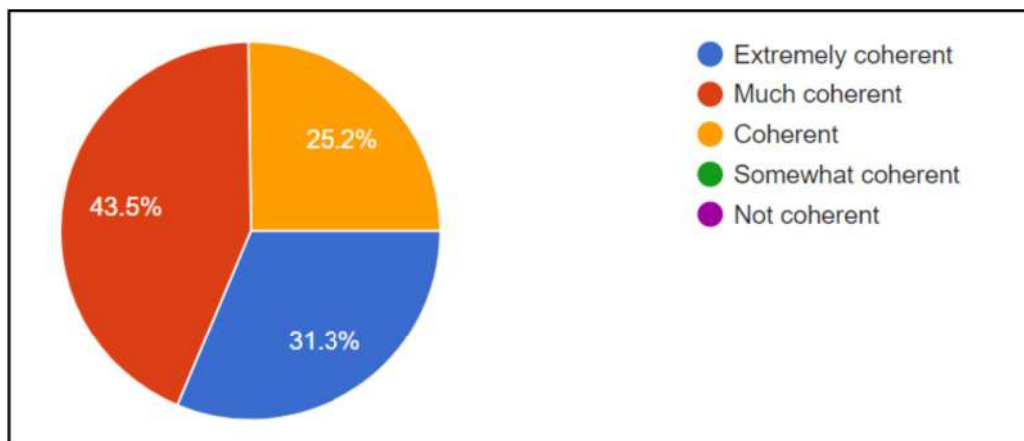| N	Questions
01	Is the organization in the *Ritornello* platform coherent with the teaching plan of contents of the Arts / Music course?
02	Did *Ritornello* help you learn the Arts / Music content better?
03	How much did the contents of *Ritornello* help to complement your knowledge of the discipline?
04	How did the quizzes efficient evaluated your learning of the contents?
05	How often did you use or think you will use the *App* outside of the classroom?
06	How satisfied are you with *Ritornello App* by comparing it with traditional classes?
07	Did *Ritornello* make you more interested in the Arts / Music discipline?
08	How would you rate the teacher-student interaction with the usage of *Ritornello*?
09	How easy is it to handle the *Ritornello App*?
10	Rate how the *App* influenced the development of your creativity and artistic expression?

Note: By The Authors, 2017

Question 1 (Fig. 5) dealt with the organization of contents on the *App Ritornello* platform, observing its coherence in relation to the teaching plan of the Arts/Music subject. The results were that 43.5% (50 students) of respondents perceived a lot of coherence between the contents and the platform, 31.3% (36 students) perceived extreme coherence and 25.2% (29 students) saw coherence between the two. The standard deviation of this question is 17.36%, with a sampling error of 3.17%. Thus, 100% of those who answered understand

that there is a very positive relationship between the content taught in the course and the application platform, which certainly favored and strengthened the learning of the presented contents.

Figure 5 - Question 1 results.

Note: By The Authors, 2017

Question 2 (Fig. 6) evaluated the effectiveness of *Ritornello.* In this way, 35.7% (41 students) of respondents answered that *App Ritornello* helped a lot to learn the content better, 33% (38 students) answered that it helped very much, 28.7% (33 students) answered only helped. It was observed that 97.4% (112 students) of the responses were positive, pointing the application as a as a tool that facilitates the educational process. Only 2.6% (3 students) evaluated the contribution as being of "little help". The standard deviation of question 2 is 15.45%, with a sampling error of 2.82%.

Figure 6 - Question 2 results.
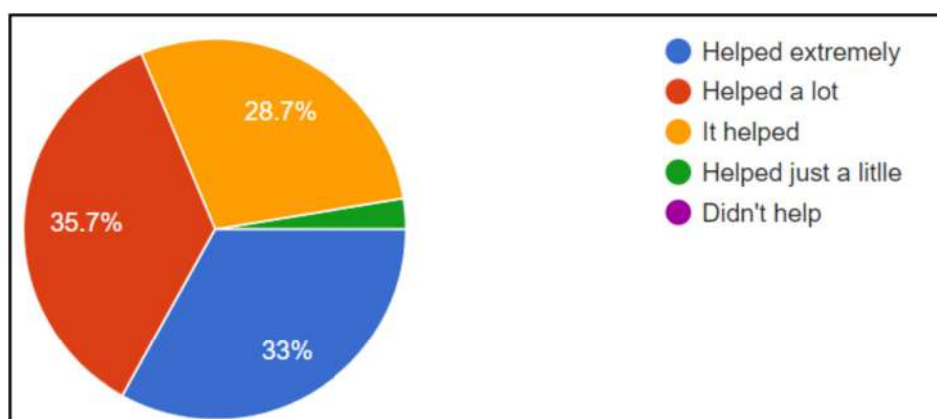
Note: By The Authors, 2017

In Question 3 the purpose was testified *App's* complementary character in relation to the course contents. More than half of the students, 57.4% (66 students), said that the *App* greatly complements the contents of the music subject, 21.7% (25 students) answered that the *App*

complements too much the music contents and 20% (23 students) said that it complements moderately. In resume, 99.1% (114 students) believed that the *App* fulfills well the role of complementing the educational process in the classroom. Only 0.9% (1 student) considered the complementary character of the *App* invalid (Fig. 7). The standard deviation of this question is 20.82%, with a sampling error of 3.80%.

Figure 7 - Question 3 results.
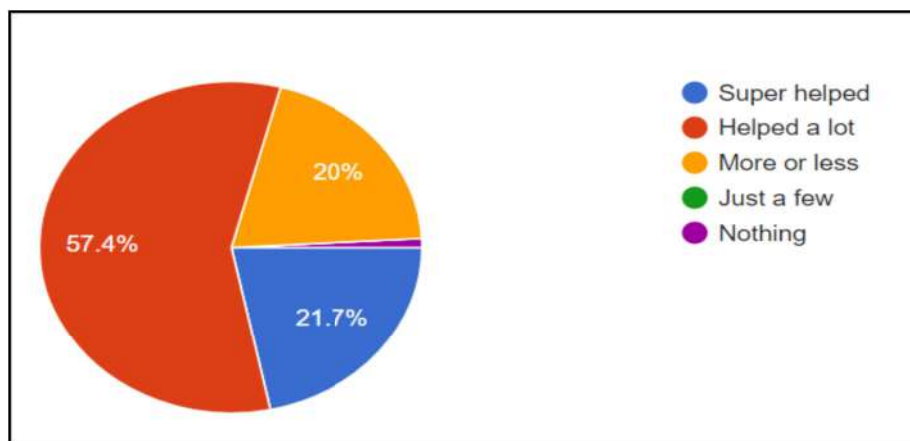
Note: By The Authors, 2017

Question 4 relates to the quizzes in the *App* and their effectiveness in evaluating contents. In the answers (Fig. 8) 39.1% (45 students) believe that the quizzes evaluated very well, 31.3% (36 students) said that they evaluated well and 25.2% (29 students) evaluated as an excellent tool of evaluation. Thus, 95.6% (110 students) acknowledged that the quizzes fulfilled their role of efficiently evaluating the learning of contents per unit, favoring the pedagogical process. In this question, only 4.3% (5 students) concluded that this evaluation was regular. No one considered the quizzes to be inadequate. The standard deviation of this question is 15.27%, with a sampling error of 2.79%.

Figure 8 - Question 4 results.
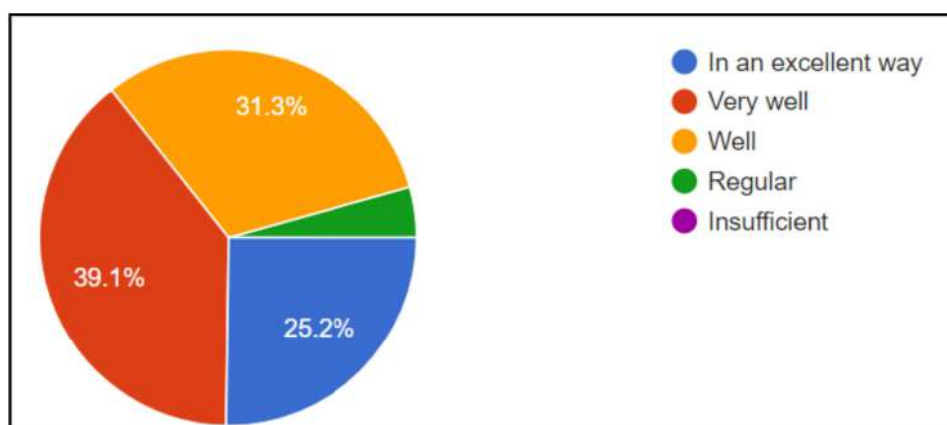
Note: By The Authors, 2017

In question 5 the focus was on how often the students would use the *App* outside the classroom. The answers (Fig. 9) showed that 48.7% (56 students) reported that they could use the *App* only once a week, 23.5% (27 students) could use twice a week, 13% (15 students) once a day, 9.6% (11 students) will never use the *App* out of the classroom and 5.2% (6 students) could use 2 or more times a day. With this, 72.2% (83 students) agree that *Ritornello* is a complementary technology tool to be used in or out of class to deepen the contents of the discipline. Despite this, 27.8% (32 students) of those who answered the questionnaire evidenced using the *App* at other times and places, which may greatly extend the application function in the future. The standard deviation of question 5 is 15.56%, with a sampling error of 2.84%

Figure 9 - Question 5 results.
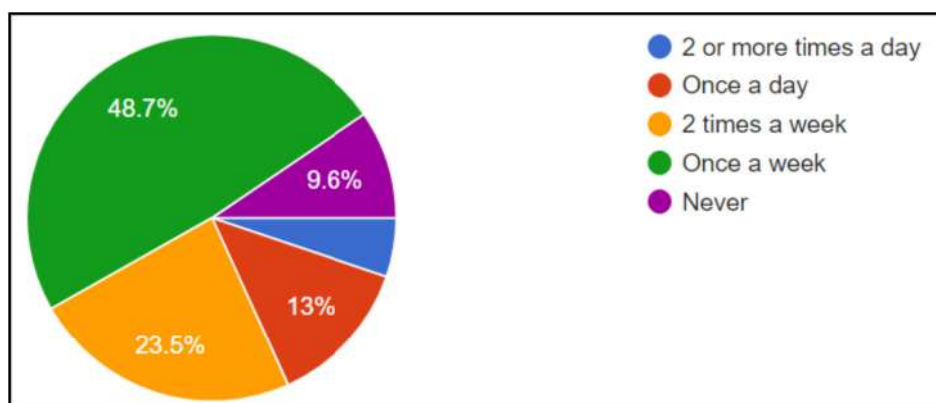
Note: By The Authors, 2017

Question 6 evaluated the degree of satisfaction of users with the use of the *App* in relation to traditional classes (Fig. 10). 49.6% (57 students) of the evaluators believe that they are satisfied with the *App*, 35.7% (41 students) said they were very satisfied, 12.2% (14 students) felt that their use was indifferent in relation to traditional classes, 7% (2 students) reported being dissatisfied and 0.9% (1 student) expressed dissatisfaction. In total, 85.3% (98 students) of the students showed satisfaction with the use of the *App* in its relation with the traditional classes, evidencing that it presents a positive differential, being able to potentialize the educational process. The standard deviation of this question is 19.39%, with a sampling error of 3.54%.

Figure 10 - Question 6 results.
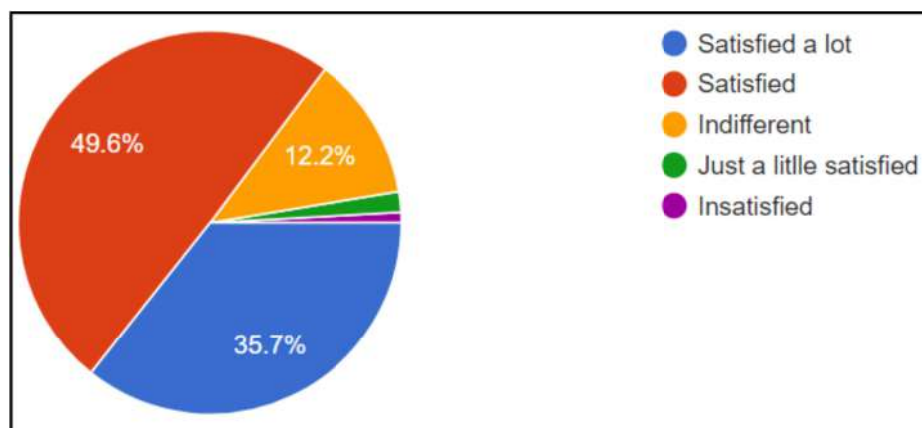
Note: By The Authors, 2017

Question 7 inquired whether the use of the *Ritornello App* increased the student's interest in the Arts/Music discipline (Fig. 11). 46.1% (53 students) of the respondents said yes, they were much more interested, 32.2% (37 students) answered yes, they had a little more interest, 13% (15 students) said that it was indifferent, 7.8% (9 students) pointed that they continued with the same interest and 0.9% (1 student) that their interest has decreased. Only 0.9% (1 student) affirmed that interest in the subject decreased due to its use and 20.8% (24 students) evidenced that they were not affected by the interest in the discipline with the use of the *App*. The standard deviation of question 7 is 16.68%, with a sampling error of 3.04%.

**Figure 11 -** Question 7 results.
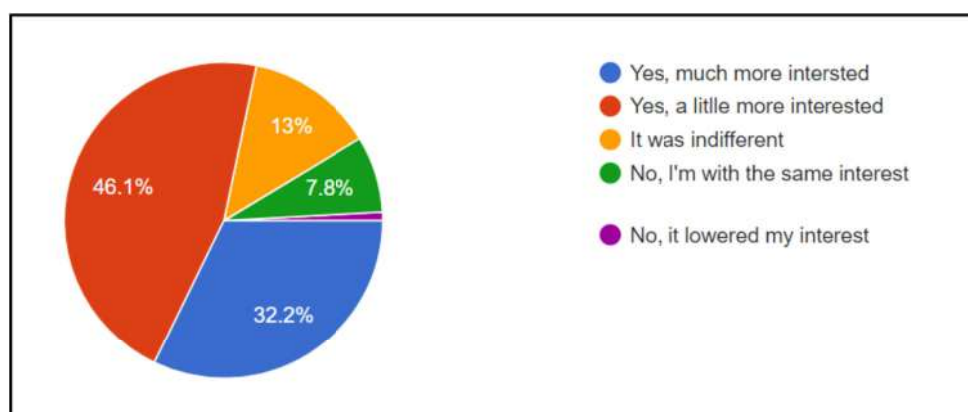
Note: By The Authors, 2017

Question 8 measured the student-educator interaction. More than half of the respondents, 51.3% (59 students), said that the interaction improved, 34.8% (40 students) that the interaction improved greatly, 13.9% (16 students) answered it was indifferent and 86.1% (99 students) believed that there was an increase of interaction between teacher and students through the use of *Ritornello*. No one said that using the *App* made it difficult to interact or said that its use put away the interaction. The standard deviation of question 8 is 20.18%, with a sampling error of 3.68%. On the contrary to common sense, the research results point to the

positive relationship between the educational process actors by the use of new technologies in the classroom (Fig. 12)

Figure 12 - Question 8 results.
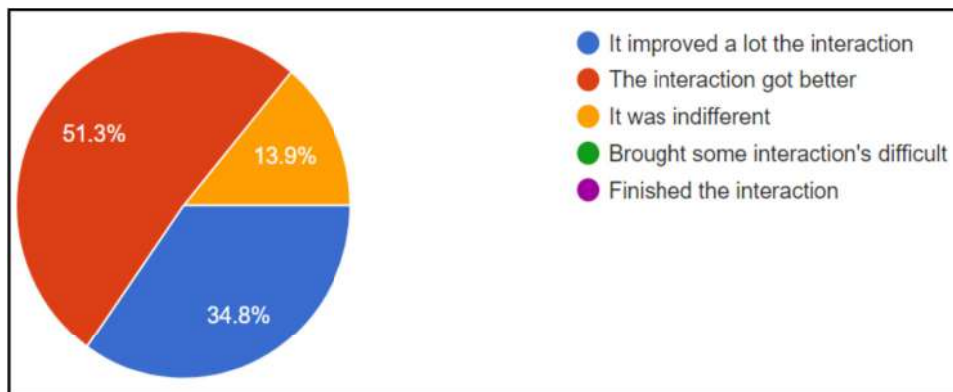
Note: By The Authors, 2017

Question 9 evaluated the degree of usability of the *App*. 34.8% (40 students) of respondents said that the use is very easy, 30.4% (36 students) which is relatively easy and 31.3% (35 students) found it easy. From the respondents 96.5% (111 students) believe that *Ritornello App* is user-friendly. Only 3.5% (4 students) stated that it was difficult to use the application. The standard deviation of this question is 15.02%, with a sampling error of 2.74%. With this response, it is possible to say that *Ritornello* can be widely used in High School and even adapted for use in lower education, to younger people and people who are not accustomed to the use of technologies (Fig. 13).

Figure 13 - Question 9 results.
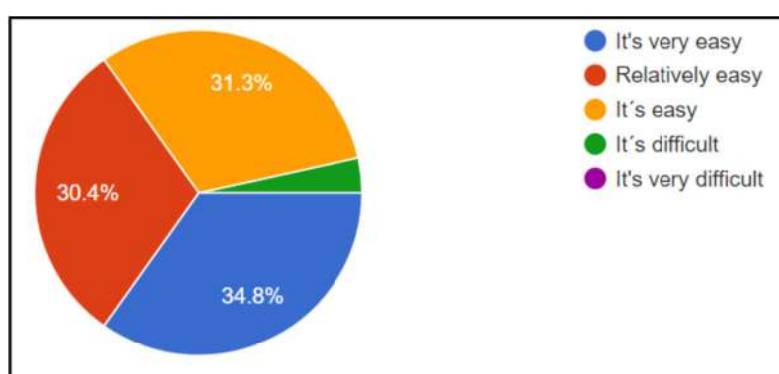
Note: By The Authors, 2017

Question 10 evaluated the relation between the use of *Ritornello* and the increase of students' creativity ability and its application in students' artistic expression. More than half - 57.4% (66 students), said that the *App* helped a lot in such development and 20% (23 students) answered it helped a lot, making a total of 77.4% (89 students) as a positive

position. Besides that, 18.3% (21 students) were indifferent, 2.6% (3 students) believed that the *App* did not help in creativity subjects and 1.7% (2 students) opined that it helped little in such development. The standard deviation of question 10 is 20.18%, with a sampling error of 3.68% (Fig. 14).

Figure 14 - Question 10 results.
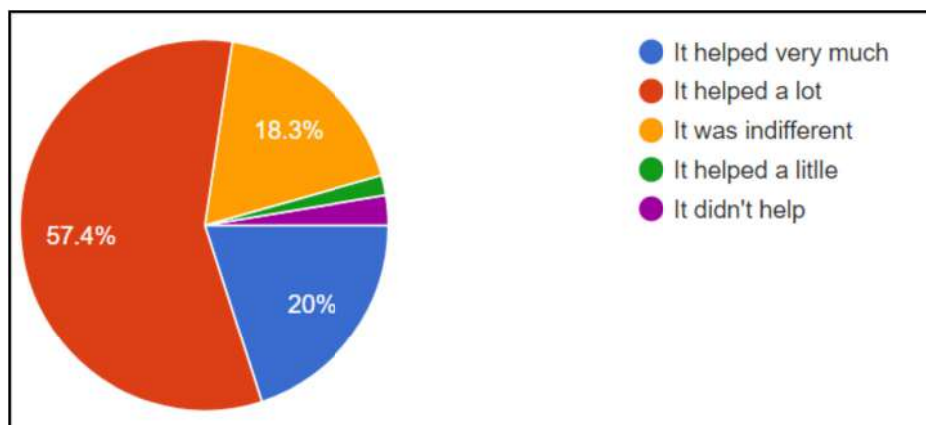
Note: By The Authors, 2017

Conclusions

As technology has much to contribute to education, it is known that the use of TVs, multimedia devices and computers have been used for some decades in the classroom. However, more recent technologies, such as smartphones, should be inserted, adapted and applied to education in the context of a hyper-modern world, with all the possibilities it suggests, since a large part of the population already have their personal appliances.

Music education as other areas of knowledge, needs incentives and adjustments, with properly trained teachers, appropriate methodologies and didactic materials to the specific area, and updated pedagogical tools that stimulate learning in all degrees of educational system.

Ritornello App came to supply some of these needs, aiming to increase student's protagonism, their interest in Art/Music subject, as well as improving the teaching-learning process in Music and the satisfaction of the actors involved in it.

Otherwise, some challenges are set, such as the solution to the inefficiency of broad access to a satisfactory internet in the classrooms of all Brazilian schools, a greater training of teachers from the most diverse areas, regarding the use of technologies and an increasingly access of personal computers by students, besides the development of a greater number of technological educational tools.

It is recognized, however, that further research will be needed on the monitoring of the implementation of the tool in the classroom - the appropriate environment to where it was created, and in a second moment, as future works, in the which *Ritornello* will be implemented with other contents and could be applied to other subject areas. It will be possible to verify the results of its efficiency/effectiveness in Music Education. In addition, from data collection performed on the user experience (UX), the application can be adapted, improved and expanded in order to fully achieve its purpose and can be used in different disciplines, courses and institutions, in different contexts of education, being a pedagogical tool that allows even the limits of formal education. The Education, Technology and Communication relationship points to a future of unlimited results, provided that appropriate investments in research and innovation are made available.

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