# An Exam Platform for Efficient Student Evaluation

## Cristea Boboila, Maria Goae, and Alexandru Savulescu

ABSTRACT. This paper presents an online application for student evaluation. The traditional approach of paper-based tests is augmented with the efficiency of the electronic-based approach. The proposed application provides an user interface for testing, speeds up grading and allows fast publishing of the grades.

## 1. Introduction

In a time where computers are common, we can use them to aid us in our daily routines. As a professor, one would need to spend a lot of time and resources to hold exams and to grade the test papers. As a first measure, multiple choice tests are good, but we can further increase the effectiveness of grading papers and also allow fast publishing of the grades.

This application was designed and implemented as an exam platform. It is called eGrila and it provides the means for a professor to mange his exams, and for students to take them. The website has an appealing interface and allows student registration to access the multiple choice tests. The application has an administration module, permitting the owner of the platform to easily add/delete/modify multiple choice tests representing exams, manage students, view marks and also choose which tests are available to registered students.

Web-based learning [3] and online evaluation have gained considerable interest with the recent development of distance learning [1], [2], [4], [5]. Online testing tools exist [9], [10], however, they are usually not free of charge. One of the advantages of our tool is its implementation with open source languages, and thus its availability to everyone.

## 2. Description

**2.1. Database.** The database diagram is presented in Figure 1 and consists of five tables:
- **Table 'admin':** indicates the username and password for the professor who has administration rights. The administrator can add or delete new items or view/accept/reject orders made by users.
- **Table 'studenti':** contains information regarding a student that has registered with the system. It stores a unique CNP (Personal Numeric Code), a password for the account, and also information regarding the student (full name, group).
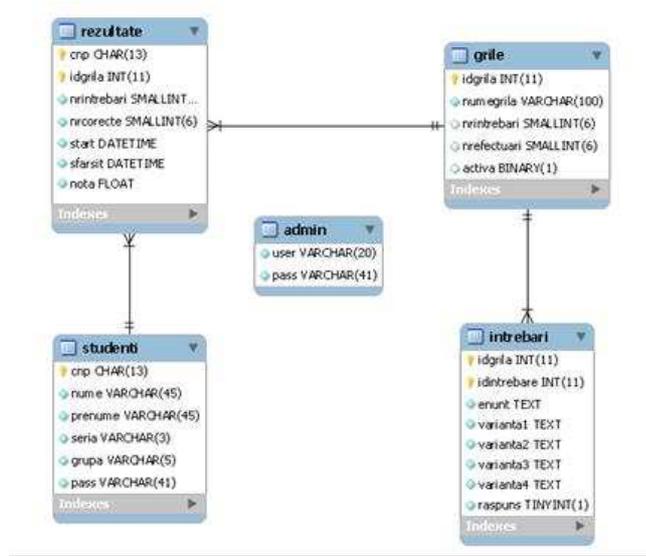
FIGURE 1. Database Diagram

- **Table 'grile':** contains the names of the multiple choice tests along with the number of questions, the number of times it has been taken, if it is active. Each test is identified by a unique id of integer type.
- **Table 'intrebari':** stores information about the questions specific to the tests. Each question has a statement, four choices and an answer. Each question is identified by a unique id of integer type, and it also has a foreign key to the id of the test. A deletion of the test automatically cascades the action to this table.
- **Table 'rezultate':** contains results for tests that have been taken by students. It has two foreign keys, one to the CNP of the student, and one to the id of the test. It contains information regarding the number of responded questions, the number of correct questions, start and finish time and date and the mark associated to the test. Any deletion of a student or test will cascade the action to this table.

**2.2. Design.** The application has two main modules: the student interface module and the administration module. In Figure 2 we can observe the interaction between the modules, and between the modules and the database.

A student can create a new account on his own. This can be accomplished through the registration form. The form has to be filled with personal information, a CNP (Personal Numeric Code) and a password.

After the information is filled, the student must press the "Creaza cont" button (thumbs up). The data inserted is validated, and if successful, the student can log into the platform. CNP validation is applied, and the password must be 6-12 alphanumeric characters. The form can be accessed by going to the registration page (ex: http:/host/egrila/register.php) or by pressing "Inregistrare" button on the index page.

A student has to log into the system to able to manage his account. The student can access information about his account, change the password, log out of the platform, or go to the exams area. If he clicks on "Detalii cont" a form will appear where he can
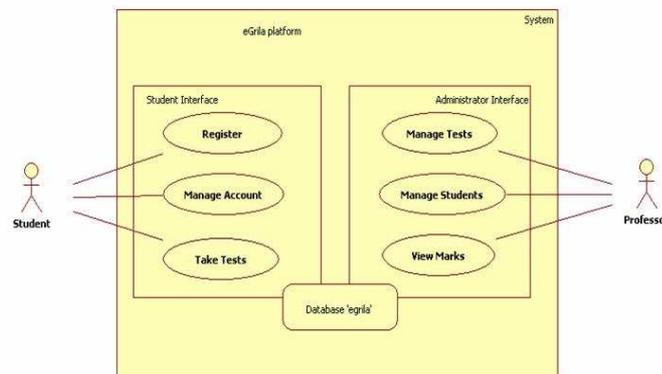
FIGURE 2. Module Interaction Diagram

change his details (name, group); if he clicks on "Parola Noua" a form to change the password will be presented. By accessing the "Testele mele" option from the menu, the user is presented with a situation on his already taken exams and also with a list of available tests.

When taking a test, the student is presented with information about the exam: the number of questions and number of answered questions. After he answers all the questions, the grade is calculated and he will be able to see it right away in the "Testele mele" area. During the test, a student has the option of ending the exam before answering the entire set of questions. This implies, though, that his grade is going to be calculated as if he answered incorrectly to the remaining questions of the specific exam.

As we can see in Figure 3, the statement and the four choices are presented to the student. The questions must be answered one by one. To validate an answer, the user must check the radio button for the choice he thinks is correct, in the answer area. After that, he must click on the "Raspunde" button (thumbs up). To finish the test ahead of time, he can click the "Sfarsit test" button. To prevent mistakes, a validation cassette is prompted to the student warning him about the consequences.

**2.3. Administration.** The PHP modules needed for the administration are stored in a separate directory ADMIN. The administrator can reach this module simply by specifying the path to this directory in the URL (ex.: http:/localhost/egrila/admin).

A professor has to log into the system in order to able to manage the platform. The professor must enter his username and password provided in the installation phase (see section 3), and then hit the lock button to login. If the authentication is successful, a menu will appear that will give him the possibility to manage the platform, and also some statistics regarding the number of exam tests and students that are currently found in the system.

By accessing "Grile" in the top menu, a table will appear showing all the tests that are defined in the system. If the professor wants to delete one or more tests, he can easily check the associated checkbox and click on "Sterge grila" button.

By clicking "Adauga grila" in the same page, the professor is prompted with a form where he can insert a new name for an exam test. After adding tests, the

Figure 3. Answering a test question

professor will go to "Grile" area to add questions. For an existing test, questions can be added/deleted/modified.

Students can not see tests right away. After the teacher finishes adding questions to the exam test, he must activate it to allow students to take it. He can also deactivate it. The test becomes active or inactive depending on the original state (Active → Inactive, Inactive → Active).

The platform administrator can view the registered students in a list by accessing "Studenti" in the top menu; a table will appear showing all the students with their details (CNP, full name and group), alongside with a checkbox. If the professor wants to delete one or more students, he can easily check them and click on "Sterge student(i)" button. The results for a student are also deleted (if they exist) as a result of the foreign key between "rezultate" and "studenti" table. The professor can view the grades for a specific test by accessing "Note" in the top menu; a drop down list will appear showing all the available tests in the platform. He must choose the one he wishes to view the grades for, and then click on the green arrow button. The grades are displayed.

**2.4. Implementation.** For this application we have used the Apache HTTP Server [7], MySQL [6], for working with the database and PHP [8] as the server side script responsible with dynamic content provisioning. MySQL is currently the most used DMBS (Database Management System) online, being very simple to use in terms of manipulating information onto a relational schema.

## 3. Installation

The application has an installation script that simplifies this task for the administrator (to avoid using phpMyAdmin application). The steps are:

(1) Copy the application files into the htdcos directory.
(2) Access from the browser the 'install.php' script.
    E.g.: http://localhost/egrila/install.php
(3) Provide the MySQL hostname, username and password for database authentication. Uncheck 'Demonstratie' checkbox if you do not wish to add sample multiple choice test and students to the database. The password may be null. Usually, the hostname is 'localhost'and the username is 'root'. Press the lock button to connect to database and add the tables. If connection information is not correct, appropriate messages will be displayed.
(4) Provide a username and a password for the administrator account.
(5) Press "Sterge script instalare" to delete the 'install.php' script (this must be done in order to avoid someone else to access it and destroy the database data).

## 4. Conclusions

This paper presents a test platform for student evaluation. The test platform is implemented entirely using open source languages, and it features a modular design and implementation. The tool assists students and professors in testing and grading, increasing the efficiency of the evaluation process.

## References

[1] J.D. Golanics and E.M. Nussbaum, Enhancing online collaborative argumentation through question elaboration and goal instructions, *Journal of Computer Assisted Learning* **24** (2008), no. 3, 167-180.
[2] G. A. Mentzer, J. Cryan and B. Teclehaimanot, A comparison of face-to-face and Web-based classrooms, *Journal of Technology and Teacher Education* **15** (2007), no. 2, 233-246.
[3] K. Sun, Y. Lin and C. Yu, A study on learning effect among different learning styles in a Web-based lab of science for elementary school students, *Computers & Education* **50** (2008), no. 4, 1411-1422.
[4] C.Q. Urban, The effects of using computer-based distance education for supplemental instruction compared to traditional tutorial sessions to enhance learning for students at-risk for academic difficulties, Ph.D. thesis, George Mason University, Fairfax, VA, (2006).
[5] D. Zhang, Interactive multimedia-based e-learning: A study of effectiveness, *American Journal of Distance Education* **19** (2005), no. 3, 149-162.
[6] http://www.mysql.com/
[7] http://httpd.apache.org/
[8] http://www.php.net/
[9] http://www.classmarker.com/
[10] http://www.onlinetesting.net/

(Cristea Boboila, Maria Goae and Alexandru Savulescu) DEPARTMENT OF COMPUTER SCIENCE, UNIVERSITY OF CRAIOVA, 13 A.I. CUZA STREET, CRAIOVA, 200585, ROMANIA
*E-mail address*: boboila@central.ucv.ro, m.goae@inf.ucv.ro, a.savulescu@inf.ucv.ro