

Information system for monitoring the results of assimilation of a discipline

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Abstract¹

The article is devoted to the development of information system for monitoring and recording the results of assimilation of a discipline by students. The database provides information about the types of monitoring, control activities, information about the levels and timing of their execution. The accumulated information is used to determine the current and the resulting ranking student during the semester, as well as to monitor the dynamics of the formation of the rankings. The system was implemented in the educational process.

1. Introduction

The reorganization of the educational process in the framework of the Bologna agreement provides in addition the introduction of multi-level education, mandatory transition to teaching in the system of credits. The use of score-rating system of evaluation of knowledge increases the objectivity of student performance data, encourages them to work systematically and effectively solves the problems of general and subject certification at different stages and levels of education.

Score-rating system of students knowledge estimation has the following advantages [1]:

- improves training quality and ensures the objectivity of evaluation of educational achievements of students in the discipline;
- increases students' motivation to the active and systematic work throughout the semester on

mastering the basics of professional knowledge and skills;

- generates in students the skills of independent work by raising the motivation for the accumulation of professional knowledge, self-development and self-realization;
- identify ways of improving educational-methodical and scientific-methodical work of teachers;
- allows to provide extensive information about the graduates to employers for promotion their employment.

Development and implementation of such a system requires creation of monitoring progress methods and forming students' ranking. This requires to implement information support of methods and to use computer technologies to develop them.

2. Methods of monitoring progress

Methods of monitoring progress depends on the types of control provided by the university. Under the provision of the score-rating system USATU recommended to use the following types of control:

- current control - continuously monitor the level of learning and the formation of skills during the semester;
- mid-term control is carried out at the end of study module discipline;
- intermediate control is carried out as the examination on the discipline provided by the curriculum.

Each type of monitoring results must be expressed in scores. On this basis, are formed an individual rating of

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the student in the group and final rating evaluation on discipline.

Progress estimation is carried out in the current, mid-term and intermediate control. Current control carried out in the course of training (classroom and extracurricular) activities carried out on schedule. Surveys, small tasks performed in the classroom can be used as a form of current control. Also there can be used attendance monitoring : lectures, practical classes, laboratory work and consultations on the discipline, course project, implementation of the calculation and graphic works (CGW) and controllable independent work (CIW). Mid-term control is carried out to determine the quality of assimilation of training modules disciplines material. Colloquiums, test papers, test control, reports on topics of essays, presentation and protection of CGW and CIW can be used as a form of mid-term control. Intermediate control of academic discipline is carried out at the end of the semester in the form of a course work or course project, exam, test.

The current ranking of students is calculated by determination of rating at the control points. Distribution of the control points is performed on the time interval training. The location and number of control activity on the timeline are due to the content of the discipline: the sections, individual topics and the training schedule.

In developing the system, it is necessary to take into account the peculiarities of competencies formed by discipline. The basic educational program are characterized decrease in the proportion of classroom teaching, especially the lecture that is also important factor. This is in turn requires lecturers pay more attention to extracurricular activities. In this connection it is necessary to identify new forms of control of independent work. The lecturer must to use a flexible approach to the formation of the list of control measures taking into account the specifics of the discipline in evaluating ongoing work in the semester.

Final estimation of successful assimilation of discipline R is calculated according to [2]:

$$R = \alpha \cdot \sum_{i=1}^I \beta_i \cdot \sum_{j=1}^J \gamma_{ij} \cdot b_{ij} \cdot 100 + (1 - \alpha) \cdot B, \quad (1)$$

where α – weighting factor, which reflects the importance of the ongoing work;

i – type of the control activity (I – the number of types of control activities);

β_i – weighting factor that reflects the importance of i -type control;

j – the number of this type of control activity (J – the number of control activities of this type);

γ_{ij} – weighting factor that reflects the importance of the j -control activity of i -type control;

b_{ij} – the degree of implementation of the j -control activity of i -type control (the level of control activity implementation);

B – scores, that correlated with estimation on intermediate certification.

3. Engineering of the information system

The process of designing a technique performed in DFD notation. Data flow diagrams (DFD) used to describe the workflow and processing. Data flow diagrams is a system modeled as a network of interconnected works. The main aim of DFD is to show how each work converts its inputs into outputs, and identify the relationship between these works.

Context diagram is defining the most general form of the system and is shown in fig. 1. It shows how the developing system will interact with the receivers and sources of information, that is, it describes the interface between the system and the outside world [3].

In the next step each subsystem of contextual data is detailed using diagrams flow diagram. There four processes are identified in the system (fig. 2): work with the lecturer, the student, with discipline and with the deanery.

The resulting DFD-model allows to reveal interrelation of functions and data of processing software of score-rating system.

The generalized scheme of functioning of the information score-rating system is shown in fig. 3. It includes the basic functions performed by the software.

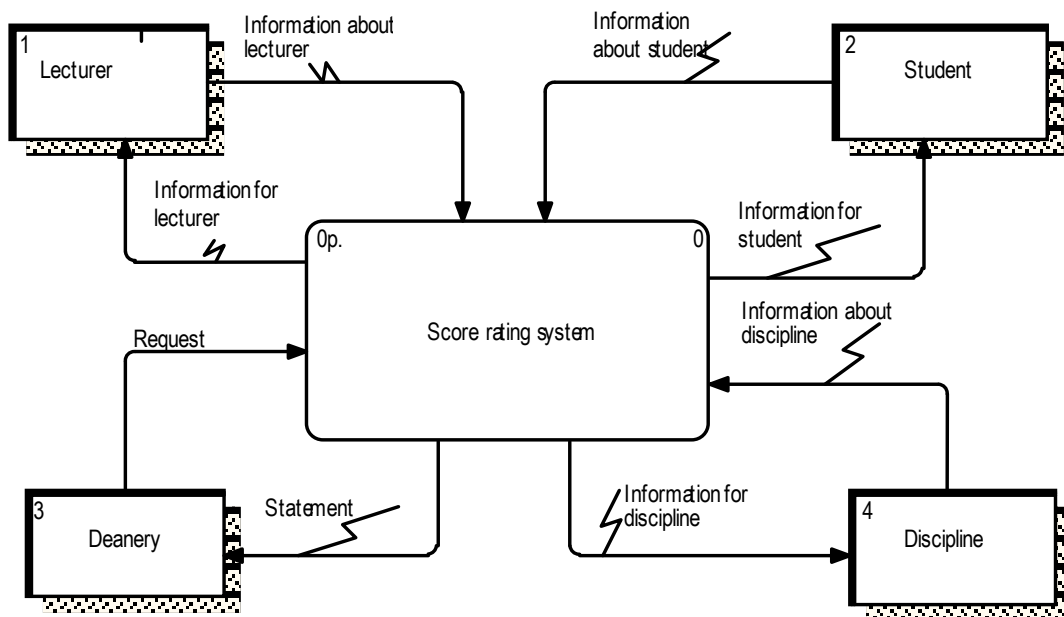


Fig. 1. Context diagram

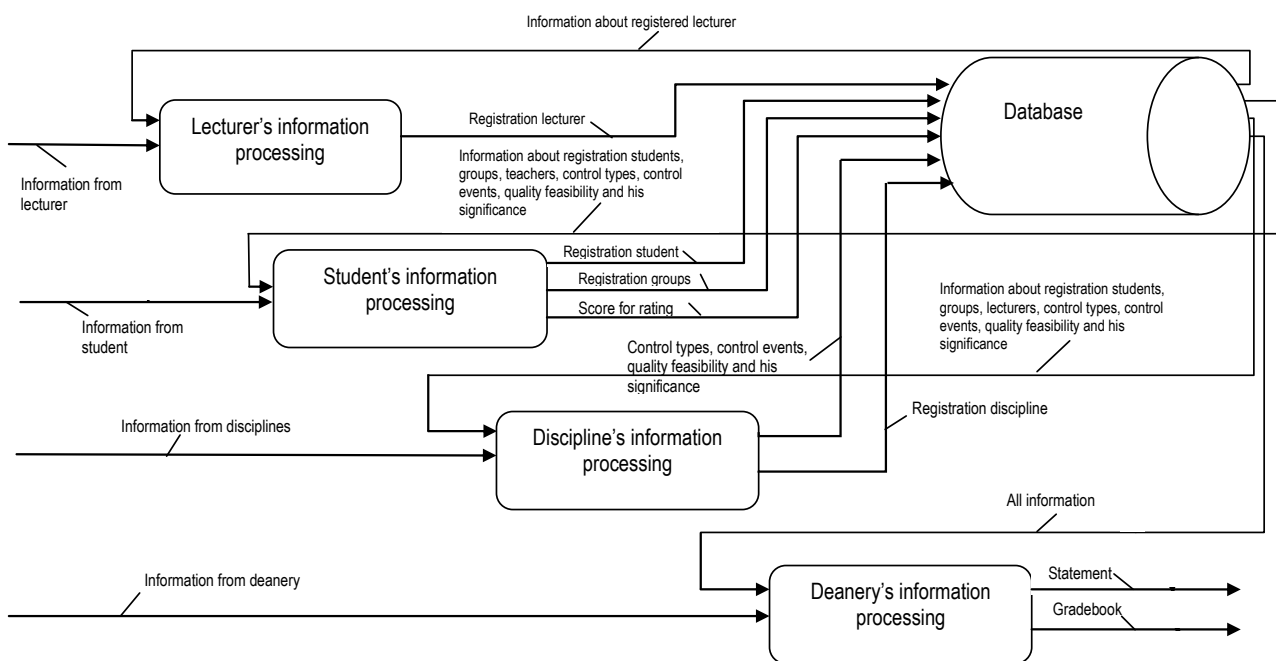


Fig. 2. DFD «Score-rating system engineering»

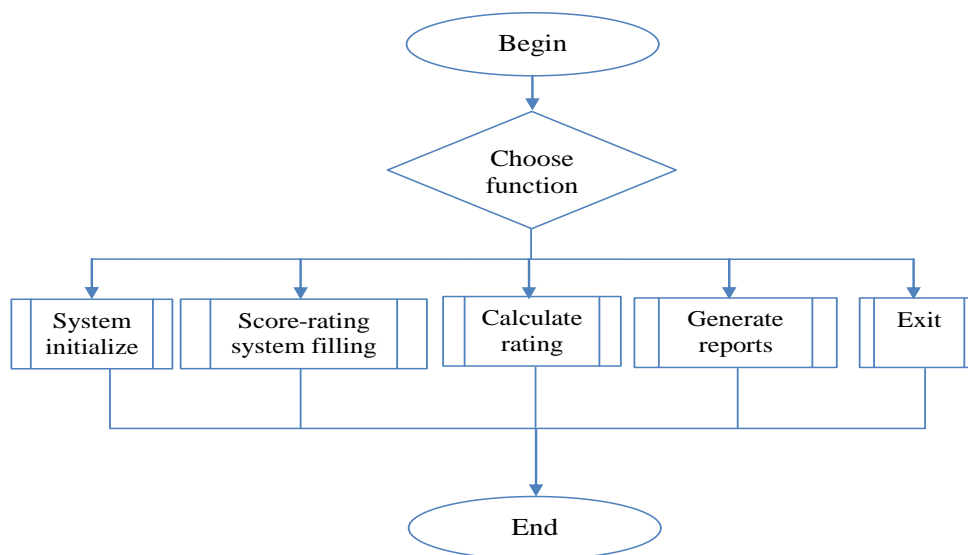


Fig. 3. The generalized algorithm of the system operation

As a means of implementing the developed algorithms is used the C # programming language. To date, one of the most powerful, fastest growing and in-demand languages in the IT industry. At the moment, it is used to write a variety of applications, from small to large programs, web portals and web services, serving millions of users every day [4].

4. Introduction of the score-rating system in the educational process

Certificate of registration by software product is received [5]. As an example, consider the use of information monitoring system in groups of students studying towards bachelor 27.03.03 "System analysis and management".

According to the by the curriculum of the basic educational programs in the discipline "Theory and technology of programming" allocated 3 credit units, which corresponds to 108 hours: theoretical training - 72 hours, the number of classroom load - 36 hours lectures - 12 hours, laboratory classes - 24 hours, independent work of students - 36 hours and the intermediate examination - an examination - 36 hours.

Interim certification evaluated differentially. Scale of final grades of student performance establishes a correspondence between the traditional four score system and ranking by hundred-point score system is presented in table 1.

Table 1. Scale of final grades of student performance

Total score	Differentiated rating
91-100	5 «excellent»
74-90	4 «good»
61-73	3 «satisfactory »
0-60	2 «unsatisfactory »

The lists of control measures types of control are determined according the specifics discipline.

The list of control measures by current control are included:

- monitoring attendance by lectures ($i=1$);
- monitoring attendance by laboratory classes ($i=2$).

The list of control measures mid-term control are included:

- performance of tests ($i=3$);
- reporting and protection of laboratory works ($i=4$);
- representation and protection of individual work of student ($i=5$).

There are several control measures for each species. For each set weighting factor γ_{ij} .

On control events:

- monitoring attendance by lectures: there are six lectures, with equal importance – $\gamma_{1j}=1/6$, where $j=1..6$;
- monitoring attendance by laboratory classes: there are six laboratory classes, with equal importance – $\gamma_{2j}=1/6$, where $j=1..6$;
- performance of tests: there are three test papers, in one of which a test $\gamma_{31}=0,3$, $\gamma_{32}=0,35$, $\gamma_{33}=0,35$;
- reporting and protection of laboratory works: there are six laboratory classes, with equal importance – $\gamma_{4j}=1/6$, где $j=1..6$;

- representation and protection of individual work of student: there are two independent works, with equal importance $\gamma_{51}=0,5$, $\gamma_{52}=0,5$.

The screen form for entering data on the levels of

performance of control activities throughout the semester is shown in fig. 4. For help, please click on the sign «?».

Background information on the accrual of points on the control activities of the current control is shown in fig. 5.

Fig. 4. Screen form for calculating rankings

Оценка	Описание
0	Студент не был на лекции
0.5	Студент был на половине лекции
1	Студент был на всей лекции
0	Студент присутствовал на лабораторной работе
1	Студент отсутствовал на лабораторной работе

Fig. 5. Help for charging points for control activities by current control

Diagram of formation rankings for the perfect study process displays a regular, systematic work of the student in the semester to give them the highest possible score on each of control measures in established the week.

Not all students executed complete schedule of the study process in practice. This is due to objective reasons: больничный This is due to objective reasons for sick

leave, performance of scientific, social activities, family circumstances, as well as subjective.

Especially actual cause is now desire full-time students have a job at the undergraduate, for seniority and ability to pay for their own training. In this case the student is psychologically easier to skip the lecture streaming than laboratory classes, where the task will be executed individually.

This situation requires the formation of a rating on a controlling slice, which signals the behind the schedule of the educational process.

Monitoring the dynamics of formation of the rating during the academic semester, you can monitor and in graphical representation (fig. 6).

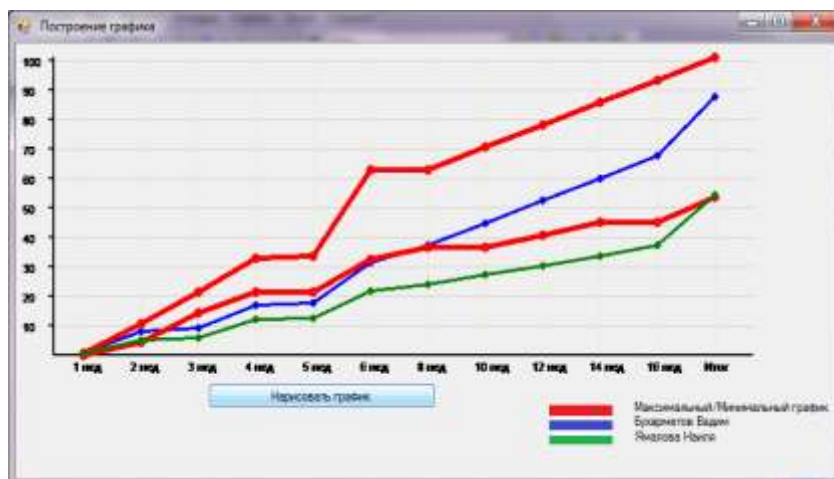


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6. Screen form of the diagrams ratings

The program has the user-friendly interface and is designed for use by a lecturer or methodist.

5. Conclusion

The results showed the adequacy of the developed rating system.

Information system for monitoring and recording the results of assimilation of a discipline lets:

- take into account the characteristic of the discipline, the kind and number of control measures by type of educational work using a system of weights, which reflect the importance of control measures;
- monitor the dynamics of the formation of rating and compliance with the schedule of the study process;
- promotes the development of a competitive stimulus among group students.

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