

Information and communication technologies adopted for musical education

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Abstract: *In the current pandemic context, we are forced to remodel the didactic act in the sense of forming the complex of skills the contemporary human being needs. Musical education, as well as the order subjects adopts itself to the circumstances, the teachers and the students moulds their behaviours, blossom together and individually, they value their previous experiences, they learn to interact externally and together they start using systems of communication that are efficient to the musical language. They also succeed to define and to build knowledge and also to associate with their focus area resulting from here a new variable, the one concerning ICT knowledge. The teacher uses during their teaching activity digital skills, pieces of information that can be exploited in order to stimulate the interest of students regarding the rigorous study of music, the students proving to the more responsive concerning the wide universe of internet and computers.*

Key-words: *musical education; teacher; student; ICT; didactic act; computer*

1. Introduction

With the emergence of the current COVID-19 pandemic and the interruption of schooling in the spring of 2020 the education system had to face the creation of resilient educational systems at the level of each school. The school started transmitting online information and the employees were encouraged to work from home. We had to adapt quickly to an uncertain pace for parents, students and teachers and to look at the school year with concern. It was necessary to plan the resumption of classes, to analyze learning losses after the closure of schools, to find viable in order to ensure a greater degree of readiness for possible crisis in the future that could significantly contribute to improving education, to find preventive actions regarding the high-risk behaviours of young people, in order to reduce the dropout rate in schools and also in the entire educational system.

Unesco Education Center study², specialized in educational research in the UK, suggests that the problems of families are related to unrealistic expectation, but also to the lack of technology needed for online learning, especially when parents needed access to work from home. The same problems apply to Romania, where resources are not available and many households do not have access to technology.

The pandemic still profoundly affects education, it aggravates the existing social inequities in the country and causes significant disruption in education, training and mobility activities for students and teachers. These considerations have forced us to create systems that educate through a variety of ways, methods and to give greater importance to the implementation of new technologies in the activity of teaching.

At this time there are various online and also offline tools that can be used in order to connect teachers and students when they are in different places, to access information and

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² <https://www.bbc.com/news/uk-northern-ireland-53368876>

platforms that are not normally available at home or in the educational institution and also to encourage the continuous professional development of teachers in a flexible manner.

All social partners have made efforts so that all students can participate in online classes, be provided a quality education, be supported so that all barriers to participation, learning and assessment are removed in order to increase the resilience of the educational system and the capacity of schools, teachers and those in charge of the educational system.

2. The importance of using information and communication technologies in the didactic act

Pedagogy faces a period of transition that is preparing a paradigm shift and tools in the reconstruction of pedagogical knowledge, of its role in solving the specific crisis education faces, a crisis largely determined by the specifics of the new pandemic context. This change provides the combination of traditional elements with those used in digital technology, each teacher wanting to keep a certain data from the classical teaching and they will use the most valuable acquisitions. Teachers enrich their teaching material by adding results and scientific acquisitions processed and adapted from the classical to online teaching and balance the informative and formative dimensions of the educational process. The new education programs and methodologies are being built, turning the crisis into an opportunity to grow and adopt to the needs of student, teachers and parents. Digital technologies for education have reached a high level of maturity, being used as infrastructures, devices, tools/software and specific contents.

The vision on education is currently the result of new to synthesize the perspectives of understanding education and also its aspects. In addition to activities and products regarding teaching and learning activities, pedagogy involves the professional development of teachers, aspects regarding the curriculum and the assessment, the development of teaching and learning materials, but also pedagogy and educational design for planning, implementing and evaluating learning in all its settings.

The same educational theories are to be found in the pedagogical trajectory of musical education where the design of the educational activity affects the educated more than the educational process. The contemporary educational system becomes absolutely irrelevant if it is not connected to the student's lifestyle and also to his learning style³. The students had to be integrated to a complex, diversified universe, that is in a continuous transformation, being surrounded by technology, the school trying to keep up with an enormous amount of changes.

It can be noted that information and communication technologies help and motivate students to engage in learning activities, reduce the difficulty of understanding and analyzing abstract concepts, used in the teaching of musical education. Students manage to effectively close their time, to establish an open dialogue with parents and all those involved in the process of education, all of them becoming partners of education.

Learning through music education determines the formation of skills, knowledge, abilities, skills and attitudes of fast adjustment to information, acquired in moral and aesthetic behaviours, in specific contexts of achievement, adopted to the age and the cognitive level of the student so that music transforms itself from an emotional – informational stimulus to a concept-operant one. Messages and information are perceived by the students differently, depending on the level of development of thinking and also individual characteristics, so that the activities regarding musical education materialize themselves in a data system related to music, the human psyche and the connections between them.

³ Learning for the 21st Century, a Report and Mile Guide for 21st Century Skills

The organization of student's cognitive and behavioural conducts is an interdependent connection with the level of his psychic development, which determines a preoccupation of current didactic regarding the transposition of the message that it is conveyed through a language accessible to the student, compatible to the thinking system and also to their own learning style. In musical education, this idea is transposed by the need to expand musical education in the area of creation, the manifestation un unique and particular forms of musical experiences, as it is suited for each person. Each musical education course can be considered as an act of creation whose product fits within the quantifiable parameters to the same extent as it is influenced by a series of unpredictable factors.

Student use ICT in everyday life, even from an early age, they listen and create their own music, games they communicate information and socialize with the help of applications, but they are not aware and they do not associate the use of the computer as a tool in the learning process. If we regard the educational process from the perspective of computer science we will notice that it is "the bearer of message representing a particular, special way, a special manner of interpersonal communication"⁴.

Using ICT during musical education classes, students can have a much more interesting and attractive class, if they are given information designed to arouse their curiosity and also trigger the thirst for knowledge through their own efforts. They can be guided to choose a proper materiel according to their age and also to their ability to receive and understand. Students can also be presented with the appropriate films, guided in accessing quality electronic materials and they can be taught to look for authorized and targeted information by competent people.

By relating to their previous knowledge, skills and abilities, to the sound of environment that surrounds them, to the musical information conveyed in the formal and the informal setting, students can generate hypotheses that are usually predictable and verifiable. The musical activities that students can carry out with the help of ICT have a very large scientific palette and the results obtained offer a continuous openness to other hypotheses. The motivation and the preoccupation for music of the students and the teacher, the scientific curiosity, the perseverance, the intellectual level, the learning style, the creativity are just a few factors that influence the evolution of the musical study that is not limited to listening or interpretation.

We can analyze and compare by using a huge volume of audio-video and/or theoretical materials, a problem of vocal or instrumental technique, involving students in the search for these materials. We can use their favourite soloists or choose familiar instrumental solos, scrolling through a large volume of music and information, as well as software that makes transcripts (increasingly elaborate and subtle) such as Chromaton Transcriptor - which allows the repeated listening of the desired fragment and writing it on the score in order to studying it in the smallest details.

Both students and the teacher must have the digital skills needed in order to store and play them when needed. The musical education teacher contributes to the verification of the hypotheses that triggered the study through efficiently and carefully directing students to scientifically sound and well-documented areas, by validating their conclusions so as to determine the transformation of this process into an evolving mobile perpetuum.

Beyond musical thinking and broad perspective on the musical phenomenon, students form skills that they will use throughout their lives to distinguish between good and evil, between value and kitsch, between correct, authorized and inappropriate information, especially as the internet proves to be an unlimited source of unselected data. They are supported by the professional skills of the musical education teacher and gradually acquire different values,

⁴ Miron, Ionescu. 2011. *Instruction and education: modern educational paradigms*. Cluj-Napoca: Editura Eikon, p. 111.

usually by completing or remodeling previously owned entities, they materialize in action through various forms, bringing a particular note to each teacher taking into consideration his concern for self-improvement and self-education.

The teacher had to face online distance teaching in emergency situations that illustrate the circumstance the courses are offered through distance learning, in response to a crisis, rather than having been planned or organized for the purpose of distance learning. It refers to a sudden (and often rushed) transition from learning in a classroom to distance education and/or virtual classes. We need distinguish between online learning, based on inclusive pedagogy and distance learning, taking into consideration the fact that online learning has been planned and organized, while distance learning is primarily about using technology in order to perform tasks designed for classroom teaching.

Distance learning (distance education) is defined as the education offered to distance students without regular face-to-face contact with a teacher in the classroom and includes learning with the support of printed materials that can be taken home, or it represents learning through radio, television, programs and the internet.

Online learning is usually understood as education that takes place on the internet and it can be part of distance learning programs or it can be added to teaching that takes places in classrooms (blended learning). Students can study online at home or in the classroom with their classmates. In online teaching we use a number of formats, combining technology based on internet access and educational technology applications that can also be used offline.

Another type of learning that it is frequently found during this period is blended learning, with combines several manners of teaching, face-to-face teaching and learning, the use of educational technology applications and students' interaction with online learning, distance learning. In this type of learning, educational technology applications and online learning represent some of the teaching strategies that can help students achieve their learning goals.

Teachers are daily involved in a continuous learning process and change their skills, abilities, knowledge and also the way to use all of these in the new technological context, finding a balance between modern and traditional methods, as well as the appropriate time to apply them. The teacher possesses specialized knowledge that contributes to the musical education activities that are obtained during the professional training and it covers all the constituent elements of a musical material but the training and the improvement of the musical education teacher are focused only on specialized knowledge and psychopedagogy are considered insufficient during this period.

A fundamental component of the professional profile, that is used today, is, as in the case of any other profession, the level of ICT skills. During the teaching act, the teacher can use computer-assisted teaching strategies (computers, laptops, video projectors, projection screens, interactive whiteboards, internet connection) in order to introduce the scene into the classroom. Information and communication technologies are just tools that the teacher uses. This results in a new variable for the teacher, meaning, to have knowledge of using a computer in a proper way.

Most teachers think that the musical education activities they carry out with their children are facilitated more by the technical/digital skills they have than by the psychopedagogical knowledge, but in this case, they were qualified as unsatisfactory. It should be mentioned that the awarding of this grade is assigned if students focus strictly an operating with certain software, in specific situations, the pedagogical objectives being neglected⁵.

⁵ Nick Breeze, 2009. *Music and ICT in European Education*. University of Bristol, UK: European Association for Music in Schools.

Educational systems are currently open to new actors, and trainers, and learners can create strong and inclusive communities in support of rich learning experiences, with online activities being used to personalize learning, teaching and assessment.

Digital educational resources can be used, shared and adopted for different learning contexts, allowing learners to be part of the production of teaching materials and create authentic learning experiences.

3. Information and communication technologies adapted to musical education

The COVID-19 pandemic and the national measures needed to combat the spread of the virus have caused significant disruption to education, training and mobility activities for students and teachers. To ensure continuity in education and training activities, we have started to use Information and Communication Technologies (ICT) adapted to musical education. Various teaching materials, tools and solutions that are needed to maintain contact between students, teachers, schools and parents have been accessed online and offline, in order to put the online education system into operation. It can be used to create digital educational environments for students and teachers, to connect when we are in different places, to access information and platforms that are not normally available at home or in the educational institution and to support the continuous professional development of students. The aim was to move from the urgent mode of distance teaching to a more structured approach to distance education, including online education.

In the current context, ICT plays an important role in the development of musical skills, in understanding and knowing the musical phenomenon. Online or hybrid learning helps students not only by assimilating current knowledge but also for their future, giving them autonomy and responsibility, a sense of collaboration and trust, resilience. There is currently a suite of instruments that can be used not only as a means of music education, but also as a different environment for musical expression and interpretation, which forms, promotes and supports activities for students.

By using ICT, teachers have the facility to exemplify any concept, elements of musical language, the assessment process is improved by using audio-video recordings, exploring innovative opportunities for online virtual exchanges and can manage the e-learning environment so that learning experiences are personalized, according to the abilities of each student. There are collaborative platforms that allow teachers to communicate, exchange resources, take professional development courses and create projects together. The open and multilingual online community connects professionals in the education sector, in order to contribute to increasing the quality and diversity of the offer in the respective field.

The presence of technology in musical education activities is not a phenomenon that appeared in the pandemic but has made its presence felt since the first possibilities for recording and playing music used on a large scale in professional and semi-professional music environments, starting with the gramophone and reaching the computer, it revolutionized not only music in general, but also musical education. Music software found in the professional environment can be imported and adapted to the level of musical education activities, using simplified versions.

Students have access to computer creation even if the level of their musical skills (musical writing-reading, instrumental interpretation) or knowledge of music theory is low. They use ICT to record or listen to music, use ICT to model the universe of electronic sounds or to explore as many alternatives available for comparison and evaluation. They spend a lot of their free time listening to music and the impact of the genres they come in contact with in this

form on their musical taste and musical preferences is major. So, if much of the music that students listen to is created with the help of ICT, technology is the bridge between school music and music in everyday life.

It is known that students easily communicate the terms specific to the IT field, transferring it even in their usual language and that in the virtual environment they feel comfortable. For this reason, they become familiar much faster than adults do - teachers, parents - with all the innovations that appear in the computer-dominated universe, which causes a reversal of common hierarchical roles, as noted by S. Wise⁶ in his studies. Researchers such as M. Prensky⁷ and others believe that due to the fact that their entire existence takes place in an environment where computers, video games, digital music players, mobile phones and other devices abound, today's students can be considered products of digital age, consecrating for them the term digital natives.

The online resources and tools, the great diversity of software and hardware that are currently available, even in free versions, provide students with the necessary conditions to work in an extremely varied context, which encourages the formation and development of musical thinking, creativity and commitment. in the middle of the musical process. ICT provides adequate support for the artistic effort of creation and interpretation and it can facilitate cross-curricular and intercultural interaction and collaboration.

New technologies certainly contribute to improve the quality of teaching, but innovation in music education should not be the starting point for this category of teaching, according to R. Clark⁸. The functionality of ICT is easily observed based on the immediate results obtained in the activities that carried out, but this aspect should be a consequence of the design of the type of experience considered suitable for the educated, respectively of the types of relations with the objective world, in order to guide the student towards its formation and development.

Specialized information and communication technologies (ICT) for music are called music technologies: electronic keyboards (keyboards), sound modules, multi-track recorders, synthesizers, hardware and software components that allow ordering, writing, editing and recording using MIDI⁹ and all acoustic resources.

The general categories of music software for the Windows operating system that can be used in music education activities are:

- Audio / video players: Winamp, Windows Media Player, VLC, adapted for all categories of users through the simplicity of the commands.
- Software for burning CDs and DVDs: Nero, Clone DVD for printing data, images, audio-video materials or other types of information.
- Computer aided composition software: Cubase, Adobe Audition, DAW, Magix Music Maker, Band in a Box, Garageband, are just some of the examples that can be used successfully in children's music creation.
- Specific to all the listed software is the use of literal notation that has not been adopted in our country. In case of their use in music education activities, minimal explanations regarding this notation system are required. Such applications are also built into mobile phones, iPhones, but with limited options for entertainment. Young people use them mainly to personalize their

⁶ Stuart Wise, Janinka Greenwood, Niki Davis. 2011. "Teachers' use of digital technology in secondary music education: illustrations of changing classrooms", *British Journal of Music Education*, 28:2, pp. 117-134.

⁷ Mark Prensky. 2009. "H. Sapiens digital: from digital immigrants and digital natives to digital wisdom", *In Innovate Journal of online, Fort Lauderdale, FL: The Fishcler School of Education and Human Services*, Vol. 5, Iss.3, article 1.

⁸ Richard E. Clark. 1994. "Media will Never Influence Learning". *Educational Technology Research and Development*, 42(2), pp. 21-29.

⁹ Music Instrument Digital Interface.

devices with unique ringtones.

- Software and applications for training and development / training of musical hearing. Most of these applications can be accessed online and are designed so that the user can recognize the sounds, intervals, chords played by the computer synthesizing the piano timbre: Personal Ear Trainer, EarMaster Pro but also sites such as: <http://www.musictheory.net>, <http://www.earpower.com/>.

- Software with musical effects or, more precisely, applications that provide the user with the most diverse online sound effects (natural phenomena - rain, storm, wind, thunder, etc .; sounds / noises specific to the city - police sirens, ambulance, firefighters; site noises - hammer blows and other tools, crane squeaks, traffic noise - engines, wheel squeaks, brakes, slammed doors, congestion, horns, collisions, sounds coming from urban agglomerations, from different fields of activity or from the entertainment, leisure area - laughter, screams, lift, cash register, papers, telephones, etc., the examples can go on indefinitely)¹⁰. In teaching practice, the presence of these effects in fragments created, edited or mixed by students, can be studied by reference to the music of great composers such as: Pierre Schaeffer, Pierre Henry, and later, in a more expressive form, Pierre Boulez, Karlheinz Stockhausen and many others who, in their creations, have enriched sound resources by investing noises with the value of musical sound.

- Format converters. The Internet abounds with music examples in various formats, but not all of them are suitable for use as teaching materials in music education activities, YouTube Downloader, or online applications such as the online version of the above software, <http://www.video2mp3.net/>

- Tuners for various instruments¹¹. These applications, most often online, provide assistance in providing the tool. Their usefulness is especially proven for beginners. When there is a vocal-instrumental group in the general culture school, it is usually the teacher who gives all the instruments, the children's hearing being still insufficiently developed for them to do so.

- Software for children. They represent the category of software with the friendliest interface, with the highest degree of accessibility, respectively with characteristics similar to computer games: FlexiMusic Kids Composer¹², Classics for Kids¹³, Children's Music Web¹⁴.

- Metronome. This application is useful for those who study an instrument. It works like a portable mechanical or electronic metronome, marking times on a scale of 40 to 208, as selected by the user.

- Sound editor. These applications are very useful for cutting parts, applying noise filtering, spinning, equalizing and many more effects: Audacity¹⁵, FileLab Web Applications¹⁶, AV Music Morpher, ALO Audio Editor.

- The sites provide users with a series of information related to different instruments, presenting agreements, explanations regarding the theoretical notions necessary to understand the instrument singing technique, notation systems encountered - classical notation on portable,

¹⁰ <http://www.partnersinrhyme.com/>

¹¹ <http://www.gieson.com/Library/projects/utilities/tuner/>

¹² <http://fleximusic.com/product/fleximusic-kids-composer/>

¹³ <http://www.classicsforkids.com/>

¹⁴ <http://www.childrensmusic.org/>

¹⁵ <http://audacity.sourceforge.net/>

¹⁶ <https://www.filelab.com/>

tabs: ProChitara¹⁷, Sweet Little Piano¹⁸, ButtonBeast Piano¹⁹, Electronic Piano²⁰, Simple Piano²¹.

- Keyboards on the keyboard. These applications are similar to those used for piano playing.

- Karaoke²². There are online applications that encourage vocal singing. The application are designed based on a modern repertoire - Classics, Country, Dance & Electronic, Indie & Alternative, Metal, New, Pop, R & B & Soul, Rap & HipHop, Rock, Schlager, Older, 60', 70', 80', 90', 00', varied and attractive for young people, it instantly evaluates the pitch of the sung sound, through a score that shows the position of the participants in the top of the day, of the week, of the month. The song identifies itself with the game.

- Musical notation. The most used software in this regard are Sibelius²³ and Finale²⁴. The two software allow the creation, editing of scores, with special attention paid to the technical details regarding: measure, key, armor, transposition of different instruments, ambit of the selected instruments / voices, playback of the written fragments.

- DJ software. These software are used to mix even instantly: Reason²⁵, The One²⁶.

Capitalizing exclusively on the resources of classical music, through concept, design, animation and especially through the proposed games, the sites of the philharmonics, lyrical theaters attract a large number of visitors among children.

In many cases, ICT is considered a fast, efficient technical means, which ensures a good quality for the audio-video presentation of musical materials considered relevant and valuable by the teacher, to exemplify the different elements of musical language, to mark certain moments in history. music etc. However, this is only a starting point in exploring the art of sounds, as the possibilities for exploring them are much wider. In order to become attractive, interesting and effective, musical education activities must be in line with students' concerns, so that they can study music and become creative through their own effort so well dosed that it does not diminish the pleasure of discovering the sound universe. From this point of view, it is necessary to introduce the computer in the specific instrumentation, as well as to implement teaching strategies based on information and communication technologies in modern musical activities. Using the computer in musical education lessons does not necessarily mean a static activity. Also, it should not be exclusive so as to occupy the entire time saving of the class, but can be effectively alternated with activities of singing or expressing musical content through movement, drawing, etc.

Used in musical education activities in general education system, software and applications contribute greatly to a more efficient dosing of time. Another advantage of ICT in the educational context is that students can also prepare at home, individually and progress based on the immediate feedback they receive from the computer, observe where they encounter difficulties, what elements need to be practiced more for to perfect them. The same software also contributes to the efficiency of the stages of ensuring the reverse connection, ensuring retention and transfer, as well as obtaining performance in mixed activities to the same extent

¹⁷ <http://www.prochitara.go.ro/>

¹⁸ http://www.ronimusic.com/sweet_pi.htm

¹⁹ <http://www.buttonbeats.com/pianomanBB.html>

²⁰ <http://www.pianoelettronico.com.br/index-en.html>

²¹ <http://www.simplepiano.com/>

²² <http://www.karaokeparty.com/>

²³ http://www.sibelius.com/home/index_flash.html

²⁴ <http://www.finalemusic.com/default.aspx>

²⁵ <http://www.propellerheads.se/products/reason/>

²⁶ <http://www.digitaldjtips.com/2012/01/the-one-dj-software-officially-announced/>

that they can be used in knowledge revision and systematization activities or in those of evaluation.

4. Conclusions

The chapter of conclusions should answer the research questions. In case of hypotheses, it should present whether they were validated or not. The use of information and communication technologies in music education activities does not imply the conscious substitution of music with computer science, but through their use the digital competences are highlighted for the extension of the horizon of exploration of the universal sound. Teachers play a key role in helping students to acquire and develop their knowledge and skills in the field of ICT, they open their mind to innovation aimed at improving teaching and learning through new technologies.

The technical skills that teachers have, followed closely by creativity, outline a new vision of musical education. Traditional and modern methods, based on ICT, are not mutually exclusive but they interact permanently. There is a tendency to balance, in musical activities, ICT-based actions with those that develop other musical skills so that students' education is complex and also as complete as possible. However, the balance is established through musical activities that can create a symbiotic relationship. The need to have knowledge of operating the software, applications, music games that teacher proposes to students to solve the formulated work tasks determines either the individual study of the teacher or his participation in training courses that inform him properly in this regard and to train them, to develop the necessary skills.

The didactic act is perceived as a partnership in which all the factors involved contribute in an equitable proportion, capitalizing on the information, experiences, skills they have at a given time, in order to obtain the best results in optimal conditions. The Internet is intended to be a dynamic teaching tool that facilitates exploration, discovery, creation, interpretation, communication / debate in a virtual music creation workshop and a fundamental element for ensuring the adaptive nature of the learning environment. Musical, learning and socializing experiences can be harmoniously combined in activities built with the help of designed teaching strategies based on lateral thinking. These innovations do not diminish in any way the role of the musical education teacher, but on the contrary, it amplifies it, because all the changes that have taken place require a very careful monitoring in order not to alter the interpersonal relations.

Commitment to innovation requires a holistic approach and the participation of actors at all levels of the education system. The opening and innovation of learning environments has many dimensions and it involves more than just the use of digital technologies. New interinstitutional and transnational partnerships and methods of cooperation have become possible and they should be encouraged.

Personalized learning, facilitated by digital technologies, can bring significant improvements in learning outcomes. The acquisition of digital skills and competences cannot be dissociated from the way in which the learning processes are organized and from the way in which the study programs are translated into pedagogical practices.

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