A SMD COURSE WITH WEB-BASED MODULE

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This paper describes the web-based module of a Surface Mounted Devices (SMD) course, which comprises laboratory exercises and running control of students. Elements typical for contemporary company management, methods for testing and communication are implemented. Tasks are assigned individually and have deadlines after which their reports are not accepted. All student works are available to everybody, but their completion is individual. Results from the module's activity and a comparison with its previous version are given.

1. INTRODUCTION

Contemporary electronics production implements constantly changing technology processes which require continuous improvement of knowledge. At the same time more and more SMD processes are being controlled by personal computers. On the other hand the distant learning methods (electronics based education which is specified by the Law [1]) are intensively applied. Distant learning in many cases is oriented towards transmission of knowledge through appropriately structured information, carrying our exercises and tests related to it. Different versions of such kind of education are developed at the Technical University of Sofia [2] and [3]. [4] described the educational test module for the SMD technique subject.

1. THE WEB MODULE

The objective is to improve the capabilities of the existing web-based module [4] in its test and laboratory exercises sub-modules. A more elaborated structure and convenience for the lecturer and students was to be developed. The curriculum of the course defines 5 or 10 laboratory exercises and 2 tests.

1.1 Structure of the web module

A number of basic sub-modules are defined:

- Laboratory exercises;
- Trial and real tests;
- A Forum.

As with the previous version each student has own work cell and password for accessing it.

1.2 Laboratory exercises

Students are required to study theoretically the problem they are going to explore, the tasks for completion and their guides, report form templates. All information is included in the manual for laboratory exercises.

The exercises themselves are carried out in a specialized laboratory. Ingoing and outgoing tests are also supported by the module. The lecturer uploads report forms to the work cells of all students who have attended the exercises after its completion. The form has to be filled in by the students and uploaded to their work cells. The report forms could be uploaded globally or individually. Deadlines are also globally or individually assigned. After their expiration report form uploading is not possible.

An optional bonus for early submission of report forms is supported by the module. The first three reports are given additional points. Their number is defined by the lecturer. The total number of points is also defined. For the SMD course the bonus points are respectively 7, 5 and 3 and the total number of points is 100, 40% of which are for self-study and 60% for laboratory exercises. The latter are given after the lecturer reviews the reports.

In order to create conditions for team work all cells are readable by everybody and writable only by its owner, thus incorporating the individual responsibility for the accomplished work. The lecturers has own system area for supplying all necessary information.

1.3 Tests zone

Here students are enabled to perform an unlimited number of trial tests. Special conditions are defined for the real tests [4].

Different question combinations with images related to them are randomly generated. The respective answers differ in position each time, in order to avoid the involuntary memorization of the text, image and answers related to them.

The database contains all trial test results, as well as statistics for the most frequent wrong answers, both of which are available to the lecturer only.

In respect to [4] now it is possible for the students to view only their own real test question combinations and answers at a later period of time (fig. 1).

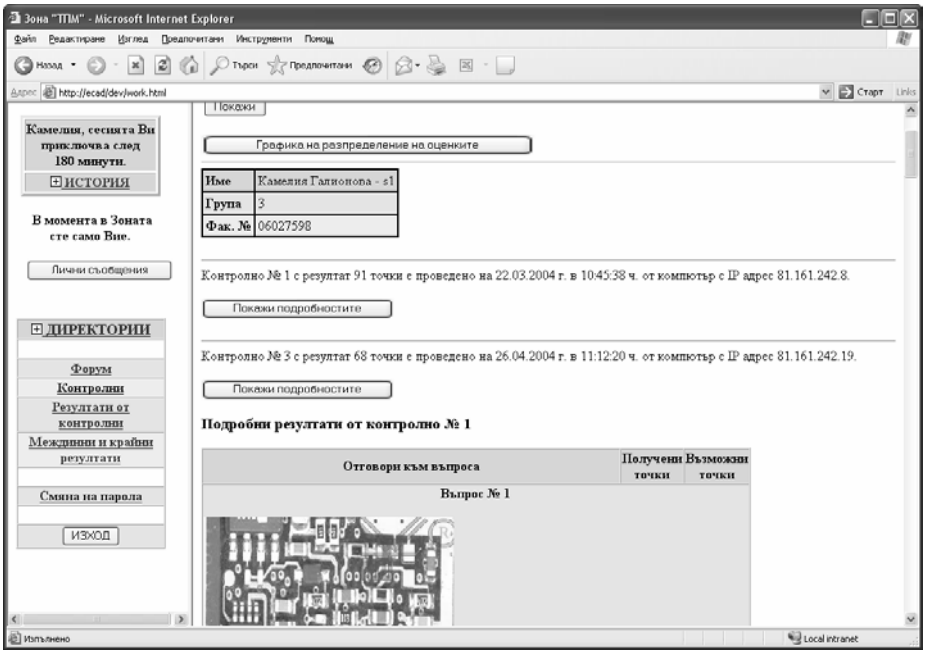

Fig. 1

The module's database holds data about all activities during the semester.

All information from laboratory exercises and tests define the mid and final marks, which are visible by all students in a table form (fig. 2).

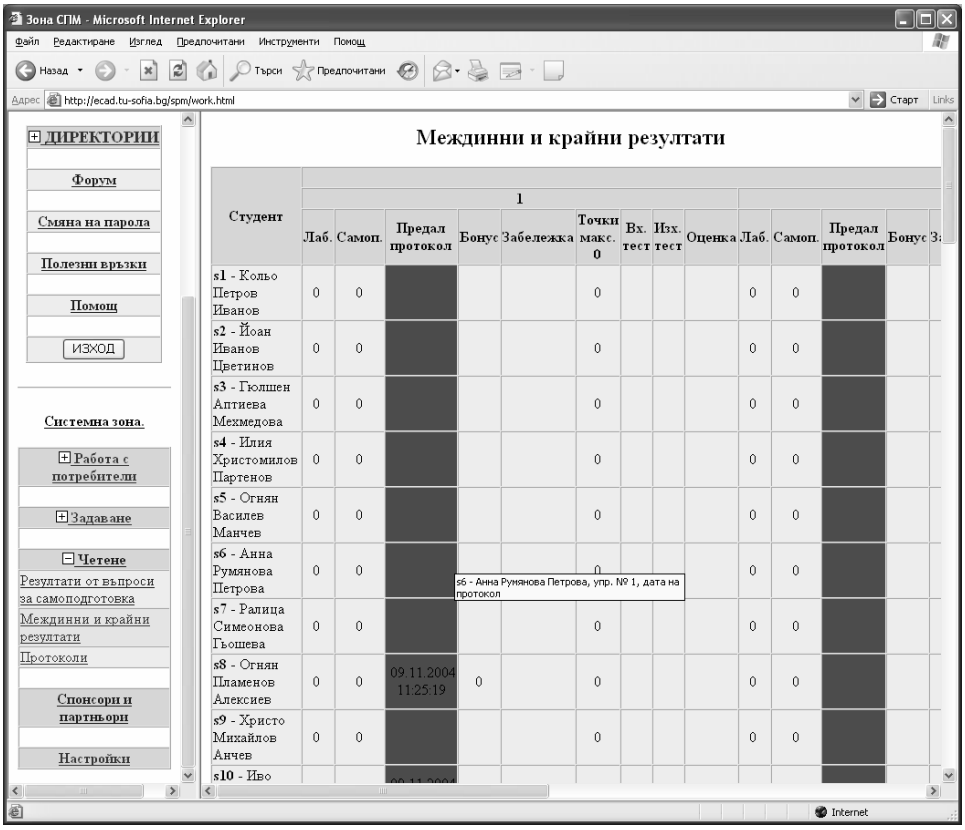

Fig. 3.

2. RESULTS

The trends for the web-based module development were defined 4 years ago, and some of the results are the same. During the last semester the module was used by 50 persons. As with previous results, those from the second real test are averagely higher than those from the first one. Students who had performed more trial tests scored higher results, but this relation is not so strongly expressive. The analysis revealed that trial tests were completed on a more formal base. Obviously the aim was to examine the number of questions in the database. The time for the test completion is indicative. An example is given in table 1 and fig 3.

Table 1.

Points	37	-8	5	6	-15	0	16	15	-13	-5	2
Time of submissions	23: 25: 56	23: 29: 23	23: 30: 52	23: 33: 09	23: 36: 26	23: 34: 43	23: 37: 14	23: 37: 59	23: 38: 50	23: 39: 30	23: 42: 15
Time for completion	4' 10"	3' 13"	1' 2"	3' 12"	2' 55"	1' 7"	3' 3"	0' 30"	1' 0"	0' 20"	2' 19"

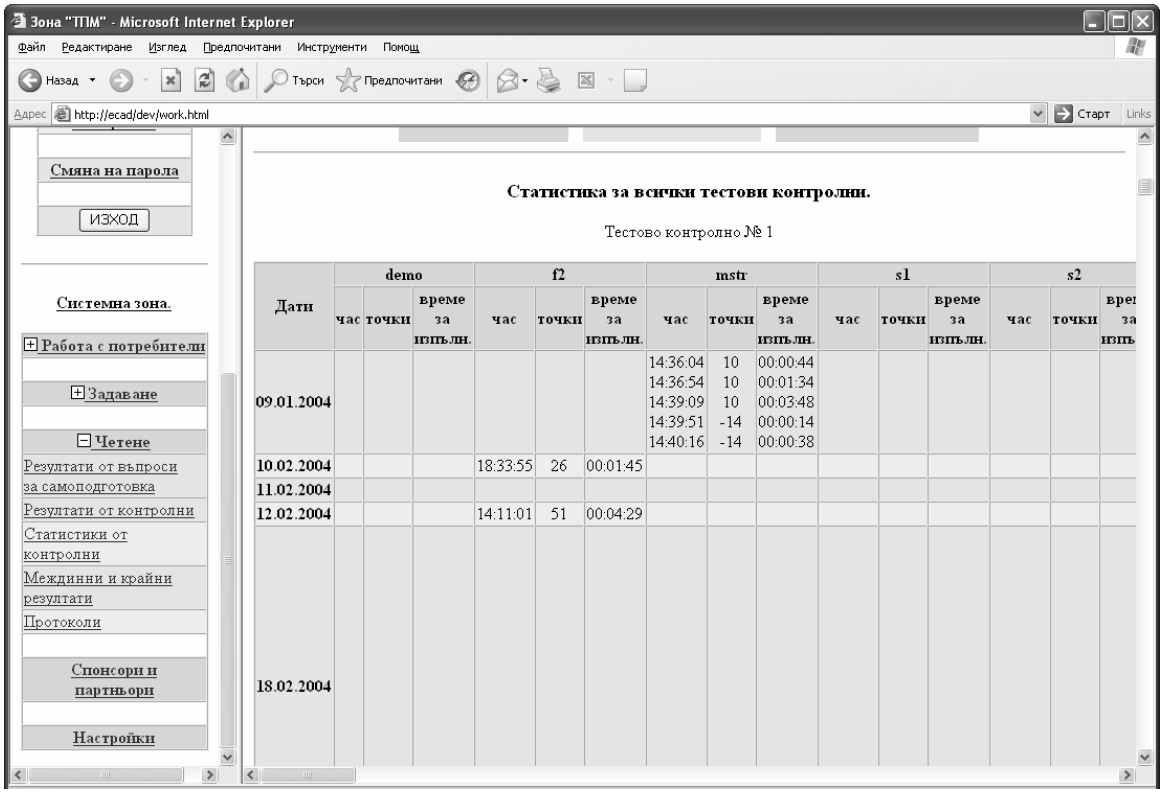

Fig. 3.

In order to interpret the above figures it has to be underlined that a wrong answer is not always indicative for lack of knowledge. A special criterion for a test's authenticity has to be developed. One possible criterion could be the time for completion and its comparison to the average time as well as the period of the semester. Trial tests from the beginning of the semester could be less authentic than those performed a couple of weeks before a real test.

Formality is characteristic of the laboratory exercises, too. The available bonus system tempted the students not to be so diligent and get the extra points. The maximum number of points for the report in the SMD course is 20, and a bonus of 7 is over 30% of the total amount. Some other tendency is to copy from other reports, including the errors. This led to password protection of the reports, which in turn is contradictory to the idea of team working. One possible solution is to define individual tasks for each student, which could lead to lecturer's overloading.

Although the time for real test completion was increased from 10 to 15 minutes during the last academic year, the scores did not raise with 50%, which is logical (fig. 4).

Forbidden referencing was noticed instead. There was a peculiar attempt for Internet referencing. The student tried to look up an answer using the Google search engine. The attempt was unsuccessful by chance, since the image was edited to protect copyrights.

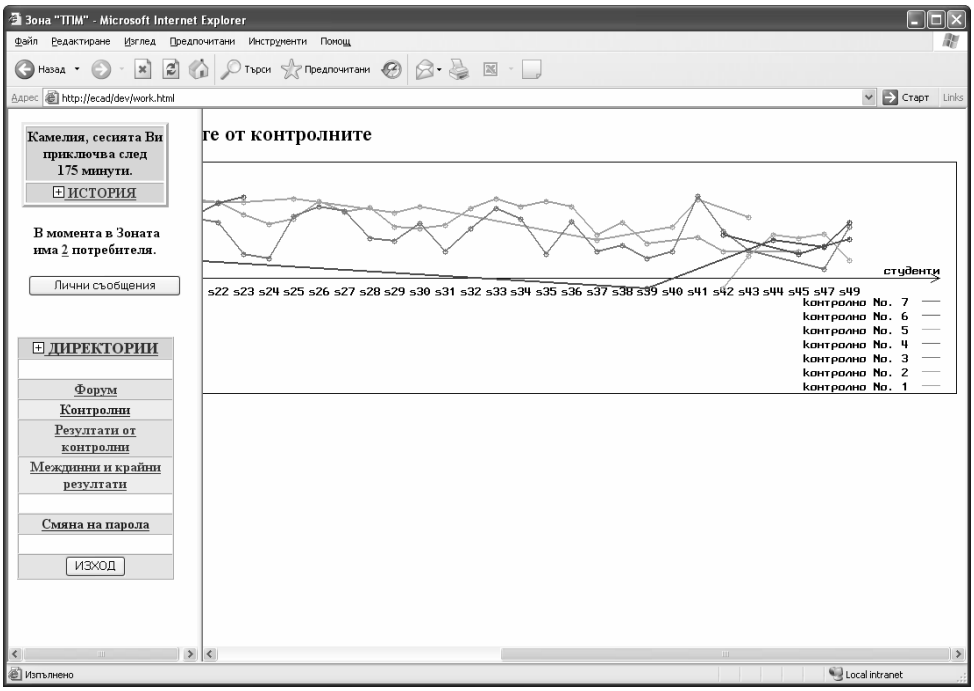

Fig. 4.

3. CONCLUSIONS

The web-based module turned out to be functionally suitable for laboratory exercises and tests. It is useful for gaining knowledge and skills for the implementation of new educational methods and in time completion of tasks.

Special attention must be paid to the system for assessment of wrong answers.

4. REFERENCES

[1] Higher Education Law, State Gazette issue 112/27.12.1995. Last changes in issues 48 and 70/2004.

[2] http://demlab.tu-sofia.bg/course/

[3] Martínez, C., Mileva, N., Tzanova, S., Castro, M., Stoyanov, S., Bastiaens, T., Mathieu, N.: "Diseño y Evaluación de un Sistema de Aprendizaje Interactivo con Ayudas Educativas a través de Internet", X Encuentro Iberoamericano de Educación Superior a Distancia. Calidad, Tecnología y Valores en la Educación Superior a Distancia, AIESAD (Asociación Iberoamericana de Educación Superior a Distancia) y UNED (Costa Rica), San José (Costa Rica), Julio 2003

[4] Videkov V., R. Radonov, B. Ianov, Web-Based Test Module For SMD Technology, 12th International Scientific and Applied Science Conference Electronics ET 2003, Sozopol, Bulgaria, September 24-26, 2003, book 4, pp 49-54.