

# Web-Based Education in Secondary Schools in Cyprus – A National Project

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**Abstract:** This paper describes a national project in the area of web-based education, which investigated the use and acceptance of a set of internet-based tools that were developed that placed emphasis on teacher-student communication and computer-supported collaborative work. During the course of the project, several unexpected but eventually realistic obstacles were encountered and finally it was concluded that there can be great potential for web-based education in the Cypriot secondary school reality.

## Background

The introduction of ICT in the Cyprus Educational System is being viewed as a matter of utmost priority by the Ministry of Education and Culture. Facts and figures indicate that in terms of technical infrastructure, the situation in Cyprus is satisfactory and relatively better compared to other new countries-members. To illustrate this, we refer to the (eEurope+ Final Progress Report, 2004), in which it appears that in Cyprus, the number of computers per 100 pupils/students according to has raised from 1.3 to 6.3 in primary education and from 6.5 to 10.2 in secondary education (2001 and 2003 figures respectively). These figures are continuously improving.

Furthermore, the government has decided on connecting every school to the Internet. This has been implemented fully in upper secondary schools and partly in all other levels of education.

There also exist several other governmental initiatives that are not related to infrastructure. For example, at the secondary level of education, ICT is part of the curriculum, in the form of subjects aiming at computer literacy and developing skills in the area and as a tool used for supporting other subjects or as a teaching aid. There is a general effort for promoting ICT in all the levels of education as tools in the teaching process, one initiative being the organization of training programs for teachers on the use of technology in the classroom, another the development of a website with electronic material for primary education (<http://www.moec.gov.cy/dde/klimakio/>). At the moment these governmental initiatives are rare and take much time for implementation due to the bureaucracy involved.

In this respect, research projects led by industry and universities seem to be necessary: they need to investigate and experiment with new technologies in schools before more formal attempts are made. This is the only way that the weaknesses and problems in the particular circumstances will be discovered and subsequently dealt with. Future projects will then build upon those project findings.

## Case Study

This paper describes a national project in the area of web-based education, which investigated the use and acceptance of a set of internet-based tools developed within the project. These tools take advantage of existing e-learning technologies, combining them in such a way that emphasis was placed on teacher-student communication and computer-supported collaborative work. An off-the-shelf e-learning solution, such as WebCT (<http://www.webct.com/>), or moodle (<http://moodle.org/>), was not considered, as a tailored made and specialised

solution was desirable based on the given requirements. The project was entitled “Ergadiktyo” (<http://www.virtualschool.com.cy/>), ran for 22 months and its study took place in the settings of “The English School” secondary school (<http://www.englishschool.ac.cy/>). The English School is one of the oldest and most prestigious schools in Cyprus, offering a broad spectrum of high school education and activities including sport, music and drama.

This project’s objective was to develop and test two different e-learning applications. The first one, from now on referred to as Virtual Classroom, would allow the teacher to deliver his lesson through the internet with his students being present (i.e. connected) and at the same time ask his students questions on the subject to test their attention, as well as receive his students comments, questions, etc. The second application, from now on referred to as Exchanger, would allow students to work collaboratively on a given project, while their teacher is present and monitors, resolves potential problems, etc.

The project’s partners, namely Virtual IT (coordinator) (<http://www.virtual-it.com.cy/>), the English School and the University of Cyprus, Department of Computer Science (<http://www.cs.ucy.ac.cy/>), all worked together in order to see the project to completion. Virtual IT was responsible for management and application development, the English School for providing the teachers/students and the labs for testing and the University of Cyprus for monitoring and evaluating the impact these applications would have. In the sections that follow, the two e-learning applications developed and used/tested in the school are described, the testing phase and the respective test sessions that took place are analyzed, evaluation findings are presented and finally the conclusions of this case study are drawn.

## **E-Learning Applications Developed**

Two e-learning applications were developed as part of the Ergadiktyo project: the Virtual Classroom and the Exchanger.

### **Virtual Classroom**

This application creates an online class. Teacher and students can have an online class, from wherever they are, as long as the Virtual Classroom is installed on their computer.

This application has two specialised software tools: the ‘Teacher’ and ‘Student’ tools. Communication between participants of the Virtual Classroom can be achieved through the chat screen and also through voice.

#### ***Teacher tool***

The Teacher tool is used from the teacher in order to create a virtual class, give access to the students that he/she wants to participate in the Virtual Classroom, and upload learning material for its online class. The teacher will be able to see the participants in his/her class, and also ask them questions to see whether they are following the lesson. A screenshot of the interface can be seen in (Fig. 1).

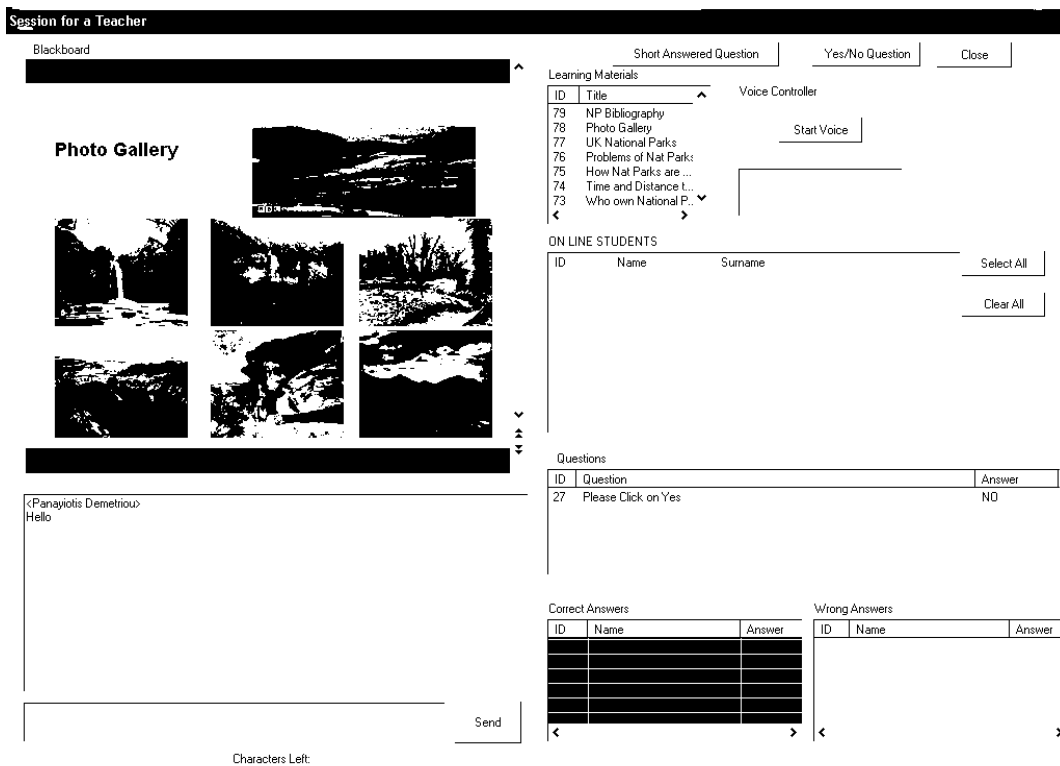
#### ***Student Tool***

Students will be able to work from home, school, or remotely. They will be able to even work wirelessly outside school. The purpose of this tool is to use the online environment to participate in a session that the teacher has already created. The learning material will appear in the presentation area and the student will have the opportunity to listen to the teacher, ask questions and answer questions.

### **Exchanger**

The Exchanger is a development environment for students, to be used as a virtual workshop both from home and in class. Students will have project development assignments and exchanger will allow them to build simple or complex projects online. Purpose of this application is to use the online environment to develop and test objects to

be used in a technology or computer science class with multiple recipients. Communication between participants of Exchanger can be achieved through a chat screen and also through voice. In Exchanger, users are organized in groups. Up to 5 students can log in and join a group participating in the project.



**Figure 1:** Screenshot of the Virtual Classroom Interface, as Seen by the Teacher

## Testing

The two applications were scheduled to be tested in two subjects: Geography and Design Technology. The two respective teachers were extremely determined, showing remarkable motivation to meet our objectives. Several students participated in the initial stages, but seven of them tested the final versions.

### Test Sessions – Geography

The geography sessions concerned the application which implements the synchronous e-learning. It is a teacher-to-student application where the teacher can talk to the students and at the same time can show them a slide presentation. The students who took part in the geography sessions were in the range of 17-19 years old. The geography teacher used for all of the sessions the same slides and the students worked voluntarily and the sessions did not affect their grades.

The first session was mostly like a “crash test” for the application. In one of the school’s labs, the developers tried to simulate a state where the teacher is teaching at least 15 students. After managing to get through the local network’s security and access rights, the developers installed the application. The teacher was in the lab too and as soon as everything was ready he uploaded the PDF file. The next step was for the students to launch the application on their PCs and enable the sound. As students begun to do this, it appeared that the network and the application could not support the specific number of users. Therefore, it was concluded that the application needed some modifications, given that the network could not change. It was not possible to complete the test session successfully, however the developers managed to get enough feedback for further improvement.

At the second session the students were reduced to six, based on the criterion that they could participate in the project during after-school hours. The session took place at the same lab as the first session. The lesson was already uploaded and soon after the developers checked that every student had speakers and that the microphones were functioning, the e-learning lesson began. Of course, some delays existed but the flow of the lesson was satisfactory, since the teacher could talk to the students. The only problem was that all students could talk via their microphones, leading to occasions where three or more students were talking at the same time causing confusion. The presence of the teacher in the same room with the students though, could clear out this confusion but this would not happen in a real e-learning lesson. So, it was decided that the next session would be done in a lab where the teacher would not be in same room as the students. Furthermore, the students' "talk" feature would be removed from the application in order for confusion to be avoided.

The third and final session was situated in the geography lab, which has an extra room-in-room. The teacher got in the room where the students could not see him or listen to his voice through the wall. The developers had already modified the application by making it faster and by removing the "talk" feature from the student accounts. The session began as soon as everyone logged onto the lesson. The presentation was familiar to all of the students but the teacher wanted to simulate the lesson as if it was a new one. So, he made an aural introduction to the lesson and then presented the slides and asked questions for every slide. All six students were asked in every slide and could answer by writing in the chat box. The teacher could also write too but he preferred the talk feature. Even though the students were all in the same room and could help each other, the third session was successful because the students appeared to like it and the application ran without delays.

### **Test Sessions - Design & Technology**

The application for this lesson was a file exchanging program. The purpose of this application is to enable the student-student and student-teacher collaboration and file exchanging. The lesson's teacher decided to hand out an exercise to be completed through this application. The first step would be for the teacher to upload the exercise details and then the students to download them. Subsequently, by using the text and audio chat that the application offers, the students would have to divide the work and assign tasks among themselves. Finally, after each student completed his/her part they would have to upload it, and then one student would have to combine all parts into the solution of the exercise and upload the final answer. This file would be downloaded and graded by the teacher. The students who took part in the design & technology sessions were in the range of 15-17 years old. There were six and they were not graded for this exercise. The purpose of the sessions initially was to complete this exercise in three meetings.

This first session was similar to the first session in the geography class testing. This means that technical problems held back the process that was planned for the exercise. The main problem was that even though the teacher managed to upload the exercise, the students failed to download it in time. The download rate was too slow, so the teacher gave the exercise to his students in hardcopies. The developers had to improve the application to enable more download bandwidth, especially for big files. In addition, some problems with the audio (delays and noise) were encountered.

The second session took place in the lab as well. The download rate was faster and the students managed to get the exercise in electronic format. The audio worked well, but echoing was experienced (it could not be avoided with everyone in the same room). The students started working on the exercise according to the plan but without the use of audio. Since the application was implemented for distance learning it was decided to continue the exercise from different places (the students from their homes, the developers from their office and the observers from the university).

The third and final session was planned at a certain time and day. The students had to have their part of the exercise ready before this date. The purpose of the session was for the leading student to combine the work of all the students and deliver it to the teacher. Both text and audio dialogs worked perfectly but there was some echoing from the users that did not use a headset. After thirty minutes the leading student combined the work of his classmates by using their help through continuous conversation. The teacher liked the way the students worked as a team and the result of their work left him more than satisfied. Another interesting fact was that all of the students remained in the session and kept chatting even after the teacher and observers logged out.

## Evaluation

The two applications developed were tested through the respective test sessions. The participants were volunteer students who showed interest in using new technologies and demonstrated great commitment to the procedure. The test sessions confirmed that the two applications function quite well, but did not capture the students' thoughts, feelings towards them and e-learning in general. For this reason, a questionnaire was designed and given to the participants to complete. Its objective was to learn more about the students' experience with computers, their attitude towards e-learning and their impression about the two applications tested. The questionnaires (hard copies) were completed and collected after all test sessions ended, allowing the students to have a more global view of the two applications. Seven students (two boys and five girls) completed and returned the questionnaire.

As shown in (Tab. 1) all participants were knowledgeable about the use of computers, at least to the degree of knowing enough to get by. What is really interesting though, is that all students answered that they use computers every day at home, although not every day at school. This probably happens because in secondary school, not all subjects require the use of a computer lab. Therefore the computer is probably used in the more practical subjects, e.g. ICT, Design Technology and Geography.

Question 2. How much do you know about computers?	Nothing at all	Very Little	Enough to get by	A Lot	I'm a real expert
	0%	0%	71%	14%	14%
Question 3. Where did you learn most about computers	I taught myself	With someone in my family	At a friend's house	At school	Somewhere else
	71%	0%	0%	0%	29%
Question 4. Roughly how often do you use a computer in school?	Every day	Three or four times a week	Once or twice a week	A few days a month	Hardly ever
	43%	29%	0%	0%	29%
Question 5. How often do you use a computer outside school?	Every day	Three or four times a week	Once or twice a week	A few days a month	Hardly ever
	100%	0%	0%	0%	0%

**Table 1:** Questions on Knowledge of computers and frequency of use

Questions 6 to 13 in the questionnaire were related to the use of computers at home and elsewhere. The majority of participants use a computer for general tasks, such as information search (in any medium), to send e-mail, and even to play games, but rarely or never use it (and sometimes do not know how) to make newsletters, to program, make animations, run simulations, link to a music keyboard, or other device (such as webcam). In addition, none of the participants uses computers for video-conferencing with other schools.

It is worth pointing out that all participants had a computer at home linked to the Internet, with a broadband connection, although not necessarily in their room. These students use a computer at home (or somewhere else outside school) for similar tasks to the ones for which they use a computer at school, but the percentages seem to be higher in some cases. Specifically, more students appear to use a computer at home for tasks related to leisure activities, such as send digital photographs, play games, link to a music keyboard. It is very interesting to note that 86% of the participants never use their computer at home to practice things they learn at school.

Finally, there was a question regarding the idea of collaboration with the use of computers, given that one of the applications tested was designed for collaboration. The relevant results are presented in (Tab. 2).

Question 14. What do you think about the idea of using a computer for collaboration purposes, e.g. working with classmates on group projects?			
	Agree	Disagree	Don't know
It is very useful	86%	14%	0%
It makes collaboration a lot easier	71%	14%	14%
It is helpful when working from home	86%	14%	0%
I prefer meeting with my classmates in person	71%	0%	29%

**Table 2:** Question on Collaboration

One notices that although the majority finds collaboration with the help of computers very useful, they prefer meeting their classmates in person, either at school, or elsewhere. This seems like the anticipated answer, given that these students attend the same school and live in the same city. Nevertheless, they would opt for the online collaboration option if working from home. Therefore, the advantages of online collaboration were confirmed and it is to be sought after in particular circumstances.

By examining the correlations amongst answers for different questions, we found out that *Question 2* “How much do you know about computers” and *Question 14a* “What do you think about the idea of using a computer for collaboration purposes → It is very Useful” have a correlation of 0.88, indicating that the less students knew about computers, the more they tended to agree that using a computer for collaboration is useful. This is very interesting, showing that students have been informed and are aware of the strengths of technology and are eager to learn and use it. Other questions did not demonstrate significant correlation, or it appeared in cases where there was no particular interest.

There were also open questions in the questionnaire, asking the participants to write down any problems they faced during testing and possible suggestions. Previously, in a question whether technical problems were encountered, 57% of the students answered that they faced problems while testing the two applications, whereas 43% answered that they did not. The problems that were reported from students included sound problems, problems logging on, or automatically logging a student out and some delay in the teacher receiving a student’s message. Finally, some participants were critical enough so as to provide suggestions. These included also allowing the students to use a microphone to communicate with the teacher and making students’ messages to the teacher visible to all other students.

## **Conclusion**

Two e-learning applications were developed as part of the “Ergadiktyo” project. The ulterior motive was to see how some forms of e-learning would work, supporting the traditional teaching model. Secondary education in Cyprus is largely based on the traditional teaching model, with very few teachers trying new methods.

The test sessions that were conducted, were finally successful after a few technical problems and proved that the school’s students and teachers are keen to use technology in learning. The problems that were identified by students in the systems tested will become valuable feedback to improve these applications. Since the participants were just a small subset of the total number of existing students, generalization of conclusions would probably be inaccurate. Nevertheless the findings were indicative of the great potential of this area.

There are great possibilities for the inclusion of technology in learning within the Cypriot educational system. This will require a positive attitude from all stakeholders, namely national policymakers, school officials, administrators, teachers, parents and students. Changing the way one has been doing things up until today is not a trivial task and cannot be accomplished overnight. Careful planning is needed so as to smoothly transition to a new model of combining e-learning with traditional teaching.

## **References**

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