

# How to Speed up the Bologna Examination Process

Marija Krznarić, Sonja Zentner Pilinsky, Krešimir Petković

Polytechnic of Zagreb

Department of Electrical Engineering

Konavoska 2, Zagreb, Croatia

Phone: 01 36 88 160 Fax: 36 65 011, [mkrznaric@tvz.hr](mailto:mkrznaric@tvz.hr), [sonja.zentner@tvz.hr](mailto:sonja.zentner@tvz.hr), [kresimir.petkovic@globalnet.hr](mailto:kresimir.petkovic@globalnet.hr)

**Abstract - Since the beginning of the academic year 2005/2006 when Croatian higher education started implementation of the Bologna Process, teachers have been faced with new and different educational activities. This paper deals with the new assessments based on the Bologna process and gives examples of how periodical testing of students can be obtained in different subjects. As far as foreign language courses are considered, types of courses, learning activities and testing have to be changed, new technologies have to be implemented and suitable strategies have to be developed.**

**The computer program we developed for testing and evaluating student's achievements is described in this paper. The article also gives a few examples of how to evaluate electrical engineering students' workload and their outcomes using a computer laboratory.**

key words: education, computer program, testing

## I. INTRODUCTION

The purpose of the **Bologna process** (or Bologna accords) is to create the European higher education area by making academic degree standards and quality assurance standards more comparable and compatible throughout Europe. It is named after the place it was proposed, the University of Bologna with the signing, in 1999, of the Bologna declaration by ministers of education from 29 European countries in the Italian city of Bologna. This was opened up to other countries, and further governmental meetings have been held in Prague (2001), Berlin (2003) and Bergen (2005); the next meeting will take place in London in Spring 2007.

The 40 Signatory States in the Bologna Process have identified ECTS (the European Credit Transfer System) as one of the cornerstones of the European Higher Education Area. A large number of countries have adopted ECTS by law as an accumulation system for their own higher education systems and others are in the process of doing so. ECTS makes study programs easy to read and compare. It can be used for all types of programs, and for lifelong learning purposes. It can be used for accumulation within an institution and for transfer between institutions. ECTS helps learners moving between countries, within a country, town or region, as well as between different types of institutions. For these reasons the well-known acronym "ECTS" now stands for "European Credit Transfer and Accumulation System".

ECTS is a student-centered system based on the student workload required to achieve the objectives of the program of study, i.e. 60 credits measure the workload of a full-time student during one academic year. ECTS takes into consideration the time required to complete all planned learning activities such as attending lectures, seminars, independent and private study, preparation of projects, examinations, and so forth. Credits are allocated to all educational components of a study program (such as modules, courses, placements, dissertation work, etc.) and reflect the quantity of work each component requires to achieve its specific objectives of learning outcomes in relation to the total quantity of work necessary to complete a full year of study successfully.

In Croatia, the implementation of the Bologna process started in the school (academic) year 2005/2006. The existing academic degree granted with a *diploma* was transformed into a baccalaureus and the programmes were shortened from 4 years to around 3.

Bologna has been here for a year, first it opened and then entered our lecture rooms, it is among our students, with its different ways of teaching, testing and examinations. It has become an academic way of life. However, to many teachers, Bologna is both new and troublesome. Since the Bologna examination process requires frequent testing of the students' knowledge, constant monitoring of the learning process of each student, our written and oral examinations are history, a new way of testing, a new evaluation have been knocking at our door. Discussing the problems with our colleagues teaching courses like mathematics, electronic circuits, fundamentals of telecommunications etc, it is obvious that they have been facing the same problems. This paper gives two examples of how and what we have done about it at the Department of Electrical Engineering, Polytechnic of Zagreb.

For several years, students have been using well equipped laboratories in the Department of Electrical Engineering, one of them being a computer laboratory with 18 PCs also used for English language exercises. Although the groups have more than 18 students, they can easily work together in pairs, discussing the problems and "arguing" about the questions they see on their monitors. Sometimes they do exercises from the Internet (several addresses are listed in References) which offer keys to the exercises and give their score. These exercises usually have a special key called "hint" which students use if they do not know the answer. Unfortunately, some students use "hint" too often without even trying to think about the problem. Therefore, teacher's own exercises are mostly used. Students download the exercises which do not offer

keys and do not have the tempting “hint”, so they really have to use their skills and pay attention to what they are doing. If they do not understand either the question or the answer, they are always welcome to ask the teacher for an explanation. Those who are fast and good in English, are given other exercises, more difficult, more complicated.

In order to use a similar type of exercises for writing short but frequent tests, second year students have offered their help in preparing new tests for computers. Instead of writing different tests for each group, typing them, printing or photocopying them, finding a large lecture room, watching them while they write, correcting their tests and calculating the percentage of correct answers, the teacher has to write one test only. Since there are only 18 PCs in the lab, students have to be split into two groups to enter into the lab. Results are available in 45 minutes! A group of 18 students write their tests and see their score given in percentage in only 20 minutes! And they cannot copy, each student is given a different test question sequence.

When their tests appear on the monitor, the tasks are randomized, each test has tasks in a different order, i.e. the tasks number 1 in the first test is number 12 in the second test, and it is number 7 in the third test and so on. Since the time for writing tests is limited, the students are busy writing their own tests and do not have enough time to look at other students’ monitors. The possibility of finding the same question on the neighbor’s monitor is very small. There is another advantage and a very important one. The tasks are equally difficult, because the tests are actually the same. When the students complete their tests, they just have to print out their score. No more red pencils, no more counting mistakes, no mathematics, calculations, no percentages.

The only practical problem in implementing this type of process is the following: “Is there a lab with computers in your higher education institution?” If the answer is “Yes”, go ahead, if the answer is “No”, go ahead anyway, you will probably get the lab, sooner or later.

## II. COMPUTER PROGRAM DESCRIPTION

The computer program we developed for testing students is built with php scripting language and relies on database called postgresql. It is published on apache web server. In database we stored information about students, tests, privileges etc.

PHP is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. PHP has been chosen because only one master computer is required for storing the program. There is no need to install software on the client's computer (in this case the student's computer), only a web browser is required, such as Microsoft Internet Explorer or Mozilla Firefox.

So far only two types of tests have been developed, i.e. 'multiple choice', where students choose the correct answer between two or more possibilities, and 'supply correct verbal forms' where students have to fill in the gaps with

the correct verbal forms. Multiple choice was given to students who were tested on Mobile communications and the other type to students for testing their competence in another language, in this case, it was English.

When security of the tests is considered, several mechanisms are implemented including randomized order of questions, time limited logins and session based checks (each session-id is checked in order to disable attacks).

## III. AN EXAMPLE OF THE TEST IN THE ENGLISH LANGUAGE

The following is an example of a test and instructions for students how to begin, log in etc. Each student is given his/her «username» and “password” and then:

log in, please.

Username:

Password:

Login

[Admin login](#)

INSERT PRESENT SIMPLE, PRESENT CONTINUOUS, PRESENT CONDITIONAL, FUTURE SIMPLE or “GOING TO”:

1. What (go)  on? Where (the noise, come)  from?

2. If I (see)  him, I (tell)  him to come tomorrow.

3. Jim and his brother (not, be)  at home. They (play)  football in the school yard.

4. It's my birthday tomorrow. I (be)  21 years old.

5. It (be)  very cold today. I (think)  it (go)  (snow) .

Provjeri

When students finish the test, they click the key Provjeri/Check at the end of the exercise and the next page

opens. There, they will find their score, which is the percentage of correct answers.

Computer based assessment may also be used to test and improve technical vocabulary in subjects where students already have a well developed understanding of the topic. Imagine for example a simple light bulb. Student can see it on the screen (projected by an LCD) or on their monitors. Their task is to list the terms in English and describe and write the English equivalent. They will need the following words: insulator, contact, filament, support wires, glass supporter, brass base contact. Or another example, a flashlight. There are even more words, e.g. cell, metal case, leaf spring, on-off button, metal reflector, etc. There are electric components and their symbols, there are measuring devices and other elements which students can describe, write the English equivalent and all that using computers and getting the results before the class is over. Again, when they finish, the computer will open the next page and give them the score.

#### IV. RESULTS OBTAINED WHEN TESTING IN MOBILE COMMUNICATIONS

Pilot tests in Mobile communications [1,2,3] have been carried out using the "multiple choice" principle. Each test contained 10 questions and each question had 4 answers. Only one answer was correct. Questions were based on the theory students had already learned and the understanding of that theory (i.e. causes of some effects or consequences of some effects). 17 students were tested and the percentage of their correct answers is given in Fig.1.

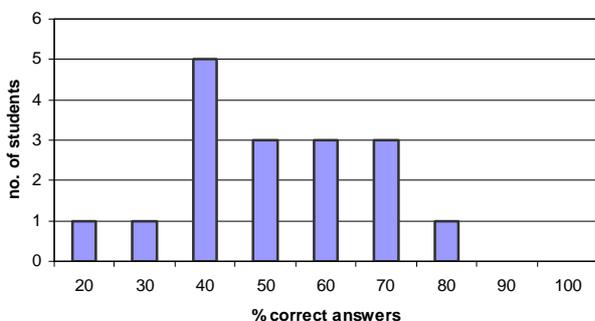


Fig.1. Number of students and the percentage of correct answers

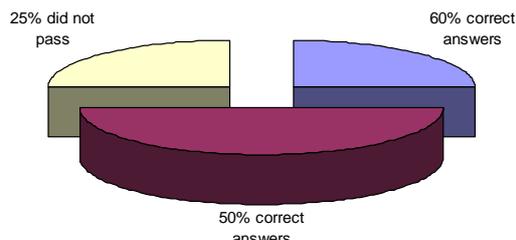


Fig.2. Percentage of students who failed the test (25%), and who passed the test (75% - 50% with 50% correct answers and 25% with 60% correct answers)

In the second pilot test 25% of the students did not pass the test (they had less than 50 % correct answers), 50% of the students had 50% correct answers and 25% of students had 60% correct answers, as shown in Fig.2. As the pilot tests had rather low rate of passing grades and overall relatively poor results, the testing process indicated that further teaching effort was required.

#### V. CONCLUSION

Computer based testing may significantly speed up examination process. This could bring real benefits for both the teachers and students. Students get the results immediately. They do not need to stand in front of the billboard, or knock at the teacher's office, or open the Internet and try to find results on their teacher's site. The teachers get immediate feedback on areas requiring further effort.

In addition to specific advantages of computer based testing, the process fits well with modern student attitudes. Students like computers, they are more or less familiar with the possibilities which computers offer them. They find learning in laboratories modern, up to date and dynamic. Since our students study electrical engineering, their communication with computers is an imperative. New media and technologies have spread all over the world and Croatia is not an exception.

Moreover, a small country like Croatia with the language spoken by a few millions only, must encourage and help future generations to become part of the European Union as part of the Bologna process. The graduates must achieve good oral and written competence in at least two EU languages. The language modules are integrated into programs of most higher education institutions and students are expected to master the particular language of their specialty.

In the paper we have described the program for testing students on a computer. The beta version we developed and tested in various subjects (Mobile Communications, English language) has shown good results both in reducing teacher's effort in preparing and correcting tests and enabling student to get test results practically in real time.

#### REFERENCES

- [1] E.Zentner "Antennas and Radio Systems", (in Croatian) Graphis, Zagreb, 2001
- [2] S.M.Redl, M.K.Weber, M.W.Oliphant "An Introduction to GSM", Artech House, 1995
- [3] S.Zentner Pilinsky, notes for lectures in Mobile Communications (in Croatian)
- [4] M. Krznarić "Bologna je već tu!", (in Croatia) Strani jezici, Zagreb, 2006
- [5] [http://en.wikipedia.org/wiki/Bologna\\_process#Effects](http://en.wikipedia.org/wiki/Bologna_process#Effects)
- [6] [www.englishpage.com](http://www.englishpage.com)
- [7] <http://a4esl.org>
- [8] ECTS Users' Guide, Directorate-General for Education and Culture, Brussels 2004