

WCES-2010

## Risk assessment of information and communication technology use in multinational educational projects

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Received October 23, 2009; revised December 1, 2009; accepted January 13, 2010

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### Abstract

The use of ICT in multinational educational projects can lead to different risk situations. The purpose of the paper is to identify and assess the potential vulnerabilities and threats, by analyzing the use of ICT. This study was conducted during the activities that took place in two Socrates-Comenius 2.1. European projects. The participants of the two projects have used a variety of ICT tools: collaborative and e-learning platforms, software for processing multimedia materials, software for generating educational tools etc. Risk situations were evaluated in terms of several categories of users: members of the project management teams, teachers enrolled in courses organized within projects, as well as children in classes where implementation has been achieved.

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*Keywords:* Risk assessment; ICT; Comenius 2.1 project

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### 1. Introduction

The economy and world security are totally dependent on information technologies and information infrastructure. The core of information infrastructure, of which humanity depends, is the Internet, a system originally designed for sharing of unclassified research among scientists, the same Internet that today connects millions of computers from different networks, solving the most basic services, and leading nations in the functioning infrastructure. These conditions have facilitated the introduction in schools of new teaching methodologies and pedagogical strategies based on the ICT tools.

The introduction of ICT in education has changed the traditional way of teaching and learning and forced the teachers and students to adapt their technical abilities and knowledge of ICT. Generally, the ICT support can be identified in teacher training programmes, education management and information systems, educational content, distance learning, education policy, media outreach and assistance for equipment and related facilities. But the implementation of ICT in the teaching/learning process mainly conducted to the change of the educational perspectives and instruments (Gorghiu et al, 2009).

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## 2. Promoting the use of ICT in classroom through Comenius projects

In its essence, the FISTE (A Future Way for In-Service Teacher Training Across Europe) project aimed at finding new ways of how to train in-service teachers and how the teachers themselves can learn and upgrade their knowledge and teaching methods by using ICT. The project's specific objectives were: 1) To develop methods for integrating face to face and web-based learning for everyday work of in-service teachers; 2) To apply the methods for teaching in various learning environments in the work of joined partners; 3) To improve teacher education possibilities to use new types of technology for in-service teacher education; 4) To improve in-service teachers' use and understanding of ICT to support their own work in meaningful ways; 5) To develop European cooperation and awareness; 6) To improve the research base of knowledge of how to integrate and best combine face to face learning and web-based learning in European in-service teacher education; 7) To disseminate the results of the European in-service teacher education project on local, national and European level. (Suduc et al, 2008; Bîzoi et al, 2006)

The main purpose of the VccSSe (Virtual Community Collaborating Space for Science Education) project was to create training modules, teaching methodologies and pedagogical strategies based on the use of virtual instrumentation for teaching Sciences subjects. The VccSSe project provides technical and pedagogical elements in order to facilitate the implementation of the virtual applications, through ICT tools, in the classroom. The overall aim of the VccSSe project has the following specific objectives: (1) Offering the in-service teachers a particular technology (based on Virtual Instruments) that will enhance learning in specific laboratories; (2) Applying the developed teaching methodologies and pedagogical strategies to the teaching process and share them in an easy-accessed learning environment (the Virtual Cooperative Space); (3) Improving the research base of knowledge and the implementation to other training areas; (4) Developing European cooperation and awareness; (5) Disseminating all the results at the local, national and European level. (Gorghiu et al, 2009)

## 3. User categories and ICT tools

Within these projects, participants can be grouped into three categories: project team members (management team members and tutors), teachers participating in training courses and students who participated to the lessons where the teachers implemented what they had learnt during the training courses.

In the frame of both projects, VccSSe and FISTE, in order to fulfilling the projects' objectives, there were used a wide range of software for different types of activities.

In the VccSSe project, for communication and collaborative work within the partnership it was selected the *phpGroupWare* platform. The platform was chosen to be used due to its feature richness and flexibility and, not least, because it is free of charge (Bîzoi, 2009). The training activities had place with the support of distance learning software, Moodle. For the training process (to teach Science teachers how to benefit of the virtual instrumentation in the classroom), four software products were used: *Cabri Geometry II*, *LabVIEW*, *Crocodile Clips* (Suduc, 2009) and *Geogebra*. For the dissemination video conference, stipulated in the project proposal, which held in the last year of the project, *Adobe Connect Pro* was selected. Regarding the types of project's participants, *phpGroupWare* was used only by the project team members and the other software was used also by the teachers (course participants). *Cabri Geometry II*, *LabVIEW*, *Crocodile Clips* and *Geogebra* were used by the teachers to develop their own virtual experiments which, then, they introduced it in the Science lessons, in the classroom, and used by the students.

Unlike the VccSSe project, where there were used two different platforms (*phpGroupWare* and *Moodle*), in the frame of the FISTE project, a *BSCW* system was acquired to support both the partnership collaborative work and the training process. But even so, in the FISTE project a wider range of software was used. This diversity is owed to the fact that the course developed within the project was about using ICT in education. The course included a technical unit which aimed to provide information about different information technologies which can be applied in education: *Windows Movie Maker* for video editing, *Camtasia* for screen recording/capturing, *PowerPoint* for narrating slides, blog and *MSN* and *Skype* for communication, *Picasa* for image processing, *MS Publisher* for print publications and *Convenos Meeting Center*, *iVisit* and *EarthLink Conference Manager* for online and video conferencing.

All these software, including *BSCW*, was used both by the project team members and the teachers (for training). The teachers' products developed during the "Using Technology" unit, were applied in the classroom, thus the students used some of these software.

#### 4. Results and Discussions

Risk assessment can be divided into several phases: (a) Identifying the risk; (b) Evaluating the risk; (c) Analyzing the risk; (d) Managing the risk. Risk identification involves finding all situations that threaten the fulfilment of the objectives. The evaluation phase will determine how often the risks occur and what is the level of the threats. The next phase will analyze the consequences arising if the threat occurs. Risk management phase involves the creation of policies and procedures to minimize the effects if the risk occurs.

##### 4.1. Identifying the risk

From the perspective of project management team, there were identified the following potential risks: (a) Not all the project team members possess computer skills to fulfil the project objectives. Some of them are experts in science education and there is a risk of misunderstanding certain technical aspects. (b) The infrastructure of partner institutions is not sufficiently developed to allow the project activities. Organization of courses in the frame of the two projects involved the existence of the partner laboratories equipped with computers and communication devices. For certain activities, the partners needed a stable, average speed, Internet connection. (c) The coordinating institution ability to implement a collaborative web-based information system. In both projects there have been used web-based collaborative platforms to support educational activities and project management. (d) Higher costs for software and/or hardware comparing to the original budget. In the projects proposals, there are some costs estimated for software and hardware requirements. (e) Failure of Internet service provider system or power supply system. This kind of problems are inherent although, generally, occur rarely.

Taking into consideration the profile of the teachers who participated in the trainings developed in the two projects, there have been identified the following risks: (a) Poor course participants skills in working with computer. The teachers involved in projects courses are teaching different subjects and not necessarily related to science. Their skills in working with computer may vary from poor to very good. (b) Lack of infrastructure needed in the classroom or at home. For a computer-supported lesson, a teacher needs to have the appropriate equipment not only in the classroom, but also at home, in order to improve his/her computer skills and to produce new lessons. (c) Problems with software: high costs, hardware requirements, impossibility to disseminate created lessons, complexity etc. These are only some of the many problems which can occur. (d) Lack of English skills. In the frame of the projects, all the training materials were translated in national languages. However, the software used doesn't have the interface translated. Generally, the interface is in English and many teachers cannot understand the terminology and the software messages. (e) Meeting the national curriculum requirements. Sometime it is almost impossible to introduce new methodologies in the existing national curricula. (f) Management of students' learning behaviour. The student's behaviour differs not only from place to place, but also in the same place, in different classes. It is the teacher role to adapt his/her learning methodology to student's behaviour. (g) Evaluation of students' performances. The introduction of new teaching methodologies involves the introduction of new assessment methods.

Based on the student's feedback, other threats were identified: (a) Organization of classroom is improper. There are a lot of aspects which can support this statement: there is no power outlet, furniture does not permit the installation and the use of equipments, the room is too big or too small etc. (b) Classroom activities do not allow the use of ICT. In some schools, the classroom activities are well defined and can not provide the use of ICT. (c) Problems with hardware and software utilization. Up to a certain level, students can find very difficult to operate equipments or to use specific software. The specialized software used to support the lesson may be inaccessible to students of early age. (d) Poor students' motivation. Students will lose focus if the presented interface is too simple or too complex. Also, the lesson should be appropriate designed in order to achieve its goal. (e) Lack of ICT infrastructure in their homes. The impact of using a virtual instrument is increased if it is used also outside the classroom. Same virtual instruments can be used by the students who did not attend the lesson in classroom or it can be used many times by the students who want to remember the experiment.

#### 4.2. *Evaluating the risk*

Some of the risks listed above may occur at the beginning of the projects. These relate mainly of: (a) infrastructure problems (its existence), (b) the coordinating institution's ability to implement the selected collaborative computer system and (c) problems of higher costs for hardware and software than expected. All other risks may occur at any time during the projects life time.

Some of the risks are very important because it can stop the project development: (a) Poor partners and coordinator ICT infrastructure; (b) Improper set-up of the collaborative and educational information systems; (c) Unforeseen expenses that can not be covered by the budget; (d) Teachers are not interested to follow courses modules and to apply new teaching methodologies.

It is estimated at the average level of importance, those risks that affect, only in part, the projects activities: (a) Failure of Internet service provider system or power supply system; (b) Personal skills in working with computers; (c) Meeting the national curriculum requirements; (d) Problems with software and hardware.

Low risks to achieving project objectives are those which not affect directly the project activities deployment, but affect the quality of products obtained and the classroom implementation: (a) Low English knowledge; (b) Bad understanding of student's behaviour; (c) Unmotivated students; (d) Inadequate evaluation methods; (e) Lack of ICT infrastructure in the students' homes.

#### 4.3. *Analyzing the risk*

If the above outlined risks take place, the possible consequences are as follows: (a) Participants with low computing skills will cause delays in carrying out the activities of the projects; (b) Lack of ne partner ICT infrastructure will lead to failure to achieve certain activities; Lack of classroom ICT infrastructure unable the implementation of the new lessons in the classroom; (c) Failure of implementation of the collaborative system will block the further project development; (d) Higher costs for hardware and software means lower budget for other expenses or even project abandonment; (e) Failure of Internet service provider system or power supply system will create temporary blackout; (f) Any kind of software problems (including misunderstandings due to low English knowledge) will delay the projects activities and it will affect the products quality; (g) Impossibility to meet national curricula requirements and the restrictive classroom activities will eliminate the possibility of classroom implementation; (h) The rest of identified risks will generally affect the quality of the implementation process of the new methodologies.

In the FISTE project, 245 teachers were enrolled in the training program, 216 participants reached the final stage and 226 products were delivered. Only 150 (61%) finalized the course and implemented their products in the classroom. In the frame of VccSSe project, 363 teachers were enrolled in the training program, 206 teachers finalized the course, 218 products were delivered and 146 (71%) implemented their virtual instruments in the classroom.

#### 4.4. *Managing the risk*

In each of the two projects, management team tried to identify potential vulnerabilities and find solutions to minimize or eliminate their effects. The partnerships have established the following: (a) Each partner must have people with technical skills, in their local team; (b) If necessary, the local infrastructure must be improved to meet the requirements; (c) To eliminate some costs by using free software and the hardware architecture was adapted to respect budget constrains; (d) To install backup systems and uninterruptible power supplies in order to prevent hardware and power systems failure; (e) To translate the numerous documents created during the project into the local languages in order to assist the course participants and to minimize the risk of misunderstandings due to low English knowledge; (f) To find a common solution to harmonize the new methodologies with the national curriculum of each partner; (g) To develop an assessment system based on questionnaires in order to have a clearer vision on the project activities and, implicitly, on the risks. Thus, the teachers completed the initial assessment questionnaire, participated to the course activities, then completed final evaluation questionnaire and after classroom implementation, they completed the impact questionnaire. The students' feedback was collected using a special designed questionnaire: 2860 students in VccSSe project and 2190 students in FISTE project.

Some risks such as improper organization of the classroom, lack of ICT infrastructure in the classroom or at home cannot be minimized by the projects' partnership. It can only make the selection of the participants who possess the infrastructure.

## 5. Conclusions

The evolution, in the last years, of the information and communication technologies allowed a wider usage, in most of the activity sectors, leading to an increased dependence of computers. Latest technological advances are providing new opportunities but it also lead to an exposure to a wide range of risks.

The risk situations that may occur in the use of ICT in the classroom are numerous and often there can be identified with some difficulty. Although there were identified various risk factors, usually not only one risk factor leads to the failure of implementing ICT tools in the classroom, but combinations of several of these factors.

In spite of the many risks which were identified, due to a good management and hard work of the project team, the activities of the two mentioned projects were finalised with great success.

## Acknowledgements

This work was funded through the Socrates-Comenius 2.1. European projects 128989-CP-1-2006-1-RO-COMENIUS-C21: "VccSSe - Virtual Community Collaborating Space for Science Education" and 108766 - 2004 – RO – COMENIUS - 2.1.: "FISTE – A Future Way For In-Service Teacher Training Across Europe". The support offered by the European Commission, Education and Training, School Education: Socrates: Comenius and the Education, Audiovisual and Culture Executive Agency as responsible for the management of EU's programmes in the fields of education, culture and audiovisual, through the project mentioned above is gratefully acknowledged.

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