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# An Environment for Computer Based Assessment in the Educational Process

A. GARMPIS[1] , K. IOANNOU[2] , S. SIRMAKESSIS[1,3], L.PANAGIOTOPOULOS[4]

[1]Department of Applied Informatics in Management & Economy,
Technological Educational Institution of Messolonghi,
Nea Ktiria, 30200, Messolonghi,
GREECE

[2]Wireless Telecommunication Laboratory, Department of Electrical and Computer Engineering,
University of Patras,
Rion 26500, Patras
GREECE

[3]Hellenic Open University,
K. Palama 84, 26224, Patras

[4]Dept. of Agricultural Machinery and Irrigation
Technological Educational Institution of Messolonghi,
Nea Ktiria, 30200, Messolonghi,
GREECE

*Abstract*: In this paper the technical features and the capabilities of a Computer assisted Assessment System are presented . Our system called '*MathExam*' provides the opportunity for evaluation of any course/exam that was constructed during the educational process from an tutor. Moreover, we present the overall features of '*MathExam*' and indicate its importance for the educational process.

*Key-Words:* e-Test, Evaluating knowledge, Computer assisted assessment, Math exam.

## 1. Introduction

The problem of the evaluation of student performance is without doubt one of the most important educational issue in our times. The examinations and the grades attract everyone's interest in the educational system. Parents and students are interested in examination outcomes and teachers and policy-makers are concerned both about educational change based on evidence and are looking for new methods and techniques that will enable them to evaluate the students more fairly and objectively. Despite the importance of this issue and the fast changes in the areas of technology and education, the vast majority of Greek schoolteachers are performing their duties based on experience rather than actual teaching qualifications[8].

Computer based education (CBE) can help teachers in reaching this goal, offering the possibility to obtain models for evaluation which are active, intentional, contextual, and reflective [9]. The computer can greatly stimulate the students' intention for study; take them away from the routine execution of sets of rules and can provide valuable data to feed into discussions and create a new and richer educational context. Therefore the scope of our small research as presented in this paper is to contribute to improve the examination and evaluation of students, enhancing traditional evaluating situations. Moreover, shows the way of how the examination process could be put the students in a position such that they study the concepts of exams' subjects; investigate their misconceptions and mistakes; so they conquer in new knowledge and remediation.

In recent years, several software packages have become available for the students assessment [8]. These new packages focused on the evaluating method, while do not stimulate students to study and improve their weaknesses. In this context, we have developed a computer

package that aids tutors to record and store students' answers, results, crises, and opinions of evaluation process; to attend students' progress through statistical data analysis providing; so he has the possibility to improve and adapt the lectures depending on the prevailing conditions every time. On the other hand, students inspired from the environment could express the perceptions and their reflections for the exams' questions and saw the achieved grades. When the examination process is completed, they study at home in order to be well prepared for the discussion in school class with the teacher's participation.

## 2. Development environment

The goal of '*MathExam*' is to support teachers to develop examinations that:

- would be user friendly, both for teachers and students, requiring only basic computer skills for teachers;
- would be concerned with the students' evaluation during the whole of the academic year and not only based on the final examination; since the teachers would have the opportunity to regularly (and informally) exam the student,
- would also help the teacher to objectively award grades to students.

The software is based on a MS Access Database [4] and the interfaces together with almost all the necessary functions were developed in MS Visual Basic (version 6.0) because of the Object Orientation features provided [5], [6], [7]. This specific software was developed at Greenwich University; London, UK (2000) and then has been modified to adapt the requirements of Greek educational system (Greek version, 2003) [1], [2].

In the development process certain rules of human computer interaction for the development of a smart user-friendly system have been taken into consideration, including appropriate use of colours, buttons, a Tool Tip Text feature and Help facility [3].

As far as the teacher is concerned, the software offers high level of security since the use of a password for the log-in process is essential both for the teacher and the student. Also the software allows students to take each exam only once. The tutor enters the questions to be examined (the number of questions is set to be 10 for each exam). Questions can be changed on request.. Teacher has control over the students' personal data. Furthermore the teacher can determine the examination time, the password and the title of the test. Here we should note that the correction and evaluation process is done automatically without the teacher's intervention guaranteeing fair results for all students.

Through the use of our software package the teacher can have a detailed list of all the students' results in each exam separately, the examination date, and the classification of results, as well as the great point average for every module. Another very important feature of our software is the availability of statistical data for each course and class; this is something that can be used to provide the teacher with the historical data useful for future research concerning both students' and school's development. A distinctive characteristic of this software is that it allows the communication between students and the examiner since students can express views on a specific question and even critically evaluate the exam as a whole.

As far as the student is concerned he/she can choose his/her name, class and paper number. Before the examination procedure starts a help-form appears including useful information about the examination. The student knows in advance the length of time of the examination and is also informed that the specific exam will be corrected automatically (a process more secure to the student). When the student decides to leave the exam he/she gets a message that informs him/her if there if still time left. He/she is informed that there is time to complete any questions that have not been answered (accidentally or not) as well as the opportunity to review already answered questions. The student is also made aware that he/she can receive the mark almost immediately, relieving the student from the stressful situation waiting for the results. Moreover there is the facility to get a print out of the correct answers so that he/she can revise in the future or simply double check with the results received and therefore learn from any mistakes.

Finally, we should note that our system is able to operate in a Local Area Network (LAN) which will allow the simultaneous use of the system by more than one classes. It constitutes a completed computer application with a very limited requirement for resources

## 3. Sample sessions

We present the software's features for both student and teacher through two interfaces.

1. **Teachers' Interface** (see *Figure* 1):

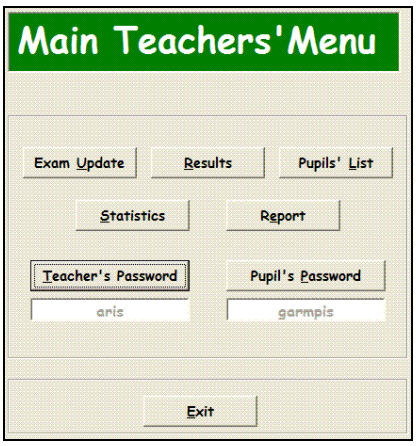


*Figure 1.* Teacher's Main Menu.

The teacher can:

- determine the passwords for the log-in process for both Teacher and Student interfaces.
- enter the Students' personals data as First Name, Surname, Middle Name, Class and Students' Password (see *Figure* 2):

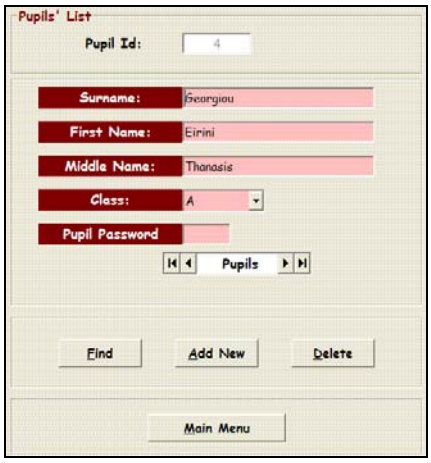


*Figure* 2. Students' data entering.

- enter the questions to be examined; the number of questions is set to be 10 for each Exam (see *Figure 3*):

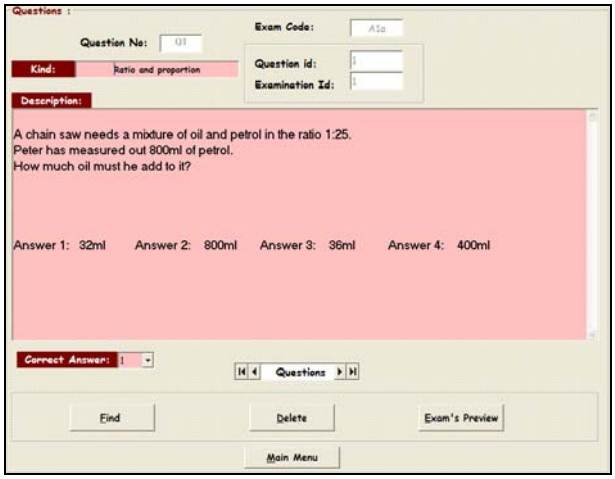


*Figure 3.* Exams' data entering.

- determine the Examination Time, the Title and the Examination password of the test (see *Figure 4*):

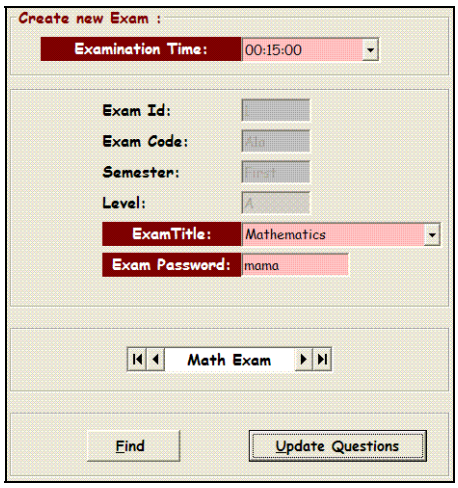


*Figure 4.* Exams' restrictions.

- have a detailed list of all Students' results in each exam separately, the Examination Date, and the classification of results, as well as the great point average for every module (see *Figure 5*):

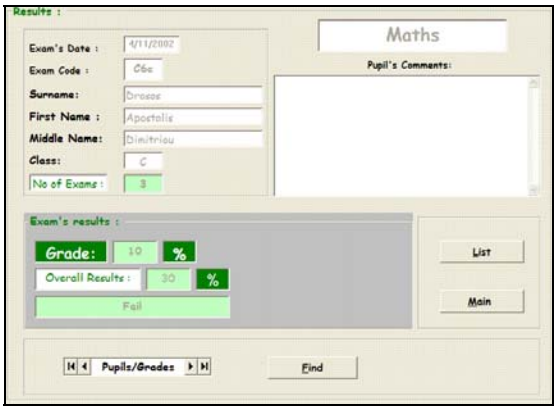


*Figure 5.* Results of the evaluation process.

- have statistical data for each Test for each course and class (see *Figure 6*):

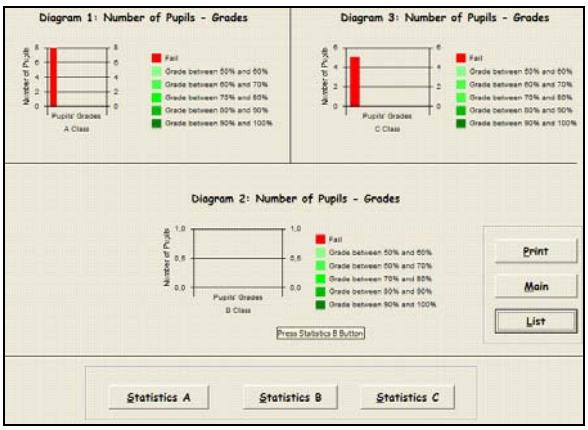


*Figure 6.* Statistical results view.

2. **<u>Students' Interface</u>** (see *Figure 7*):


*Figure 7.* Students' Main Menu.

The Student can:

- enter the Password for the students' interface.
- choose his/her Name, Class and Paper number (see *Figure 8*):

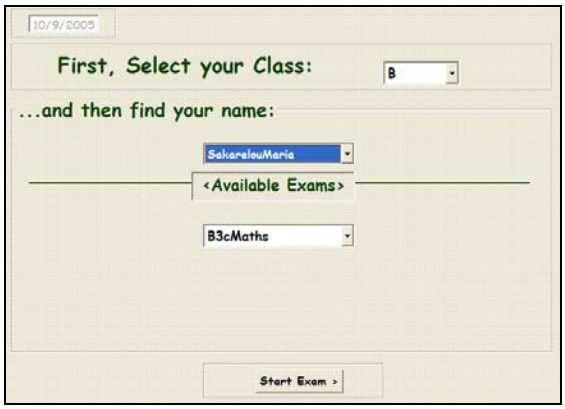


*Figure 8.* Selection of personal details and Exam's code.

- enter his/her personal Password and exam's Password.
- see a help-form including useful information about the examination, before the examination procedure starts (see *Figure 9*):

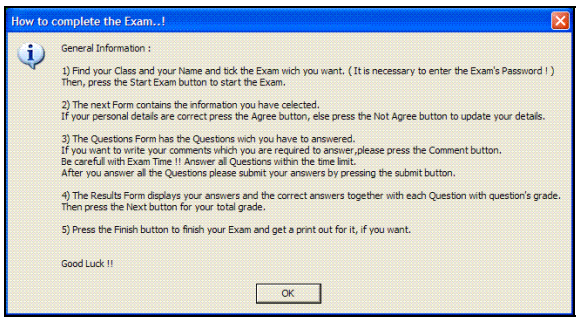


*Figure 9.* Help Form.

- see the length of Time of the examination.
- get a message that informs him/her if there is still time left.
- inform if there is time to complete any questions that have not been answered, when he/she decides to leave the exam (see *Figure 10*):

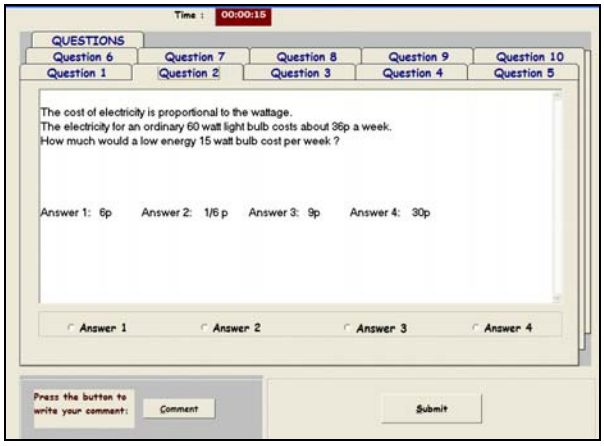


*Figure 10.* Exam's Questions.

- receive the Mark immediately (see *Figures 11& 12):*

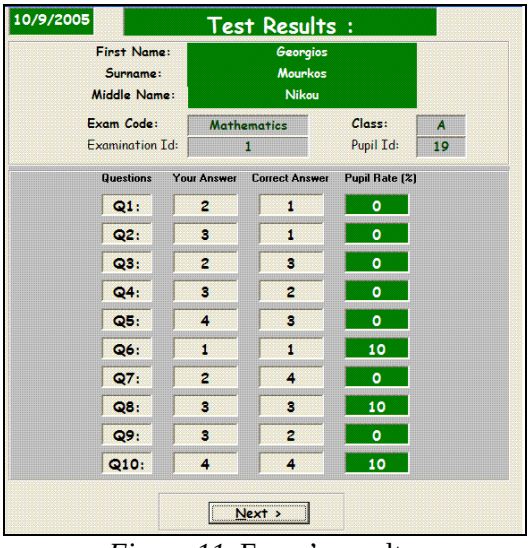


*Figure 11.* Exam's results.

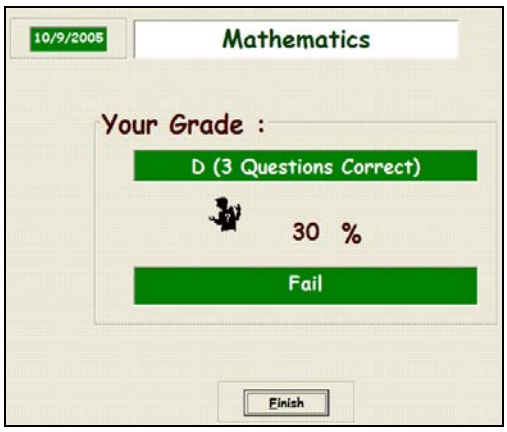


*Figure 12.* Final Grade.

- get a print out of his/her answers.

A distinctive characteristic of this software is that it allows the **communication** between students and the examiner since a student can express views on a specific question and even critically evaluate the exam as a whole (see *Figure 13):*


*Figure 13.* Form for the Student's comments.

## 4. Use of the Software in the context of the educational experiment.

The '*MathExam*' described and shown in the previous section is already being successfully used by *Evinochori High* School in Greece. This application has been used directly in the school's laboratory, so the students were evaluated for their knowledge. The ages of target group were between eleven and fourteen. Our educational experiment with 75 children spanned two academic years. Students examined twelve times in each semester faced on e-exams in regard to the subjects: Mathematics, Physics, History, and English language; and according to the educational time plan of school.

## 5. Results

We have conducted a survey to collect students' opinions and also to test their level of knowledge. In regard of students' opinions, we can only give qualitative results. Students are really accepting the method and really appreciate the whole process. We have compared the results with those obtained from a traditional class (by using paper and pencil assignments), and although we do not claim statistical severity, in lack of significative numbers, contingent results seem to prove the effectiveness of the method.

At the end, we have ascertained that students who were evaluated with '*MathExam*' increased their learning interest progressively; the time of study at home; and also their participation in class-lectures, especially the weaker students.

## 6. Conclusions

Computer Aided Assessment of this type has enormous potential, illustrated in various ways in this paper. Educators, wary of the pitfalls of multiple choice questions, have now an alternative tool that not only allows them to move a large amount of questions onto a computer system, but also allows for the efficient delivery of question types, answers and students' views. That communication process prompted students to investigate subjects that were showed in each exam's questions, opening simultaneously new educational horizons.

A computer based assessment system, such as 'MathExam', is only a tool in the hands of the educator. Teachers' experience is really important constructing questions or exams. One should never loose sight of the educational objectives intended and should give careful thoughts on the way these tools are to be integrated in a school classroom. From a pedagogical point of view, Computer based Evaluation, in our experience, seems to be really efficient when used in parallel with classical lectures.

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