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INTERNET EXAMINATION – A NEW TOOL IN E-LEARNING

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ABSTRACT

The Internet has been widely used as a powerful educational tool. It gives the possibility to deliver the educational material widely all over the world without the need of the students or the teachers to travel and be present at the same location. For this we have developed the e-learning portal EVICAB (European VIrtual CAmpus for Biomedical engineering). We have extended the use of EVICAB to offer the examination service. When using the EVICAB portal the students may take the examination at their home university or anywhere in the world provided that controlled circumstances are ensured. Because the examination is offered via the Internet, the students also have all the material from the Internet available. This makes certain requirements for the style of the questions. Typically, the questions should not ask "What is …" but instead "Why is .., which one is better and why .., design a system which …". The students seem to appreciate this kind of examination, because it better reflects the situation of the real working life.

KEYWORDS

Internet education, e-learning, Internet examination.

1. INTRODUCTION

Internet education has reached a strong and stable position (Buffardi, 2011). It has several benefits over the traditional classroom education, e.g., increased accessibility to information, ease of updating, standardizing and distributing content, accountability, interactivity, self-paced speed, usefulness for international students and also for disabled students, etc., (Ruiz et al, 2006). However, it is generally agreed that Internet education does not fully replace the classroom education but serves as a strong supporting method. Distant learning is nowadays widely acknowledged by students (Kian-Sam et al. 2003) and teachers (Smarkola, 2008) all over the world.

There exist many different portals for Internet supported education. These include, e.g., Yovisto (http://www.yovisto.com/), Webcast Berkeley (http://webcast.berkeley.edu/), MIT Open Course Ware (http://ocw.mit.edu/), Videolectures. NET (http://videolectures.net/), Connexions (http://cnx.org/) or various course management systems, e.g., Moodle, Blackboard, WebCT, Ilias (Romero et al, 2008), etc.

We have developed a free access e-learning portal EVICAB, which is the acronym from European VIrtual CAmpus for Biomedical Engineering (http://www.evicab.eu). Its basic development was funded as an EU project (Malmivuo, 2007). Despite that EVICAB was developed particularly for biomedical engineering field, its application is not limited only to this field but it may be equally well applied to any other discipline.

To enlarge the educational properties provided by EVICAB we have developed and included the Internet examination service to the portal. The Internet examination serves both to the students who have made their studies with the aid of the EVICAB portal as well as to the students who have attended classroom education. The internet examination is very well accepted by the students, because, on one hand, it better evaluates the students' ability to understand the issues in the course rather than remembering small details, and on the other hand, it makes it possible for the students to take the examination at their home university and there is no need to travel to the university, which has provided the course either as an Internet course or as an intensive classroom course.

2. MATERIALS AND METHODS

2.1 EVICAB Portal

EVICAB is a free access portal for e-learning. It offers high-quality video lectures including associated lecture slides and additional teaching materials, e.g., textbooks, exercises, laboratory works. The material is primarily recorded during classroom lectures. Educational institutes outside the EVICAB community may also propose courses to be included to the portal, as well as other educational institutions may take EVICAB courses to their curriculum. Their students may take the examination, and thus earn credits for the studies. The video lectures are provided in various formats: videos for a computer screen, i.e., in a flash format implemented as web pages, for iPods, and for mobile phones. Detailed instructions about the courses and introductions of the teachers are available. The portal also includes a large number of publications concerning e-learning in general and especially this virtual campus.

The EVICAB portal is written in Hypertext Markup Language (HTML) and the code can be used as an open source. Other teaching institutes of any other discipline may build their own version of the portal because the programming is relatively simple.

We combined recorded lectures, accompanying narrations and synchronized presentations when developing video lectures. Lectures were recorded in a traditional classroom environment. The process was divided into five steps: 1) technological setting, 2) video, audio recording and screen capturing, 3) audio and video data editing, 4) rendering files for personal computers, iPods and mobile phones, and 5) developing system for shearing video lectures via the Internet (Kybartaite et al, 2010).

Video lectures were segmented into time intervals based on the topics. The lectures were rendered in a very common flash file format and implemented as web pages, Figure 1. The resolution was selected so that it fits different computer screens without excessive scrolling or scaling of the contents, i.e., totally 1040x595 pixels. All the files were placed on the server so that the lectures are accessible via the Internet by anyone and anytime. The minimum bandwidth is 350 kilobits per second (Kb/s) but 1 Mb/s is recommended in order to watch the lectures without buffering pauses. Video file converting software was used to obtain file formats for audio, video players and mobile phones. It became possible to access files with freely available software, i.e., iTunes and Quick Time player and then upload them to personal gadgets.

WorldPress blog tool and publishing platform was implemented as the asynchronous communication and rating system. It is the open source project, which was downloaded and installed as a software script. Users all over the world have the possibility to leave their comments, messages and suggestions in the system. A rating system was included so that users could evaluate each lecture and express how interesting is a certain topic.
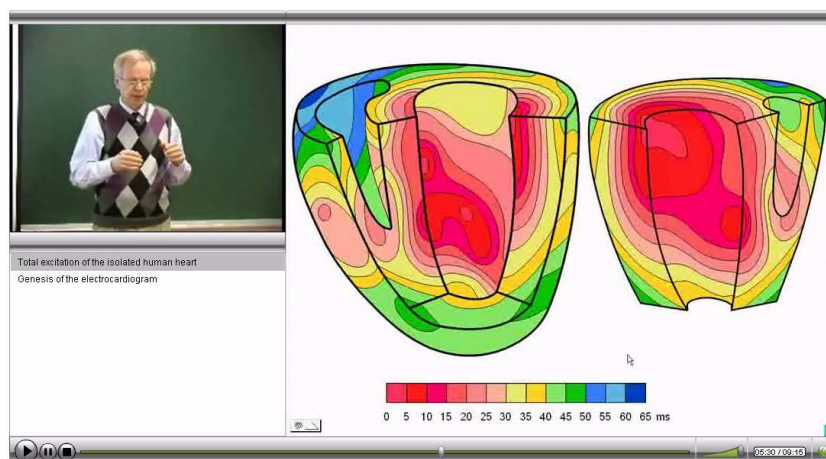

Figure 1. Example of a video lecture in Flash format. It can be accessed using PC.

2.2 Internet Examination

2.2.1 Taking the Examination

After attending classroom lectures or following video lectures students may take part in the examination. During the examination the students may use all the material available on the Internet, including the course book. The only thing which is not allowed is communicating by e-mails or other direct means, e.g., talking, and sharing books or lecture notes with other persons. This approach changes the style of the questions. In ordinary examinations, where the students are not allowed to use any material, it is more tested whether the students remember certain details from the course. In the Internet examination, where all material is at hand, the examination aims to test whether the students have fully understood the concepts and have the ability to combine various issues and to give rationales for their conclusions. This approach is relevant for developing professional skills that the students need when they move to the working life.

Depending on whether the course is a part of a degree programme or a supplementary course, the students participate in the examination in different ways.

In the degree programme the students take the examination in a computer classroom of a university. Their identity is checked and the supervising assistant controls that the students log on the examination with their own names. It is also important to have a list of the participating students so that no student outside the classroom may participate in the controlled examination. An additional method to confirm that only those students who are in the classroom participate in the examination is to give a password in the classroom, which the students write to the examination form. If the students are from several universities, the examination may be arranged at their home university at the same time provided that the aforementioned conditions are ensured.

In supplementary education course the students may take the examination anywhere because there is no need to control their identity. This is one important feature of the Internet examination. In supplementary courses, arranged, e.g., in connection with international scientific seminars, the students may be from several countries and different cities, and universities. The examination is usually arranged a couple of weeks after the course as it would be impossible for the students to take part in the examination without preparation.

2.2.2 Examination Style

The Internet examination may include questions with multiple choice answers, calculation tasks or essays. There may be questions of several parts, e.g., the question having part a) and b), where part a) requires a short answer, e.g., definition or explanation of a phenomenon and part b) requires more detailed analysis and explanation of the phenomenon.

Based on the experience of the authors, a multiple choice examination is more suitable for the formative assessment, i.e., for tests performed during the course. The calculation tasks or essays are more appropriate for the final summative examination. The Internet examination has the problem that writing equations with the computer is more difficult and time consuming, and therefore calculation tasks may be used only where the correct result is sufficient. Deriving equations on the digital examination form is practically impossible. The students find that writing essays is the most practical way to express ideas. Also the teachers and assistants find the essays preferable because they describe more effectively the students' understanding of the issues of the questions though the essays are more time consuming to check.

2.2.3 Examination Classroom

The students take part in the examination in the computer classroom. They open the Examination web page in the EVICAB portal, Figure 2. There is a symbol indicating that the examination time is approaching. At the beginning of the examination the assistant uploads another version of the Examination page to the Internet. It indicates that the examination has started and through this page it is possible to download the examination form. The form is a Microsoft Office Word file including the questions. The students write their personal data and the password given by the assistant supervising the examination to the form. The password is important to control that the examination is attended only by the students in the classroom.
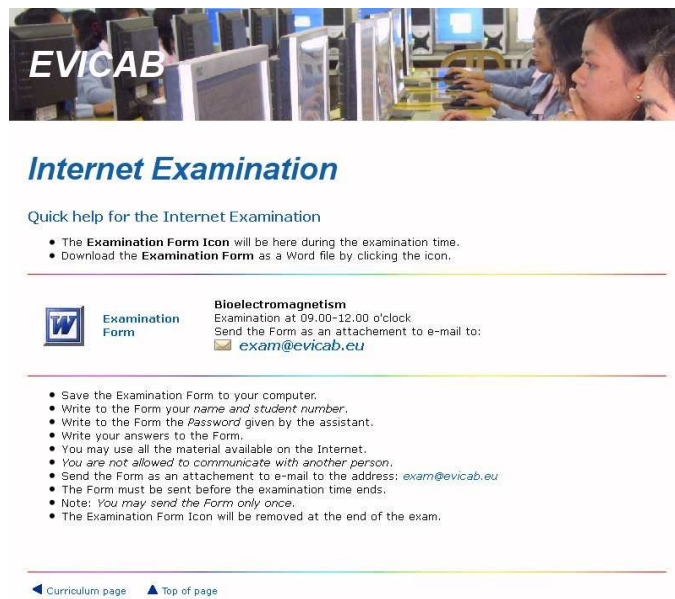
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Figure 2. Screenshot of the Internet examination on the web page.

The students are free to use all the material available on the Internet. So they do not need to remember all details of the topic. It is more important that they understand it and are able to make conclusions. We tested the Internet examination first on our course on Bioelectromagnetism (Kybartaite et al, 2009). The textbook for this course is available on the Internet (Malmivuo and Plonsey, 1995). At the end of the examination the students send the examination form as an attachment by an e-mail to the assistant to the address given on the Examination page.

2.2.4 Operations of the Teacher

Because the students have the Internet available during the examination, the teachers should not prepare questions of the style: "What is …?" but rather of the style "Why …?" or "For what purpose …?". Such questions measure the students' understanding of the topic of the question and ability to make conclusions. The teachers/ examiners have to consider suitable and pedagogically sound questions.

Unfortunately, some students, who apparently have not fully understood the topic of the question, may copy and paste even several pages directly from the Internet. It is clear that such answers may not be accepted.

Internet examination requires educational institutions to provide computers with the Internet connection and ensure their proper functioning during the whole examination time.

2.2.5 Pros and Cons of using the Internet Examination

The teacher may store the students' answers from the e-mail attachments and print them out after the examination. It is easier for the teacher to review the answers written on the Word document than by hand. One more benefit is that all the documentation from the examination may be easily archived to the computer.

Important is that the teacher/ assistant administering the examination does not need to be at the examination location during the examination but all the administration may be performed from any location in the world where the Internet connection is available.

In addition to the advantages the Internet examination includes several disadvantages, e.g., plagiarism, copying and pasting, collaboration via digital or mobile devices, incorrect attendance information, and exceeding deadline for submitting the examination forms. These issues should be carefully considered by teachers, examiners, supervisors and following consequences well explained since the Internet examination is still quite a new endeavor for the students.

3. CONCLUSION

The Internet examination has the same aim as the traditional examination, i.e., it allows examiners to assess learning outcomes and performance of the students. Meanwhile, the students have the possibility to demonstrate their individual knowledge within particular subject and under certain circumstances, i.e., the students should have confidence in using information communication technologies (ICT) and be able to express their ideas in digital format.

The Internet examination is a modern way to perform the examination. It seems that the students and the teachers appreciate the advantages it can offer. One reason is that all information for finding small details on the topic of the questions is available on the Internet. The teachers and the students appreciate that the Internet examination allows not to be tied to one location but may be arranged in several different locations at the same time.

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