

# Electronic Identification of Completing the Evaluations of Students in a Database

Rosen I. Radonov<sup>1</sup>, Konstantin A. Zaimov<sup>2</sup> and Valentin H. Videkov<sup>3</sup>

**Abstract** – The paper examines the developed application to the existing university information system, allowing to trace the completion of students' evaluations database. The developed application relates to an electronic protocol system allowing completion of evaluations by teachers. The basic functions of the electronic protocol and its relationship to the central database are described. The algorithm for tracing the evaluation completion is presented. Some sample results of the system's utilisation are given.

**Keywords** – Computer systems, information systems, automation, education, quality

## I. INTRODUCTION

In the education system the primary evaluation of the process is carried out based on the success of the students. That is identified by evaluations of individual disciplines. In the standard case evaluation is carried out based on discipline and students' evaluations, and rarely on the teacher of the discipline. In practice there is no university which does not maintain an electronic database with such kind of information. A significant part of these systems support the possibility for an exchange over the Internet [1]. The better systems maintain complex information, linking data on discipline, teachers, curricula, etc. One of the advantages of these systems is the ability to do analysis on various criteria [2].

An update to the existing information system is made at the Technical University of Sofia. The system is of the type described above and enables the electronic completion of students' evaluations in the database and tracing the process of evaluation.

## II. TUS' INFORMATION SYSTEM

The existing University Student Information System (USIS) is based on Oracle Database [3] and is a client-server windows desktop application. The system is designed to store data for university students and to provide basic references. It is designed to store data for university students and provide

reference information. The system is integrated with a second system providing data from admission campaign. The system uses TCP/IP protocol over the existing intranet for connection with the database server. The initial window after the successful login into the system is shown in Fig. 1.

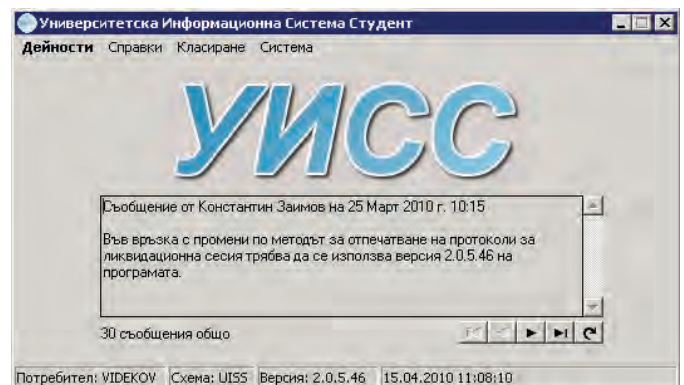


Fig. 1. The initial window of USIS.

The main sections in it are related to data input for individual students and retrieval of individual records for them.

In Fig. 2 is shown the main window with student's data. The personal data such as name, address, previous education, and more are displayed. The current status – certified semester, status, academic year and others are also displayed. Pages with other information can be opened from the navigation bar. They are related to health insurance, student status, academic curriculum in which learning takes place, etc.

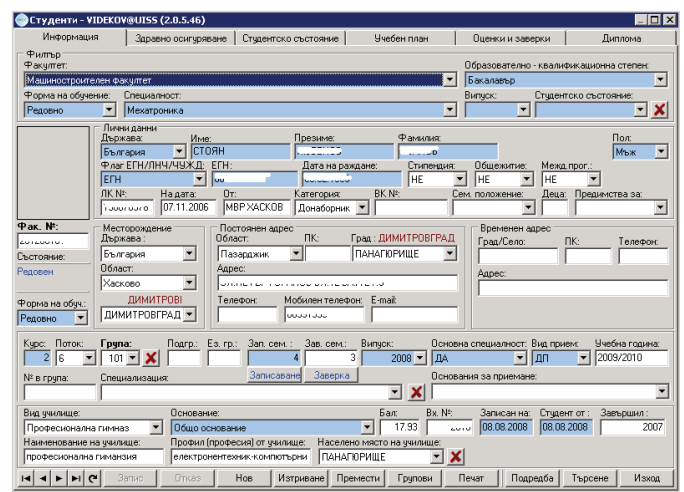


Fig. 2. Main windows – student's data.

<sup>1</sup>Rossen I. Radonov is with the Faculty of Electronics, Technical University of Sofia, 8 St. Kl. Ohridsky blvd, 1797 Sofia, Bulgaria, E-mail: Rosen.Radonov@ecad.tu-sofia.bg

<sup>2</sup>Konstantin A. Zaimov is with Information Services PLC, 2 Panayot Volov Street, Sofia 1504, Bulgaria, E-mail: K.Zaimov@is-bg.net

<sup>3</sup>Valentin V. Videkov is with the Faculty of Electronics, Technical University of Sofia, 8 St. Kl. Ohridsky blvd, 1797 Sofia, Bulgaria, E-mail: Videkov@ecad.tu-sofia.bg

A window displaying information from the page with student's evaluations in each discipline is shown in Fig. 3. It shows the name of the discipline, semester in which the study is carried out, the evaluation, the type of evaluation, etc.

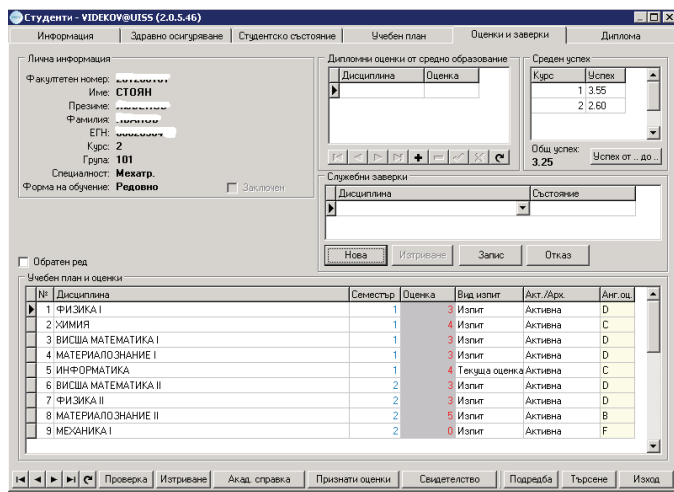


Fig. 3. Evaluations and certifications.

### III. TASKS

In any management system not only the outcome is important (good or bad), but also the process of achieving that result. To achieve good results and correct management decision the process must be traceable [4]. This approach is not implemented in the current procedure for completion of the evaluation database.

What could happen and what is desirable to be known? Each system could produce an error while functioning. One simple error is to fill in a wrong evaluation. The first interested party in this case is the student. There is a possibility for the students to check their evaluation via the Internet using their personal code and faculty number. In the case of a higher evaluation it is quite possible, in practice, that there will be no feedback from the students.

In the opposite case, the employee in the student's office will inform the teacher and he or she will correct the error. This process, however, is not identified in the electronic database. Another thing is that between the evaluation in a student's e-file and the teacher stands in the office employee and that to some extent blurs the responsibility for errors.

There was no identification of the evaluation's grounds and origin in the old system – fig. 4.

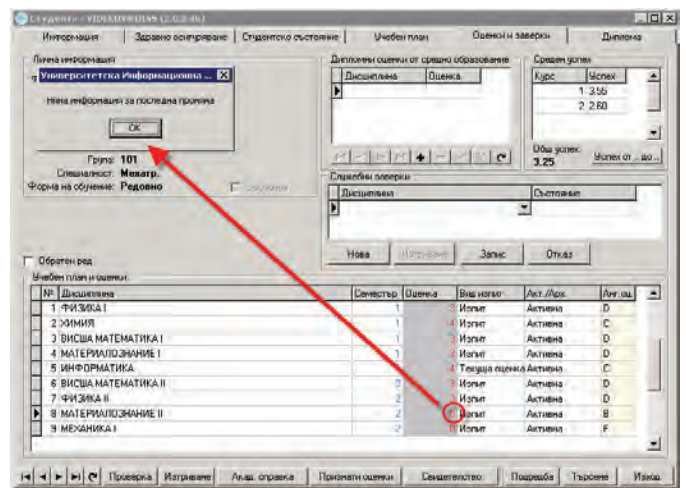


Fig. 4. Identification of the evaluation.

It is necessary that the completion of the evaluation database is not only an obligation but also a responsibility of the teachers. It is also necessary to do the completion within controlled deadlines and document the process in the timeline.

The process of error correction also has to be documented, not only because of the responsibility, but also due to the need of obtaining statistic data about errors possibility..

Having in mind the above-mentioned, the tasks are to develop a system for electronic completion of evaluation database by the teachers allowing the process to be documented and identify the origin of the evaluation.

### IV. THE ELECTRONIC PROTOCOL SYSTEM

The requirements to the system are derived from the tasks to be completed. It has to:

- ensure capability for electronic completion of the database with evaluation for each discipline by the relevant teacher;
- ensure protection from records manipulation;
- give information about the evaluated student to the teacher;
- identify corrections.

These requirements resulted in the development of an Internet site for completion of the evaluation database by the teachers.

The widest range of possibilities is provided by the option for using an arbitrary computer connected to the Internet. In this case special measures have to be taken in order to ensure protection of the database.

A 4-tier security system is used – username, password, digital signature and PIN code for accessing the digital signature from the USB flash memory. The digital signature can only be read from the USB flash memory.

After the successful login to the system the teacher is granted access to the menu – Fig. 5. The electronic protocol system is linked to another system – the e-management system. The last one provides automatic transfer of the evaluations from the site of the discipline to the electronic protocol – position 1 in Fig. 5.

**Мени**

1. Попълване
2. Изпечатване
3. Парола
4. Архив
5. Съобщения
6. Създаване на протокол
7. Изход

**Легенда**

- трохкутът в червено са важни;
- зачерен семестър в червено не разрешава нанасяне на оценки;
- X - забрана за попълване

**Попълване на протокол**

Номер на протокол: \_\_\_\_\_  
 Сортиране по:  имена  факултетен номер

Автоматично попълване от сайта на дисциплината:  
 Целен адрес на сайта: \_\_\_\_\_

Напр. <http://aai.dicpinafaul-e-osveta.php> За подробности се обръщайте към системния администратор

Протокол № 4549  
 Генериран на: 02.11.2003. Срок на попълване: 11.09.2010  
 Учебен план: ФКУС-КС, бакалаври-2002  
 Специалност: Компютърни системи и технологии (КСТ)  
 Предмет: ПОЛУПРОВОДНИКОВИ ЕЛЕМЕНТИ  
 Семестър: 3  
 Форма на контрол: Ипит

№	Име, презиме, фамилия	Група	Фак. №	Зав. сем.	Предпоставки	Редовна сесия	Попр. сесия	Оценки
1	Антон	57	РК05	ДА (5 <sup>ти</sup> )	0			
2	Боян	56	РК03	ДА (5 <sup>ти</sup> )	0			
3	Ваян	53	РК03	ДА (5 <sup>ти</sup> )	0			
4	Велислава	354	1222	ДА (10 <sup>ти</sup> )				
5	Владислав	56	РК03	ДА (5 <sup>ти</sup> )				
6	Георги	53	РК03	НЕ СЪРЪ	0		X	
7	Елена	53	РК03	ДА (5 <sup>ти</sup> )	0			

Фиг. 5. Electronic protocol – completion of the evaluations.

The status of the student is being retrieved in real time and the relative information about the last certified semester is displayed (position 2 in Fig. 5). If the student does not have the necessary certification the electronic protocol system does not allow completion of the evaluation. (position 3 in Fig. 5)

The teacher can edit the protocols as many times as he/she wants within the denoted period of the respective examination sessions. After completion the evaluation protocol is marked as ready and submitted electronically. The protocol is automatically being marked as ready by the system after the expiry of the deadline for submission.

After the submission of the protocol the teacher prints and signs it, and submits the paper copy at the respective student's office. The printed copy has a watermark which represents checksum and other data specific to the protocol – Fig. 6.

Протокол № 71337  
 Генериран на: 07.1.2010. Срок на попълване: 11.07.2010  
 МТТ-2007-БАК.  
 Специалност: Машиностроителна техника и технологии (МТТ)  
 Предмет: СОЦИАЛНИ КОМУНИКАЦИИ  
 Семестър: 5  
 Форма на контрол: Текуща оценка, Редовна и поправителна сесия  
 Стр. 1 от 2

№	Име, презиме, фамилия	Група	Фак. №	Зав. сем.	Пред. явяв.	Оценки и подпис
1.	Албена	28	08120	ДА (5 <sup>ти</sup> )	0	Добър (4)
2.	Ангел	28	08120	ДА (5 <sup>ти</sup> )	0	Добър (4)
3.	Асен	28	08120	ДА (5 <sup>ти</sup> )	0	Добър (4)
4.	Божидар	28	08120	ДА (5 <sup>ти</sup> )	0	Мн. добър (5)
5.	Борислав	28	08120	ДА (5 <sup>ти</sup> )	0	Мн. добър (5)

Fig. 6 Paper copy of the protocol..

In some special cases the evaluation can be completed by an authorized person (e.g. an employee at the student's office). When browsing the evaluations the name of this person, protocol number, date and time are displayed – Fig. 7.

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Оценка по ФИЗИКА I  
 последна промяна на 15.04.2010 09:53:31  
 от XXXXX YYYYYY ZZZZZZ № 74990

Дисциплина: Оценка

Среден успех:  
 Курс: Успех: 1 3.55  
 2 2.60  
 Общ успех: 3.25

Специалност: Мехатр.  
 Форма на обучение: Редовно

№	Дисциплина	Семестър	Оценка	Вид изпит	Акт / Арх.	Анг. бу.
1	ФИЗИКА I	1		Изпит	Активна	D
2	ФИЗИКА I	1		Изпит	Активна	D
3	ВИСША МАТЕМАТИКА I	1		Изпит	Активна	D
4	МАТЕРИАЛНО ЗНАНИЕ I	1		Изпит	Активна	D
5	ИНФОРМАТИКА	1		Текуща оценка	Активна	C
6	ВИСША МАТЕМАТИКА II	2		Изпит	Активна	D
7	ФИЗИКА II	2		Изпит	Активна	D
8	МАТЕРИАЛНО ЗНАНИЕ II	2		Изпит	Активна	B
9	МЕХАНИКА I	2		Изпит	Активна	F

Fig. 7. The evaluation is completed by an authorized person.

When the evaluation originates from an electronic protocol, which has been completed by a teacher, only its number, date and time are displayed – Fig. 8.

Университетска Информационна Система

Оценка по ЕЛЕКТРОТЕХНИКА  
 последна промяна на 21.03.2010 09:51:03  
 от ЕЛЕНА ИВАНОВА № 70570

Дисциплина: Оценка

Среден успех:  
 Курс: Успех: 1 3.45  
 2 3.58  
 3 3.86  
 Общ успех: 3.60

Специалност: Мехатр.  
 Форма на обучение: Редовно

№	Дисциплина	Семестър	Оценка	Вид изпит	Акт / Арх.	Анг. бу.
21	ТЕОРИЯ НА МЕХАНИЗИТЕ И МАШИНИТЕ	4		Текуща оценка	Активна	D
22	ЕЛЕКТРОТЕХНИКА И ЕЛЕКТРОНИКА	4		Изпит	Активна	D
23	РУСКИ ЕЗИК	4		Текуща оценка	Активна	A
24	ОСНОВИ НА ПРОЕКТИРАНЕТО НА МЕХАТРОННИ СИСТЕМИ	4		Изпит	Активна	C
25	ИНЖЕНЕРНА МЕТРОЛОГИЯ	4		Изпит	Активна	B
26	ТЕОРИЯ НА СИГНАЛИТЕ И ИЗМЕРВАТЕЛНИ ПРЕОБРАЗОВАТЕЛИ	5		Изпит	Активна	C
27	ТЕХНОЛОГИЯ НА МАШИНОСТРОЕНЕТО	5		Изпит	Активна	D
28	ТЕХНОЛОГИЯ НА МАШИНОСТРОЕНЕТО	5		Курсов проект	Активна	F
29	ЕЛЕМЕНТИ И МЕХАНИЗМИ НА МЕХАТРОННИ СИСТЕМИ	5		Текуща оценка	Активна	B
30	МИКРОЕЛЕКТРОНИКА	5		Текуща оценка	Активна	C

Fig. 8. The evaluation is from an electronic protocol.

The introduction of the electronic protocol system makes it possible to visualise the process of students' evaluation. Thus for example, the process of electronic protocols submission by the teachers can be traced. Fig. 9 shows the dynamics of the submission.



Fig. 9. Number of electronic protocols submitted per day.

The errors during completion of the database are another indicator of the evaluation process. Since the completion of the electronic protocol is the immediate responsibility of the teacher, errors could be the result of technical implementation, for example. The procedure for handling the electronic protocol is such that after submission of the protocol no changes are possible. After finding an error it has to be corrected by a separate correcting protocol. An interesting statistics can be made on the time to detect the errors after the protocol's submission and the distribution of these errors. An indicative sample is shown in Fig. 10, which shows the percentage allocation for correcting protocols as a function of time after submission of the basic protocol.

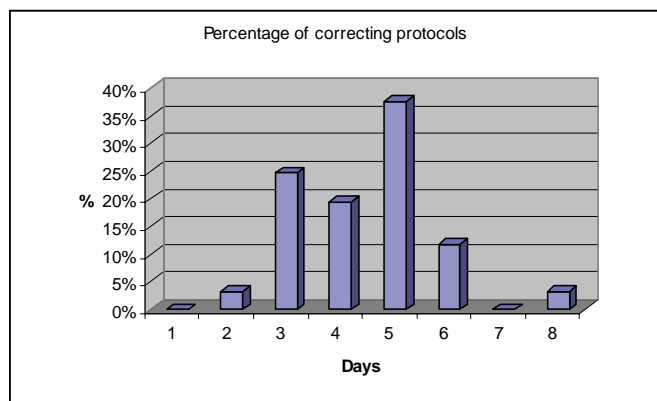


Fig. 10. Distribution of correcting protocols over time.

The results of preliminary tests of the system showed that the number of correcting protocols is less than 8% compared to the basic ones and as they concern a single evaluation their number is relatively small. In a database with over 11000 evaluations the number of corrections is below 40 or below 0.4 %. Perhaps with the acquisition of habits of teachers, this percentage will be reduced.

## V. CONCLUSION

The Technical University in Sofia has developed an Electronic Protocol system relating to the existing database system for students that allows electronic completion of the evaluations by teachers. That speeds up the process of evaluation and the most important is that the responsibility for this process belongs to the evaluators. Its implementation makes it possible each evaluation to be identified by the time, person and on what basis is done.

A second important point is the ability to monitor over time the process of evaluating the different disciplines with the probability of errors in evaluation.

## ACKNOWLEDGEMENT

This research has been carried out in the framework of Contract Application No. 102НИ196-3.

The authors express their gratitude to the USIS support team and employees at the student's offices at the faculties of

Electronic Engineering, Machine Engineering and the directions in the first year of study on the generation of experimental protocols for the implementation. We thank our colleagues – the teachers, who completed the electronic protocols, as well as the authorities of the Technical University of Sofia, who supported the launch of the system.

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