Soundcool Project Collaborative Network Website

E.Robles[1] N.Lloret[2], J.Sastre[3], A. Murillo[4], E.Carrascosa[5], R.Morant[6],

[1,2,3] Universitat Politècnica de València, Valencia, Spain
[4,5,6] Universidad de Valencia, Valencia, Spain

E-mail: [1]elrobma@bbaa.upv.es, [2]nlloret@upvnet.upv.es, [3]jorsasma@dcom.upv.es,

[4]adolfmurilloribes@gmail.com, [5]elicarras@hotmail.com, [6]remigi.morant@uv.es

Abstract: **This paper exposes the possibilities of creating a collaborative network website for our technologic and educational music project: Soundcool. It means a new model for music education based on the use of this application, a modular system with smartphones, tablets and Kinect developed by Universitat Politècnica de València (UPV) through several grants from UPV, Generalitat Valencianaand Carasso Foundation (Spain). Soundcool has been programmed in Max, a modular graphical programming environment for music and interactive multimedia creation, and uses Open Sound Control, designed to share information in real time over a network with several media devices. Our application is a creative development environment in its own right, but for running Max patches it requires only the free application Max Runtime/Max player. The pedagogical architecture of Soundcool is based on three music education scenarios that allow interaction between the various agents involved in the classroom. Soundcool is being used as a music educational tool in several European countries through an Erasmus+ European project. For this reason, creating a virtual networking website helps all the users to interconnect and to share experiences and media about the app. On this way, the Soundcool users interaction by sharing in a virtual site means a new research methodology, which enables us to find out more possibilities for the application in all the creative and pedagogical ways.**

Keywords: Soundcool, Music Education, Technology, Interfaces, OSC, MAX, Collaborative Network.

1 INTRODUCTION

Soundcool is a project based in an innovative system for music education and collaborative creation using smartphones, tables, Kinect [1], Open Sound Control (OSC) and MAX/MSP/Jitter. At present, it is reaching an international impact, as some teachers in European schools are using it in their lessons. Our collaborative network website symbolizes a virtual meeting point for the varied whole range of users, creating new technical and pedagogical possibilities of the app by sharing and participating. The methodological perspective and application of Soundcool can as wide as the creativity and collaboration of its users.

2 SOUNDCOOL: NEW TECHONOLOGIES FOR MUSIC EDUCATION

New schemes for human-computer interaction (HCI), such as the low-cost interface Kinect, tablets and smartphones are promising tools to improve the motivation and interest of students, to develop their cognitive skills and to support the learning process. However, music education in many elementary or secondary level classes generally revolves around classical music and is oriented towards traditional musical language and the conventional use of instruments such as flute, piano, etc. The incorporation of new audiovisual technologies and interfaces in music production, where practically any sound material can be used, suggests that we incorporate these technologies into music instruction in order to motivate students and improve the learning process. Thus, the first objective of our project *New Audiovisual Technologies and Interfaces for Music Education and Sound Creation* [2], started in January 2013 with an Universitat Politècnica de Valencia (Spain) grant and, in 2015-2016, with the Generalitat de Valencia (Spain) grant AICO/2015/120, was to implement a modular software system based on low-cost interfaces such as tablets, smartphones and Kinect for music education and sound creation, named Soundcool. We are also building a collaborative web creation system thanks to a Daniel and Nina Carasso Foundation grant. Soundcool has been adopted in the Erasmus+ project 2015-1-ES01-KA201-016139, to be used in Italy, Portugal, Romania and Spain for music education through collaborative music creation. At a time of high budget cuts in education, the implementation of a low cost education system that might spread into different educational institutions is an important contribution of the university to society. To avoid extra costs, the application is intended to use the typical resources that may be available in any classroom and those that students can easily have themselves (tablets, smartphones, etc.). The implementation platform is Max/MSP/Jitter [3]. Max is a modular graphical development environment for music and multimedia creation developed by Cycling '74 which allows the processing of audio and video in real time. Due to its extensible design and graphical interface, it is widely used by composers, artists and software developers interested in creating interactive programs. Our application is a creative development environment in its own right, but for running Max patches it requires the application Max in the free player version (Max Runtime in Max 6 or Max without authorization code in Max

E. Robles, Universitat Politècnica de Valencia, c/Vera s/n 46022, Valencia, +34601332727, elrobma@bbaa.upv.es

7). For communication between devices and sensors, we use the OpenSound Control (OSC) protocol [4] from UC Berkeley CNMAT (Center for New Music and Audio Technology). OSC is designed to share information in real time over a network, enabling the communication between electronic musical instruments, computers and other media devices, such as mobile devices equipped with Wi-Fi or Bluetooth. This protocol, along with applications such as TouchOSC [5] (or our free Android app), allows the creation of tactile interfaces in tablets and smartphones, as well as using Kinect to control applications developed in Max.

2.1 New Technologies For Music Education Based on Creation

In the Spanish educational system, musical practices aimed at the development of creativity through creation are scarce. In fact, current practice is more focused on formalist approaches that emphasize theoretical content over the practice of music making. There is another important factor to be taken into account when analyzing this situation. In general, music teachers received their musical training in classical conservatories, and they usually offer some resistance to practical implementation. Technology is not perceived as a tool that helps to break down the practices that prioritize western music from the infinity of currents that are merged into the conglomerate of cultures that coexist in society [6]. Our contribution is focused on the transformation of these practices by designing a tool that integrates ancient and modern approaches. In the instructional design of Soundcool, various training scenarios were developed that allow classroom collective work in small groups [2]. These scenarios encourage peer learning and foster the autonomy of our students through the control of the system, creating spaces and environments that improve creativity. The last of the scenarios consists of a performance where all that the students have learned in the previous scenarios can be applied to a concert spectacle where music, sound, images, dancing, etc. will be produced. The concert can use acoustic and electronic instruments along with additional sounds and processing by Soundcool, controlled by devices like tablets or smartphones. The designs of the different scenarios and the use of the Soundcool system allowed us to develop different projects, see [7], which are presented in this paper.

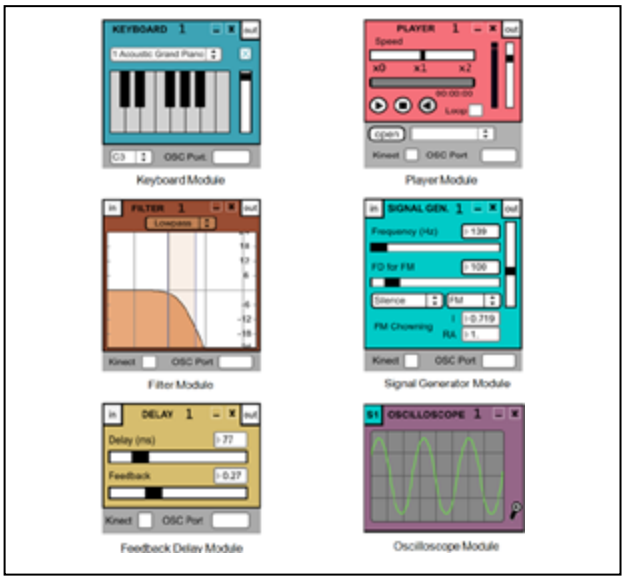

Figure 1: Several Modules

2.1.1 Technological Architecture: The Soundcool System

Soundcool is a growing modular system which deals with the basic concepts of audio processing. Soundcool modules include (Fig. 1): record, play, feedback delay, panoramic, transposer and pitch shift; audio routing; mixer, with 8 inputs; VST host to incorporate VST instruments and effects; keyboard, to receive MIDI notes and controls from a smartphone/tablet via TouchOSC; spectroscope and oscilloscope to visualize audio signals in the frequency and time domains; sample player to load and play up to 12 audio samples in one module; direct input module to capture microphone or line-level input; filter, with 10 different filter modes; signal generator, to create different kinds of waves based on Frequency Modulation, Amplitude Modulation or Ring modulation; sequencer, to automate sounds from the signal generator module; envelope; and audio Module to configure audio in/out and MIDI devices. Most of these can be controlled by iOS or Android tablets/smartphones, and Kinect, with very simple and homogeneous interfaces (Fig 2).

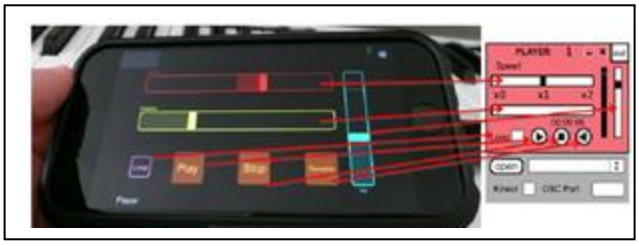

Figure 2: OSC Module Control for smartphone-tablets

The teacher or students should setup the desired combination of modules and their connections in the computer or computers available in the classroom for each concrete activity. Then, each student can control one of the modules with his/her own

smartphone/tablet or Kinect being placed in whichever place around the class the activity needs. All the modules are executed with Max Runtime/Max player. But when using Max Runtime/Max player that capability is not available due to the restrictions of the free version of Max. Instead of this procedure, the modules are connected "wirelessly" by using Max native objects "send" and "receive" (and their signal versions "send~" and "receive~"). As for the OSC communication between the computer and other mobile devices, all the devices must be connected to the same network and the sending address of the mobile devices must be set up to the IP address of the computer where the modules are being run. Additionally, the receiving port for each module can be configured to match with the sending port of each mobile device so that each device can control a different module. The different modules are being tested by authors A. Murillo, and E. Carrascosa, pedagogues and music teachers, responsible for pilot tests at several European countries through the Erasmus+ Project 2015-1-ES01-KA201-016139 (Fig. 3). 5975 Figure 1: Several Modules. Figure 2: OSC module control for smartphone/tablet.

Figure 3: Soundcool pilot tests at ES Arabista-Ribera-School Spain

2.1.2. Pedagogical Architecture

Explanation of the design: as mentioned above pedagogical architecture is based on three scenarios or teaching situations that allows interaction between the various agents involved in the classroom. Working with these scenarios allows, on one hand to provide a framework for researchers observation, and on the other hand, to place the focus of the research not only in the tool, but also in the interactions that unfold through collaborative creation actions. Working in these three scenarios in the pilot study allowed the researchers to develop both technical features of the tool and didactic aspects.

1) The first scenario or didactic situation focuses on the teacher-student relationship redrawing a dialogic situation, allowing the educational agents to relate in a more horizontal way. The objective of this scenario is to share, as an open debate, the various working proposals to allow the "chorality" of the voices participating in the process.
2) The second scenario focuses on collaborative group work and it facilitates the interaction of participants in small groups. Observations made in this scenario offer a view of the tensions and approaches that occur during teamwork.
3) The third scenario explores shared listening; it is during this type of group listening that the multiplicity of sound ideas are exposed and shared by the different groups participating in the performance. The end result is a concert or a stage performance.

Each of the Soundcool proposed scenarios allow developing elements, which feed the different actions of creation and help focus classroom work in how technologies are used and not on what technologies are used. Moreover, [9] note that the new technologies are difficult to implement in the classroom because sometimes their use is not linked to the needs that arise in the classroom. Given this set of assumptions, the Soundcool system was designed with a clear pedagogical objective: to rely on technology to encourage more creative thinking in the classroom. For this purpose we advocate a new paradigm focused on collaborative and creative learning, where the tool is treated just as an extension of that creative thinking. As [10] states, "the technological means are extensions of our bodies, our desires, they open doors to perception and extend our perception" (p.45).

2.1.3. The Music Classroom as Sound Lab

Another aspect to take into account about Soundcool is its ability to integrate the musical instruments available in the classroom, such as Orff instruments or recorders with ICT (Information and Communication Technology). Soundcool was not designed with the intention to replace or remove the musical instruments that are usually available in the music classrooms, but the objective was to offer students and faculty the ability to transform that same classroom towards a concept of sound 5979 laboratory, suggesting the fusion between digital and analog sound, between old and new. In this way, the system can enrich the sound palette available in the classroom without having to discard musical instruments that are part of standard practice in many music classrooms. Soundcool's ability to integrate facilitates the change towards a real transformation in the concept of classroom that would connect the experiences of the students and their imagination through creative processes that enhance student's learning. In this way students interact with each other, encouraging balance between their practices out of school and those that occur in the classroom. Likewise, the use of these new technologies allows new classroom disposition. The classroom organization should provide a creative environment and this should enable new flexible and changing groupings among students, corners or areas that help and complement the work of sound experimentation that is indispensable in any process of sound creation. As [11] argue, "the contents remain linked to the abilities to know, to be, to do and to live together; on the other hand, the need for learning not

reduced to memorization, but to be in a position to be applied in all circumstances of life" (p. 11). Thus, new digital tools allow students to transit in unexplored land and to go beyond the common or customary sounds and structures [12].

As a result, the fieldwork with high school students from the Secondary School Arabista Ribera from Carcaixent (Valencia) and in the European schools partners, provides data that encourage us to think that Soundcool could be a system with excellent potential to promote creativity and collaborative work in the music classrooms. Its simple design and its learning curve, allows the students to handle the tool in an efficient way in very few lessons.

2.1.4. Teacher training

New practices focused on sound creation As [9] state, teachers do not have to focus on teaching the use of ICT but they need to serve as guides investigating the way in which students can use technology resources wisely. In a similar way, one of the cornerstones of the educational commitment that has been made through the Soundcool system has been teacher training. Different teacher training workshops were made during research and it is an important purpose of the tool to introduce a disruptive model that breaks with the historical model of musical education in order to embrace the proposal for creation. Usually each workshop focuses on a creation proposal. First, the management of the system is explained, and then musical creation is started. It was in this second stage where major problems were detected, so we concluded that teachers needed more training to actually cause changes in the musical practices in the classrooms. Redirecting musical practices towards more participatory and creative models of teaching and learning involves deploying a range of strategies that should help to redefine a new teacher's role that allows the change towards a less mechanical and more consistent learning with the requirements of the twenty first century society.

Since the beginning of the project, Soundcool generated curiosity in a group of musical education teachers from all educational levels (primary, secondary and university level). The reason was obvious; Soundcool is a free off-line tool with a vast palette of instruments and possibilities that is available to all teachers and students to work through mobile devices. Additionally Soundcool uncovered the hidden difficulty to work with music creation in the classrooms in a collaborative way. Consequently there was the need of a pedagogical framework to settle this important contribution. Different workshops to introduce Soundcool all over the Spanish territory were conducted by researcher Adolf Murillo, where participants expressed the need to put aside their fears to use ICT in the classroom.

3 COLLABORATIVE NETWORK WEBSITE

Our purpose within our collaborative web creation project was to build a virtual gathering place called Soundcool Collaborative Network [13], which eventually becomes the meeting point of the Soundcool users, first in Spain and Europe and slowly all around the world. Our goal is to achieve that every person who gets to know the app, and everyone works with our system, from an individual experience to a collaborative work, can register himself and create a profile in this website: teachers, pupils, professors, researchers, musicians and anyone who's involved somehow with our application.

Therefore, as it is a participative music tool which can be used in several pedagogic ways. We motivate users to share their experiences and achievements with Soundcool in this virtual forum. Here they can find the necessary traits to find themselves in their own local partners, as in an international group with common interests. In short, a virtual co-working site where the possibilities are as many as the ideas that participants can have, as well as their capability to work by participating.

3.1 Interaction & Sharing: New Research Methodology

Soundcool application has an open short of uses: collaborative and interactive, pedagogical and creative. Our team, in the teacher training, gives to the teachers and users the basic clues, so they can learn the technic and basic steps for later improve it in their lessons. Then children and others can improve it while learning and playing as well, and go even further. This is a fantastic characteristic for an educative tool: depending on user's point of view and his deepness research capacity and creativity, the app can adopt several and diverse methodologies for music education. But it's not limited to the individual experience, so it is in community too, groups and collectives interactions. One-step more when this learning fact takes place virtually. Internet, as we already know, enable us to interact with other people, no matter precedence, age or culture. Just common interests connect us. If we offer our users and followers a meeting website for collaborative network about Soundcool, it would become a type of virtual classroom with pupils from different characteristics but with one thing in common.

3.1.1 Soundcool Audience Profile

The registration field we installed requires users to specify in particular areas about themselves which are interesting for our project. Knowing and measuring Soundcool followers allows us to realize the real growth and impact of this project. On this way, we can outline the main profiles of our users, the principal academic professional areas they come from, as well as their provenance, rang of age, job, etc. Users will be able to indicate their institution, and make evident their academic belonging and relation with the rest of participants.

There are different roles as a user: admin, moderator, participant,

3.2 Website Architecture

This website is structured in three sections: Meeting, Lab-Forum and Performing:

- Meeting is actually the meeting point, where rules and introduction will be explained. It is the first place users will find when they get into the website. It's similar to the Agora of the Soundcool community. It is the free access main page.
- Lab-Forum is the registration needed part, where the potential sharing section takes place. Here users are be able to chat, comment, create forums and topics, upload and download media, working with it,… In short, sharing experiences, learning and creating while participating. The plugins for external media sharing are essential for the real interactivity. The fact that the network site participants find in it a familiar network structure enables them to work and collaborate more easily. We are all used to be and save material online in the most popular social network (such as Facebook and Twitter), also with the cloud drives (such as Dropbox), young generation specially. The intern connection between the website and these social networks is very relevant. This creates a feeling of "standardized routine" which permits the interaction and media sharing more fluent, and the feeling that they are always connected to the same networking space.
- Performing section brings together all the project performing media and rest of material in regard to Soundcool: actuations, plays, videos, shows, articles, etc. It is a kind of Wall of Works Performed.

Figure 5: Main Menu of the Collaborative Network Website

There is the option to create groups by the users, choosing private or public aspect, relating topics and keywords. Consequently, small and diverse communities will be born inside the principal one, which is our purpose to study all the possibilities of Soundcool uses.

3.2.1 The tool is the medium

This website is being developed with WordPress, being added the necessary plugins for our objective. The most important to build it as a social network is BuddyPress, which for instance, is a free flexible software for online communities, teams and groups, which help us building our Soundcool community website using WordPress. BuddyPress enable users to create profiles, activity streams, groups, messaging and so on. Soundcool Network website means to create a Collaborative ICT tool, where collaboration and E-Learning by sharing are the best practice to know the limits and possibilities of Soundcool system, as well as in a technical meaning and on personal level, recognizing us as a multidisciplinary and polyhedral team which grows though participation.
We play with the the possibilities of BP and WP and the creative skills of our web designers and programmers. Participants suggestions and complains will also help to make the website better.

3. CONCLUSIONS

This study shows that exists a need for deepening in the methodological approach of collaborative music creation using mobile devices, and in this sense, Soundcool is a very useful tool usable in all levels of education, both formal and informal. The data from the surveys completed in all of the workshops that were conducted demonstrate the need for professional development courses to implement creative pedagogical approaches using collaborative music creation in the classroom. From the prospective, Soundcool will be used in the next two years of the above mentioned Erasmus+ project with primary, secondary and music schools from Spain, Italy, Portugal and Romania. Also, thanks to the Daniel & Nina Carasso grant, we are building at present the Collaborative Network Website, as an experiment of research in educational and creative methodologies by sharing and participating. Thanks to this, the project really rises the international and virtual co-working.

Soundcool project is not limited to the musical area, its behavior and structure can also be applied in visual arts (we wish we can explore this option in the future years). The clue remains not in the importance topic, but in the app and working structure. This, transferred to a virtual space as a meeting point (such as the Collaborative website), opens a different world of possibilities of creation thanks to new tools. This is the real proof of education and creation by collaborating and participating.

This experience will strengthen the project and generate the educational materials necessary for the spread of Soundcool at a large scale. We believe that this tool and the pedagogical framework underneath will make a big contribution to the new century education methodologies.

Acknowledgements

Soundcool has been supported by Daniel and Nina Carasso Foundation, Project 16-AC-2016, the European Comission Eramus+ Project 2015-1-ES01-KA201-016139, and the Generalitat Valenciana (Spain) AICO/2105/120.

References

[1] http://www.xbox.com
[2] J. Sastre, J. Cerdà, W. García, C.A. Hernàndez, N. Lloret, A. Murillo, D. Picó, J.E. Serrano, S. Scarani, R.B. Dannenberg, New Technologies for Music Education, in Proc. of the 2nd Int. Conf. on e-Learning and e-Technologies in Education (ICEEE), Ed. IEEE, 2013, pp. 149-154.
[3] http://www.cycling74.com/
[4] M. Wright, The Open Sound Control 1.0 Spec., V. 1.0, March 26, 2002, http://opensoundcontrol.org/
[5] http://hexler.net/software/touchosc
[6] A.T. Regelski, Music and Music Education: Theory and Praxis for 'Making a Difference, in D.K. Lines (ed.), Music Education for the New Millennium: Theory and Practice Futures for Music Teaching and Learning, Malden, Blackwell Publishing, 2005.
[7] S. Nicolls, Seeking Out the Spaces Between: Using Improvisation in Collaborative Composition with Interactive Technology, Leonardo Music Journal vol. 20, 2010, pp. 47-55.
[8] A. Miranda, G. Santos & S. Stipicich, Algunas características de investigaciones que estudian la integración de las TIC en la clase de ciencia (Some characteristics of research exploring the integration of ICT in science class), in Revista Electrónica de Investigación Educativa, 12(2), 2010, from http://redie.uabc.mx/index.php/redie/article/View/259 [9] M.E. Almirón & S. Porro, Las Tic en la enseñanza: un análisis de casos (ICT in education: an analysis of cases), in Revista Electrónica de Investigación Educativa, 16(2), 2014, pp.152-160. [10] M. Corradini, Crear. Cómo se desarrolla una mente creativa (Create: How a creative mind is developed). Madrid. Narcea, 2011.
[11] V. Zabala & L. Arnau, Métodos para la enseñanza de las competencias (Methods for teaching of skills), Barcelona, Graó, 2014. 5981 [12] A. Giráldez, H.J. Álvarez, G.E. García, A. Miralpeix,J. Monteagudo, A. Murillo, M. Rives, G. Ufarte & F. Trujillo, De los ordenadores a los dispositivos móviles. Propuestas de creación musical y audiovisual (From computers to mobile devices. Proposals of musical and audiovisual creation), Barcelona, Graó, 2015. 5982.
[11] V. Zabala & L. Arnau, Métodos para la enseñanza de las competencias (Methods for teaching of skills), Barcelona, Graó, 2014. 5981
[12] A. Giráldez, H.J. Álvarez, G.E. García, A. Miralpeix,J. Monteagudo, A. Murillo, M. Rives, G. Ufarte & F. Trujillo, De los ordenadores a los dispositivos móviles. Propuestas de creación musical y audiovisual (From computers to mobile devices. Proposals of musical and audiovisual creation), Barcelona, Graó, 2015. 5982
[13] http://network.soundcool.org