

Graduate Level Music Education in the Context of the Digital Arts: A Practical Example

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Introduction

The music education system should be prepared to respond to the challenges of the new "information society" (to use a fashionable name) and the educational institutions should be responsible for training musicians for this new reality. Unfortunately the current situation does not give us any good expectation for it. In this article we present some thoughts on the current situation and ideas for new educational curricula, even though we are conscious of the difficulty and danger of it. It is impossible to have the necessary historical perspective to understand the artistic trends being developed and to decide what type of curriculum should be the most appropriate one for preparing the professionals that will be involved in these trends while creating new ones. But today's society cannot wait for us to have the right perspective and we should attempt to give some solutions even knowing that they will be temporary and that they will have to change as we go along. We should be prepared for constantly rethinking the problem and changing our solutions accordingly.

We start by presenting our view on the current situation of the education in music, the arts and the specific discipline of Computer Music, as the key areas for our discussion. We then describe the Master in Digital Arts offered by the Pompeu Fabra University, as a practical example of the these views, and finally we include a commented list of educational institutions that have been used as references.

Music Education Today

Most of the old European institutions in music education were established following the central European tradition of music conservatories and have not been able to adapt to the cultural and social changes that have taken place during this century. These conservatories were designed with the fundamental goal of training instrumentalist and based on the romantic view of the virtuoso performer as the ideal musician. But the musical needs of our society have been changing fast in the last few decades and the music profession is going through drastic transformations. The need of symphony orchestra performers is definitely not increasing, possibly decreasing, while there is an increasing demand for other types of music experts. Developments in the recording industry, cinema, television, radio, multimedia industry, and others, have created new markets at the expense of the more traditional ones. They have also favored new ways of understanding and using music that go beyond the classical music tradition. The use of new tools in the production and public presentation of all this music, such as computers and other electronic devices, require an expertise that traditionally trained musicians do not have. The music profession has had to adapt to this new reality but most of the well-established educational institutions have not, leaving a gap between the two.

The situation is different in every country. Holland, for example, has better adapted its educational system to today's musical needs than, for example, Spain, which is having many problems handling this transition. Spain is an example of a country that adopted the central European model without having a strong tradition in classical music culture of its own. This means that music conservatories have always been somewhat detached from the cultural and social life of the country and with the changes in the last few decades this detachment has become even more apparent.

In Spain, like in many European countries, music, at the professional level, is the exclusive competence of the Conservatories and only the very traditional historical musicology is taught in the universities. This academic isolation from the rest of the artistic, humanistic and scientific disciplines makes it harder for the conservatories to adapt to the natural changes of the society. The Anglo-Saxon model of music education, where music is mainly taught inside the universities and in contact with other non-musical disciplines, has been better suited for this transition.

In the last few years Spain has been immersed in a major restructuring of the educational system at all levels, thus opening up a great opportunity to modernize the music education system. The restructuring of the music conservatories is still not complete, but from what has been already regulated there are very few chances that the new system will respond to the needs of today's society. In this new plan, the studies have been divided into three levels: elementary (4 years), middle (6 years) and high (4-5 years). The high level is what corresponds to the university studies and its framework has been defined by a Royal Decree of 1995. This decree governs the basic aspects of the curriculum and it is left to each local administration the elaboration of the details of the curriculum. It is a timid attempt to bring music education up to date, but it keeps most of the problems of the old conservatories. Conservatories will still be separate from the university system and the curriculum is fundamentally the same than the old one. It is beyond this article to criticize the Spanish Royal Decree, but let's just say that it is difficult, if not impossible, to bring the education system up to date by remodeling the old conservatories. New structures are needed.

Digital Arts Education

Digital Arts is a term that identifies the arts that make significant use of the digital media in their conception and production phases. Since this is not a consolidated field, different terms are used to describe these arts and what is understood by these terms is still under discussion. What is clear is that new artistic genres have been born out of the specific possibilities of this new media. For example, 3D-animation, Virtual Reality, Interactive Systems and Internet have opened up completely new creative possibilities. Traditional art forms such as cinema, 2D-animation, video art and, definitely, music, have also been strongly influenced by the digital technologies and new sub-genres have developed.

Traditional art schools have an even harder time than music schools adapting to these technological changes. The difference between these new digital arts and the traditional ones is greater than between instrumental and computer music. The expertise required for being involved in this field cannot be obtained in the traditional fine arts schools and this situation has favored the establishments of new centers and schools that are just dedicated to the digital arts discipline.

During the last decade many universities have established research centers and initiated studies in digital arts. Pioneer and influential laboratories like the Media Lab of the MIT have become major references for the establishment of the more recent centers. In most cases these institutions are quite independent and have loose connections with related university departments. There is no standard profile and each center has had to invent its own structure and define the areas to be active in. In general, they benefit from very interdisciplinary approaches to their activity and from being active in research, education and production at the same time. Traditionally, music has been left out of Art schools for being a very specialized discipline that requires a special treatment. But with the digital media the integration of different arts has become easier and in fact it is one of the most appealing possibilities of this media. Similar concepts and tools are being used both for music and the rest of the digital arts and many new artistic productions take advantage of this integration. Most centers dedicated to the digital arts do not include music in a fundamental way, even though they normally need sound in their

productions. However, a small but significant number of centers have music departments and quite a few would be interested in incorporating them if they had the expertise to do so.

Computer Music as part of the Digital Arts

Computer Music is by now a well-established academic discipline in the US. All the universities offer courses related to this topic in their Music Departments and many of them grant specific degrees. These courses typically include Algorithmic Composition, Sound Synthesis and the practical use of some of the most popular software and hardware systems for music composition. Systems based on the MIDI protocol have become the standard for most music applications and there are many powerful commercial software and hardware products based on it. There are also a few non-commercial software systems that are harder to learn but more powerful in terms of the flexibility and control of the music that can be produced with them. The consequence of this situation is that the majority of the composition students in the US are familiar with the basic Computer Music concepts and tools. In Europe the situation is not that good, nonetheless a number of music schools have incorporated this discipline into their curricula.

Computer Music is strongly interdisciplinary and to make justice to it requires seeing it from several points of view. Richard Moore in his book "Elements of Computer Music" (Prentice Hall, 1990) includes a diagram, shown in Figure 1, of the disciplinary context of Computer Music. Such a diagram can be discouraging for students that are starting in this field but, to be fair, it should be said that not all the disciplines have the same importance. The ones that traditionally have been considered fundamental are: Composition, Performance, Programming, Digital Signal Processing, Acoustics and Psychoacoustics.

Being such an interdisciplinary field different approaches are possible and each center, or school, has a specific emphasis depending on the expertise of the faculty and the framework that the school is part of. There are examples of Computer Music studies being part of schools of music, performing arts, engineering, digital arts, and combinations of them. As a natural consequence, each of these affiliations favors a different aspect of Computer Music.

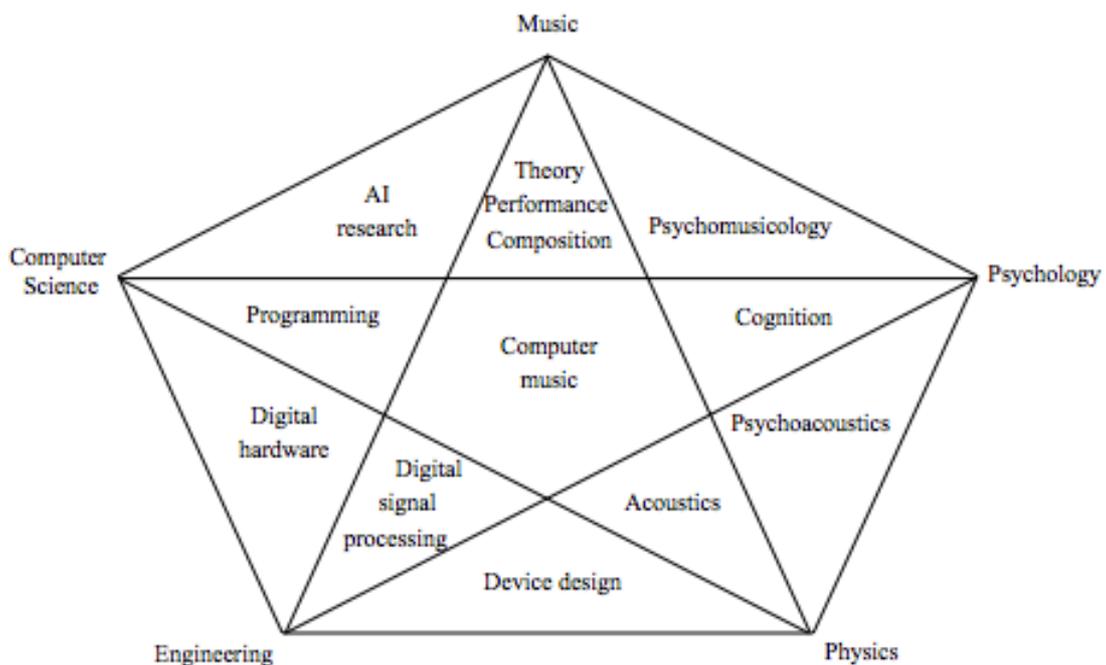


Figure 1. Disciplinary context of Computer Music. (from F. Richard Moore).

The digital arts world is changing fast and in many cases Computer Music institutions have not changed with it. Today, the musical use of the digital media goes beyond the US academic tradition and a fresh look to the field is needed. For example, it is clear that concert music, understood as the music produced to be played and listened in conventional concert halls, accounts for a very small part of the music being produced today. Concert halls have become "reserves" of historical music and today's music uses other venues for its dissemination. Educational institutions should prepare people to make a living in this new reality.

We do not have the answer as to what Computer Music should be today, but looking at what successful centers are doing, both in terms of research and education, we can see some trends. We have used the list of institutions given below as references of centers having a digital arts perspective. We do not claim that this perspective is the good one, but just a possible one that brings fresh ideas into the field.

Within a music-only framework, we can detect some research areas that are being very fruitful and that will hopefully influence the music to be produced in the near future. Some of these active areas are: synthesis and processing techniques based on physical and perceptual models, new performance interfaces, performance based approaches to Computer Music, or real-time systems based on open software platforms. It is beyond the scope of this article to describe these research areas but a look at the articles published in the last few years in the Computer Music Journal and in the Proceedings of the International Computer Music Conference, should give us some insight on them.

In the digital arts framework, music should benefit from being part of some areas that are very active both from a creative and research points of view. For example, Cyberculture, non-linear narrative, new authoring systems, or immersive environments based on Virtual Reality, should give new perspectives for the involvement of all the digital arts. There are a number of conferences (SIGGRAPH, DEAF, ISEA, Ars Electronica, Multimediale,...) and journals (Leonardo, Computer Graphics of the ACM, ...) that should help us to follow the new trends in the digital arts and understand how music should fit into them.

The Master in Digital Arts of the UPF

The Audiovisual Institute (IUA) of Pompeu Fabra University offers, in conjunction with the Phonos Foundation, the Master in Digital Arts, which covers the latest innovations in the field of visual and musical arts by digital means and presents them in an integrated way, featuring both theory and practice. The degree is awarded by Pompeu Fabra University, validated in Europe as a European Media Master (EMMA) by a group of universities coordinated by C.I.T.E. (Center for International Technology and Education) and supported by the European Union MEDIA Program.

Its general aim is to familiarize students with the digital technologies for audiovisual and music production. It consists of a common core of subjects and two specialties: Image and Music. It focuses on the new developments of computer-based audiovisual products, which open up broad creative, professional and industrial perspectives.

Objectives

- To provide integrated studies in the area of digital arts and the use of digital technology linked to two specialties: Image and Music.
- To provide the necessary academic and practical knowledge to carry out innovative productions taking into account the increasing scope and the potential of the digital medium.
- To provide the knowledge of the necessary tools for image, sound and interactive multimedia of interest to those involved in audiovisual and music production.

- To provide an overview of contemporary aesthetic trends and their influence on artistic production by computer.
- To carry out a series of practical assignments and a creative or research project.
- To exchange knowledge and experience with students of the other European Media Masters.

Course structure

The studies consists in a block of common core subjects with a total of 135 hours and two blocks of subjects corresponding to the two specialties Image and Music, of 225 hours each. There is also guided practical work amounting to 300 hours. Furthermore, students are required to carry out a Project and attend a European Forum.

The core subjects (135 hours) are the following ones:

- Digital images (22.5 hours): Art and technology. History of calculus and calculating machines. History of computing. History and survey of synthetic images.
- Networks (10.5 hours): Design and technology of network-based communication. Navigating and page editing.
- Audiovisual technologies (12 hours): Introduction to concepts and technologies of image and sound.
- Digital music (12 hours): History and current survey of the Computer Music field. Basic computer techniques for music production.
- Interactive programs (10.5 hours): Survey and characterization of interactive programs. Hipertext. Alternative literature. Interactive fiction. Non linear narrative.
- Programming (22.5 hours): Basics of computer programming. Java language.
- Aesthetics (12 hours): Artistic expression with digital media. Contributions to the area of theory, criticism, analysis, etc.
- Computer resources for research and production (12 hours): Methods and procedures to carry out research and production in the digital arts field.
- Cyberculture (10.5 hours): Communication networks and their social, cultural and political aspects.
- Production and the market (10.5 hours): Industrial survey of digital arts. Projects, production and management.

The Music specialty (225 hours) includes the following subjects:

- Theory and history of music (45 hours): Description of the musical system and its applications from a modern perspective. Music history and analysis.
- Music programming techniques (30 hours): Programming techniques for audio applications and music.
- MIDI and interactive programming (45 hours): Introduction to the MIDI protocol and MIDI-based equipment and programs. Programming interactive music applications.
- Sound synthesis and processing (30 hours): Theory and practice of the synthesis and processing of sound by computer.
- Algorithmic composition (30 hours): Computer-assisted compositional techniques.
- Music composition workshop (30 hours): Theory and practice of composition techniques.
- Audio postproduction (15 hours): Techniques and processes for organizing the sound materials that make up an audiovisual production.

The Forum is a meeting of all European students of EMMA master's degrees organized by C.I.T.E. in order to exchange experiences. The Forum lasts approximately a week and is held in a European city.

The Project consists in carrying out, under the supervision of a tutor, a production or research assignment in one of the areas covered by the master's degree.

Educational examples

As explained above, the way that Computer Music is structured inside the educational system is different in every country and institution. Here we include a commented list of centers representing different approaches to Computer Music education. We have only listed centers that go beyond the music framework and favor a digital arts point of view.

- *Audiovisual Institute, Pompeu Fabra University, Barcelona, Spain.* [<http://www.iaa.upf.es>]
Education, Research and Production center dedicated to the Digital Arts. In terms of education it offers the Master in Digital Arts with an specialty in Music (described above). The rest of the education is done as part of the School of Audiovisual Communication of the same university, which offers undergraduate and graduate degrees in the general area of audiovisual communication from a humanities point of view.
- *California Institute of the Arts, USA.* [<http://music.calarts.edu>]
Institute devoted to all the arts and with a strong emphasis on interdisciplinary work, offering both undergraduate and graduate level degrees. It includes a School of Music and a Program in Integrated Media. The school of Music includes degrees in Composition-New Media (graduate level) and Music Technology (undergraduate level).
- *Center For Research in Electronic Art Technology, University of California, Santa Barbara, USA.* [<http://www.ccmrc.ucsb.edu>]
Education, Research and Production center in the field of multimedia art and technology with a major focus on Computer Music. It has strong ties with the Music Department and its undergraduate and graduate degrees in music.
- *Institut du Multimedia & Architecture de la Communication, Université Paris II, France.* [<http://imac.u-paris2.fr>]
Education and Research center focused on the digital technologies of image, text and sound. It offers a Master in Audiovisual and Multimedia, with an artistic perspective, and an Engineering degree in Media and Communication, with an engineering perspective. There is not much presence of music courses.
- *Institute for Electroacoustics and Experimental Music, University of Music and Performing Arts, Vienna, Austria.* [<http://fgidecl.tuwien.ac.at/mhinst-elac/>]
Education, Research and Production center dedicated to Electroacoustic music with some emphasis on the digital arts aspect. It offers a degree in Computer Music and Electronic Media and another one in Sound Engineering.
- *Media Lab, Massachusetts Institute of Technology, USA.* [<http://www.media.mit.edu>]
One of the largest and most important research centers dedicated to the general area of information technologies. It has an engineering approach to the field and it includes Computer Music as one of the research areas. In terms of education the Media Lab is associated with the Program in Media Arts and Sciences which offers undergraduate and graduate degrees. The artistic aspect of music is not part of these degrees.
- *Royal Conservatory of Music and Dance, The Hague, Holland.* [<http://www.koncon.nl>]
A traditional conservatory that has incorporated many new specialties including Computer Music, Image and Sound, and Music Registration.
- *Technology in Music and Related Arts, Conservatory of Music, Oberlin College, USA.* [<http://www.timara.oberlin.edu>]

Special undergraduate program of a traditional conservatory dedicated to Computer Music with a digital arts approach.

- *Utrecht School of the Arts, Holland.* [<http://www.hku.nl>]
One of the largest schools of the arts in Europe. It includes a Faculty of Music, a traditional conservatory with a somewhat traditional curriculum, and a Faculty of Art, Media & Technology which offers an undergraduate degree in Music Technology with a very practical and artistic approach.

Conclusions

We have presented some preliminary thoughts related to the benefits that music education should have by incorporating a strong Digital Arts point of view. We have also described practical examples of this music education perspective. This approach does not exclude other approaches to musical education; it is just a new one that can offer a new educational framework and fresh ideas that should be complementary to the other ones. We do not claim to have reached any definite conclusion, but just opened topics to be discussed further and to be constantly reformulated.