Beyond new technologies: essential tools in music education

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Abstract: The growing use of new technologies, and more recently, the use of new digital educational options, such as, the free on-line courses, has open a new concept in teaching art. In the case of the music subject, we cannot forget that technology offers teachers and students something much more interesting than playing a traditional instrument. In fact, technology is affecting the skills needed in teaching any subject or students level. Nonetheless, it seems that art, and moreover art education, should be essential tools in teaching in this new era, maybe more than using technology. This paper aims to show the possibilities for embedding art and creativity into teaching, and understand the role of new technology related to music education.

Keywords: education, music, musical software, new technologies, teaching.

Aristotle, Dewey: beyond the new technologies

Nowadays, everything related to new technologies: games, flipped learning education or virtual classes, are becoming the main pedagogical method. Although they seem contemporary ideas, these methods have their roots in the proposals such as the heuristic of Aristotle or the pedagogical and aesthetic thinking of John Dewey. Dewey (2004), for example, proposed in his writings an educational approach focused on emphasizing the interests of the student. The main point should be to let the students explore their environment. These pedagogical approaches believed in a multidisciplinary curriculum, a curriculum that is focused on connecting multiple subjects where students could move freely inside and outside the classroom while pursuing their interests and building their own ways of knowledge. The teacher's role in this environment would be more an organizer than an instructor (Dewey, 2004). The difference, of course, is that current approaches have technology as the main tool.

Without any doubt, this technological revolution, which surrounds all areas of Western society, has helped to facilitate a new point of view in education and to expand the possibilities of learning and connection between the different areas of knowledge. But is technology (the new technology) the correct way to develop the current idea of teaching? Have we forgotten the (very important) idea of personal effort? (Coffield, 2008). The present paper tries to show a new approach in the idea of teaching music using new technologies. But, in our opinion, there is an idea that seems crucial: nowadays, creativity is much more important than technology. That is the basis of the paper we suggest.

New approaches in teaching: Where is humanism?

Since the beginning of this century, teachers, universities and even schools are trying to replace the traditional class (lecture style class) with other educational approaches, such as: video game learning or flipped learning class. The main goal: to make the student an active part in the learning process. Undoubtedly, one of the decisive point that areencouraging the use of technology in education (including artistic and musical education, which we will go into later) is the certainty that the current education approach is becoming obsolete. This certainty becomes really evident in primary schools; the world that teachers offer to these students is far from the one they are living (Lluna, 2017).

Maybe, this is the main problem: educational institutions are living so far from thehopesand real life of their students. Nowadays, students live in a world of quick feedback and they are demanding "fast and easy to use"tools. It may seem something similar to an ultimatum, but any active teacher knows that this is the daily experience with their students. That's why new technologies should be a first order tool for all of us: teachers and students (Beetham et al, 2009).

But, in our point of view, although weendorse technology as an essential key in education, we can´t ignore the idea of defending a deep humanism in teaching (which includes music education) in our education centres. Perhaps, the join of technology and humanism, is the only way for students to perceive their learning process in a different way. This should lead him to have his own thoughts and learn to be creative (CuevaRamírez, 2017).

Teaching music in the new era

Teaching of music in our schools (or universities) has changed radically in the last few years. Just a decade ago, technology: computers, tablets, audio-visual software, etc., were so far, like in a distant horizon

that, hardly, few of us believed could turn into the real thing. In those days, both in primary schools and universities (music is missing in secondary schools in countries such as Spain), developing the skills to play the flute was the only reality in a music class. Since then, advances in technology have turned-up very quickly and their applications in the music classroom have grown radically. Curiously, once this reality has become possible, many teachers and students consider that music education and technology should not be mixed. In our opinion, the two ideas work in an unbeatable way if they are used well together.

Althoughwe assume that new technologies are not the holly grail that will improve artistic and musical education in an extraordinary way, our daily life as teachers, shows the evidence that the use of new technologies in the music classroom has many advantages. In fact, a teaching based on notation software or MIDI files can improve the understanding of the full musical fact (which includes musical theory, interpretation or composition) in a remarkable way. Music software applications allow students to manipulate musical and sound variables (from the sound wave itself to, for example, tempo and pitch of a musical tracks) in a way never seen before (Miranda, 1999). New technologies have been incorporated little by little in our classrooms, but, in our opinion, the capabilities of these latest technological advances such as the Internet, computers, audio sequencing software, etc., should not be avoided by the teachers of this remarkable moment. In fact, music, as a global subject, should take advantage of these technological advances to improve the possibilities of innovation and artistic creation for our students.

Obviously, there has been technology (new technology) in all times. The term "technology" is usually defined as any element that a scientist uses to achieve a desired result. Therefore, we cannot forget that technology has helped teachers(including music teachers), for centuries. The trumpet, for example, was played without valves throughout the baroque period. But, in the late nineteenth century valves were incorporated into its design and this idea revolutionized the instrument, while at the same time radically changing the way of teaching its interpretation. Similarly, the appearance of computers and sequencing software in the late twentieth century has had a similar impact (probably the largest in our history) in music education (Rudolph, Richmond, Mash, Williams, 2002).

Teachers have realized the huge possibilities of technology in teaching music. Students can use new technologies to compose, record their musical works or to learn the basic (or complex) notions of music theory. The simple fact of manipulating parameters of an audio wave with editing software already causes the student an unconsciously learning of the elements of musical theory, while the same student is aware of the reality that links the real thing to that theoretical idea. Gary Willis, one of the best jazz musicians of all time (I was lucky to know as a teacher) repeated over and over again in his music classes: "I am a composer thanks to my MIDI sequencer". This anti-romantic thought condenses his particular vision of music education: nowadays a musician, and therefore a teacher, cannot be locked to the traditional vision of the classical instrumentalist or composer. A contemporary musician should know all the capabilities of new technologies related to music because they are the future, and certainly the present, of the music of our time.

Therefore, we are the witnesses of what has happened in the last two decades in our schools. Technology has caused a great impact on art, music and, consequently, on the way in which these subjects are taught. But, as we have introduced at the beginning of this paper, technology should not the big key (or should not be) if we are looking for an improvement of artistic and musical education. Following the teachings of educators such as John Dewey, today there is a large number of teachers and institutions related to music education that promote the active collaboration of teachers as one of the essential aspects in learning of artistic disciplines. That is, according to the teachings of Dewey or Malaguzzi, music teachers should take into account the idea of "learning by doing" as a starting point to develop their classes in schools or universities (Dewey, 2004).

Methodology: Digital technology and creativity

As we have said, nowadays there are still some doubts in the idea of assuming the use of technology in artistic education. Is this a traditional thought? Maybe it is not, perhaps it iscurrent and contemporary. Maybe exists a large group of teachers that would like to show us that, creativity is much more important, as a teaching tool, than technology. We agree. Surely, the first thing that teachers and educational institutions must do is find the purpose of new technologies in music education, and this purpose should be found before starting to apply the technology inappropriately (as it seems in some cases, perhaps due to ignorance). In our opinion, if we only have a classroom full of technology, the problem, in all probability, is not solved.

In any case, the use of new technologies, of course, has many advantages. The first evidence that it is obtained from our daily life experience, is that the new technologies motivates the students to learn and, of course, also motivates the teacher to find new ways to improve their teaching. The use of computers or laptops, for example, improves the student's ability to create and analyse all the basics of the musical fact. If the students can play traditional instruments: flute, guitar, piano, etc., the use of virtual instruments (the so-called VSTI,

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instruments that can be generated from a keyboard) will show them the infinite possibilities for composition or analysis of musical theory (Miranda, 1999). Moreover, the use of new technologies in music teaching allows teachers to know the individual needs of each student and, therefore, make learning appropriate for each student. Not all students have the same knowledge about music theory, solfeggio, or instrumentation. With the use, for example, of composition software, the student can go step by step from their own level understanding the entire musical basics, without depending on the teacher or the level of the class.

Consequently, students and teachers could choose what software or electronic devices they need for the classes and how to implement them in the classroom. That is to say, the teacher could, and should, look for his own teaching methodology that leads him to the achievement of the objectives that have been established as a goal at the beginning, for example, of an academic course. A teacher could start with two general objectives such as the achievement of skills, referred, for example, to the ability to play a musical instrument, and on the other hand, knowledge, which refers to the understanding of the basic tools of composition, musical theory or counterpoint (Rudolph et al, 2002).

In this way, any music notation software becomes an ideal way to learn music theory. This software (Sibelius, Finale, etc.) allows teachers not only to teach solfeggio and traditional notation writing, even also these programs have many tools that can explain the fundamentals of musical theory, such as: keys, intervals or elements relative to dynamics. Sequencing software applications (known by their English nomenclature as Digital Audio Workshop or simply DAW) have the capability of recording, editing, mixing and mastering audio files. This sequencing software allows teachers and students, not only to create their own recordings also students can learn by first hand the world of music production (Miranda, 1999).

The MIDI protocol (Musical Instrument Data Interface) is used in the field of electronic music to connect instruments (real or virtual instruments) with other electronic devices or software, for example computers or music notation software, achieving a series of data, known as MIDI files, that can be read by a computer or a digital interface as a real sound. MIDI files offer students and teachers the capability to explore and manipulate music in a very unusual way. The student can create musical passages and give them real sound. Students canmake and arrange a piece for orchestra and chorus if they wished, and they would have the result (the real sound) of this composition playing on a pair of speakers directly. The big advantage is that they do not need to hire more than a hundred musicians to realise how this composition sounds. Another example of the use of this type of software, could be to experience a very common situation in the current musical production, the work of altering dynamics or changing the tempo of a piece or a single track. We are all aware of how the music we listen in the radio each time has more volume level and is more rhythmically cleaned. Working with MIDI files provides the opportunity to learn this type of musical process through experimentation (Eice, 1990).

Another interesting work to develop would be to sing a repertoire of vocal music (classical, pop, rock, etc.) supported by the use of any music notation software. In this particular case, the student may be aware of the actual pitch of their voices or tempo mistakes. With the help of sequencing software and the use of MIDI files, a composition could be created in order to, for example, improvising solos, melodies or arrangements. The use of this sequencing software could lead to the creation of a multitrack recording that would be useful to listen to or analyse different types of music, and even, to correctly evaluate the musical performances recorded by the students. Even more, if we turn our attention to aesthetics, we will have a large filed of possibilities powered by the use of technology in showing the students how new technologies have changed the way of making music in our days (Rudolph, 2004).

Although, and to be honest, we cannot hide the experience that we live in our educational centres. This educational approach clashes with the reality of our classrooms. We are still far (perhaps only in Spain) from enjoying the benefits of this great tool that is music technology. Currently, in most of our schools and universities, computers, audio sequencers or MIDI files are not used in music education and are relegated to exceptional use by teachers who know how to use them. In fact, a large part of the teaching staff is not informed of the possibilities of these new technologies, and those who know their advantages, few are prepared for their use in the classroom. (Lluna, 2017).

Results: Benefits in learning

As real results (maybe not empirical) extracted from the teaching experience, Thomas Rudolph in his excellent work, *Teaching music with technology*, shows the benefits of using technologyin learning music since the end of the last century. Rudolph (2004), talks about how the motivation of students (art and music students) has improved exponentially in the last years, and how these students (and even teachers) have acquired a deeper understanding of basic musical concepts compared to the students who have been taught by traditional approaches. In addition, the use of new technologies has improved, not just thecompression of the essential musical elements; it has also improved their concentration, memory and, surprisingly, technology has also improved their cooperative learning (Rudolph, 2004).

Perhaps some readers could understandthat these results are made from a biased point of view. But, although it is true that we cannot provide empirical data, we have obtained similar results based on our experience as music teachers inUpmj (Junta de Andalucía) and the University of Jaén. For over ten years we have used sequencing software and mixing consoles to teach our students everything related to the subject of music, and all of them have showed a significant increase in their motivation and knowledge towards the subject of music. Students demonstrate at the end of the learning process a great understanding about how to play music and even the development of complex arrangements and recording sessions. Our students included these new technological tools naturally in their idea of learning, this fact collaborates enormously to increase their creativity since they have all the options to make possible any musical idea they can imagine, from the creation of a drums patch to the adjustment of the pitch of a vocal track. And perhaps the most important, this experience shows that students who use new technologies (computers, software, MIDI files, etc.) end up receiving an "education" to solve the difficulties in their daily life finding solutions based on their great knowledge of new musical technologies. That fact,it is really difficult to find in students who use traditional learning. Consequently, we have no choice but to agree with the conclusions of the studies of Susana Lluna, what is most surprising in the so-called "technological students" is that they use the knowledge acquired in a class, in this case in music subject, to solve problems of other matters (Lluna 2017).

Conclusions: Why do we need new technologies in class?

We sincerely believe that any music student, regardless of the instrument they play, should learn how to use some type of music notation software, MIDI files or audio sequencer. As we have described in this paper, students (singers, composers or members of a band) could take advantage of the use of this software for, for example,their hearing education, improve their rehearsals or practicing improvisation playing a longwith virtual instruments. Composition would be, undoubtedly, the subject most benefited from the use of these technologies. Students can listen their compositions in any music notation software, test any arrangement they imagine and even change the instrumentation of this composition. And maybethe most important: students can listen to the real sound of their compositions;they do not have to imagine it as it happens if you write this arrangement in a sheet music.

In our opinion, new technologies are the best way to renew the teaching of musical subjects. In the future, our schools and universities should be equipped with spaces and professionals capable in developing technology-based teaching. The possibilities of new technologies should be a main tool for teachers (teachers and students) of the 21st century. They should take advantage of these tools to improve their innovation and creativity capabilities.

Nevertheless, as we said at the beginning of this paper, we should not fall into the error of believing that new technologies are the Holy Grail that will solve everything in teaching, even more, in a complex matter such as music. Nowadays, our classrooms are starting to be full of computers, tablets and multimedia devices. Therefore, if the technology begins to be used regularly in our schools, why do students drop out of our classes? Maybe we miss clear evidence: learning is a (really) hard work. We should not be blinded by the illusion of new technologies; these are just one more tool, necessary without a doubt, but they are only gear no the main thing in teaching. In our opinion, the solution is not to introduce *Finale*or *Sibelius*(the well-known notation software) in the music class; we believe that the centre of the issue is not to introduce the technology in the classroom at all costs. The first question we should ask ourselves is why our students are losing the enthusiasm of learning? We need to bring them back again.

On the other hand, maybe we have no choice; we need to work with this technology. We need to understand that the world of our students is different from the world we lived in the past. We must realize that there is no other option but to listen to themin order to know their problems and hopes, and, technology, could be an excellent start point to do that. Perhaps the Holly Grail (even in music subjects) is to understand what our students' interests are, that is, to think about what matters to them. Understand them from another perspective is to be creative, and technologies, from this point of view, are a meeting point. That is why teachers need to experiment with technology and find new ways to teach in a more effective way. In our opinion, this is how new technology can renovate education in the best way. Beyond technology, we believe that the key lies in an educational system with enthusiastic teachers and students focused on learning, maybe that should be the way (maybe the only way). Teachers of art education, and music teachers, should be aware that this new time offers us the possibility of contributing to education with something more important than technology, that is, the great tool that involves the idea of thinking as an artist: to be creative.

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