prelude

ICT in Music Education



Socrates
Comenius

Education and Culture

Good Practice Guide

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Table of contents

1. For the teacher 4
2. Introduction 6
3. The PRELUDE project 8
- 3.1. Basic principles of the PRELUDE programme 11

4.The PRELUDE training programme 14
- 4.1. Structure of modules 16
- 4.2. Content of modules 17

5.1. Best practices in using tools and technology for music education 22
- 5.1.a. Digital technologies in support of music education 22
- 5.1.b. Computer sequencer / midi files / drill & practice software 22
- 5.1.c. Audio CD / CD-ROM / Internet resources 23
- 5.1.d. Sound processor / synthesiser / sampler/ digital recording 23
- 5.1.e. Electronic keyboards 23
- 5.1.f. Using the electronic keyboard as a sequencer, using the record function 23
- 5.1.g. Hardware and software for music education 24

5.2. Workshop best practices: Delivery of training to in-service teachers 26
- 5.2.a. Best practice: workshop organization 26
- 5.2.b. Teachers workshops 27
- 5.2.c. Training courses (phase A) 27
- 5.2.d. School centred work (phase A) 27
- 5.2.e. Training courses (phase B) 27
- 5.2.f. School-centered work (phase B) 27

5.3. Trainees projects 30
- 5.3.a. Using Finale NotePad in the school classroom 30
- 5.3.b. Using Audacity for studying a leading theme with an accompaniment 31
- 5.3.c. Using Audacity to understand sound and timbre in music 31
- 5.3.d. Using Cubase to add sound and music to a narration 32
- 5.3.e. The DMA project 34
- 5.3.f. VEMUS (Virtual Eurapean Music School): A virtual music school for rural students 36

6. The PRELUDE platform 38

Evaluation of the PRELUDE project 40

Conclusions 44

#1. For the teacher

Some of the important benefits identified by teachers who use ICT in music education, are individualized instruction, improved and efficient assessment and increased pupil motivation. Pupils are motivated when they achieve goals that were once beyond their ability. The process of instruction and assessment should be designed to help pupils set and achieve realistic goals, which in turn generates intrinsic motivation. The more individualized teachers make the instruction and assessment, the more effective this process is, since pupils do not develop musically at the same rate, their musical experiences and needs are widely varied and they are not all interested in the same types of music. Studies relating to attainment generally suggest positive outcomes in terms of social learning, educational learning and the development of technology skills (Byrne & Macdonald, 2002; Cox & Abbot, 2004; Glover & Miller, 2001). However, not all practice increases efficiency and leads to more engaging teaching and learning (BECTA, 2003). A study of ICT in English secondary school music lessons also confirms this finding (DfES, 2006).

Music teachers can, for example, use ICT to develop the pupils' practical skills and musical understanding, by helping them use and investigate sounds and structure, refine and enhance performance and composition and extend their knowledge of different styles of music. There is a body of literature on how ICT can be incorporated into music lessons, particularly at secondary school level (Ashworth, 2006; Bray, 2000; Brown, 2007; Busen-Smith, 1999; Cornu, 1995; Green, 2001; Philpott, 2001;Philpott & Plumeridge, 2001; Reese, 1998; Webster, 2002). Most of this particular literature is a set of 'how to' instructions; however there is also a growing body of empirical research relating to the use of ICT in music lessons.

Obviously, the teacher needs to be familiar with all the possibilities and opportunities that ICT holds as a compensatory and/or supporting tool and must be able to determine the pupils' needs. In terms of ICT as music teaching tool, teachers must strive to achieve an appropriate blend of musical activities, concepts and technology with technological tools being used correctly and appropriately in order to enhance the music and not diminish it.

There are many ways in which technology can help teachers meet their instructional goals. These include:

- Programs designed to help students develop their musicianship or improve their knowledge of notation and skill in reading notation
- Simultaneous appearance of sound and notation
- Aids with improvisation skills
- Programs which focus on teaching music notation or performing aural tests involving recognition and dictation of rhythm patterns, melody patterns, musical intervals, chord sequences and harmonic progressions;
- Notation and sequencing programs which assist students in composing activities
- CD-ROMs focusing on music history and listening activities
- Virtual instruments allow experimentation through changes in tempo, modality, voice and transpositions

Basic requirements for appropriate and effective music technology could include:

- multimedia computer (with a sound card and a CD-ROM drive).
- Appropriate educational software including both open and closed programs. Open programs are applications where the user (teacher or student) can access and interact

with the information, manipulate and personalize it. They include music editors, sequencers, sound editors and multimedia platforms. With the closed programs, on the other hand, the user cannot alter the information nor be involved in generating activities. These programs include tutorials, entertainment programs and multimedia applications.

- MIDI keyboards or sound modules.

All these ICT devices can and should be integrated and supported with other already established ways of teaching music, as embedding them in the music curriculum saves time and resources, by reducing teacher workload in terms of lesson preparation, planning and assessment. (Laurillard et al. 2000).

Music teachers are crucial to the successful use and integration of ICT in music education. They should take new roles and responsibilities if ICT is to be effectively applied to enhance teaching and learning quality. The main focus for teachers should relate to developing ways of fully and appropriately integrating ICT use into their existing teaching and learning programs. In particular teachers are challenged to develop ways for optimizing the level of cognitive and creative involvement of students. They are also required to devise appropriate and valid methods for assessing or evaluating student achievements.



#2. Introduction

Music technology has become a recognized subject area in its own right. There is no doubt that technology has become increasingly prevalent in schools all over the world and that there are still many exciting developments in this area on the horizon.
The benefits of using ICT in the educational process reside both in the manifold instruction opportunities it offers and in the transformation of relationships among learners, teachers and the learning equipment.
Inside the European PRELUDE project, a Music Education Consortium formed by 7 Countries (Greece, Austria, Estonia, UK, Sweden, Spain and Romania) conducted an investigation on the ways of effectively integrating ICT in music education through the creation of a common pool of tools and applications for music education. The PRELUDE project is designed to address the educational needs by employing up- to-date findings from the fields of music education, computer and web based applications.
This document is addressed to music teachers and provides a series of examples of good practice for the usage of Information and Communication Technologies (ICT) and Open and Distance Learning (ODL) applications in the classroom. Its aim is to be a full, systematic, practically useful and directly applicable guide for music teachers who are willing to follow the proposed training programme. A principal objective of the Guide is to present case studies of teacher using ICT in music education that are recorded on the PRELUDE platform (mini-projects).
This guide is a brief presentation of the PRELUDE project, basic principles of the training curriculum and modules.
A few cases of trainee's projects are also presented to inspire good practices. A short manual on how to use the PRELUDE is also given. The guide is completed with important results from the evaluation of the project.


Once
upon a
time...

#3. The PRELUDE project

The PRELUDE project develops a training programme for the use of ICT in music education and is addressed to in-service music teachers. The implementation of the training programme takes place in five European countries (Greece, Romania, Sweden, Estonia and Spain) and is completed in two cycles while each cycle has six months duration. The project is funded by the European Commission under the Socrates Programme (Comenius 2.1.)

Aim of the project is to provide training and support to music teachers on using ICT in their classroom and integrating it in a flexible and pedagogically oriented curriculum.

The use of technology in general and information and communication technologies (ICT) in particular in the world of music today is an inescapable fact. The use of technologies in music teaching and learning has been a field of research for many years and the highly interdisciplinary nature of the field is reflected in the diversity



Figure 1. The PRELUDE project website on http://www.ea.gr/ep/PRELUDE/

of approaches given to the applications of ICT in music.
PRELUDE is developing a training programme on Information and Communication Technologies (ICT). It is addressed to in-service music teachers (primary and secondary teachers, instrumental teachers and teachers of theory of music) and aims to teachers' lifelong learning and familiarization with innovative teaching tools and teaching practices. PRELUDE is based on an up-to-date distance learning course. Training material is supported by an e-learning platform, specially adapted for the project. This platform will be constantly updated and include online training material such as modules, lesson units, activities for the trainees in combination to audiovisual material. Thematic areas of the programme are:

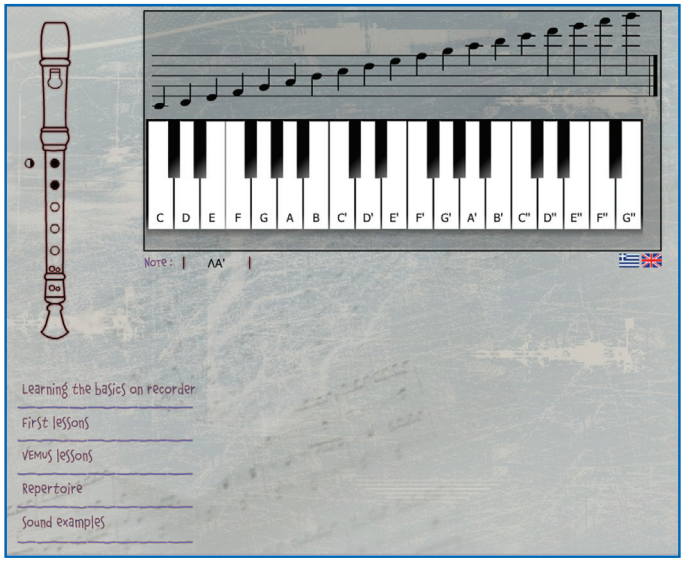


Figure 2. Recorder fingerings illustrated through an interactive piano

- Theoretical and methodological approaches to the incorporation of ICT in music education.
- Introduction to basic ICT skills (use of internet, e-mail, word processing, power point and other programs).
- Familiarization with basic tools of music technology (sequencers, MIDI, software).
- Presentation of particular educational software that address different areas of music curriculum, such as performing skills, notation, theory of music and creative activities (composition, improvisation, recording).
- Software applications into music classroom by using specific learning scenarios.

Through the project website music teachers were initiated to the PRELUDE programme and returned to it for finding news, events and conference announcements. A small interactive piano welcomes and initiates the website user to the underlying concept of using ICT in music education.
The website inspired a learning scenario where a similar interactive piano was re-used for the introduction of basic recorder fingerings (Figure 2).

The main outcome of the PRELUDE project is the development of a specialized training programme that will affect both the teaching and the learning of music. The consortium of the project is spanned to seven countries, namely Greece, United Kingdom, Sweden, Romania, Estonia, Austria and Spain.

All training material is accessible via the elearning platform specially adapted for the PRELUDE programme: www.e-PRELUDE.eu (Figure 3).

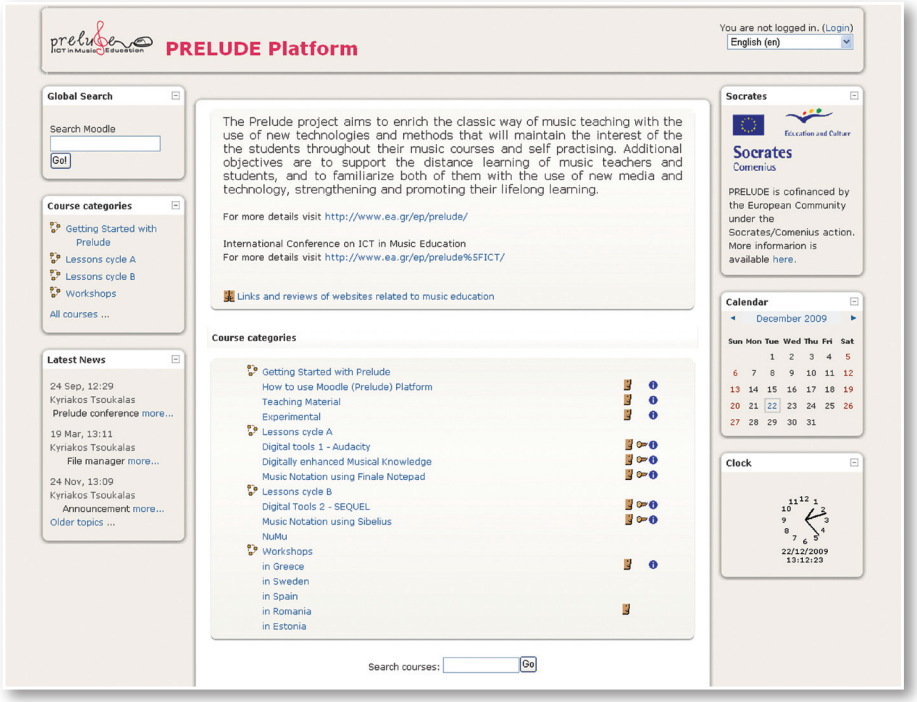


Figure 3.The e-learning platform provides access to the training material

#3.1. Basic principles of the PRELUDE programme

The basic principles of the PRELUDE programme are identified in the needs analysis which imitated a user centred approach that characterised the project throughout. In its turn the development of the pedagogical framework has been informed by the main findings of the needs analysis report and the market research and builds on already existing strengths within each country. According to these findings and following discussions during the project the idea that teachers are crucial to the successful use of ICT is respected during the design, development and evaluation of the training programme. Teachers should be required, and should be positively encouraged to assume new roles and responsibilities if ICT is effectively applied to enhance teaching and learning quality. Initial teacher education for all teachers should include compulsory ICT training to an adequate level of competences and skills. The main continuing need for teachers should relate to developing ways of even more fully and appropriately integrating ICT use into their existing teaching/learning programs. In particular, teachers need to continuously develop ways of optimizing the level of cognitive/creative challenge involved in the students' use of ICT and devise appropriate and valid methods for assessing or evaluating student achievements as demonstrated during the course of such use.

Furthermore, a fundamental question that the needs analysis addressed was "How can the use of ICT raise standards in music education?". According to the needs analysis, ICT can be used as a tool to support teachers in accomplishing the following tasks:

improving the lesson design through learning platforms;

developing tools and resources supporting the creation of a strategic vision for teaching and learning;

engaging and motivating pupils to access online the learning resources;

providing opportunities for pupils to learn in alternative and challenging ways, using a wide range of sources of information and techniques to support critical thinking;

enabling both collaborative and individual work;

providing pupils with access to sources of information relevant to a particular enquiry by searching websites on the internet;

helping pupils to investigate musical alternatives by means of sequencers;

enabling pupils to improve their compositional skills through the use of sequencers;

helping pupils to review, refine, redraft and modify work in progress;

assisting pupils to refine their performances and present them more effectively and in different ways;

Thus the pedagogical framework may be seen through the perspective of awareness raising exercises that assist trainees to move beyond simply gaining knowledge of technology and music and move towards a greater awareness of their own self and identity. In that sense the adopted pedagogical approach takes into account a wide range of activities and runs on two axes; on the vertical axis, running from Personal knowledge through to subject knowledge, whilst the horizontal dimension is set within the broader role moving from personal development through to the organisational development.

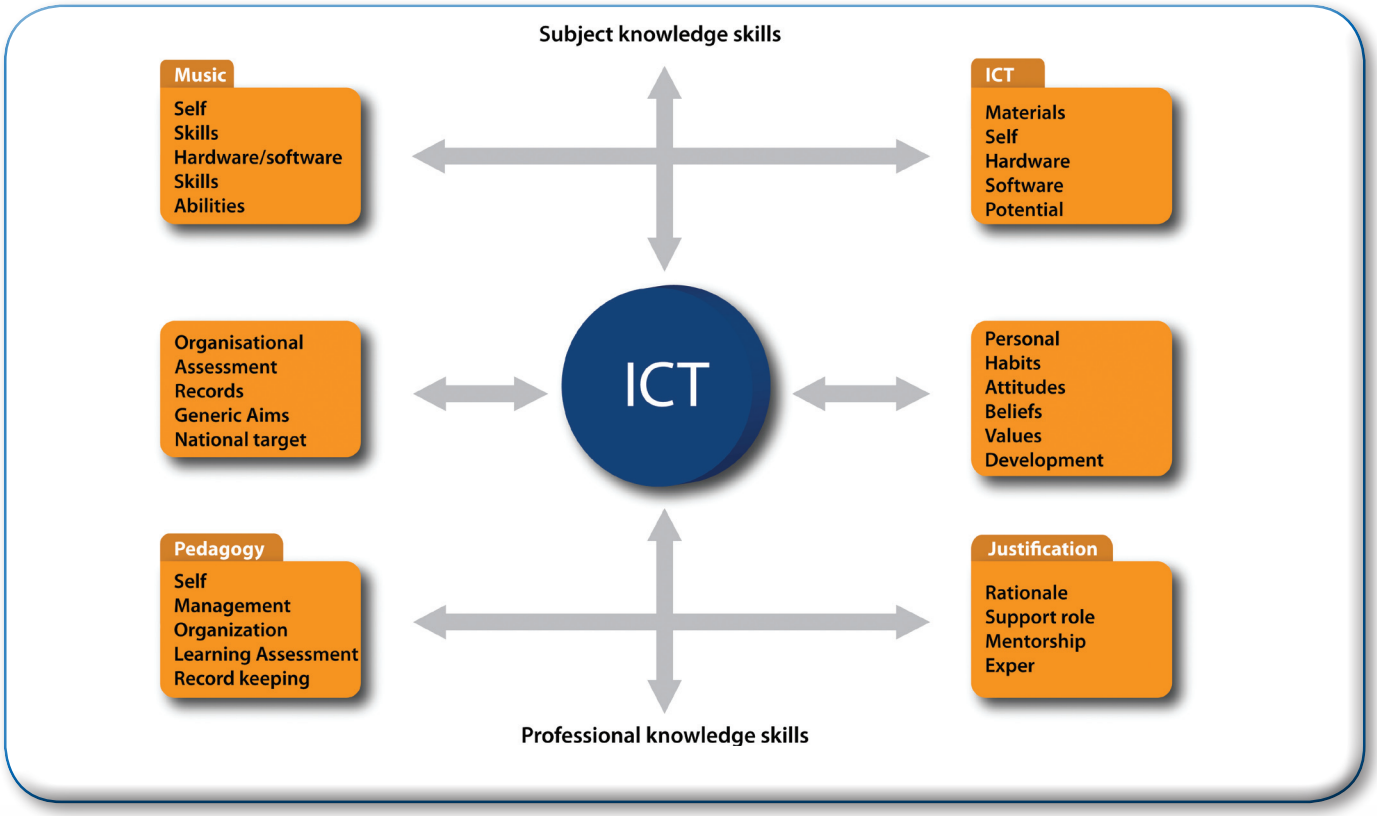


Figure 4. The pedagogical framework of PRELUDE

As a basic principle of the PRELUDE programme the design of the training programme takes into account the differences between countries and educational systems. As a result the developed training framework is broad but sufficiently structured to enable all partners to work within a common structure whilst remaining sufficiently flexible to enable indi-

vidual countries to encompass their own training needs.The training programme is designed to be sufficiently specific in order to teach and develop skills, knowledge and confidence but also be sufficiently general to:

I. be of use to all countries, regardless of their national music curriculum

II. be sufficiently broad with sufficient generic concepts to be incorporated into the varied level and pattern of training required by each partner

III. be sufficiently accessible to all partners by having due regard to cost

Overall the PRELUDE training approach is expected to enhance the professional and personal skills of music teachers as well as to develop their skills and abilities in designing and evaluating learning scenarios and didactic plans. The expected impact of the training programme can be specified in the followings:

- The users (i.e. the trainees of the programme) will take advantage of the recent technological innovations and develop tools for enhancing their music teaching.
- They will be motivated to access online learning resources and music educational applications.
- They will have opportunities to learn in alternative and challenging ways, using a wide range of resources and methods to support their critical thinking.
- They will learn to work collaboratively as well as individually through school-centered work they will share with others.
- They will develop their self-reflection within a broad area of activities, influences and experiences.
- They will develop both their subject and their professional knowledge skills on aspects such as music skills, ICT equipment, organisation and classroom management, personal developments and pedagogy.
- They will learn to implement and access specific case studies.

#4. The PRELUDE training programme

The design of the PRELUDE training programme relies heavily on the results of the needs analysis that was completed at the beginning of the project. The results analysed data from a survey with 175 participants (25 teachers from the seven countries of the consortium). The methodological approach consisted of gathering both qualitative data through individual teacher interviews and quantitative data through the completion of questionnaires. Questions were aimed at providing a detailed picture of the resource and training needs of teachers with specific reference to ICT and Music education.

The teachers were asked about the expectations they have from an in-service training on music teaching. They agreed that such training will provide a lot of tools that will make their lessons more efficient and attractive, too. They need didactic strategies for incorporating software in their teaching, as well as strategies on how to use a computer in classroom. Briefly, the teachers' expectations from an in-service training emphasised on:

- introduction of ICT for creating music lessons more attractive and even interactive;
- ICT training to facilitate the access to music information and proper audition;
- support provided to help teachers use the new methods in classroom and enhance pupil learning and enjoyment;
- provision of new possibilities for creative dynamic lessons in which pupils and students are going to do something practical with music.
- tools that make lessons more efficient; with resources in order to improve the organization of the teaching material.

A high level of requests was made directly by teachers that aimed at notation package. It was also noted a certain level of ignorance of the potential of technologies especially as far as the web storage is concerned. It was thus stressed by the designers of the training programme that awareness raising exercises are needed to help the trainees realize what they can do and what their strengths are. According to the survey results, teachers suggested that their training, in terms of knowledge and skill should include training on a) Notation packages, b) Composition and improvisation skills, c) Basic ICT skills, and d) Classroom organisation. Specifically, through face to face semi-structured interviews 50 teachers in Romania and Greece were asked about the methods and tools they would like to include in their teaching (Figure 5).

In order to develop the content of the

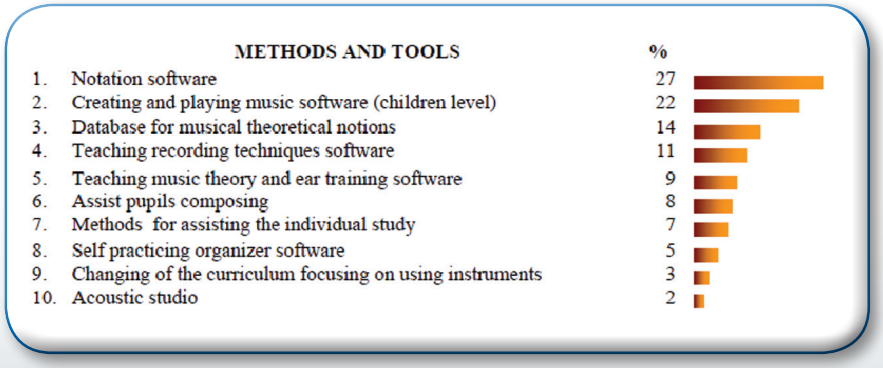


Figure 5. Teachers' expectations from in-service training regarding tools and methods

training programme we should start from the user's point of view and try to identify the basic learning scenarios of using ICT in the music classroom. For this, it was proposed that all countries involved could videotape some skilled teachers who use ICT in their music lesson. These video tapes could be incorporated in the multi-media teaching material of the platform.



#4.1. Structure of modules

The PRELUDE training programme is structured on conventional courses-workshops and on material that is structured in modules on the PRELUDE distance learning platform (www.e-PRELUDE.eu). One could state that the platform constitutes the global approach of the programme and the workshops, the local one. The workshops "localized" the content of the modules to suit their trainees' needs.

Here we see the global approach of the PRELUDE training programme as structured on the platform. The PRELUDE training programme is spanned into two implementation phases lasting approximately six months each. Both cycles overall have four modules themes which can expand in both cycles:
MODULE I: Digital Tools - recording and editing,
MODULE II: Digitally enhanced musical knowledge
MODULE III: Notation packages
MODULE IV: Caught in the web
This four module structure is broad and flexible to encompass various lessons. That is, the content of a module covers more than one lesson that share the same module theme. **Getting started with PRELUDE**
Before introducing the trainees to the core of the modules a brief introduction into using moodle and the e-learning platform "PRELUDE" is given. The provisions of a few tutorials and useful information ensures that each trainee becomes a competent member of the



Figure 6: The structure of the PRELUDE modules

PRELUDE user group

MODULE I: Digital Tools - recording and editing,

Aim of this module is to teach trainees how to use a computer program for basic sound recording, editing and sharing and how to incorporate it into their own teaching. After extensive market research the free software Audacity was chosen for the following reasons: (i) it supports multilinguality, (ii) it has a friendly user interface, (iii) it is easy to install and manage, (iv) it does not require specific hardware/software as it works both on Mac and PCs and (v) it is a free software and no purchasing of user licenses is needed.

MODULE II:Digitally enhanced musical knowledge

In module this module the trainees consider a range of music software and are encouraged to develop ways of creatively incorporating these applications into their own music teaching. Demos and case studies from commercial and open-source software are presented considering the different level and age of pupils and a range of teaching objectives.

MODULE III: Notation packages

This module develops the skills needed for creating a digital music score (such as inserting notes, lyrics, dynamics and musical expression signs and creating scores for various instruments and/or voice). The module is based on an open-source software named FinaleNotepad which consists the free version of the commercial software Finale

MODULE IV: Caught in the web

This module is based on the needs analysis that revealed a clear and distinct lack of knowledge of the potential of web storage and the instant messaging and search engines programmes in combination with the access that all countries have to the web Module IV draws together the learning and skills developed through modules I,II and III and develops the trainees' competencies in ICT in a whole school setting. This module envisages the school of tomorrow by incorporating the technological progress and the resources provided via the internet. It is anticipated that trainees who follow this module could develop by the end of this an ongoing ICT music portal for use across the school.

#4.2. Content of modules

During it the first phase of implementation (training cycle A) the programme is structured around one free software, named Audacity. Audacity (audacity.sourceforge.net) can be used for a number of musical activities, such as looping, importing and saving to various formats, sequencing, pitch changing, real tuning, time stretching, multitracking, editing and mixing. The lessons on Digital tools 1- Audacity include videotaped examples of good practice that cover a range of musical activities and screenshots of Audacity functionalities. During the training programme the trainees should implement suggested activities with Audacity in their lesson and record their feedback.

The lessons on digitally enhanced Musical Knowledge provide trainees with a wide range of educational material and information on different types of music software (both commercial and free). Tutorials to get to know some of the presented software are also included so that teachers can use them for their own teaching needs. Further case studies and demos demonstrate how music applications can be used in music teaching.

The lessons on Music Notation using Finale Notepad realise the scope of Module III Notation packages. Finale NotePad is is a free program working on both Mac and Windows computers. Aim of this module is to show the workflow from starting a new score to printing on paper in a general way as possible. The knowledge acquired here using the NotePad is useful and transferable when using a more professional application like Sibelius or Finale.

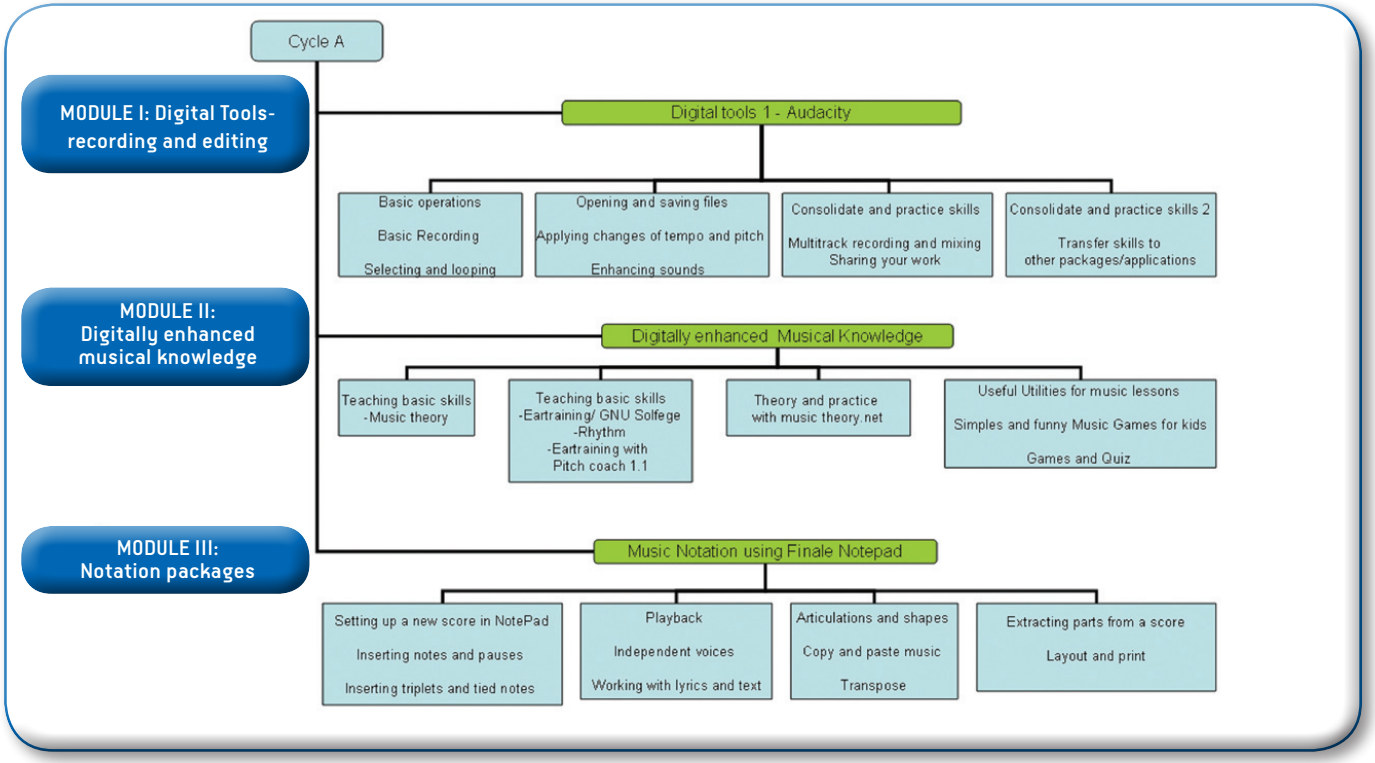


Figure 7. Lessons corresponding to modules of Cycle A of implementation

During the second phase of implementation the MODULE I covers lessons on the use of the application Sequel, a digital studio tool that can be used in the classroom. The application can be used by the teacher when preparing lessons or during teaching as playback platform and recording studio. Students can use the application as a tool for musical experiments and as a creative tool for testing and developing musical ideas

In the MODULE II notation packages, the trainees expand their knowledge to using Sibelius. Sibelius is an advanced, compared to Finale notepad, scorewriter program. It is used by composers, arrangers, performers, music publishers, teachers and students, particularly for writing classical, jazz, band, vocal, film and TV music. In addition to editing and printing scores, Sibelius can also play music back using high-quality sounds, scan in printed scores for editing, and publish scores on the Internet.

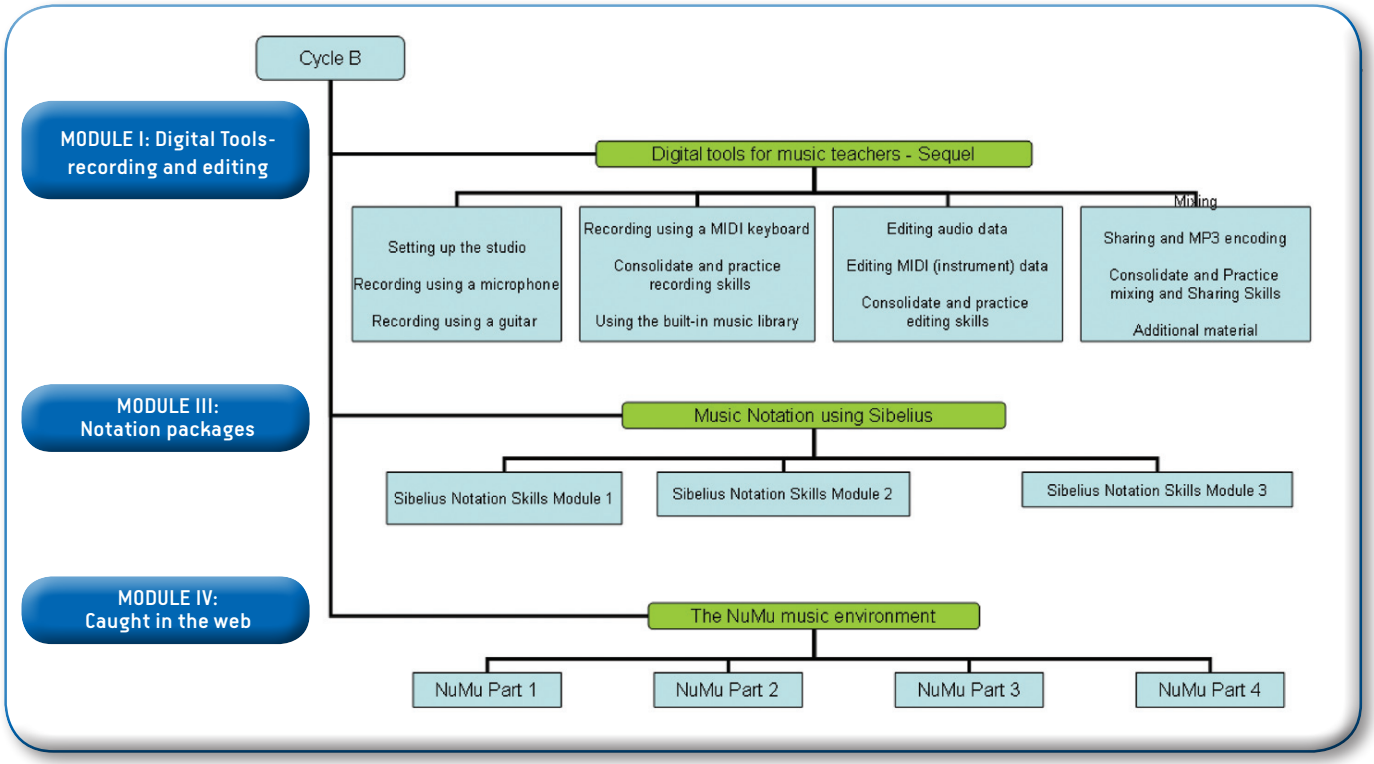


Figure 8. Lessons corresponding to modules of Cycle B of implementation

As part of the Module "Caught in the web" The NuMu site is presented. NUMU (www.numu.org.uk) is a unique website for young people to safely publish their music and meet other young musicians and communicate about their music online. It features a unique national weekly chart of music made by young people. Schools can join NUMU and establish their own school record label, and enable their students to create an online portfolio of work. It can be used as a forum for students to share their music with their peers across the country & to receive feedback. Each student has their own web page where they can publish music, write blogs and receive feedback from the NUMU community. Teachers have complete moderation control over their students' online portfolios and can create online project pages to share resources and support activities.

Each month students write over a thousand blog entries on NUMU while the reviews section gives students a chance to try their hand at music journalism.
As part of the "Caught in the web" Module two projects are presented the DMA project and the VEMUS project, presented in detail later in subsequent sections of this Guide.
The DMA project (Distance-learning Music Agoge) is a pilot e-learning project for music teaching aiming to encourage young people living in remote places around Greece to learn a musical instrument under the guidance of an experienced teacher. The platform Adobe-Connect pro is used as the tele-conference platform that supports the weekly lessons and allows online storage of teaching material.

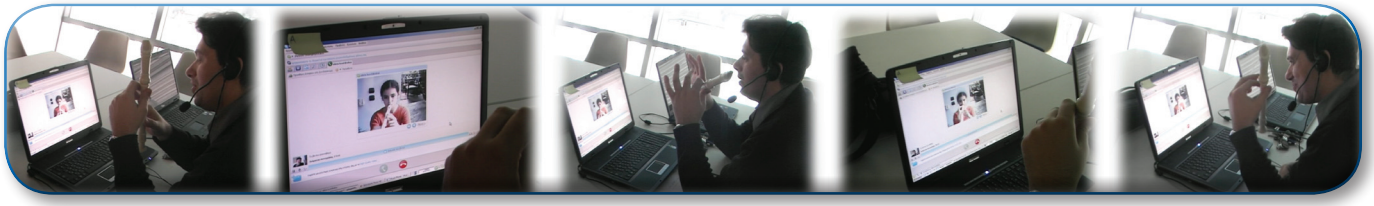
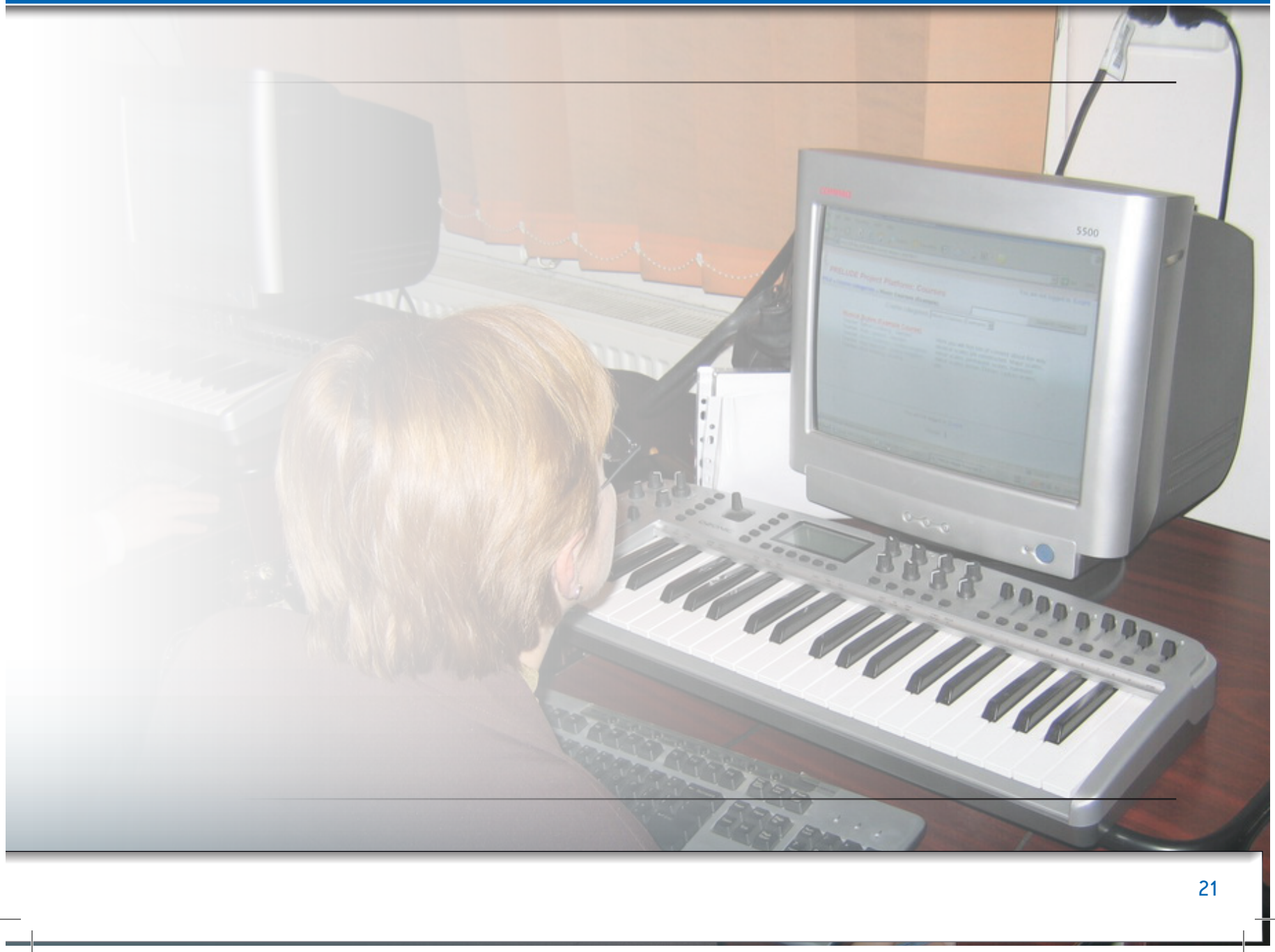


Figure 9 DMA is a e-leanring service for music teaching in remote areas


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#5.1. Best practices in using tools and technology for music education

Recent research demonstrates that many digital technologies are being used to support the implementation of musical curricula (Burnard and Finney 2007). The issue of concern here is how to best work out the key concepts of music education curricula into realistic classroom activities that promote learning through the integration of Digital Technologies. In this section we give a brief overview of the possibilities of ICT in music education. This overview and the brief description regarding workshops that follows should give insight and ideas to people who would like to organise workshops that make the most of the content of the PRELUDE modules.

#5.1.a. Digital technologies in support of music education

ICT provides the means to access a wide variety of sources of information and provides the opportunity for interaction between people involved in different stages of music production.
For example ICT can help pupils:

- make and explore sounds
- record for different purposes
- structure music
- interact with different information sources
- perform and compose music
- understand musical processes

The following bullet points give an overview on how ICT can be used in the classroom to support music learning.

#5.1.b Computer sequencer / midi files / drill & practice software

- use a midi sequence file as accompaniment or stimulus for improvising e.g. drone, chord sequence, rhythmic genre
- pupil uses sequencer as a composing tool (single or in pairs)
- pupils devise a repeating looped sequence, or a sustained timbre, as one element of a class or group composition
- use a midi file while teaching vocal/instrumental parts; use solo, loop, mute etc. to aid teaching
- search for and download midi files
- devise a way to perform a song / instrumental using midi file / sequence as accompaniment
- listening / responding / refining as a class to a given sequence: timbre / structure / texture
- use 'creative composing software' to reorder given material, edit timbre, tempo, structure, texture to achieve a satisfactory result, according to the styles offered by the software, preferably within the current classroom context
- download midi files of music relating to a specific historical / cultural / geographical / stylistic or topic; listen to and appraise; use as supporting material for research
- as above, but focus research on musical content e.g. modality, chord sequences, blue notes.

#5.1.c Audio CD / CD-ROM / Internet resources

- compare recordings of own compositions on a given concept alongside similar commercial recordings, refine and enhance
- use CD-ROM (music) encyclopaedia to research a specific musical style / historical period/ geographical area / social context / instrument / composer, (group)
- as above, but via online search
- explore one piece of music presented in a multimedia format on CD-ROM, in the context of other complementary classroom activities; music learning points may depend upon CD-ROM presentation
- support individual / group instrumental or ear training skills with drill and practice software
- pupils identify which ICT resources have been used within music to which they listen

#5.1.d Sound processor/synthesiser/ sampler/digital recording

- explore a range of sounds, then process, use within a composition e.g. poem, soundscape
- collect, label and sort a wide variety of sounds
- use equipment to modify a sound in as many ways as possible, use results for composing
- explore natural reverberations; compose specifically for a large space, using reverb.
- use a sound processor to modify a performance
- listen and respond to music that uses real or electronic processing; use as a stimulus for composing
- 'Use ICT to create, manipulate and refine sounds' (Breadth of study)

#5.1.e Electronic keyboards

- use keyboard timbres / styles as part of composition, (group or whole class)
- use accompaniment backing for improvisation e.g. within performance of known song
- use pitchblend etc. for expressive control of melodic playing
- explore manual and auto playing of chords, create chord sequences, improvise to chord sequences
- use rhythm accompaniments as supporting resource when exploring 'duration' (pulse, rhythm, accent)
- investigate styles, devise accompaniments for songs / instrumentals
- use keyboards as a resource for normal classroom performing activities with pitched instruments e.g. learn and then perform a round (group / whole class)
- perform song / instrumental using sequence as accompaniment
- listen to and appraise styles relating to a specific cultural / geographical / stylistic genres; use as supporting material fro research
- as above, but focus on musical content e.g. modality, chord sequences, duration, texture.

#5.1.f Using the electronic keyboard as a sequencer, using the record function

- group devise composition and record, layering tracks if appropriate
- group devise and record accompaniment for song or instrumental, using fills, changes of texture, chords, as appropriate
- teach vocal / instrumental parts, using pre-recorded tracks; use mute function to aid teaching
- record midi files to use on keyboard (rather than PC) as required

#5.1.g Hardware and software for music education

The following software and hardware can help pupils' learning in music at beginners level:

- tape recorder with counter
- sound-processing toys capable of producing a range of effects transforming the voice to sound like a robot, ghost, cartoon character, etc
- keyboard with a selection of voices
- multimedia PC with soundcard and speakers
- focused activity software such as pitch and rhythm games
- simple pattern sequencing software.

The following software and hardware can help pupils' learning in music at intermediate level:

- digital effects units
- MIDI keyboard featuring a wide range of preset sounds
- stereo tape recorder with microphone and line inputs
- software for recording and processing sound
- software for exploring style and structure
- simple sequencing software.

Also, the following software and hardware can develop pupils' work in music at intermediate level:

- MIDI keyboard featuring
  a facility to make alterations to sounds
  recording and playback of several parts
  limited sound sampling
  disk drive
- minidisk recorder
- creative mixing software.

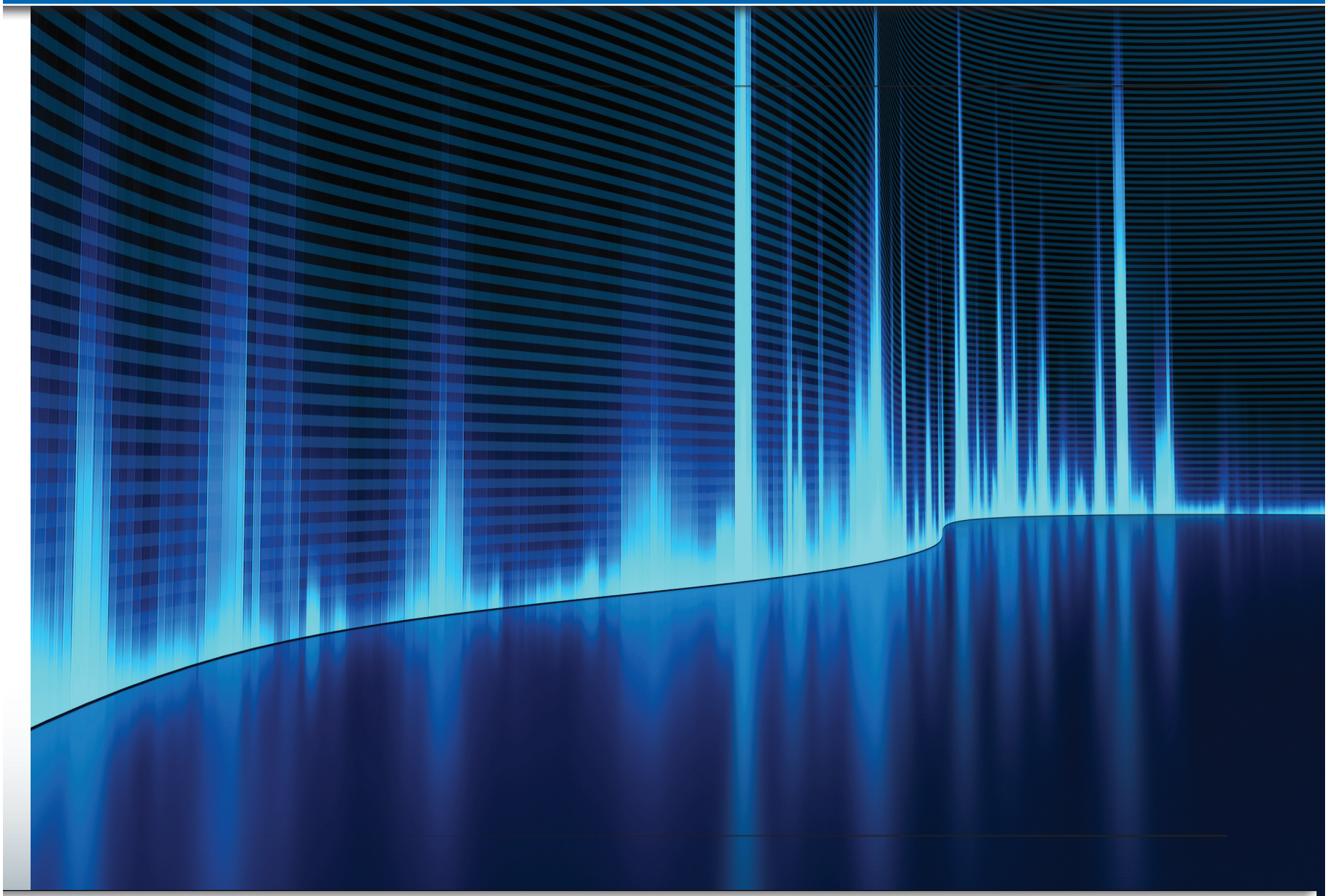
The following software and hardware can help pupils' learning in music at advanced level:

- digital effects units with decent quality microphones and amplification
- computers with high quality soundcards and in sufficient quantity to enable all pupils in a class to work in pairs at the same time
- music software specifically designed for exploring structures and styles
- sequencing software
- MIDI keyboards
- sampling and processing software
- 8- or 16-channel mixer linked to one computer and digital effects unit
- classroom-based PA system (linked to the mixer).

Also, the following software and hardware can develop pupils' work in music at advanced level:

- music notation software
- four-track tape recorders
- DJ turntables or mixing devices
- innovative sound manipulation and control tools
- karaoke player (hardware or software based)
- CD writer
- minidisk recorder with stereo microphone
- additional keyboards/synthesisers with extended features
- advanced software-based sampler and editor
- interactive whiteboard or digital projector
- internet links in the music classroom.

A list of examples of software tools for music education and a short description for each one are given in the Annex of the Guide.



#5.2. Workshop best practices: Delivery of training to in-service teachers

The PRELUDE training programme offers in-service training to music teachers on the use and effective integration of new technologies in music education. The implementation of the training programme is based on distance learning techniques in order to accommodate the participating music teachers to take part from their schools, taking full advantage of all capabilities the web offers. The developers of the training programme decide that an initial series of face to-face workshops are essential for all trainees for the following reasons:

- The trainees need to have a first-hand experience with the structure and facilities of PRELUDE platform.
- PRELUDE's modular character would be better served by organizing a series of workshops in accordance to each country's training needs. From the needs analysis report it became apparent that each country has different training needs especially as far as the use of basic ICT skills is concerned. Therefore the training programme should have both modularity in designing the preliminary workshops and at the same time follow certain basic guidelines.
- The realization of face-to-face workshops would better help the trainees to form a learning community, promoting thus the communication facilities and exchange of feedback the platform offers. One main concept that PRELUDE platform adopts is the notion of social constructivism that favors collaborative learning.
- Face-to-face workshops provide the opportunity to elaborate on the pedagogical framework of PRELUDE project upon which the self-reflective approach of the evaluation is structured.

Workshops provide the local aspects of the programme versus the global aspects that the module of the distance learning platform present. The structure and the amount of the workshops should be decided baring in mind that the basic skills on ICT are provided in one or two workshops. The PRELUDE platform adopts a collaborative and exploratory learning style rather than a classic, linear sequence of static material. Thus the realization of the training programme does not follow a detailed timetable as two of the main principles of the project are the interactivity between the trainees and the trainers and the user-centred approach that is based on teachers' own needs and own classroom activities.
Each country designed a series of workshops aiming at familiarizing the trainees both in the PRELUDE platform and the basic ICT skills which included hands-on activities and computer labs.

#5.2.a Best practice: workshop organization

PRELUDE workshops should take place at the beginning of the training programme, and can be expanded according to the training needs in each setting. The partner institutions should find out well in advance the number and the level of competence of the participants in order to organise more efficiently the infrastructure and content of their workshops (see trainees' form, appendix...).
The workshops should contain a lot of hands-on activities using music technology in very simple ways to start with and theoretical aspects that will enhance the participants' pedagogical approach on music technology. According to the pedagogical framework of the project, main objective of the training programme is to assist teachers to move beyond simply gaining knowledge on technology and music and move towards a greater awareness of their self and identity.
Workshops need to take note of the following:
- That the pattern of technology and music technology provision within each

country is varied
- That the attitude of schools to music and technology are positive within each country
- All countries to some degree have difficulty buying technology equipment
- All countries would wish for more up to date technology equipment
- Internet access is available in most countries
- The use of e-learning credits is little known and little used

#5.2.b Teachers workshops

The PRELUDE training programme began on September 2007 in five countries of the consortium. Following the needs analysis report each country designed a series of workshops aiming at familiarizing the trainees both in PRELUDE platform as well as basic ICT and music technology skills by offering many hand-on activities.

#5.2.c Training courses (phase A)

Following the PRELUDE workshops the distance learning course started in five countries of the consortium (Greece, Romania, Spain, Sweden and Estonia). In total 73 participants followed the course modules and many of them downloaded the proposed music software applications and started exchanging their first feedback, questions and comments.

#5.2.d School centred work (phase A)

During the training phase A trainees implemented a series of educational scenarios. These scenarios were discussed with the trainers during the training process and then they were implemented in the school environments. The aim of this work was to demonstrate the effective introduction of technologies in specific setting according to the user needs. The scenarios included activities for classroom use, self practice at home and also remote teaching cases where eLearning tools and platforms were used for music lessons to remote students. During this phase numerous educational materials (presentations, guidelines for the use of specific platforms and tools, students work, references) enriched the digital repository of the PRELUDE platform.

#5.2.e Training courses (phase B)

A total of 55 participants followed the second phase of implementation. Teaching material ranging from elementary music score editing modules to advanced audio processing was introduced to the participants who also had the opportunity to produce their own teaching material using methods of sound production.

#5.2.f School-centered work (phase B)

During the training phase B trainees implemented a series of more advanced educational scenarios making use of the experiences gained during the first cycle of work. These scenarios were again discussed further with the trainers during the training process and then they were implemented in the school environments. The aim of this work was to demonstrate the effective introduction of technologies in specific setting according to the user needs. The scenarios included activities for classroom use, self practice at home and also remote teaching cases where eLearning tools and platforms were used for music lessons to remote students. During this phase further educational materials (presentations, guidelines for the use of specific platforms and tools, students work, references) enriched the digital repository of the PRELUDE platform.

List of Workshops (Phase A)

Country	Number of Participants	Date	Subject
GR	17	20/10/07	Basic skills on ICT,
		21/10/07	Module I:Digital tools – recording and editing
		03/11/07	Music technology in the classroom
		04/11/07	Distance Learning Platform PRELUDE
RO	17	20/10/07	Basic skills on ICT
		21/10/07	Basic skills in music technology (recording and editing a digital audio material).
		17/11/07	Basic skills in musical notation with the use of ICT
		18/11/07	Distance Learning Platform PRELUDE
EE	15	30/10/07	Basic ICT skills, learning of music software
		31/10/07	Basic skills, digital tools – recording and editing, notation
		24/01/07	Basic skills, digital tools – recording and editing, notation
		25/01/07	Distance learning platforms: Miksike, PRELUDE Modules
ES	12	26/11/07	Music and Computer Science
		27/11/07	PRELUDE Platform
		05/02/07	Music education in Spain
		07/02/08	, Interactive White Board
SW	11	29/10/07	PRELUDE Module 1 & 2
		07/01/2008	PRELUDE Module 1 & 2
		08/01/2008	PRELUDE Module 1 & 2

List of Workshops (Phase B)

Country	Number of Participants	Date	Subject
GR	12	13/12/07	Basic skills on ICT, Self-practicing environment
		14/12/07	Classroom environment, Distance learning Tool
		28/03/07	Music technology in the classroom
		29/03/07	Music education websites, Distance Learning Platform PRELUDE
RO	16	16/01/09	Elements of theory of music
		17/01/09	Basic Skills in musical notation with the use of ICT
		13/02/09	Using Software in history of Music
		14/02/09	Sequel and Audacity
EE	13	31/10/08	Basic skills on ICT & Internet usage
		22/12/08	music technology in the classroom
		19/03/08	Distance-learning tools, Music education websites
		20/03/09	Audacity, Finale
ES	10	17/02/09	Uses of platform and Moodle
		17/02/09	Uses of platform and Moodle
		28/04/09	PRELUDE platform
		28/04/09	Sibelius5
SW	4	08/01/09	Audio Software Practice
		09/01/2009	Audio Software Practice

#5.3. Trainees projects

Overall, there is much to be learned from the experience of teachers who have made use of ICT to improve learning and standards within their subject. In some cases, this has been achieved against the odds where personal initiative has led to developments in the use of ICT within their department. In other cases, developments have been part of a coherent, whole-school approach. Some of the projects considered as good practices are presented here and described in a common structure covering mainly the:

Rationale: the context, motivation and overall content of the project.
Project's objectives and association with the identified needs analysis: The purpose and intentions of the project with reference to the initial needs analysis. It also includes reference to as duration and age group.
Applications involved: This field describes technological and didactic solutions identified to be used for the implementation of the project
Relevant resources: This field refers to relevant PRELUDE modules or resources.

#5.3.a Using Finale NotePad in the school classroom

Rationale: The Finale NotePad software is simple and allows entering one note at a time on the score. Based on this functionality students were supported to learn to write music on the score using an alternative and modern way while they were enabled to create their own rhythmic and melodic patterns. At the same time they could listen to the sound of each note from the computer. Research studies have pointed out that, comparing to a pen and pencil method, students who used the Finale NotePade learned and retained more about basic musical skills. Games with learning to position notes on the score were also introduce by the teacher. At a later stage, after the students became more experienced with the software, they were asked to write their own music piece and perform it on a glockenspiel. At following stages they performed it in front of one of their peers and experimented with changing it.
Age group: Middle years of elementary school
Duration: 6-8 teaching hours

Project's objectives and association with the identified needs analysis:
This project provides opportunities for students to learn in alternative and challenging ways using a notation and sequencing program that supports students in composition activities. At an advanced stage it may enable students



to improve their compositional skills by reviewing together with peers and modifying work in progress.

Applications involved: The goal synthesis was for the students to use Finale NotePad to create a four-measure example using identified sixteenth note rhythms. For this example, the teacher predetermined the time signature and rhythm sequence but the note choice was up to students. The teacher discussed with the students some ideas that would help their examples to be playable and sound "good." Each student opened NotePad and set up their document for their instrument, and used their name as the



title. Listening to the playback through headphones, they busily set about creating their examples.

Relevant resources and or teaching aids: The teacher gave some quick lessons regarding the basic use of Finale NotePad. She connected an LCD projector to her computer so everyone could see, and took some selected screenshots and printed some follow-along handouts. Wanting the activity to go smoothly in the computer lab, she made a fairly detailed set of instructions.
In the computer lab, she again used a computer connected to an LCD projector to demonstrate the use of the software if questions were raised.
See: www.e-PRELUDE.eu Cycle A, Module: Music notation using NotePad

#5.3.b Using Audacity for studying a leading theme with an accompaniment

Rationale: An exercise was devised to help a young girl to balance her two hands while playing a Schubert Waltz. She was playing too loud with her left hand (accompaniment) while the leading theme that she was playing with the right hand was too soft and weak in expression. Her good left hand performance was recorded using Audacity. The software was also used to play back the recorded left hand while the student with the help of the teacher was working to improve the right hand.

Age group: Third year of piano lesson
Duration: 1-2 teaching hours

Project's objectives and association with the identified needs analysis: Audacity allows to record and visualise sound so that the student can reflect on both its sound and visual representation. The piano student can deal with the cognitive overload of performing by decomposing the performance in parts or layers and study each one separately. The Audacity application allows to record several layers(tracks) of sound add individual parts one at a time record small chunks of music at a time and edit it together afterwards, which is often useful when recording pupils

Relevant resources and or teaching aids:: www.e-PRELUDE.eu Cycle A, Module: Digital Tools 1 Audacity

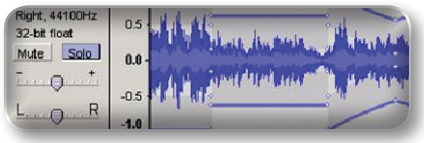
#5.3.c Using Audacity to understand sound and timbre in music

Rationale: Following the discussion with the whole class on the qualities of sound (e.g. Pitch, loudness , direction) we focused on timbre. This sound quality is probably the most difficult for students to understand. By the end of the 2 lessons the students knew how and why, adjusted to their knowledge level of final year of elementary school, two sound waves are different. They gave comments such as that the recorder's timbre is low whilst the glockenspiel's one is louder as these two instruments are made from different materials



Age group: 6th Grade of elementary school
Duration: 2 lessons lasting 45 minutes:

1 lesson in the general classroom: 1 lesson in the IT lab
Project's objectives and association with the identified needs analysis: Students may: "Visually" understand one of the musical quality of timbre by observing the sound wave of an instrument. Further they develop the self-reflective thinking skills by reviewing and reflecting on their own sound which can play pack and see it through the sound representation in Audacity. They can also compare the sound of different instruments by reference to the visual

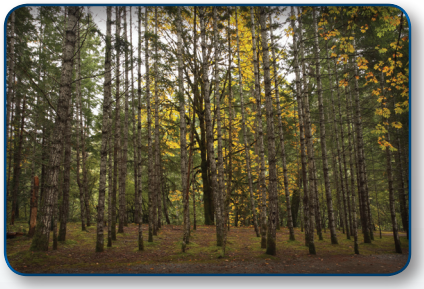


wave and sound.

Applications involved:
After listening to the same note played by different orchestral instruments the students tried to discern what makes the violin sound differently from the guitar while playing both the same note. The students were also introduced to a game during which students should have their eyes closed and distinguish the voice of their classmates by just listening to their different timbre. During the last lesson, each student recorded a tone played by the recorder and a tone played by the glockenspiel using Audacity software. Each instrument was recorded with an external microphone in different track. The students thencompared then the two sound waves and wrote their remarks.
Relevant resources and or teaching aids:
See: www.e-PRELUDE.eu Cycle A, Module: Digital Tools 1 Audacity

#5.3.d Using Cubase to add sound and music to a narration

Rationale: Collaborative authoring and sharing of resources and learning objects in the classroom ensure a



link between working in the classroom and working at home on material collected in the classroom. The project "in the woods" is a collaborative project in which all students worked to create a sound track, in other words they collaborated to embellish with music and sound the narration of a text. The narration describes using a poetic style the changes in the nature during a rainy day in the forest. They applied skills of sound editing and mixing using the music software Cubase SX.

A new day dawns in the forest. The golden rays of the sun pass through the tree leaves. Birds are heard singing everywhere. The forest wakes up. A gentle breeze blows through the forest making the leaves rustle like a sweet whispering. The crazy bug tired of flying sits on a big stone and chats with the water. The stream comes from afar and has a lot to say. Somewhere away, a frog is singing. But why did it stop suddenly? The sun hides behind grey clouds and the earth smells more strongly. A spring storm is approaching. The first rain drops begin to fall and the rain increasingly strengthens. Thunders strike in

the sky, while the animals are running to hide in their nests. Gradually, the rain stops and the rainbow shows up like a coloured bridge over the forest. The sun shines again. The rays encounter the drops on the misty leaves and a mysterious atmosphere is lingering in the woods. It looks like the elves and fairies play amidst the foliage. The forest returns to its normal rhythm.

Dusk is falling. The forest sleeps into serenity. The night has arrived. Their only partner the owls and the crickets are here. Another day in the woods is over.

Age group: 5th year of elementary school
Duration: 4 lessons lasting 45 minutes each. Students are required to search their music CDs or the internet outside the teaching time

Project's objectives and association with the identified needs analysis: During this project the students will have the chance to developed their artistic expression and creativity along with the basic procedures of sound editing. They are encouraged to use the Internet as a tool for finding information such sounds and music. An interesting and unusual aspect of the project is that students are encouraged to explore the relationship between written discourse and music and how music can promote text which can introduce the students to the art of filmmaking.

Applications involved:
Beside using the CUBASE SX software the teacher and the student should be able to find, retrieve and store forest sounds (singing, breeze, pookie, creek, frogs, rain drops, sudden rain, lightning, owl)

Stages of work:

- The students were asked to search in their personal library and the Internet to collect texts and poems to describe a day in the woods.
- The music teacher in collaboration with drama teacher wrote a text describing a day in the woods, based on texts brought in by students.
- The students were divided into three groups and searched the internet for sounds of the forest (singing, animals, rain, wind etc).
- The students, after having heard various music tracks and pieces, chose the music that was used as background music to events of the day in the woods (morning, the first trickle after the rain, dusk).
- The music teacher presented the music software Cubase SX to the childern. Students worked on the mixing of the tracks, after having decided what music and what sounds will be heard at each segment of the text.
- The students finalised the music editing of the whole synthesis (variation of intensity, fade in-fade out, editing, sound mixing and events).
- The children practiced creative reading to prepare for the recording, where each child was recorded reading a small part of the text.
- The teacher of music made the final mix
- The track was given to children as a souvenir (CD).

Relevant resources and or teaching aids:
Cubase is a Digital Audio Workstation used for audio arrangement, recording and editing. Most of the facilities which exist in traditional recording studios are now available for computer owners using Cubase or other similar products. This project encompasses most of the skills involved in the modules where the use of Audacity, Finale NotePad and Sequel are presented.

#5.3.e The DMA project

Rationale: The DMA project (Distance-learning Music Agoge) is a pilot e-learning service that provides teaching of music instruments to students that live in remote areas in Greece.

The weekly music lessons that a student or a group of students receives are given via videoconferencing facilities and a distance learning platform. Aim of the service is to encourage young people who have restricted access to music schools and teachers because of their remote location to learn a musical instrument or to continue their studies under the guidance of an experienced teacher. A key concern is to encourage people to start their studies in music even if access to premises where music is taught is difficult or remote. Nowadays, the internet provides a number options for students to access content and to interact with an instructor and other students. One of these is the use of interactive video, where cameras, microphones, and monitors are installed in two or more locations and interaction can take place. While such technology set up used to require specialize hardware at both ends the DMA project is trying to overcome some of the obstacles by providing some simple and inexpensive solutions.

Age group: Beginner music learners without an age specification

Duration: The courses take place once a week on a plan or agreement between the teacher and student. The frequency of the courses may change depending on the interest and level of student or teacher availability. In its pilot phase of implementation the service offered recorder and flute lessons while aim of the service was to expand to include a variety of musical instruments.
Project's objectives and association with the identified needs analysis:
Delivering music lessons via e-learning requires from the teacher to envisage and overcome several obstacles and issues. During the video conference it is aimed that the teaching procedure is not significantly different than the one followed during a conventional face-to-face lesson. The teacher's leading role throughout the lesson is crucial at that point. A moderate attitude in respect of the teacher's tasks is needed. The student should be asked to perform simple procedures that can be tracked down by the teacher.

Figure 10 A varied teaching approach taken in synchronous teaching with videoconferencing









In synchronous teaching with videoconferencing (VC) communication has to be approached in a new way. Maintaining contact differs very much from the face-to-face situation. In music teaching (with VC) this means that the teacher needs to give more responsibility to the pupils or students than he/she is used to doing in traditional classroom methods. This actually works better than teachers normally expect. The time delay makes playing by the teacher inefficient, except perhaps for giving cues or for first time training. It is impossible to evaluate students, while one is playing oneself. Furthermore, effective and informative camera handling requires experience, although the camera can focus students attention, e.g. on the recorder holes. Restricted interaction brings teacher to change her/his teaching methods and the way of thinking.

Many times this is fruitful and refreshing to the teacher. Technology gives a possibility to illustrate and construct knowledge and skills in a new way. Diagram, figures, shapes and other illustrations are necessary for conveying ideas and making up for the lack of face to face interactions. Videoconferencing platforms allowed to share the same desktop and even interact on the same applications as if teacher and student where in one room.

In the current phase of the program the use of the camera supports the teacher in making basic corrections such as general body posture throughout the performance, and basic fingering positions. In the future multiple web cameras covering different aspects of the pupil's movement and zooming in and out via remote control would be useful.

The poor sound quality –if compared with a regular lesson- is considered to be a minor issue given that the need for sound quality is not a priority for a beginner. Additionally in the case of the recorder, the sound quality is hardly different between a beginner and a fairly advanced pupil.

Applications involved:
In DMA the skype as well as the platform Adobe-Connect pro were used as teleconference platform that supports the weekly lessons and allows online storage of teaching material and multiple way synchronous or asynchronous communication. Two or more participants can meet on line while using the Adobe-Connect pro platform, they can share the same desktop, annotate the same music score and exchange feedback on performances.

Relevant resources and or teaching aids: In particular for the delivery of the service it is required: A video conferencing platform such as skype or Adobe Connect Pro for synchronous communication and shared desktop space. In terms of hardware, while at the student end a web-camera and a broadband connection suffices at the teacher end the infrastructure could improve without excessive cost. High-fidelity microphones offer good sound quality during the lessons, a video projector (video projector) screen display allows the teacher to interact with a representation of the student while standing and making the lesson more realistic. Sound cards with advanced capabilities and web cameras were also necessary.

#5.3.f VEMUS (Virtual Eurapean Music School):
A virtual music school for rural students

Rationale A music teacher, teaching recorder, clarinet, flute, or saxophone in a remote rural area, is presented with the possibilities offered by the VEMUS music learning environment. This integrates e-learning components to augment music teaching in different learning settings: it supports activities in music classrooms, as well as self-study in the lab or at home, while teachers and students are encouraged to participate in the building of a learning community. It should be noted that the music teacher could also be based in an urban centre, regularly travelling to villages to teach, or receiving students in his classes who travel for their music education. In this case the teacher would use the technology to minimise the need for his physical presence in the musical education of his remote rural students.

Age group: Students in the upper grades (age 11-12) of primary school, or in secondary schools, who need to acquire the relevant knowledge and skills, and who are interested in developing innovative activities in the school and in collaboration with the surrounding community

Duration: It can last from one or many school terms.

Project's objectives and association with the identified needs analysis:
To provide people living in remote rural communities with opportunities to learn music effectively, using new technologies, in the first place, to get access to music teaching resources, and, further, to gain better quality music learning experiences through their contact with contemporary, stimulating musing learning approaches. To help music teachers and music education providers get access, and offer good quality music learning experiences, to remote rural people who have had little, if any, possibilities so far to participate in music classes.

Applications involved:
the VEMUS (Virtual European Music School) system, available at www.vemus.org

Relevant resources and or teaching aids: There are three different options available to the remote rural teachers and students of music, which can be used in any combinations. These options are presented below.

Independent music learning and self-practicing
Beginner students of music are provid-

ed with a complement to conventional music teaching, in the form of an ICT application assisting them when practicing at home or in the lab, thus making practising sessions much more informative, constructive and enjoyable.

The teaching and learning activities supported include:

- Evaluating student's performance
- Detecting errors
- Prioritizing and selecting information to display to the student
- Showing information to the student in the appropriate form
- Grading the student's performance.

Asynchronous distance music education
Groups of remote music students and teachers are supported and involved in common activities asynchronously. Users, who may be at music school or in remote settings,
are provided with access to content, content authoring tools, and collaboration opportunities. Even students and classes from different countries can be brought together and collaborate. They may select and exchange popular songs from their countries, learn how to play the songs helped by their teachers and the software, and periodically go online to follow each other's progress.

Users may make use of the following features on the web:

- an open content repository
- authoring tools augmenting the content repository
- asynchronous communication tools
- tools allowing remote coaching of students and monitoring of their progress through time.

For example, remotely located students can be supported by:

- Studying the same song separately
- Practicing at their own time and pace, communicating with each other regularly
- Uploading a new performance to a shared workplace, every time a student makes progress
- Downloading and importing the performance of someone else into their own environment, playing on top of it, using it as accompanying music
- Providing feedback to their peers.

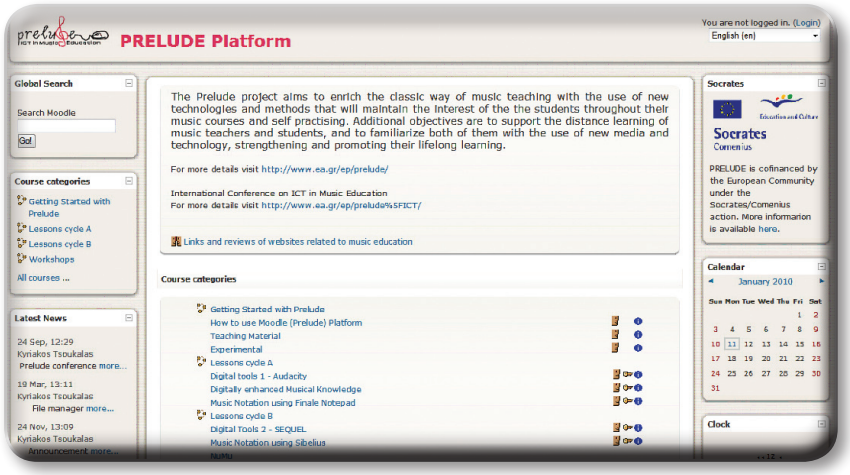
Learning music synchronously in a classroom
Music teaching in group settings may be enhanced through ICT providing aids supporting the teacher and tools supporting collaborative learning.
In this synchronous technology-enhanced music learning experience:

- Students share a common workspace and a common view of the music score.
- The teacher adds annotations on the score, which automatically appear on all students' screens.
- While a student performs, the teacher and the other students can see his/her performance and related information (e.g. visualizations, page turning) on their screens.
- The system evaluates the performance and the teacher uses graphical elements to explain "hardto-learn" points.
- The performance and all materials produced are automatically stored and made accessible to students for further reference.

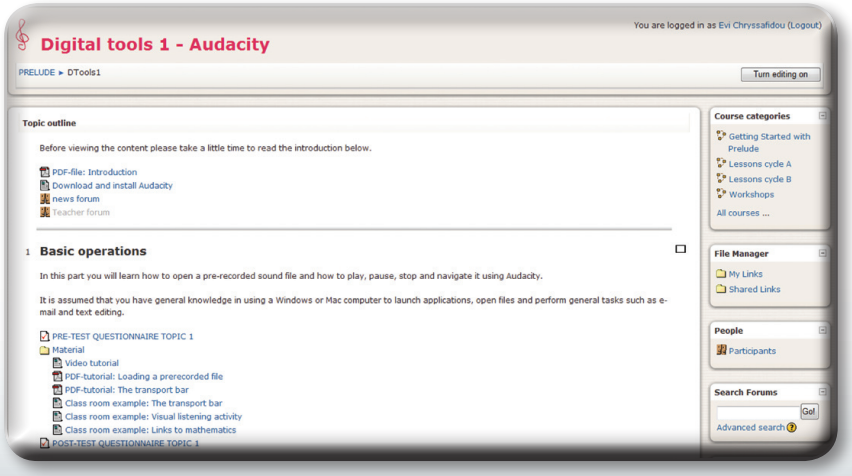
#6. The PRELUDE platform

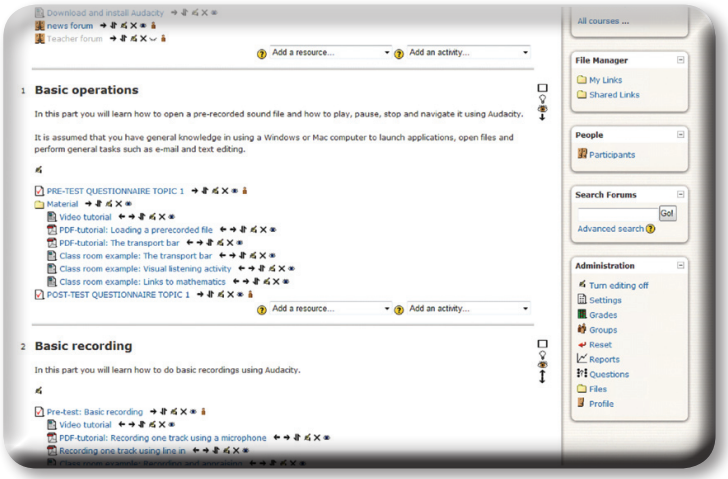
The PRELUDE platform is a web-based environment which can support learning via computers with access to the Internet and is based on the renown Moodle platform. The internet address for accessing the PRELUDE platform is http://www.e-PRELUDE.eu

The main page of the site has three columns.The middle column contains information on the PRELUDE project as well as a detailed list of course categories and courses you have already been enrolled. Above the right column is a drop down list of interface languages and the login link.

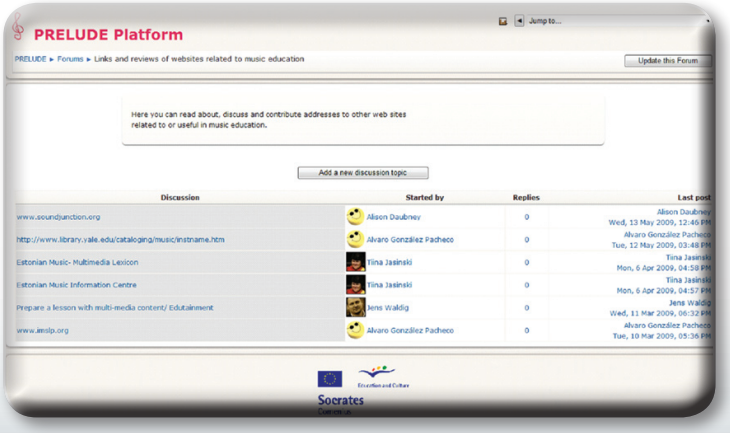


When you have logged in to the platform, you can access its courses.





You can add new resources or activities or edit existing content by turning editing on using the button on top right. The view of the content changes as buttons for editing the content are added next and below the existing content. It is now possible to move the content up or down changing the order of it, delete it or hide it.



From the main page you can also access the a forum with links and reviews of websites related to music education. The forum works like any bulletin board in that it allows users to post messages and to respond to each other's contributions. Forums are used to provide information or to generate knowledge in a social constructivist way via educational discussions.

#7. Evaluation of the PRELUDE project

Data collected from the interviews with teachers attending workshops and from other PRELUDE partners has suggested that the project has been extremely effective in facilitating all the potential benefits it is possible to gain from a comparative, international project.
The main benefits arising were:

1. Justification for music and the use of technology.

Although many colleagues felt that they personally had a commitment to including and developing further levels of technology within their own workplace, comments suggested that actively becoming involved in the PRELUDE Project had enabled them to further explore the rationale for and the greater potential of technology in their own professional lives. Over 50% of respondents commented that they felt more aware of their own training needs and more able to describe succinctly and precisely what they wished to achieve within their own personal development in technology. One third of teachers stated they felt more able to argue the rationale for increasing the use of technology in their place of work and over half of teachers spoke of an increased motivation to work with and increase their technological skills.

2. Nurturing respect.

One major potential benefit of any comparative activity is the way in which increased knowledge of the working conditions, views, strengths and weaknesses of other professionals from different working contexts can increase the level of respect between groups.
The PRELUDE Project certainly achieved this in a major way. Through the initial needs analysis, all participants gained an increased knowledge of individual circumstances in terms of best practice, aims and objectives, hopes and fears.
The most common statement coming from respondents related to the increase in respect for other colleagues and an increase in confidence gained from the knowledge that most participants share common questions and problems, regardless of their working context. It was this mutual sharing, understanding and discussion which most facilitated an increased level of respect and confidence amongst partners.

3. Comparative skills enable us to examine within our own systems and not just between systems

The initial activities of the PRELUDE Project required all participants to evaluate and present details of their own individual context in a clear and transparent way. Responding to questions and the need to present clear and precise descriptive elements of individual situations requires a significant level of work which in turn requires the author to re-evaluate and represent their context in a clear and meaningful way.
Each stage of the project required partners to discuss and evaluate why one option suited their situation rather than another and this frequently facilitated a rethinking of individual positions and therefore an increased awareness of individual contexts alongside the greater knowledge of the situation in which others were currently working.

4. Can identify natural bias

In addition to point four, this re-evaluation of individual contexts often allowed participants to identify or become aware of any natural bias or lack of balance within their own context. When individual choices have to be justified to a wider group and subjected to peer questioning and review, many issues can be viewed and considered according to a different but equally effective logic.

5. Increase in motivation

As with most comparative projects, the PRELUDE project facilitated an increase in motivation not only to learn and develop new skills in technology but to continue to broaden horizons and share best practice with others. Most participants stated that they no longer felt that any barriers existed between themselves and others working in different contexts. Common problems, difficulties and shared emotions provided a common arena in which most participants felt they were able to share and discuss and seek guidance – not only with direct answers to questions but through the opportunity to contribute their opinions and views to an appropriate and supportive peer review system. The enjoyment of learning from and with others and exploring new ways and contexts of viewing of technological phenomenon is a motivating activity and the PRELUDE project achieved this.

6. Relativity

Any individual operating within a vacuum has no real understanding or knowledge of the level of place they are currently in. Meaning to this information can be gained through viewing any individual context relative to another. Only then is it possible to truly appreciate and understand the scale of any phenomenon. The PRELUDE project enabled individuals to move out of their individual and localised settings and view their standing in a broader and supportive arena. This in turn inspires confidence, motivation and better understanding of the task ahead. Through the workshops, the needs analysis and the resulting discussions, PRELUDE participants benefitted from the opportunity to view their own context within a broader European context, which gave added meaning to their working context.

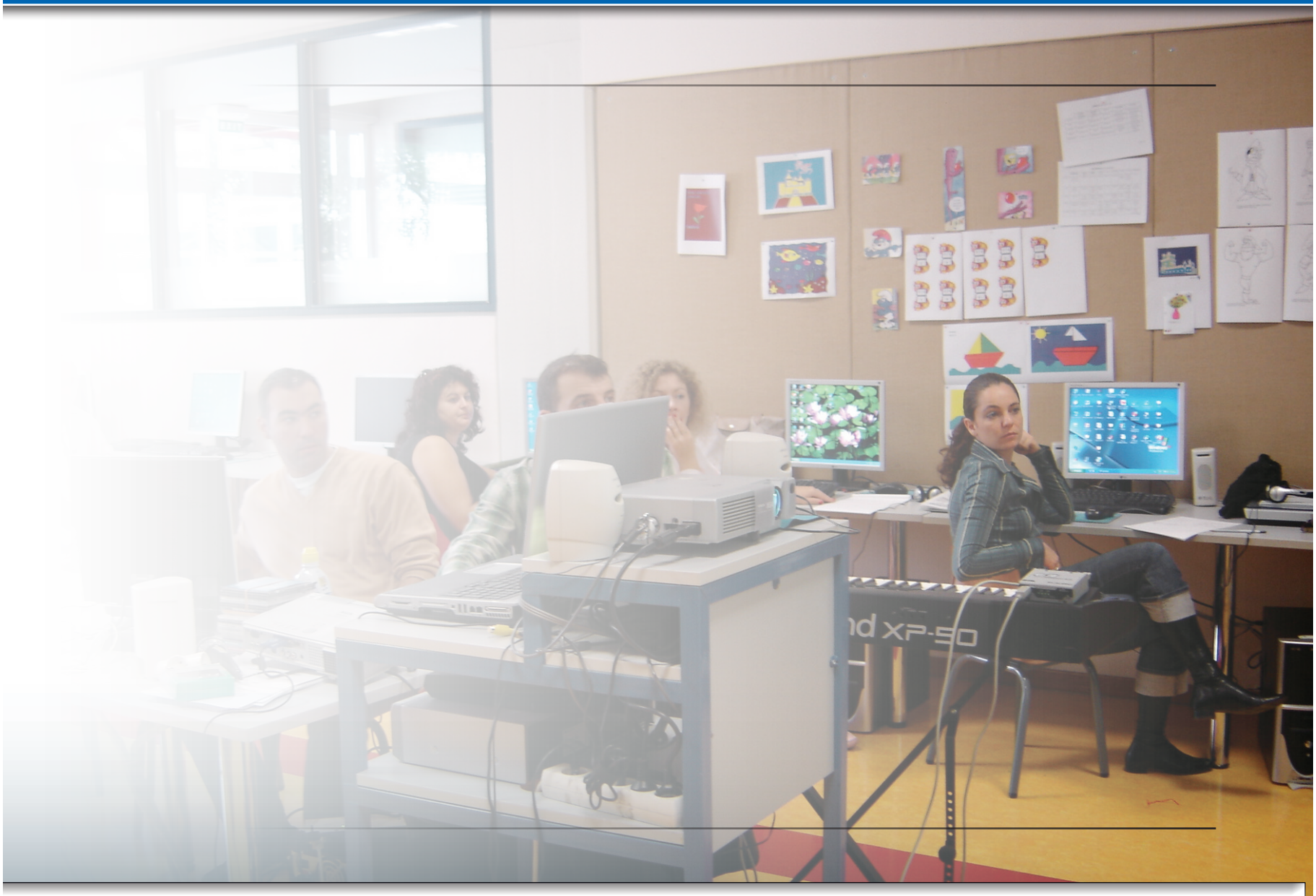
7. Individuality versus globalisation

Through working within the PRELUDE project, many participants voiced the opinion that they felt an increase understanding of how to contribute and partake in the knowledge based European society whilst at the same time begin to more fully appreciate how they could also maintain their own individual identity and cultural practices. Estonian teachers reported, for example, that they felt more able to understand and see the potential use of technology in their music teaching whilst at the same time develop and increase their individual national identity as a 'Singing nation' As previously stated the partners identified that technology has progressed significantly since PRELUDE was designed and a learning point of this, and other technology projects, is that technology must support pedagogy, not create a barrier to it. PRELUDE has clearly broadened the understanding and practices of

its partners and provided transferable skills and opportunities which stretch beyond this partnership and have great potential to be fruitfully extended in the future.

The current relationship between music and technology is a difficult and complex one. Through the use of marketing and the constant need to lead and develop and produce ever greater financial returns, the world of technology continues to develop and change and teachers continue to run to try and keep up with their pupils' skills and knowledge and make fuller use of the potential for ever more complex technological tools. Any initiative which makes teachers more skilful and knowledgeable is valuable because this allows the teacher voice to begin to lead the technology and not to always follow. The PRELUDE project

Overall, the personal and institutional learning outcomes identified demonstrate that whilst it was difficult, partners shifted their perceptions of pedagogic practice through considering and adjusting the practices of others in the consortium, gaining new insights into pedagogic practices and questions. In terms of legacy, this is a huge potential outcome if the individuals involved in this project are able to continue to forge innovative and creative pedagogic practices within and between countries. There is also agreement that the materials which have been developed can be adapted for use with other students, since they are easily transferable to a more up-to date platform. As the partners identified, technology has progressed significantly since PRELUDE was designed and a learning point of this, and other technology project, is that technology must support pedagogy, not create a barrier to it. PRELUDE has clearly broadened the understanding and practices of its partners and provided transferable skills and opportunities which stretch beyond this partnership and have great potential to be fruitfully extended in the future.


XP-50

#8. Conclusions

Computers in music teaching can offer a wide scale of tools which lead to the change of the teaching process from one closed and rigid, oriented on teacher, to an inciting and interactive educational process centered on learners.
However, according to the conclusions derived from Becta's (2001) research in the key area of e-maturity, which conclusions are also valid for the countries involved in the project, despite the manifold advantages of using ICT to support music education, many music teachers are still reluctant to the extensive use of ICT in their teaching, for a number of reasons:

- insufficient funds for equipment and technical support;
- lack of technical support and therefore having to deal with the technical maintenance of their ICT facilities themselves;
- having to waste precious class time in correcting program bugs and defective MIDI links;
- inadequate training or lack of confidence in their own ICT capabilities;
- fear that their students know more than they do;
- lack of awareness of the potential benefits of using ICT;
- concerns that technology-based music may take over from more traditional approaches;
- the pressures of having to deliver a broader music curriculum,
- simply not having enough time to address ICT issues effectively or to update their knowledge

On the other hand, regardless of how much or how little use a teacher makes of ICT and music technology, there is a set of fundamental priorities for effective music departments, among which:
Practical music making - in order to gain a real understanding of music, students need to create and play it;

- Space to allow practical music making to happen - good-sized classrooms to enable flexibility to move between teacher-led sessions, class participation in discussion, individual and group music making;
- Breakout spaces - where students can work free from distraction and intervention;
- Departmental resources that are available out of curriculum time – including extra-curricula opportunities, students working on extended tasks, etc.

Unfortunately, few schools are able to adequately provide for such situations. The music room is traditionally a teacher-led environment (teacher and resources at the front, students facing the teacher). Moving to individual or group/pair work can be time consuming because of resource storage/retrieval issues.

Opportunities for accessing these resources out of curriculum time are limited, often because of perceived security problems. This type of environment also creates problems for the assessment of practical work, again because of the way the space is used.

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Appendices

Examples of software tools for music education

Sing & See (http://singandsee.com)
Sing & See is a tool that provides feedback on the voice. It helps while practicing, to check up on pitch, or just to give something to focus on during warm up. It is designed to complement teachers lessons but it is also intended to be used as part of self-directed learning.
For teachers, Sing & See is designed to complement individual teaching style. It provides a variety of feedback displays that can be used to focus on particular aspects of the students' voice. It can also be used to illustrate aspects of a students' vocal production, as part of a normal lesson.
The software is delivered under the form of a student version, a professional version and a teacher pack.

SmartMusic (http://www.smartmusic.com)
SmartMusic is a complete music practice system for woodwind, brass, string, and vocal musicians. It is intended to a wide range of skills level: from first year beginner to professional musician.
The pedagogical approach is mainly based on accompaniment to improve performance. An exclusive Intelligent Accompaniment® system can actually follow the student spontaneous tempo changes like a good human accompanist. While learning a piece, you can turn off Intelligent Accompaniment and follow the music's original tempo or the tempo of your choice.
SmartMusic offers a great variety of practicing modes: exercises, rhythmic exercises, score based training, playing by ear, all of them automatically accompanied. It includes performance assessment and provides results under the form of graphic colored notes indicating correct and wrong performed notes.
SmartMusic allows to record a part or all of your performance. You can save recordings to CD and email them to teachers for a grade or to friends and family. However, there is no automatic mapping between the recording and the score.
It supports a great variety of music styles: popular music, jazz repertoire, classical music. Accompaniments can be created in Finale 2005 or 2006.
The full features of the system are activated by subscriptions. Home or school subscriptions are proposed.

In The Chair (http://www.inthechair.com)
In The Chair is an instrument practice system targeted to classical orchestral music: it allows you to practice together with a professional band or orchestra, it places you inside the band, enabling you to hear the other musicians around as you, watch the video of the conductor and play from your seat in the ensemble.
In the Chair provides immediate aural or visual feedback on the performance and encourages to correct any mistakes. A grade is computed in real-time, correct notes and mistakes are highlighted during the progression of the music. There are no recording

features nor high level feedback.
The system is very recent. Only a free trial version is yet available.

Noisy Things (http://www.q-and-d.co.uk)
Noisy Things coming from Q&D Multimedia is a collection of colorful musical activities.

Groovy Music
(http://www.sibelius.com/products/groovy/index.html)
Groovy Music is a fun-packed programme from Sibelius designed especially for 5-11 year olds. Children choose a character and journey through jungle or city scenery, exploring musical ideas and composing as they go. Like much of the software on show, Groovy Music is designed so that it can be used by non-specialist music teachers.

0-Generator
(http://www.sibelius.com/products/o-generator/index.htm)
0-Generator designed for ages 10-17, features a Virtual Music Teacher who can guide students through the curriculum-based lessons if the classroom teacher lacks confidence (or just needs a break from talking!). There are two strands, Learning to Compose, looking at rhythm, melody, harmony and songwriting, and World Music which explores African and Latin music where students can play along as a whole class with visual cues on screen.
Compose World and The Dums
(http://www.espmusic.co.uk)
Working in the music education sector for 20 years, ESP Music are still going strong with programmes Compose World and The Dums. They look less slick than some of their competitors but the animation is friendly and accessible. Compose World introduces the principles of composition to young children using pictorial building blocks, while The Dums are musical characters who sing and play to demonstrate how different musical ensembles work. There is also an 'International' version featuring instruments and music from around the world.
Sibelius 5 (http://www.sibelius.com/products/sibelius/index.html)
New features include the Ideas Hub, a clipboard for storing musical ideas, and a panoramic view facility, so you can see your score scroll across the screen in a single system rather than in separate pages.

Notion (http://www.notionmusic.com)
Composition and performance software Notion has beend launched in the UK. Its USP is that it features real instrumental sounds recorded by the London Symphony Orchestra rather than MIDI sounds, plus the ability to conduct the score in real time rather than setting the tempo with a metronome.

Music Delta (http://www.musicdelta.com)
Music Delta is a comprehensive interactive online resource for

primary and secondary students that covers everything from classical to bebop to disco, looking at harmony, history and composition. It is produced by the the Norwegian company Grieg Music Education, which is now being translated into English. The content is read through the school's learning management system, and teachers can give homework via the system then students can use the software at home.

Charanga (http://www.charanga.com)

In the UK, software developers Charanga have been working with Local Authorities to create an excellent online resource for KS1-4 (right) which allows teachers to build lessons and courses in line with the curriculum. There is a wealth of specially commissioned content, along with teaching notes, scores, mp3 files, worksheets, quizzes and puzzles. The system also allows teachers to give feedback on the resources, sharing content, ideas and lesson plans with others in Charanga community.

Gigajam (http://www.gigajam.com)

Gigajam are at the forefront of instrumental e-learning and have just introduced their Interactive Music School (left), a progressive programme that allows pupils to learn independently at their own pace on different instruments and then join together to play as a group. The programme allows players to personalise their learning style using video tutorials or downloadable booklets, and gives instant feedback on their performance, tapping into the spirit of incredibly popular music games like Guitar Hero and Singstar.

ACID (http://www.sonycreativesoftware.com/products/acid-family.asp)

Cakewalk SONAR (http://www.cakewalk.com/Products/SONAR/English/academic.asp)

Garageband (http://www.apple.com/ilife/garageband/)

Logic (http://www.apple.com/logicstudio/)

Cubase (http://www.cakewalk.com/Products/SONAR/English/academic.asp)

Cubase is probably the best-known name in the market, and the most popular in schools, but what if you've got the software but you don't know what to do with it? The Cubase Classroom Resource Pack (http://www.arbiter.co.uk/steinberg/products/classroom_resource_pack.htm) includes a manual and DVDs with over 100 hours of lesson material, based around musical, rather than purely technical, tasks. It's written by teachers, and packed with ideas, music samples and loops, classroom projects, worksheets and video tutorials. So, as long as you can afford it of course, it's easier than ever to make the most of what 21st century technology has to offer.

ODL Solutions for Music Education

WebCT (http://www.webct.com)

WebCT is one of the leading provider of e-learning solutions to the

higher education sector. It offers two main products:
'WebCT Campus Edition', which is a course management system designed to be implemented across a higher education institution. As well as content delivery and management it includes student performance assessment and tracking and communication tools such as whiteboard, discussion forum and instant chat room.
'WebCT Vista', which is described as an "enterprise-class e-learning system" - it appears to do the same as Campus Edition, but with a few extra features such as role-based authentication, an SDK to allow application extensions to be built, and additional functionality in the communication tools, allowing 'cross-course' communication.
WebCT can provide personalised learning paths for users, as access to objects can be conditioned on a wide range of personal data including achievement, date/time and class code (i.e. there may be many classes taking the same course, with different materials available to different classes). In reality this is seldom used to any great extent due to the high cost of developing learning materials in different styles and setting up courses to use these effectively. Personalization at the level of the individual learner is usually restricted to allowing users to set individual bookmarks and providing a single-sign-on system – i.e. the system knows which courses a user is registered for, and once signed in once all of these courses can be accessed without the need to sign in separately for each one.
There would seem to be a lot more scope for individual personalization than this, as the WebCT system records quite a lot of information on the behaviour of the users (which documents they visit, how long they spend viewing them, test results and grades). At present this information seems to be used solely for the production of reports, but could be used towards providing a truly personalised educational experience without the need for large investments of course designers' time.

Xtensis
Xtensis claims to be "a revolution in the management and delivery of e-learning" as it is specifically designed to handle LOs and their (IMS and SCORM-compliant) metadata. It is usable 'out of the box' as a learning management system, but can be configured to reflect the structure of an organisation and is more an architecture than a single product. It is used as the content management system for several UK-based LOR projects, including the National Learning Network (http://www.nln.ac.uk/), the Seeveaz Key Skills repository and Iconex (http://www.iconex.hull.ac.uk/).
Xtensis keeps a very detailed student record that allows for much personalization. As well as user interface preferences (graphics, colours, text size and font) and personal bookmarks the system stores a complete history of the LOs accessed by the user. This history, combined with LO metadata can be used by the system to make 'intelligent suggestions' about which LOs are the best ones to present to the learner next. The factors considered by the system include:

the language of the LO (compared with the preferred primary and secondary language of the student);
the platform being used at the time;
the difficulty of the LO;
the intended age range of the LO;
prerequisites of a LO;
nearness in a taxonomy of subjects (i.e. LOs dealing with the same, or similar topics);
the preferred learning style.
So far there has been little use of Xtensis as an LMS to deliver content directly to learners, so the personalization and intelligent suggestion features are yet to be extensively used. The base functionality of classifying users and LOs and making suggestions based on a mapping between them has been used (in work with Mencap) to automatically select versions of content based on users' learning difficulties or physical disabilities.
Areas that are specifically indicated as work for the future are the extension of personalised suggestion mechanisms to include factors additional to those mentioned above, and the further development and implementation of digital rights protection.

Moodle (http://moodle.org)
Moodle (Modular Object-Oriented Dynamic Learning Environment) is an open source software package for producing internet-based courses and web sites. It is an ongoing development project designed to support a social constructionist framework of education. It is a system that has been developed by a single man Martin Dougiamas, as a part of his PhD Thesis. Its development started in 2001 and the current version of the platform is 1.4.
Depending on the difficulty level of the learning content and the general level of knowledge and skills of the learners, learning process can be realized dynamically. The exemplary scenario is the following: the students read the learning content and answers several questions. Based on the answers the student gave, the system determines the next screen piece of the content. In this way the navigation through the learning units will be system-guided and personalized.
Users (learners, teacher and administrators) are able to edit their own profile. This includes subscriptions to forums and watching courses. The learner has also access to the available chat rooms, information about his/her performance, upcoming events, journals, quizzes, surveys, choices, workshops, glossaries, assignments, etc. The learner has the possibility to see his/her current status or last activities in the learning environment and to maintain his/her personal calendar (monthly and weekly) which keeps track of their event transactions and much more. That gives him/her the ability to fast restore and continue the learning process and allows more flexible schedule for learning on the work place, necessarily intermixed with work tasks.
The capacity for personalization of the environment is subject to be improved further in the next main release of the product.

Atutor (http://www.atutor.ca)
ATutor is an Open Source Web-based Learning Content Management System (LCMS) designed with accessibility and adaptability in mind. Administrators can install or update ATutor in minutes, and develop custom templates to give ATutor a new look. Educators can quickly assemble, package, and redistribute Web-based instructional content, easily retrieve and import prepackaged content, and conduct their courses online. Students learn in an adaptive learning environment. ATutor is the first fully inclusive LCMS, complying with the W3C WCAG 1.0 accessibility specifications at the AA+ level, allowing access to all potential learners, instructors, and administrators, including those with disabilities who may be accessing the system using assistive technologies. Conformance with W3C XHTML 1.0 specifications ensures that ATutor is presented consistently in any standards compliant technology. ATutor has also adopted the IMS/SCORM Content Packaging specifications, allowing content developers to create reusable content that can be swapped between different e-learning systems. Content created in other IMS or SCORM conformant systems can be imported into ATutor, and visa versa. Full language support is available through the ATutor Translation Site.

ILIAS (http://www.ilias.uni-koeln.de)
ILIAS allows users to create, edit and publish learning and teaching material in an integrated system with their normal web browsers. Tools for cooperative working and communication are included as well. The current version of ILIAS offers the following features: Personal desktop for each user with information about last visited courses, new mail or forum entries, Learning environment with personal annotations, test, glossary, print function, search engine and download, SCORM 1.2 and AICC compliance, Course management system, Communication features like mail system, forums and chat, Group system for collaborative work and organizing users and resources, Integrated authoring environment (Editor) to create courses even without any HTML knowledge, Support of metadata for all levels of learning objects, Context-sensitive help system for learners and authors, User and system administration interface, multilingual support.

OLAT – Online Learning and Training (http://www.olat.org)
OLAT is a web-based Learning Management System (LMS) / Learning Content Management System (LCMS) used in the public sector of Switzerland. The initial development started at the University of Zuerich, Switzerland where it is deployed on the main OLAT server. Official support for OLAT is available at the OLAT-Center (Only available for Swiss university members). OLAT is open source and completely free of charge. Some interesting features of OLAT are: Course system based on ideas of IMS Learning Design (Also known as Educational Modeling Language), IMS Content Packaging support, course editor allowing creation of new courses within short time, Questionnaire/Survey system, fully based on IMS QTI v1.2.1, multilingual support etc.

IBM Lotus Virtual Classroom
(http://www.lotus.com/virtualclassroom)
Lotus Virtual Classroom provides a simple, cost-effective solution to assemble learners from remote locations in one place, online. Give them a format in which they can easily respond to the material presented. And distribute mission-critical information quickly and clearly.
For organizations considering a full-scale e-learning deployment, Lotus Virtual Classroom provides a solution that can help learners gradually become comfortable learning on the Web. And the solution is designed to work with an existing learning management system as well as the IBM Lotus Learning Management System.
Teachers can take advantage of Lotus Virtual Classroom to:
Create assessments and surveys.
Deliver a presentation.
Demonstrate software.
Use audio-video to add more interactivity to virtual sessions.
Register participants online.
Send additional reading materials to students before and after a classroom session.
Catalog learning materials, presentations and content.
Track attendance and assessment results.
Assign participants to breakout sessions for small group work.
During each session, teachers can:
Receive prompts when they've spent the allotted time on a particular topic.
Initiate breakout sessions to divide students into virtual groups and monitor their progress using instant messaging.
Share any application running on either their desktop or a student's desktop.
Take advantage of attendance records and assessment results to keep a clear audit trail.
Share agenda items with all users and speaker notes with other instructors.

Blackboard Academic Suite (http://www.blackboard.com)
The Blackboard Learning System has powerful capabilities for managing courses and for tailoring instruction in order to meet student needs:
Course Management capabilities focus on effective creation and setup of courses as well as tools for semester-to-semester migration and archiving.
Content Authoring features include a WYSIWYG (What You See Is What You Get) editing tool that provides a rich text editing interface similar to a word processor.
Adaptive Release means instructors can create custom learning paths by determining when students can access content items, discussions, assessments, assignments or other learning activities.
Syllabus Builder enables instructors to upload an existing syllabus or use the built-in creation functionality to easily design and develop their own syllabus and lesson plans.

Learning Units allow instructors to create sequenced lessons and control student navigation through those lessons.
Course Cartridges® are created by all major publishers with pre-packaged content and course materials in the Blackboard format. Course Cartridges include materials such as additional readings, updated information, multimedia and question pools.
Teaching and Learning Tools enable instructors to create rich term definition lists (Glossary) as well as clearly communicate their Staff Information. They also provide students with additional tools such as The Electric Blackboard®.
Personal Information Management capabilities give students and instructors tools to better manage their work including a Calendar, Tasks and Blackboard Messages (course-based email).
Communication capabilities allow students and faculty to discuss issues online, to schedule collaborative sessions and to form groups that enable teamwork across geographic boundaries.
Discussion Board enables threaded, asynchronous discussions. Instructors can use multiple forums around different topics and embed these into appropriate content areas.
Group Projects support peer collaboration. Instructors can use this tool to form multiple groups of students. Each group can be given its own file exchange area, Discussion Board,
Virtual Classroom and a Group e-mail tool to send messages to all group members.
Virtual Classroom / Collaboration Tool supports live, synchronous interaction, through both a text-based Chat environment, as well as a full Virtual Classroom.
Assessment capabilities give instructors industry- leading tools to evaluate student learning. These features increase instructor efficiency in evaluating student performance.
Assessments and Surveys allow instructors to deliver online, automatically scored assessments and surveys. They can create assessments from scratch or draw upon personal, institutional, or commercially available "test banks" of questions. Varied question types (e.g., True / False, Multiple Choice, Calculated) can be used.
Assignments allow instructors to create assignment items through which students can submit their response directly into the Grade-book for easy management and tracking.
Gradebook stores student performance results, including support for custom grading scales, grade weighting, item analysis and multiple gradebook views.
Reporting and Performance Dashboard provides a view of student progress and indicates whether students have reviewed specific content items. It also enables usage data to be viewed for an entire course.
The Blackboard Learning System includes core capabilities that encompass enterprise scalability, multi-language support, and an open architecture that facilitates extending the system and integrating it with other applications.
Enterprise Scalability: The Blackboard platform has a proven ability to scale to hundreds of thousands of active users.
Multi-language Support: The Blackboard software learning envi-

ronment supports most European languages and multibyte character sets such as Japanese and Chinese.
Standards: Compliance and interoperability with industry standards (including IMS, SIF, SCORM, and NLN) is a fundamental capability of Blackboard's software products.
Blackboard Building Blocks (Open APIs): Our open architecture initiative, the Blackboard Building Blocks® architecture, provides a public, free software development kit (SDK) that documents Application Programming Interfaces (APIs). Clients and independent software vendors use the Building Blocks technology to create new functionality on top of the Blackboard platform or to integrate external systems with Blackboard products.
System Integration: Blackboard's data and system integration capabilities, enabled through the Blackboard Building Blocks architecture, allows institutions to integrate student information systems, authentication systems and other campus back-office systems with the Blackboard platform.

Environment, visit our website at www.blackboard.com

LotusNotes & Domino
(http://www-306.ibm.com/software/lotus/)
Lotus offers products for messaging, application development and Portal, real-time and team collaboration, document and Web content management, learning, remote access and administration, and desktop applications that help organizations to work more productively, to communicate more effectively, and to better leverage collective knowledge.

Live Meeting
Live Meeting, formerly PlaceWare Conference Center, is a new service in the Microsoft Office System that enables you to collaborate online with employees, clients, and customers in real time with groups of 2 or more than 2,000. With just a phone and a computer with an Internet connection you can free yourself from the cost and hassle of business travel.
eRoom(http://www.documentum.com/products/glossary/eroom.htm)
Provides a rapidly deployed and easily adopted Web-based collaborative workspace that enables distributed teams to work together more efficiently. With EMC Documentum eRoom, project teams around the world can accelerate and improve the development and delivery of products and services, optimize collaborative business processes, improve innovation, and streamline decision-making. eRoom is flexible and easily configurable, allowing users to customize and use their collaborative workspaces to support a wide range of business processes. Learn about our collaboration solution.

NetMeeting
(http://www.microsoft.com/windows/netmeeting/)
NetMeeting delivers a complete Internet conferencing solution for all Windows users with multi-point data conferencing, text chat, whiteboard, and file transfer, as

well as point-to-point audio and video.

Marratech & Marratech-free
(http://www.marratechfree.com/)
Marratech-Free® is for computer users looking to move beyond basic chat and messaging. It creates a fully interactive meeting environment on your computer. Meet up with friends and enjoy real-time video with exceptional quality voice plus an interactive whiteboard. Up to five people can meet, talk, see each other and share documents or pictures and make notes. It works on Windows, Mac and Linux and is entirely free. All you need is broadband high speed Internet, a headset and web cam.

SubEthaEdit
(http://www.codingmonkeys.de/subethaedit/)
SubEthaEdit is a collaborative real-time editor designed for Mac OS X. The name comes from the Sub-Etha communication network in The Hitchhiker's Guide to the Galaxy series.

The collaboration is document based and is non-locking and non-blocking. Anyone participating in the collaborative edit can type in the document anywhere at anytime. Using Bonjour (formerly Rendezvous) and BEEP, SubEthaEdit works without any configuration in the local subnet but can also coordinate collaborative editing over the Internet. Two popular areas of use are Extreme Programming and collaborative note taking in conferences.


prelude
ICT in Music Education