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Virtual Virtuosos: A Case Study in Learning Music in Virtual Learning Environments in Spain

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Abstract

In recent years, the development of Information and Communication Technologies (ICT) has contributed to the generation of a number of interesting initiatives in the field of music education and training in virtual learning environments. However, music education initiatives employing virtual learning environments have replicated and perpetuated the traditional model, resulting in sub-optimal use of ICT and curricular delivery that contributes little to the fostering of autonomous learning.

A review of online music education initiatives reveals generalised behaviour that suggests the existence of a little researched field holding great scope for further investigation.

This case study reflects how the instructional paradigm applied to education results in a less than optimal use of technical resources and the web, limiting the capacity of students to manage their own learning. This pedagogic paradigm is invoked not so much as a premeditated strategy but as the result of reliance upon traditional practice. Despite the existence of both individual and collective communication channels, teachers default, with preference, to a one-to-one relationship with the student. The resources are in place and teachers with the requisite technological background exist, however, none of these inputs are exploited sufficiently due to the instructional model implemented.

Keywords: e-learning, music education, virtual conservatoires, on-line education

Introduction

The development of Information and Communication Technologies (ICT) has affected all aspects of human activity. Music has been an on-going test bank for the investigation and development of services and applications in the field of music reproduction and creation, including the field of learning with initiatives in education in virtual environments. That said, within the music field, tradition and innovation are simultaneously complementary and conflicting forces. The presence of a teacher is understood to be an added-value in the learning process. Consistent with this view, virtual environments dedicated to music education have demonstrated a tendency to perpetuate this feature in the new medium, with the associated difficulties related to the absence of a teacher and less than optimal use of the ICT resources which could make a significant contribution to the development of autonomous learning.

This article analyses the findings of a case study that shows use of virtual learning environments in music education are not developing a methodological shift in teaching and learning music, but replicating traditional methodologies on new technologies.

Theoretical framework

Despite the dearth of studies centring on musical education in adults, the evolution of learning theories has contributed data, concepts and resources applicable to any stage of human development. Additionally, the emergence of e-learning has added impulse to the evolution of these theories as they are adapted for use in virtual environments.

Some of these approaches display clear parallels with musical training. Gagné's learning results theory (Williams, Schrum, Sangrà & Guàrdia, 2007) is significant: students acquire intellectual abilities, concepts and procedural rules which are assimilated through cognitive strategies. The teacher explains his or her own learning mechanisms often but, in the end, the student establishes his or her own. Instrumental proficiency involves motor skills acquired in the same way through repetitive practice. Finally, students develop their own attitudes as a function of their own role model observation (the musicians they admire

and prefer).

The opportunity this research presents resides in the object observed: the ConservatorioVirtual.com is the first institution created in Spain with the mission of delivering music education and training in a virtual environment. Others have followed it (i.e., AulaActual.com) and it seems reasonable to predict that similar offers will continue to emerge, above all, as a result of the resources dedicated to the technological development of teaching activities that public institutions have made available.

Despite this, virtual learning continues to maintain and rely upon traditional, face-to-face classroom delivery schemes, much as it seems to be in this case. This behaviour continues to reaffirm the notion that technological resources are "mere vehicles" (Clark, 1983). Music and the associated technological capacity to integrate sound and image endow these vehicles with the appearance of modernity which, in the end, is just that- an appearance.

Research questions

The observation of on-line music education teaching initiatives reveals some generalized behaviour that suggests the existence of a little researched field holding great scope for further investigation. The specific line of investigation can be articulated through the hypothesis of demonstrating that the learning of music through the ConservatorioVirtual.com reproduces the mechanisms of the face-to-face environment, employing technology as a "mere vehicle" for knowledge transfer. This limited use of technological opportunities and on-line working is related to the pedagogical paradigm applied in training, the causal element in this situation.

This is an inductive hypothesis, formulated as a result of observation of actual practice and ascertained through various other manifestations. In that sense, the hypothesis is articulated as a supposition, expressed without subjective bias in the evaluation of the final results. The selection of a paradigmatic case study aspires to identify trends and lessons which may be applicable and transferable to similar contexts in other fields of endeavour.

The research focuses on determining the general mechanisms of study at the ConservatorioVirtual.com the research directs its attention to those specialist areas where the technology can deliver added value to the learning process. To this end, some courses were selected for analysis: Composition, Film Scoring, and desktop Music Publishing employing the Finale software developed by CodaMusic.

Research methodology

The case study implies a qualitative approach with regard to its treatment of analytical elements. And, as opposed to "knowing a little about many people", the underpinning aspiration of the quantitative paradigm, this initiative sets out to "know much about a few people" (Alberich & Roma, 2007). The depth achieved is complemented by a case study which is narrowly targeted. The observation is focused upon teachers because it is they who are developing the content and they who display the educational use of the technology.

The selected courses are those where technology has the most potential to add value. The Composition course should facilitate an evaluation of the performance extracted from the software applications that simulate musical ensembles. Film Scoring presents similar objectives, but somewhat more broad given the didactic potential of video. The desktop publishing through the Finale program should have to display a significant capacity to employ web-based resources. In all three cases the objective is to assess whether the on-line component adds or detracts possibilities from the learning process.

Data collection

The collection of data followed three approaches:

1. Interviews with a dual orientation. One examined course content, assessment methods, and classroom dynamics, while the other explored the established roles between student and teacher.
2. A second line explored the development of resources, which technologies are deployed, and, most importantly, how useful they are.
3. This information was cross referenced with information regarding course structure, description, objectives and resources following the premise established by Rodriguez Sabiote, Pozo & Gutiérrez (2006) that there are as many methods of triangulation as there are developments and uses for them.

This triangulation process helps to evaluate the various research components from a number of

perspectives, initial objectives, results, and the intervention of ICT in the achievement of these objectives.

The analysis of the information collected was focused, on the one hand, towards the course descriptions and other elements of the web in order to contrast the public profiling of the activity with the actual contents and internal dynamic. A second line of observation monitored the transmission of knowledge: distribution and format of contents, resources (internal/external), assessment and interaction within the group and with the teacher. A third line of observation analyzed the technological competencies of teachers involved in course delivery and the functions carried out with the software in order to determine their level of ICT knowledge.

The design of the research tools endeavors to study what Badia, Barberà, Coll & Rochera (2005) denominated the "interactive triangle that represents the relationship between the student, course content and the teacher". The tools comprise a template with core/common information about the courses, an interview with each teacher, and, finally, classroom observation in each course. This methodology could generate certain reservations derived from the individual relationship between individuals and researcher. However, both the order of the themes and the sequence of the questions will be designed to foster a deepening understanding as the interview progresses, following the guidelines of Anderson & Kanuka (2002) and working to the principle that language and methodology correspond to each other. The subjective component, however, will always be inevitable because we usually adapt investigative problems to our own personal form of observing and understanding the world.

Expected outcomes

The hypothesis is derived from the observation of a reality. This predicts that the outcomes will demonstrate that the instructivist paradigm applied at the ConservatorioVirtual.com will deliver an ineffective use of the technological and web-based resources. This is not a premeditated action but the result of a model rooted in transmission of music exactly how it has been learned. The modernization would then come about as the result of the digital and web-based resources and the virtual learning environment, but use of technology-based resources doesn't seem to have shifted the teaching methodology used in music conservatories.

Arnold Schonberg once told his student, John Cage, "... for you, harmony is like an impenetrable wall of glass; letting you see what is behind but not allowing you to touch it" (Pardo, 1999:10). In the virtual learning environment we also contemplate, like John Cage, what there is on the other side of the wall. This work aspires to act as a stimulus to further research into new approaches to teaching and the transmission of knowledge needed to pass through the technological "glass wall".

The case study: general findings

The homepage of the ConservatorioVirtual.com doesn't differ substantially from those offered by other on-line educational institutions. The aesthetic treatment is comfortable and functional with a measured presence of promotional elements. The homepage contains information on the courses, objectives, contents, methodologies, academic calendar, fees and information on the academic and professional background of the faculty.

Information on the courses is generic and homogenous. Beyond the homepage, the information offered within the virtual campus becomes more specific, in technical requirements, for example, and sometimes differs perceptibly from that contained on the homepage. Interspersed between this information is the recurring comment, "It is important to follow the thematic blocks in the order of apparition, completing the assignments in the indicated sequence". The Campus Guide also reinforces the notion that, "The closest comparison to this dynamic would be a private class where the student and teacher work together on a specific proposal".

Access to the campus requires a user name and password and is channelled strictly through the homepage. Within other sections of the web, one must return to the homepage in order to access to the campus. Once within, individual courses on which students are enrolled can be selected from a drop-down menu.

Content analysis

All of the courses are presented in web text complemented with inserted images, generally musical examples generated with Finale as well as photographs or video clips for the film scoring courses. The texts are easy to read and laid out in a one page per concept format. This format comes at the occasional expense of a restriction on the depth of knowledge where complex topics requiring extended treatment are concerned. All the fragments rendered in Finale are accessible in audio format as well, although the Finale-based piano sound employed for playback is of a poor standard. High quality instrumental samples for Finale are available and would improve considerably this aspect.

Each course has its own assessment mechanisms including exercises and self-correction questionnaires.

All courses have a designated area (drop box) for the submission of exercises. This drop box will accept only one file; if more than one file needs to be submitted for an assignment it needs to be compressed or zipped.

The FAQ space is an important repository of data. It contains information on technical requirements for course access – indicating the need only for a PC, internet connection and an e-mail account. There is no recommendation regarding the connection speed, the need for broadband, or the complementary software that all three courses require.

Finale Course

The course consists in 12 didactic units spread over a 7 week period accumulating a total of 40 hours. Its instructor specifies that the only deadlines to be met are the course start and end, allowing flexibility for student self-organization of training. However, it is "recommended to strictly follow the order of teaching units" and the equitable distribution of content over the period of the course.

The teaching and learning activity consists of a review of the corresponding unit of study, the completion and submission of associated exercises, and the reception of comments and feedback. The delivery format consists of a combination of web text, screen shots from the program, program files using the Finale ".MUS" file extension, and other PDF files. The teaching materials are original and have been developed by the teacher, who has considered additional materials to be superfluous to requirements. Although the course material mentions the existence of a technical glossary, bibliography, directory of links, a library of documents, etc, there is, in fact, only a glossary and a total of four web links.

Assessment procedures are described as follows. "Continuous: Correction and return of files containing exercises (...) with a grade. Graded tests consisting of exercises and a final evaluation". In reality, the test exercises do not feature in this course. Assessment is achieved through unit-based exercises with an added final practical exercise. Assessment criteria are clearly explained.

Interaction takes place through a dedicated "Forum". All three teachers concurred that "this is not a space for them but for the students". Contact between student and teacher is carried out via private e-mail (the campus does not offer an e-mail facility). Exchanges between students are undetectable as they take place outside of the campus. On accessing the "Forum" there were 36 messages left during a period comprising six weeks. Of these, 14 were messages and 22 were responses, indicating a significant level of group activity given that none of these were from the teacher. Despite this she states that the 30 students interchanged some 360 messages with her over the duration of the course.

Contemporary Composition course, level 2: the rhythm

Similar to conservatory-based composition courses which are 4 years in length, this course is delivered over 5 trimesters. The total number of learning hours comes to 820 or 14 hours per week, which is similar to conservatory delivery levels. The actual duration of the course could become longer than 5 trimesters if the final project is taken into account. According to the teacher, however, the on-line course is delivered over two years.

Access to the 2nd level of the course, denominated "Rhythm" was obtained. The contents are organized in 4 units subdivided into chapters. At the end of each chapter there are supervised practice exercises of which only half are compulsory. There are also a series of obligatory, self-evaluated exercises at the end of each unit. While the delivery format introduces a certain degree of flexibility in terms of the distribution of work, the calendar suggests that each unit lasts two weeks.

The content format is web text-based and cannot be downloaded with the Finale generated musical examples inserted. The texts are a little longer but maintain a density level that is manageable. It is possible that the density level works against the complexity of the concepts discussed. The musical examples include graphics, arrows, and boxes to facilitate comprehension, revealing a more elaborate use of combined software. Despite the fact that Finale is capable of generating the graphics, a separate program is employed for this purpose. The musical examples are available in audio form but there is a lack of variety in the timbres used. The sound of the piano is poor in quality while the program incorporates more realistically sounding instruments. The audio reproduction does not favour or enhance the listening experience even though all three teachers confirmed they were familiar with audio processing software. The course also incorporates footnotes introduced by the teacher so as to clarify concepts. Despite the fact that additional resources are said to be available – bibliography, web based resources – these resources could not be located anywhere.

Assessment does not correspond directly with the explanation provided on the public web and is relatively complex. It consists of practical work, assessed, self-evaluated exercises, a final exam, and a practical composition project that runs parallel to the course. In summary, the assessment utilizes 5 different variables including interest, participation, and creativity.

The work method is based upon the direct master-disciple relationship and involves interchanging exercises and comments. The course room has a Forum which is used by the teacher to respond to

students. During the visit there were ten messages which had been left over a period of 2 months. These included five responses from the teacher. Despite his statement "the forum exists exclusively for the exchange of opinions between students", he uses it as a channel for communication. The influx of messages is, according to the teacher, quite dynamic and the response time is around 24 hours.

Compositional techniques for film music

The course format is similar to the other courses. The teacher explained that this is dependent upon the possibilities of the platform and the self-designed authorware. In this case the presentation of objectives is worth mentioning. These display criteria that go beyond the objectives themselves. This quality was detectable in the composition course, but here the separation is even more conspicuous. In this sense, one of the objectives is articulated as follows:

"It should be understood that the course will not evaluate the student's music from the aesthetic point of view (...). Only (...) how the music behaves as it is applied to each situation and image".

The duration of the course is expressed through its commencement and end dates. This comes to a total of 6 months, but the total number of hours dedicated to study is not clear.

With respect to the other courses, the technical requirements display no differences. Some activities require the download of video, yet there is no recommendation for users to have access to a broadband connection. The software requirements include the Real Media media player (free, link provided), and propose two alternatives for the musical files, a sequencer with virtual instruments or a Midi sequencer. During the first half of the course, the content follows the format of web text with images, in this case photos. Video clips begin to appear from module 5.

The course relies heavily on continual assessment. The self-assessed exercises are in a multiple choice or single response format and all questions must be addressed – none can be left blank. The self-assessed exercises come with the following indication, extracted from the Campus Guide, "Read carefully all instructions as if you were taking a conventional exam". This comment appears together with these exercises as a practical recommendation. The notice is relevant and reinforces the parallelism between the real world and the virtual world, as if, in some way, they were the same thing.

The communication channels are those provided by the platform (Forum and E-Mail). In this case, 9 messages appear on the Forum, left there over a period of approximately one month. Of these, only one is from the teacher who usually opens the Forum at the course start; once more the communication is based on the face-to-face relationship. The data is clear: of the 12 students enrolled, and over the period of one month, only 8 messages appear in the Forum, a clear indication of a low level of group interaction.

Faculty profile

The data on the teaching staff will be considered jointly as they display common characteristics, both in academic and professional background as well as their perspectives regarding training in virtual learning environments. This is not a matter of simplifying multiple perspectives that would allow clarifying significances (Stake, 1995). Where criteria differ, the various perspectives will be considered in the development of conclusions.

The first coincidence resides in the age of the three members of the team, who pertain to the same generation (40, 42, and 43 years-old). This reveals a recurring pattern in this professional sector where, after a number of years of dedication to artistic production, individuals gravitate towards more stable professions, with many attracted towards teaching. All three of the faculty members under observation here fit this pattern and were previously involved in the arts education field with 12, 12 and 15 years of experience respectively. Their on-line experience was acquired at the ConservatorioVirtual.com because their period of on-line teaching coincides with their tenure at the Virtual Conservatory (Finale instructor has one more year of online teaching experience).

Their training profile is disparate, even though there are some points of convergence: classical music studies – some finished, some did not – some modern music and some pedagogy. Specific training for on-line teaching is nonexistent at present, probably due to the newness of these studies, but it is interesting to observe how the on-line training experience displays parallels with technological competencies.

All three teachers were conversant with the current hardware and software, keeping both of them fairly updated, and possessed a wide range of text, graphics, image and audio programs. All three confirmed that they employed their competencies as part of their teaching, creating course contents describing complex combinations of documents and files in the elaboration of course materials. There will be further discussion of this in the conclusions section, but it is worth noting that the classes observed did not display a great deal of complexity nor variety in the elements employed; this does not signify that these characteristics are not present in other campus activities, but this is the impression derived from the observed spaces. It is worth remembering that the authorware is self-generated and may not permit

complex treatment of course contents. The Composition instructor, who is also Director of the centre, explained that the projected development of the service will involve important upgrades to the platform, tools, curriculum and contents.

None of the teachers noted any deficiencies neither in the design nor in the course contents as they currently stand. According to the composition teacher, an electronic blackboard specific for music, would add value to the tutorials and added that they are investigating its deployment. Likewise, no deficiencies are noted in technological competencies, and they enumerated their own as adequate for virtual training.

An important aspect of the research focuses upon attitudes towards virtual training in general as compared to face-to-face delivery. The comments tend towards the dismissive, recognizing few additional qualities beyond geographic freedom and its asynchronous nature which facilitates reflective learning. And while they value the range of resources available on the internet and the access it provides to distant experts, they are unaware of other e-learning initiatives focusing on music. One teacher commented that, "I don't think learning in virtual environments is the best suited to the initial stages of training". There were also comments regarding the impossibility associated with following instrumental training whereas these classes are delivered by ConservatorioVirtual.com via video conference. The wide gap between the virtual and face-to-face world is a perception that is often expressed. ("It's a very different type of activity, confidence between teacher and student develops very gradually"). With pretexts such as the type of training and arguments to the effect that contents, methodology and teachers are what count in the final balance.

In dealing with interaction, the interviews demonstrate what has already been stated: communication is based upon the student-teacher relationship, all three engaging in prompt turnaround to student enquiries. The Forum appears to be overlooked by the teachers, who don't make comments to the group (although others seem to use it). Any communication between students may exist but is undetectable because it needs to be done via private e-mail.

Discussion and conclusions

An evaluation of the data collected does not benefit from many benchmarks in this sector. Music pedagogy enjoys a long history in the 20th century but, "music education has only been the subject of investigation and analysis in relatively recent times" (Miranda, 2003:139). Despite this, the new century has reanimated educational research, particularly where ICT are concerned. Developments of schools of thought emerging from the 20th century have also provided theoretical and analytical material applicable to music.

In this sense the analytical approach employed follows pedagogical paradigms developed by Coomey & Stephenson (2001), from which we obtain four possible educational perspectives that result from the combination of two variables, contents and learning processes as applied to the two principal actors, teacher and student. The analysis will endeavour to ascertain to what extent the teacher or student control learning and also if the teacher or student control contents and activities. Combining these four factors we create a matrix with four quadrants, somewhat like a compass. The Northwest quadrant reflects the extent to which the teacher controls learning processes and activities, while the Southeast quadrant represents the opposite extreme, where these processes are controlled by the student.

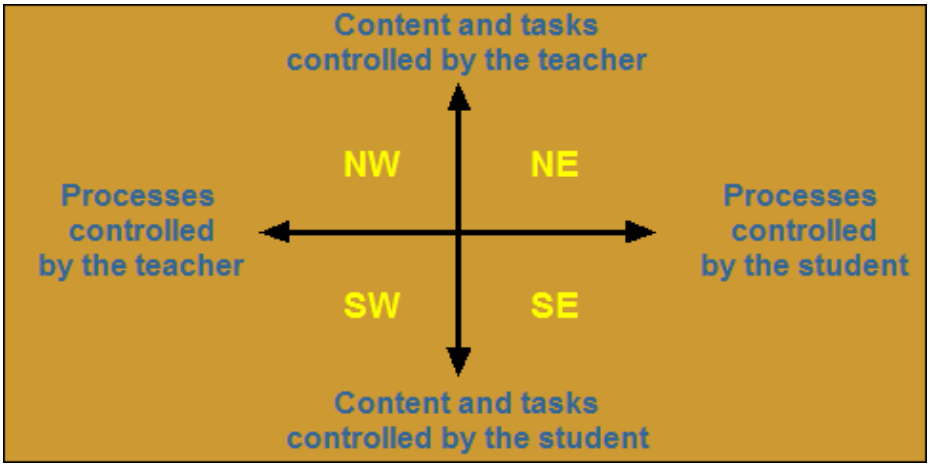

Figure 1. Pedagogical paradigms.
Adapted from Commey & Stephenson (2001)

The research hypothesizes that the ConservatorioVirtual.com follows a paradigm rooted in the Northwest quadrant: the teacher controls the contents, activities and processes. We therefore need to identify the degree to which the activity is actually located in that quadrant. The closer the educational activity is to the

Northwest quadrant, the greater the weight of proof in support of the hypothesis, and vice versa. If the analysis revealed approaches which deviated from the Northwest quadrant, the hypothesis would be refuted.

The research has already cited certain dysfunctional features: confusing course names, differences between programs and content and poor accessibility, etc. The discussion will not delve further into these elements as they do not constitute the focus of the research, although they will be referred to where they contribute weight to the conclusions.

The approaches of the three courses display a treatment which is similar in terms of style and institutional coherence, but lacking in subject specific elements in each course. All three courses possess different levels of complexity, learning and results, but employ a uniform instructional discourse with significant common content. The public homepage contains significant references concerning the organization of content that demonstrates the lack of autonomy that students will have: “It is very important that you follow the order indicated by the different thematic blocks, completing the exercises in the designated order”.

The Campus Guide clearly spells out how the educational activity develops: “The closest comparison to this dynamic would be a private class where the teacher and student wok together on a concrete proposal”. The Instrumental Workshops, delivered via video conference also replicate the model of a private lesson.

According to Miranda (2003), “teaching is highly resistant to the use of ICT, and in the case of music, even more so”. The pedagogical approach of the ConservatorioVirtual.com demonstrates what he has denominated as “distrust of the effectiveness and the degree to which ICT can be applied to education” citing the need to be in direct contact with the student associated with face-to-face training.

The educational activity follows schemes which Mason referred to as “content plus support: web-based contents and support via e-mail or, alternatively, conference” (cited by Stephenson & Sangra, 2007). The teachers have embraced the notion that little more is needed and that the quality of the content, their structuring and the quality of the teacher are the key elements to good on-line training. In this sense it is worth reaffirming Gallego and Martinez where they state that the important thing is the content. The tools employed to engage in training through the internet do not educate, they only transmit and do not create the content. It is clear that the teaching style of the teachers influences the teaching activity but learning based upon ICT provides “diverse and varied educational support (...) able to adapt to the construction processes being followed by the student, facilitating a progressive concession and transfer of responsibility” (Badia, Barberà, Coll & Rochera, 2005).

This methodological paradigm derives from an underdeveloped use of technology. This affirmation is based on a number of observations: on the one hand the format of the contents and on the other, the platform and authoring tool which provide limited scope for expansion. A third factor is the affirmation of the teachers regarding their acceptable level of ICT competence and its application to education. In reality, the materials display a linear discursive format, showing a low level of complexity. As Dewey (1938) stated, students learn better if an experiential component is integrated in the learning process, and the courses do include practical elements, but this does not contradict the fact that transmissive models are habitually discursive (Stephenson & Sangrà, 2007). All of this leads to the confirmation that the paradigm applied to training concludes in a limited use of ICT resources. The resources are in place and teachers with the requisite technological background exist, however, any of these inputs is exploited sufficiently due to the instructional model implemented.

All three courses allow for some flexibility in the delivery calendar. Only one of them imposes a mid-course deadline as a condition to continuity. This would suggest a migration towards the Northeast quadrant, but this is not as clear considering the presence of a recommended course calendar. The training activity would still remain in the northern zones of the Coomey and Stephenson paradigms, which also confirms the hypothesis. The instructors become “gatekeepers of knowledge, controlling student access to information” (Hirumi, 2002).

Juxtaposing these elements with the variable interaction further confirms the thesis. Individual and collective communication channels exist but the instructors don’t participate in the group dynamic, maintaining a strictly personal relationship with the student. With the exception of the Finale course, the number of students on the other two courses is limited. This is done precisely to foster the individual relationship. “The closest comparison to this dynamic would be the private class” (Campus Guide), and this is no source of upheaval and it demonstrates the affirmation of Stephenson & Sangrà (2007) in the sense that the same actors in the educative process, instructors and students are the ones who are resistant to change.

In light of the arguments invoked above, we can conclude that the three courses observed do not exploit in much depth the available ICT resources. The poor utilization of ICT is conditioned by the pedagogic paradigm employed in the training which is not established in a predetermined form but as a result of ingrained habits related to the manner in which they have learned to teach music.

Music lessons usually involve two types of training. On one hand instructor strives that the student learns music concepts and general artistry. On the other hand there is a lot of mechanical training, not only

related to physical conditioning appropriate for instrument performance, but also related to mental training needed to give automatic responses to diverse situations that require immediate decision making. Because of these two types of learning, a music lesson usually needs to devote time to both of them, too often mechanical training taking quite an amount of time over more conceptual, musical and artistic learning.

However, in recent years we have witnessed the birth and growth of a significant number of software applications that could easily become useful tools for music apprentices. These applications are found either on the net (www.musictheory.net, www.teoria.com, www.earmaster.com, among many others) or related to the field of videogames (brain-training applications) as well as applets designed for use in mobile devices. These software applications usually deal with quite simple aspects of music training, such as chord recognition, scales-modes identification and general ear-training issues, but when worked together, under a pre-established plan, they could become important tools that could save a significant amount of classtime. Internet has also become a space in which musicians of all kind expose not only their work but their multiple approaches to music training, deployed in a wide variety of exercises and suggestions for daily practice.

Exposing a student to all of these opportunities for training could become a means to foster autonomous learning, by widening the number of approaches that music training has acquired over time. It would also foster decision making in terms of taking the appropriate choices for working with a particular musical concept. But all of this would require that the music instructor does not lock his or her student within the classroom, thus becoming the only one to transmit "the secrets of life". Rather, it should require that classroom becomes the door that opens all these learning opportunities to the student, the instructor function being that of simply accompanying the process of making choices that would help the growth of the student's independence, not only as a musician but as a human being.

"Educational phenomenon are interactions with multiple perspectives which reside in a world that is dynamic, uncertain, and unstable" (Anderson & Kanuka, 2002:26). The dizzying progression of technology adds even more uncertainty and instability to this process. The instructor has to take on new responsibility in the exercise of his or her profession: the integration of change as an added component of the educational phenomenon, and to take on technology as an "intellectual challenge" (Xenaquis, cited by AA.VV., 1972) and finally break through the "glass wall" (Schoneberg to Cage) of past paradigms.

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