Hellenic Journal of Music, Education and Culture
HeJMEC

http://www.hejmec.eu

Hellenic Journal
of Music, Education & Culture

Article

Volume 1
September 2010

GAPMET
www.primarymusic.gr

ISSN 1792-2518

Risks and Promises of ICT for Music Education

HeJMEC
Hellenic Journal of Music, Education, and Culture

Vol. 1 | Article 2
ISSN 1792-2518
http://hejmec.eu

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ABSTRACT *This article discusses about the conditions influencing the usage of the Information and Communication Technologies (ICT) in the music classroom. Peter Webster (2002) considers three circumstances allowing or restraining how ICT is employed in music education: (1) technological development; (2) availability and integration; and (3) a constructivist approach being followed for teaching and learning. I will discuss a fourth feature: the similarity between the musical concept supported both by ICT and the school curriculum. I will develop these four circumstances and provide illustrations from a European context.*

In the ending, I will conclude that the potentiality of teaching materials that use ICT for music education by can be jeopardized for global and economic interests beyond schools. ICT is more than being proficient using technologies, but also being an active reader of mass media productions. Teachers should be aware of both potentials and risks to promote reflective listeners and thinkers rather than reproductive listeners and consumers.

KEY WORDS: Information and Communication Technology; Music technology;

Introduction

It might seem obvious to state that we live in an information society based on a technological revolution in the use and distribution of information, but it is important never to lose sight of this fact. Digital television and radio, broadband Internet connections, for example, are part of day-to-day life for a significant amount of people, at least in the Western World, and this phenomenon has only just begun. In the field of music, synthesizers and MIDI keyboards, computer-assisted composition, editing music scores, sequencing and sound editing are readily available for contemporary musicians and these technologies have opened up a wide range of new possibilities.

Arguably, inability to use these resources may lead to serious limitations in terms of people's social and cultural development and these limitations will only increase. The educational possibilities of Information and Communication Technologies (ICT) and the need to teach students how to use them are two major challenges faced by the school

system. In order to deal with these new challenges successfully, it is necessary to provide schools with materials which will also have to be constantly updated as this technology advances, in addition to proper training for teachers - not only in technical terms, but also in terms of the educational use of these resources.

In this article, I will examine the implications of ICT for music education. Burbules (2000), in his book "Watch IT: The Risks and Promises of Information Technologies for Education", discusses several critical issues and controversies concerning the potential of new information technology for education. I partially borrowed the title as the purpose of this paper is similar with regard to music education.

I will begin with a definition of musical technology as *"inventions that help human produce, enhance, and better understand the art of sounds organized to express feelings"* (Webster, 2002: 416). This definition includes not only the design of new devices, the use of computer programs or the Internet, or the creation of multimedia presentations, but also a commitment to music as a way of improving the musical experience. In my opinion, this last element is the most important since the impact of these technologies is so strong that it is easy to notice only the technical possibilities of these devices and programs, thus overlooking the fact that all technology is a means to an end, in our case, to transmit emotions and communicate through music as a main contribution of this subject to the general objectives of the school curriculum.

This article has three sections: the first deals with the use of computers in music education. The second looks at the use of audiovisual media in this same environment of music education. Finally, in conclusion it is proposed that the use of ICT should not be limited to the use of the aforementioned resources, but must also be used to educate students in the comprehension of the audiovisual language used by these devices, a task in which music education can and should make a decisive contribution. In each of these three sections, I will be focusing on the ideological and contextual comprehension that is involved in the use of ICT and will only partially be dealing with technical questions.

Computers in the music classroom

The use of computers in the music classroom requires devices with sound cards and electronic instruments, normally synthesizers or master keyboards (without their own sounds, but rather that are computer generated), which use the MIDI protocol to connect these instruments to each other and to the computers. Roca (1998) considers two possible modes of organization in educational centers: the musical computer room, devoted to autonomous learning, and the music classroom with a computer prepared for musical use, exclusively by teachers. The differing educational uses and the economic costs of each model are obvious.

There are great deal of computer applications for music education. I will now offer a brief summary of each type of programme. It is not a taxonomic classification, but structured according to the use in the music classroom:

- Score editors. These allow us to write scores with a computer. *Finale,* and *Sibelius* are probable the best known. These programmes are useful for

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teachers in creating scores and parts which can then be handed out to students.

- Sequencers. These are programmes that work as virtual mixing desks. They allow us to use digitized audio tracks with others taken from MIDI instruments. *Logic Audio* and *Cubase* are two of the most popular programmes. For music teachers these are useful for recording and editing the performances of students, for example.
- Sound editors. These are programmes that allow us to manipulate the type of wavelength. Nowadays, they are integrated into sequencers. An example of the didactic application of sound editors can be their usefulness for explaining sound parameters. *Sound Edit* is one of these programs.
- Music arrangers. These make an instrumental arrangement from the chords that the user chooses from among those offered by the programme. *Band in a Box* is probably the best known and the most powerful. In the music classroom they are useful in order to provide accompaniment while students play or sing. These can be of practical use also for teachers to create their own arrangements for school orchestras.
- Educational programmes. These programmes are created with avowedly educational objectives. They may include sound recognition and discrimination, intervals, scales, etc, and different aspects of musical language, instrument encyclopedias, composers… there are a considerable amount of programmes with educational possibilities.
- Internet. An Internet connection allows for infinite educational possibilities: educational resources and materials, downloading of MIDI files or compressed MP3 files, web searches for information related to a specific educational methodology, musical style, composer… The *Biblioteca Virtual de Educación Musical* (Musical Education Virtual Library), for instance, consists of a wide range of available web resources of interest for musical education. Evidently, no matter how extensive this list may be, it can only reflect part of these resources. This is available at «http://www.bivem.net».
- Author tools. They allow teachers to create their own materials. The universally popular *PowerPoint* programme is a tool that can be used in this way. Programmes used for web page creation such as *Dreamweaver* can also be used by teachers to create their own materials. There are certain programmes which, in addition to the basic Internet protocol, html, allow us to use more sophisticated ones such as dhtml, java, flash, xml, etc, to generate pages of exercise in those languages. *Hot potatoes* is one of these free tools and allows us to create crosswords and other word puzzles, amongst other possibilities, in a simple and attractive fashion. The open source platform *Moodle* is another tool developed for instruction by using the Internet.

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Peter Webster (2000) identified three circumstances which influence the use of ICT in education: technological development, greater availability and integration and a constructivist approach as the basis for learning. To these three, I would add the degree of agreement between the musical model proposed by the curriculum and that implicit in ICT.

The influence of technological development on its use in the classroom is related to the question of user-friendliness, particularly if it allows for use by younger students, a simple configuration, and the decreasing cost of these technologies as they become more and more common. The question of price is decisive for their implantation in public schools, given the volume of material necessary to provide for all students, including maintenance and updating.

Regarding availability and integration, these depend to a great extent on the technological development of each country and its economic capacity, as national adminstrations appear to be aware of the need to implant this technology. I will offer some data from the USA[1], the European Union and Spain [2] in order to analyze to what extent ICT is available and integrated within educational centres in general and music classes in particular. The data is presented in the following table[3]:

USA (2000)	European Union (2003)	Spain (2007)
63% of public schools have Internet connection	2.6 Internet connections per 100 students in Primary Education, 3.6 in Secondary Education	85% of public schools with Internet connection
1 computer per 5.7 students	1 computer per 11.6 students	1 computer per 10 students
97% of teachers use a computer at home or at work		
53% use programmes in class, 61% use the Internet	36% of teachers use the Internet on a weekly basis	20% of teachers use the Internet on a weekly basis (2003)
77% use computers as a complementary activity, 17% base their teaching on computers, and 6% use it as an extra		

At the same Educared conference in which these data about the EU and Spain were given, it was pointed out that the main problem in computer use in Spanish schools is not the lack of computers, but rather the question of access to the computer room.

In terms of the presence of ICT in the music classroom, I will now present some data from the USA. In the cases of the EU and Spain, it has been impossible to find data, which presumably means that there is no intention to implant musical technology in a

[1] Obtained from the US National Survey on Teacher's Use of Digital Contents in 1999 (2000) and from Reese and Hickey (1999).
[2] Given at the II and IV *Educared* International Conferences in 2003 and 2007.
[3] When comparing the data, it should be observed that the figures from the USA were published in 1999 and 2000, and in 2003 and 2007 in the case of the European Union and Spain. It should also be noted that as we are dealing with data from different sources and years there can be no direct extrapolation of the data between the USA, Europe and Spain.

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generalized way, and the existing experiences in this field tend to be isolated cases rather than the consequence of clear policies in this speciality.

- 94% of music teachers demand more training, although 83% say that they have some knowledge.
- 26% of general music teachers[4] use computers (2 out of 3 for administrative and communication based reasons).
- 45% of schools have computers in the music classroom (16% have Internet).
- Low availability of MIDI keyboards and specific music equipment.

An initial conclusion that can be drawn from the previous figures is that there is still a long way to go in the implementation of computer use in schools, and this technology needs to be more widely used, not only for logistical and organizational reasons among schools and teachers, but also because of its instructional applications. In terms of the educational use of musical computer technology, a second consequence is that although the path ahead may be long and arduous, it is necessary to begin work immediately. It could be argued that in the first place it is necessary to meet the general needs of schools, and then the specific needs of each subject with common resources. Some might respond that this is tantamount to putting music education into a secondary position once more, and that much more attention would be given to the so called "core" subjects on the curriculum. The overall state of computer use in the music classroom in developed countries does not leave much room for optimism. The requirements of availability and integration of computers in the music classroom are generally not being fulfilled.

In order to attempt to change this situation, there are various projects currently being supported by different administrations. The European Union is developing the *eEurope* Program[5] with the aim of encouraging the development of an information society in a non-discriminatory way all around Europe. In broad terms, the plan is based on the following ideas: the promotion of a favourable environment for private investment and for the creation of jobs; boosting productivity; and the modernization of public services, especially in terms of training. Among other objectives, we can highlight the provision of broadband Internet access for public administrations, schools and health centres.

In the case of Spain and its educational context, the central government developed the *Internet in Schools Project* to meet to the *eEurope* objectives of establishing an Information Society in schools. Although it is coordinated by Central Government, a significant role is also played by regional governments. I will now offer some general data from the project and some specific data from the region of Andalusia.

[4] In US schools, in addition to general music teachers there are also teachers for school choirs and bands.
[5] http://europa.eu/scadplus/leg/es/lvb/l24226.htm

The objectives of Central Government with their *Internet in Schools Project* can be summarized in two ways[6]: seeking a certain homogeneity in the initiatives undertaken by each regional government in line with the principles established at a European level, providing finance which high economic costs. By providing 726.4 million euros from 2003 to 2009, central and regional governments have been developing an Information Society for 20,000 schools, 500,000 teachers and 7 million pupils in Primary Education, Secondary Education and Vocational Training centres which are maintained with state funding[7], whilst always taking into account the fact the rate of implantation in each region will depend on the previous level of technological development. These initiatives can be summarized in four main areas:

- Providing schools with broadband Internet connections, local networks and computer equipment;
- Developing educational contents and programs;
- Effective introduction of new technologies to the teaching-learning scenario;
- Training teachers in the use of new technologies and facilitating access to equipment.

In the case of Andalusia, there are currently three projects: *And@red* (Department of Education and Science, known as "C.E.C.A", 2003[a]) is perhaps the most ambitious of these projects, with three basic lines of action: providing 17,000 computers for schools; broadband Internet access, and use of the Linux operating system. The next program is the Educational Project for ICT schools (C.E.C.A., 2003[b]), whose aim is to provide schools in the program with one computer for every two pupils. Finally, the Digital Schools Project (C.E.C.A., 2003[c]), seeks to achieve the "virtualization" of schools so that the Internet can be used for registration purposes, grant applications, school information … as well as information for parents (tutorials, academic information….) and student support (career advice, extra study…).

In my opinion, the implementation of the plan is not been as successful as had been hoped in terms of the money spent and the level of expectations created by the project. The And@red Plan started in 50 centres, a number which represents 1.5% of the 3,378 schools which make up the network of Andalusian state schools.[8] It should also be noted that the computer resources available before the implementation of the Plan in September 2003 covered 33% of the objectives of the *Internet in Schools Project*[9]. The agreement signed with Central Government has raised the number of computers to be implanted to 50,000 units and thus achieve a ratio of one computer for every twelve pupils. For the academic year 2004/2005, there were 200 schools which received funding for computer equipment[10], 5.9% of the total number of schools. In the light of these figures, it seems that the expectations of the Internet in Schools Project of reaching an

[6] Information obtained at http://red.es
[7] Information available at http://www.congresointernetenlaescuela.es
[8] Source: Ibidem
[9] Source: Ibidem
[10] Information published on the 11th of February 2004 in the newspaper *Granada Hoy*.

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average of 70% of implementation of the Project on a national level–66% in Andalusia– were not achieved. In the Project, there is also no explicit indication as to the proper maintenance of material in order to guarantee an optimal use of resources.

Another problem that has arisen is the use the Linux operating system. It appears that teachers have not received enough training to be able to use this system properly. In the case of music education, the operating system presents an additional problem: the programmes available for music education in Linux are scarce, at least in comparison with other subjects. In practice, teachers work with two and occasionally three different operating systems: Windows, Macintosh and Linux. It could be argued that in the process of transition from platform to another it is normal for these problems to arise. Proper teacher training in this field is key to the success or failure of this type of initiative.

The third situation mentioned by Peter Webster (2000) which influences the use of computers is the adoption of a constructivist approach as the basis for learning, stressing how students learn rather than the possibilities offered by the resource itself. In the use of computers, there has been a historic tendency towards a deterministic approach, a procedure which suits the logic and internal structure of these devices. Music education represents a clear example: auditory discrimination of intervals, notes or scales was one of the first computer applications for music education, and these programs worked and still work by a process of trial and error. The resources which are currently available allow for a teaching process in line with the principle of knowledge being constructed in terms of pedagogical context. A less deterministic teaching model which facilitates this construction of learning by students makes computers a more effective tool for learning since the computer is adapted for students and not *vice versa*.

Webster described two factors that influence students when using computers: cognitive style and gender. Both factors can be explained following the theories proposed by Caputo (1993-1994), who considered that the linear and rational way of thinking which is usually followed in music teaching is best suited to a male way of thinking. On the other hand, the argument was made that the more relational and analogical way of obtaining information normally used by women means that female students have to adapt more when using computers.

The three key factors identified by Webster in the use of ICT in education, although specifically referring to musical computer technology, are by no means specific to this subject and can be applied to any discipline. In my opinion, there is a specific factor in music education that may influence the use of computers in the classroom: the level of agreement between the concept of music proposed in the curriculum and that which is made possible by music computer technology. We would argue that musical computer technology assumes a concept of music which is more applicable to "low-brow", popular music than to "high-brow", classical music which is only partially reflected in the curriculum.

In order to defend this line of argumentation, I would refer to the work of Théberge (1999), who states that the history of music is to some extent part of the technological development which has accompanied the evolution of music, from the construction of

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simple musical instruments to the digitization of sound. Each one of these technologies is more than just the use of "machines", since they involve determined processes of musical production and consumption. Technology has many kinds of influence on music, although this influence is perhaps most evident in sound production and in the distribution of music and this is where we can appreciate a different underlying musical model.

The methods of sound production in "high-brow" and "low-brow" music are substantially different (Burgess, 2003), and the technologies and techniques are used as legitimizing mechanisms for what is considered artistic or not. According to this author, there is an important distinction between high-brow and low-brow music in terms of the type of instrument, although sometimes it may be the same instrument, and how this instrument is played. In the case of "high-brow" music, acoustic instruments are normally used, whilst in the case of popular music technological development has always been a major factor in the evolution of this genre. There are three main resources which have conditioned this evolution (Shuker, 2001): the appearance of the microphone in the 1920s, the electric guitar in the 1950s, and synthesizers and digital sound devices in the 1960s and 1970s.

The influence of ICT is also important in the distribution and dissemination of music. Both on modern music channels broadcast on cable and satellite television, and on radio stations, whether they use a conventional format or broadcast through a digital or internet format, there is a clear dominance of popular music over classical music. To demonstrate this phenomenon, it is sufficient to observe the FM radio options in any town or city along with the digital and internet options and the music for sale at online music stores. Internet music downloads, especially since the advent of MP3, show the same tendency. In 2003, the consultancy firm *Nielsen/Netratings*[11] carried out a market study on US internet use in terms of music. Rap was the popular genre. This conclusion seems to be *intuitive* in two ways. On the one hand, the previously cited relationship between popular music and technological development is clear especially in the cases of genres such as techno, industrial music and rap. On the other hand, it is difficult to imagine a music lover downloading classical music in MP3 files if he or she is looking for the best possible sound quality, unless it is a musical work which is impossible to find in any format or is of particular interest to the listener. The fact that the most frequently downloaded music is popular music would confirm this impression.

To return to my initial argument, the concept of music proposed in most curricula and in the main musical methodologies is based on traditional music and, above all, on the Western musical tradition which is the main reference point[12], largely neglecting the importance of modern musical technology. Evidently, there are programs which are based on other concepts of music more in line with that proposed in the curriculum, although it seems clear that it is more useful to reflect popular music in music education. I do not mean to suggest that we need to change the model of music reflected in the curriculum, but rather that it is necessary to reflect upon our preconceptions regarding

[11] http://www.nielsen-netratings.com

[12] I realize that this information is debatable and needs to be explained in more detail. Nevertheless, this explanation is not part of the objectives of this article.

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music in education and therefore avoid teaching uncritically the contents given by textbooks, computer programs or conventional thinking on the part of teaching staff. I believe that the music taught in schools should always be open to review in order to update and adapt our teaching to changing social circumstances. It is also even more necessary to develop general curricular materials and specific computer programs which can be adapted to our method of music education and not *vice versa*. Teachers must develop and apply the curriculum in context instead of merely copying that proposed by the authors of the textbook or the software manufacturer which do not take into account the specific details of each teaching context.

Sound and Music in Audiovisual Media

The second sphere of influence of ICT is audiovisual media and this field has received much less attention than computers in the context of music education. When using these media for educational purposes, it is necessary to distinguish between teaching with audiovisual media and these media in themselves.

The first option involves the use of televisions and over-head projectors, record-players music decks, power point presentations, slide shows and CD, CD-ROM, DVD, DVD-ROM, MP3, minidisc, DAT music players or recorders, synthesizers and music systems with or without acoustic surround systems … in the classroom with the aim of teaching specific contents to students. The objective is to use these resources as an instructional medium, whether that be watching a documentary or listening to a piece of music. Teaching with audiovisual media is relatively common although radio, cinema and television do not have the impact on teaching that was initially expected of them and, in this sense, the Internet is having a much greater impact.

A practical case of teaching with audiovisual media could be the use of films whose contents are related to the curriculum. This is the idea proposed by the *Editex* publishing company[13] to teach philosophy to Secondary Education pupils using films, for example the work of Kant through the film *Do the right thing* (Spike Lee, 1989), "*which dramatizes the need to take a stand against racial violence from an ethical and political perspective*"[14]. A second example can be found in the educational TV service called *Youth News Network* (McLean, 2001) which is a channel which broadcasts for schools in Montreal (Canada) and consists of a weekly program of fifteen minutes of news including two and a half minutes of advertising. The edition broadcast on the 29th of February 2000, for example, included the following subjects: the Stock Market and business; an anti-racist message; the Canadian federal budget; an advert; a competition: What day did the Great Depression of 1929 begin?; and addresses and contact details.

Teaching through audiovisual media seeks to provide pupils with the skills that will allow them fully to decipher a coded document and it leaves the task of interpreting and accepting up to the audience (Masterman, 1993). The increase in communication

[13] Collection of 19 monographical studies on the same number of philosophers ranking from Plato to Ortega y Gasset.
[14] This information in an article written by Mar Padilla which was published on page 40 of the newspaper *El País* on the 24th of May 2004.

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mass media makes this task even more necessary, although it does not seem to be properly dealt with in classrooms and when it is used the emphasis tends to be placed on its visual aspects. Its auditory qualities tend to be overlooked due to the dominance of visual images and the subdependence of sounds. Nevertheless, sound is there in dialogues, sound effects or in the example music present in films, documentaries, cartoons, and news programs, all of which transmit a message which is often subconscious and that the audience needs to understand rather than an educational focus.

The knowledge of how sound relates to image in audiovisual language is important because the message of the document is dialectical (ibid.) and is a consequence of the interaction between the audience and a specific work. If we want to decipher the message, the receiver must understand the language used by the sender and this means interaction between both parties. Practically any film is a good example in this respect, although I would like to cite the relatively recent use of music during news programmes. The background noise and the inclusion of non-diegetic background music during some sections of the programme devoted to cultural or sports news are very common and can also be found when there is a news story with strong social relevance.

I would like to comment upon two randomly chosen cases – the news bulletins of *Euronews* and *Telecinco* TV Channels broadcasted on the 11th of June 2004. On the first TV channel, the news was about the European Parliament elections, the deaths of Ronald Reagan and Ray Charles, and the awarding of the *Prince of Asturias Prize* to Claudio Magris. In the last two cases, music was used: in the case of the death of the jazz musician, the news was accompanied by images and sound from one of his performances, thus using a diegetic approach[15], and in the case of the prize, classical music was used as a background, we would suggest with a clear intention to display cultural convergence: the seriousness and formality associated with these prizes requires *serious* music and *vice versa*; the use of this type of music conveys solemnity. In the *Telecinco* news bulletin there were more news stories; in all of them, once the newsreader had told us the *facts,* the story was commented upon using images. There was also diegetic music during the information concerning Ray Charles, although this use was less significant than the use of non-diegetic music during the information on the Montreal Formula 1 Grand Prix. In this case, the music had a dynamic, pop style, applying a form of physical convergence. The fact that this channel had exclusive TV rights for Formula 1 that season probable explains why this music was used to highlight this story.

What is the point of reporting on an award ceremony or a car race with a musical background and a voice-over describing these images? The attempt to give an air of protocol to a prestigious award ceremony, to highlight one sports story above all others for commercial reasons and to seek a greater audience share is undoubtedly what led the channel to make this choice of background music. How many viewers were aware

[15] Diegesis refers to all that naturally belongs to the story narrated. When, e.g., there are musicians playing that justify the presence of music, we have diegetic music. Non-diegetic music, with no justification, is the most frequent.

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of this added sound effect? And of those who noticed, how many deciphered the message with enough resources to be able to interpret the meaning of that music and why it was used precisely in those news stories? The use of music during the news is an extreme case of the importance of working on these contents in the music classroom. The ability to decipher a coded document and simultaneously develop the capacity to feel aesthetic appreciation of this music are two good reasons to deal with this issue in our schools.

One possible methodology for the teaching of audiovisual language is proposed by Sampaio (1998), and (in my view) is based on the work of Willems. It distinguishes four working levels applicable both to the auditory and to the visual, and ranges from the most concrete to the most abstract: hearing/seeing; listening/looking; understanding; and comprehending. From this initial distinction, the author proposes a sequence of contents which begins with soundtracks: firstly, sound effects, followed by music, then language and finally experiences with educational radio. The author then proposes work with images, firstly in a static form, secondly by analyzing meaning (which is connected to the analysis of advertising), and thirdly by creating interdisciplinary activities with other branches of artistic education, and finally using the cinema.

In my view, this proposal is related to different teaching methodologies within the field of music education, since movement and sound are two basic principles of all of these methodologies and, ultimately, all movement implies images. Work on sound effects, language and image is also related to Willems and Orf, but especially with the concept of a sound landscape proposed by Schafer (e.g., 1994), or with the creation of musical stories. The proposal to sequence contents corresponds with perception, production and analysis and the principle of overall artistic education, which is reflected in current Spanish education legislation. Moreover, the three reasons given in the introduction to the current Spanish Education Law for the inclusion of music in the curriculum are applicable to audiovisual language: (1) it is so overwhelmingly present in our society; (2) we are not always aware of it, as we often just hear it but we do not listen to it; and (3) a greater level of musical comprehension will increase our enjoyment of this art form. Therefore, there is no need to insert anything new in the curriculum as the teaching principles for audiovisual language are already there as is the case with soundtracks. However, it is necessary to raise awareness of the need to work on these subjects with students. Whatever the methodology used in the classroom, in my opinion two requirements must be fulfilled:

To focus on the understanding of the meaning of audiovisual language, not only in terms of the more widely studied use of images, but also in the case of soundtracks. In his classic study from 1972, *'Ways of Seeing'*, John Berger described how images in a capitalist society imply the presence of the observer. This idea and the way he deals with this question not only connects with the analysis of the meaning of images proposed by Sampaio, but can also be transferred to the field of audition; the soundtrack may be there with the intention of not being *listened to*, as is argued by Adorno and Eisler (1981), but this does not mean that the message is not sent; its use means that the person on the other side of the relationship may not be listening but is certainly hearing, *"influencing*

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the spectator in a secret way", according to Francis Ford Coppola (see Nieto, 1996: 1), i.e., sending a message that the spectator is not normally aware of.

To use the cinema as an art form that is inspired by other art forms and as an integrating resource, not only in artistic, but also in educational terms. The cinema not only combines music, plastic and visual arts and drama, regardless of the values these forms have in themselves, and the need to provide education in audiovisual language, it also implies the use of ICT and encourages creativity and the ability to write a script and work in a team.

It is not my intention to support the teaching of cinema in an article on ICT in music education, nor to defend the position of any pressure group within any particular academic discipline. My objective in this paper is to show how soundtracks are part of audiovisual language and have semanticity, which is not usually explored in the classroom and which I believe should be worked on in the context of music education.

Conclusions

Information and Communication Technology have two aspects, computers and audiovisual media, which must be used in the classroom as objectives in themselves and as an educational medium. In practice, the availability and integration of computers in music education is very limited in terms of resources and teacher education. The teaching of audiovisual media, particularly in terms of sound, has been exploited even less. ICT in the music classroom should mean not only knowledge and use of new technologies, but also teaching students to comprehend the meaning of audiovisual language from the assumption that knowledge is a social construction. This is an ideological question, which is frequently denied if it is stated that this resource is objective and aseptic in itself.

Nevertheless, using an operating system which belongs to a multinational company is not the same as using other open source software which does not require any payment for use; it is not the same to know how to use a machine as knowing how to decode the meaning of a document which is transmitted through that technology; it is not the same to use a computer or any other resource in the classroom in a deterministic manner as taking into account the method of individual acquisition of knowledge in relation to social circumstances; it is not the same to search for and select information with the intention of encouraging equal opportunities as paying for access to this information, whether this be through watching a TV program or accessing a particular data base; it is not the same to watch an educational program in the classroom with the aim of learning some specific contents as watching in class with advertising; nor is it the same to install computers and broadband Internet connections in schools in terms of the educational opportunities and the potential for equal opportunities that they offer in educating students as to face the labour market and its current demands.

It may seem only too obvious to state that teaching ICT and music are social constructions within a determined cultural context which depend on the people that perceive and identify them as such. Within the field of Educational Policy Studies there are numerous studies on the ideological nature of the educational nature of ICT (e.g.

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Sancho, 2001, Burbules, 2000), which is not the case with Music Education, where there is a predominance of studies on the use of computers and even the cognitive implications that they entail. This could explain the fact that there are hardly any studies on the teaching of audiovisual language, especially in relation to music, as what is of most interest is technical training in the use of ICT, not the message transmitted by these media, which is in keeping with the lack of investment in specific material for musical computer use in school.

Understanding that the significance of an audiovisual, musical or artistic work in general is a consequence of a dialectic interaction between people can be one of the most important contributions of artistic education to the overall education of pupils, since although this procedure may be obvious in art, the construction of knowledge within a given sociocultural context in which subjects interact is something inherent to human nature. The skills acquired will allow us to educate not only from an artistic point of view, but inevitably they will also be applied to other spheres of pupils' lives which will enable them to become people with their own criteria who, for example, do not let themselves be too influenced, neither by the mass media, nor by the music industry when deciding to listen to music or watch a film. The opposite approach would mean training students to become workers capable of using technology in line with the demands of the labour market and docile consumers who purchase disposable products regardless of their aesthetic value in order to carry on shopping.

Training pupils in the use of ICT as an end in itself is absolutely necessary. Furthermore, we also need to consider the usual assumptions implicit in the messages transmitted. Teachers have to rethink what they want do and why. The Information and Communication Technology revolution will not truly begin until we reflect on what we understand by music education.

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ISSN 1792-2518

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ISSN 1792-2518

Hellenic Journal of Music, Education and Culture

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GAPMET www.primarymusic.gr ISSN 1792-2518