

INFORMATION AND TECHNICAL SUPPORT FOR THE ACTIVITIES OF THE INSTITUTION OF HIGHER EDUCATION

Bazyl O. O., Kravchenko Yu. A.

INTRODUCTION

World society is moving through technology, digitization. These processes cover all areas of human life, fundamentally changing the existing education system.

The effective operation of a higher education institution requires systematic analysis and automation of the majority of tasks related to organizational, technical, methodical, and financial support of university life support processes¹.

A modern institution of higher education cannot fully develop without an integrated information system² that provides all spheres of university activity and takes into account the methodology of organizing all business processes³.

The two main components of information management at the university are:

- receiving reliable and up-to-date information;
- processing and transfer of this information or part of it to other participants in the management process⁴.

The author of the research paper⁵ believes that a modern institution of higher education should have an integrated Management Information

¹ Валерій Гриценко Організаційні засади інформатизації вищої освіти. URL: <https://lib.iitta.gov.ua/1528/1/Grytsenko%20V.pdf>.

² IT-забезпечення діяльності інноваційного університету: досвід українського вишу : монографія / А. В. Васильєв, В. О. Любчак, Ю. О. Зубань та ін. ; за заг. ред. проф. А. В. Васильєва. Суми : Сумський державний університет, 2016. С. 8–10.

³ Полив'яна О. Сучасні автоматизовані системи управління закладом вищої освіти. Дидаскал : часопис : матеріали Всеукр. наук.-практ. конф. з міжнар. участю «Трансформації вищої педагогічної освіти: світовий і український контекст», 16–17 лист. 2021 р. С. 86–99.

⁴ Співаковський О. В. Особливості автоматизованих систем управління вищими навчальними закладами. *Вісник Харківського національного університету Серія «Математичне моделювання. Інформаційні технології. Автоматизовані системи управління»*. 2004. № 629. С. 86–87.

System, the varieties of which include an information system for managing technological processes, an information system for organizational management, a strategic information system, an automated office, a Learning Management Systems, a Learning Content Management Systems, an expert advisory system, and others.

In 1959, the cybernetician Kitov A. put forward the first ideas for designing automated systems. In 1969, the first attempts to create educational process management systems were made within the framework of the "ASU University" project⁶.

Let's consider the components of modern automated control systems.

1. Automated management system of a modern institution of higher education

The National Technical University of Ukraine "Ihor Sikorsky Kyiv Polytechnic Institute" uses the "Electronic Campus" automated information system to support its activities⁷. The electronic system "Socrates" is the only integrated client-server educational system in which the functions of distance learning and university management are implemented. It provides management of all processes at the Vinnytsia National Agrarian University⁸.

The constituent parts of the unified information environment of the Kherson National Technical University are the telecommunications network, which connects all buildings and divisions of the university with broadband optical fiber communication channels, and the information and analytical system of the Kherson National Technical University "ST-IAS", which provides automation of the main business processes of the university and integration with all other information systems of the institution of higher education, which function as specialized subsystems⁹. The automated facility management system also operates at the KhPI National Technical University.

⁵ Топузов М. О. Проектування інформаційно-освітнього середовища навчальних закладів у сучасному суспільстві. *Український педагогічний журнал*. 2017. № 1. С. 26–36.

⁶ Карплюк С. О. Аналіз деяких вітчизняних інформаційно-аналітичних Web-орієнтованих систем управління навчальним процесом у вищих школах. *Наукові записки Бердянського державного педагогічного університету. Серія: Педагогічні науки*. 2019. Випуск 3. С. 275–281.

⁷ Забезпечення якості вищої освіти та інформатизація освітнього процесу в університеті. URL: <https://kpi.ua/regulations-9>.

⁸ Електронна система «Сократ». URL: <http://socrates.vsuu.org/index.php/ua/pro-systemu>.

⁹ Основні напрями функціонування єдиного інформаційного середовища ХНТУ. URL: <http://kntu.net.ua/index.php/eng/content/view/full/67274>.

The IT system of Sumy State University is an integrated "University" information system, which consists of a set of subsystems supporting the main types of higher education activities¹⁰.

Higher educational institutions mainly use self-developed systems to ensure their activities and automate all processes, since in this case the requirements and needs of the higher education institution are most satisfied and the stable operation of the system as a whole is ensured.

The basis of the "Socrates" system consists of the following modules:

- "AMS-Dean's Office";
- "AMS-Medcenter";
- electronic library system "Sofia";
- university repository;
- automated system of accounting and control of students' work;
- Thesaurus automated knowledge testing system;
- educational client-server program "WEB-accounting";
- teacher's personal office;
- student's personal office, etc.¹¹.

The subsystems of the ACS of the National Technical University "KhPI" are:

- "Dean's office";
- "Central Admissions Committee";
- "Admission committees of faculties";
- "Department of student personnel";
- "Contract Department";
- "Military Mobilization Department";
- "Archive";
- "Library";
- "Student Employment Department";
- "Professional committee of students";
- "Department";
- "Educational part";
- "Education Quality Department";
- "Student's office";
- "Teacher's office";
- "Postgraduate studies"¹².

¹⁰ IT-забезпечення діяльності інноваційного університету: досвід українського вишу : монографія / А. В. Васильєв, В. О. Любчак, Ю. О. Зубань та ін. ; за заг. ред. проф. А. В. Васильєва. Суми : Сумський державний університет, 2016. С. 11–13.

¹¹ Електронна система «Сократ». URL: <http://socrates.vsau.org/index.php/ua/pro-systemu>.

AMS "VNZ"¹³ was developed by the private joint-stock company "Research Institute of Applied Information Technologies". This software is used by more than 70 higher education institutions of Ukraine, including State Higher Educational Institution "Priazov State Technical University", National University "Chernihiv Polytechnic", Kyiv National Linguistic University, Mariupol State University, Admiral Makarov National Shipbuilding University, State Higher Educational Institution "Donetsk National Technical University", Dnipropetrovsk State University of Internal Affairs, Kyiv University of Tourism, Economics and Law, Higher Educational Institution "KROC University of Economics and Law"¹⁴, Izmail State Humanitarian University, etc. The components of the software, which provides effective management of the university and the simplification of its work, are presented in Table 1.

Table 1

Modules of AMS "VNZ"^{15, 16}

System components	Appointment
AS "Admission Commission"	It automates the work of the admissions committee and provides storage of personal files of applicants and information on admission results for use in the departments of higher education institutions.
AS "Deanery"	A software and technology complex for managing the educational process of an educational institution, designed to organize the work of methodologists and reduce the amount of documentation on paper media.
AS "Student campus"	It automates the activities of the directorate of the student campus of the educational institution, simplifies and improves document flow.
AS "Test"	Assessment of user knowledge, unification of the testing process, instant processing of test results.

¹² Автоматизована система управління навчальним процесом НТУ «ХПІ». URL: <https://www.kpi.kharkov.ua/ukr/informatsijni-tehnologiyi/avtomatizovana-sistema-upravlinnya-navchalnim-protsekom-ntu-hpi/>.

¹³ АСУ ВНЗ URL: https://vuz.osvita.net/wp-content/uploads/2021/09/ASU_VNZ.pdf.

¹⁴ Добришин Ю. Є., Чернозубкін І. О. Питання ефективності застосування автоматизованих інформаційних систем управління навчальним закладом. *Вчені записки Університету «КРОК»*. 2017. Випуск 47. С. 122–129.

¹⁵ АСУ ВНЗ URL: https://vuz.osvita.net/wp-content/uploads/2021/09/ASU_VNZ.pdf.

¹⁶ Ганжа А. С., Антоненко С. В., Измайлова М. К. Огляд існуючих автоматизованих систем управління освітніми закладами. *Актуальні проблеми автоматизації та інформаційних технологій*. 2022. Том 26. С. 37–45.

Table 1 (continuance)

AS "Report Builder"	Creation and editing of report templates according to the selected component of the university's AMS.
Backup manager	The module is designed to create a backup copy of application databases.
Web schedule	It allows to embed the schedule from the AS "Dean's Office" on the university website.
Web student cabinet	The module provides an opportunity to register/authorize a student in a personal cabinet, to enroll students in courses of the student's choice, to review the student's progress, to generate reports "Individual study plan" and "Student success".
Access control system	Integrated complex, which with the use of modern technologies and approaches in the field of physical protection, provides safe and reliable use.

The integrated information system of Sumy State University combines more than 70 different functional, specialized integration and calculation modules, which are part of the following main subsystems¹⁷:

- "Applicant";
- "Student and Postgraduate Student";
- "Learning process";
- "Personnel";
- "Documents";
- "Finance";
- "Rating of subdivisions";
- "Personal cabinet" and others .

The integrated information system of Sumy State University can be divided into 4 main directions:

- Educational resources
- Public websites
- Information and library system
- Management of universities.

In the article¹⁸ it is stated that "only an integrated automated management system, implemented on the basis of modern information and

¹⁷ IT-забезпечення діяльності інноваційного університету: досвід українського вишу : монографія / А. В. Васильєв, В. О. Любчак, Ю. О. Зубань та ін. ; за заг. ред. проф. А. В. Васильєва. Суми : Сумський державний університет, 2016. 173 с.

¹⁸ Співаковський О. В. Особливості автоматизованих систем управління вищими навчальними закладами. *Вісник Харківського національного університету Серія «Математичне моделювання. Інформаційні технології. Автоматизовані системи управління»*. 2004. № 629. С. 88–99.

communication technologies, allows ensuring timely access to management information, systematizing basic data, organizing the necessary reports, and simplifying the work of employees."

2. Personal cabinet as a single point of access to information services of the university

Of particular importance in the automated business processes of an educational institution is the ability of employees and students to have quick access to personalized information with the possibility of its processing and modification. Such a task is effectively solved by the electronic personal cabinet of the student and employee.

In most higher education institutions, the teacher's cabinet and the student's cabinet are two information resources. This method is followed at Zhytomyr Ivan Franko State University, Vinnytsia National Agrarian University, and KhPI National Technical University. This is very inconvenient if the user has several roles. For example, he is an assistant at the department and simultaneously studies at the educational level "Doctor of Philosophy". In this case, the user needs to remember two logins and passwords.

At Sumy State University, the personal cabinet is located at the link <https://cabinet.sumdu.edu.ua/>. It represents a single environment for both the student and the teacher, but the set of services depends on the role of the user: teacher, student, employee, head of the department, etc.

All employees, teachers and students register in a personal cabinet independently. The login is usually corporate mail (rarely personal). When registering by identification tax number, the user is checked: whether he is related to Sumy State University and what is his role (student, scientific and pedagogical worker, employee, etc.).

A personal cabinet allows access to many university services with a single login / password.

In fig. 1 presents the teacher's personal cabinet. Some resources may be disabled. To open access to them, you need to use the Settings button. Similarly, you can disable the service if the user does not need it. You can also change your password in the settings.

Figure 2 shows the connection of the "Documents" service. To do this, you need to check the box next to the required resource.

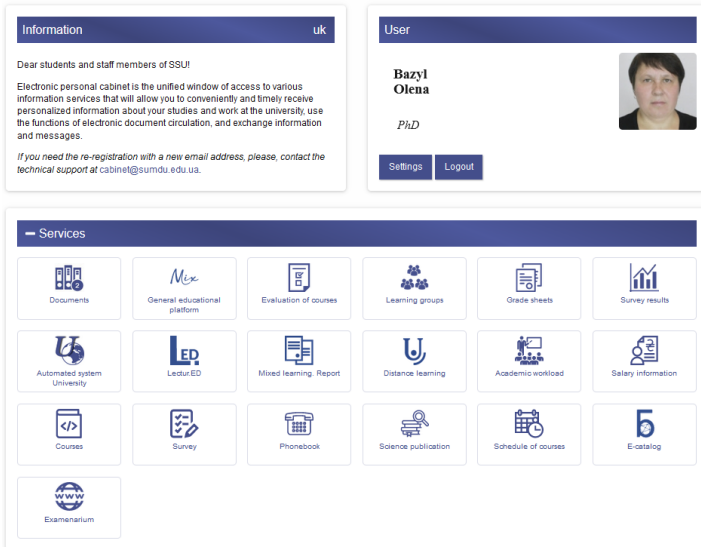


Fig. 1. Teacher's personal cabinet

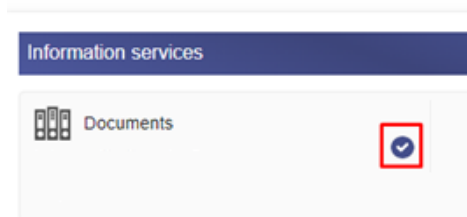


Fig. 2. Adding the information service to the main page of the personal cabinet

Let's take a closer look at the main parts of the personal cabinet.

The "Learning groups" service (Fig. 3) gives the scientific and pedagogical worker access to the list of groups and students in them. The teacher can send letters to all groups (3), send a letter to a group (4, 5) or a specific student (6). The scientific and pedagogical worker can view student lists by clicking on the "+" button next to the group name, or hide it by clicking on the "-" button. Button 1 represents the group list icon. By clicking on it, you can automatically generate a list of students for printing. Button 2 presents the student's curriculum in this course.

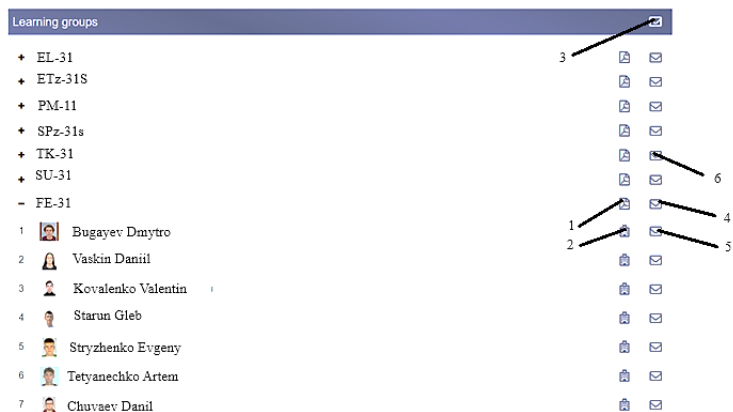


Fig. 3. Service "Learning groups"

The information resource "Performance data" allows a scientific and pedagogical worker to conveniently and timely fill in information on the performance record for the courses he teaches.

A lecturer is able to view and edit open grade sheets, close grade sheets, print grade sheet templates and send e-mail messages to the relevant dean's office.

The "Results of Assessment" resource provides information on the results of student questionnaires regarding the work of teachers. Based on the results of the assessment, a rating of the teaching staff is formed and the teacher's position in it is determined.

The "Documents" module (Fig. 4) allows employees, teachers and students to join the electronic document flow. The resource provides an opportunity to filter documents by a specified period (choose the required month and year) and document status (to information, to perform, to approval, to consideration, to voting). The user has the ability to download and create documents, send them for consideration and approval, review the stages of the electronic document. The approval sheet allows you to get information about the stages of the officials' work on the document. The employee's opportunities to work with this service depend on the user's level of access.

The "Calculation sheet" module provides an opportunity for teachers and employees to receive information on the calculation and receipt of wages. It allows you to select a month and year starting from September 2019 to view the information.

The information service "Survey" is designed to monitor the quality of the university's activities.

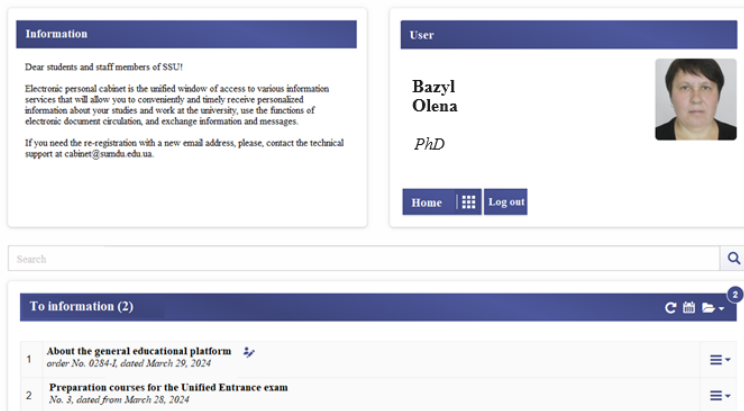


Fig. 4. Information service "Documents"

The "Personnel" module allows you to get all information about a person: surname, first name, home address, mobile phone number, department, position, academic title, date of birth, availability of awards, etc.

The "University Automated System" information resource, depending on the level of access, enables users to work with other specialized modules (for example, dormitory).

Information service «Phonebook» will allow you to quickly receive information about the telephone numbers and email addresses of the university staff and departments. The search for the necessary information is executed by the name of the employee, the name of the post or department, the department location, telephone number and / or e-mail address (Fig. 6). Enter a word or part of the word to search. Use «*» to denote any character or group of characters. To view the organizational structure of the university, click on the search button.

The "Lectur.ED" service allows teachers and employees to log in to the designer's environment of educational and methodological materials. This allows users to view semester study plans (<https://elearning.sumdu.edu.ua/plans>) and create collections of educational and methodological materials (<https://elearning.sumdu.edu.ua/works>). The first time you log in through your personal account to Lectur.ED, the user will be asked if he has an account on this service. If there is an account, the teacher or employee must first log in to this virtual environment using a login and password. The materials created in the designer can be published on the platform of the general educational platform Mix, imported into the distance learning system, used on the platform of mass open online courses Examenarium.

The information service "Courses" is designed for convenient and quick access to working programs of educational courses.

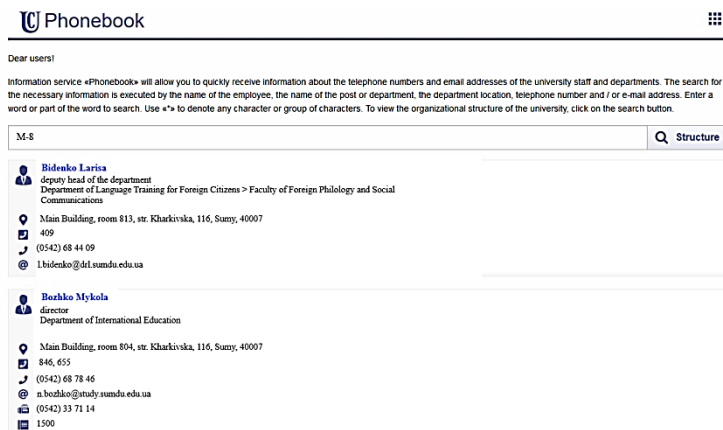


Fig. 5. A fragment of the search results for the phones of all officials and units whose offices are located on the 8th floor of the main building of Sumy State University

With the help of this service, teachers create, edit and send work programs of educational courses for approval. For heads of departments, guarantors of educational programs, heads of the Quality Council of faculties (institutes), this resource is a tool for agreeing work programs. Registered work programs of educational courses are available for viewing by all users of the service (Fig. 6).

Features of the "Courses" service:

- search for work program course;
- viewing self-created programs;
- editing and creating copies of programs, etc.

Next to each program created by the user, you can see its status; under development, for approval, approved, closed.

To receive a schedule, you must fill out the request form (Fig. 7).

In the request, it is necessary to specify the start date and the end date of the search (this period should not exceed 60 days, by default it is a week), and also fill in at least one of the fields: "Group" (classes for this group for the specified period), "Lecturer" (user's schedule for the specified period), "Room" (search for classes for the specified period in the required room). After filling out the form, click the "Request" button.

The schedule will be displayed on the right side if there are classes in the specified period that match the query parameters.

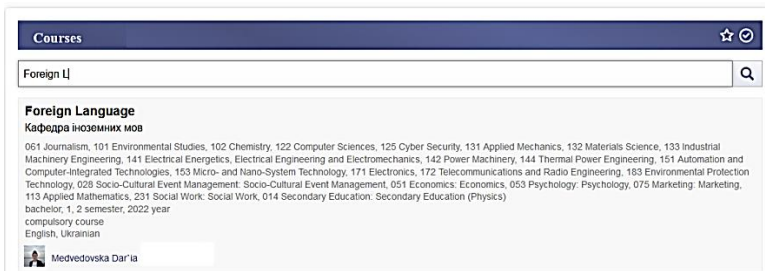


Fig. 6. Search for working programs

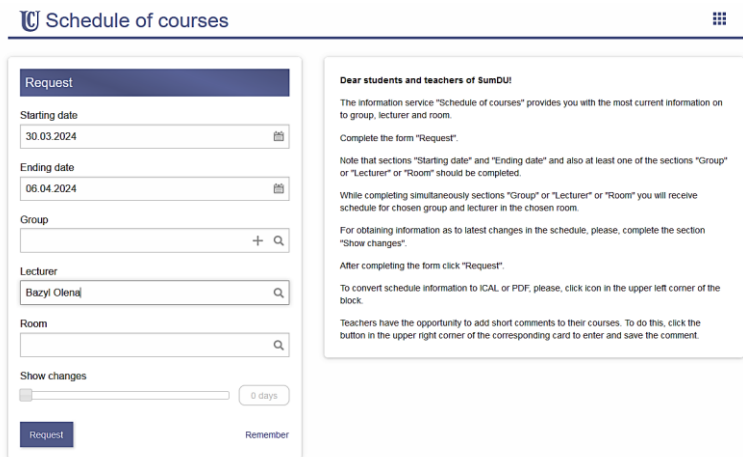


Fig. 7. Request to receive a schedule of courses

After receiving the schedule of courses, the user has the option to export it in ICAL format or PDF format. To do this, you need to click on the corresponding icon in the upper left corner of the schedule block.

Lecturers can add short comments to their classes. To do this, click the button in the upper right corner of the corresponding card to enter and save a comment.

The "E-catalog" service provides the user with the opportunity to search for the necessary literature (Fig. 8).

The "User's profiles" module (Fig. 9) allows you to find teachers, students and employees by last name. By clicking on the required user, you can get information about the place of work of the employee and teacher (department, faculty, position, availability of a degree and academic title) or the faculty and specialty of the student.

Fig. 8. Form for searching literature in the library of Sumy State University

Fig. 9. Search for user's profiles

The student's personal cabinet has the same information services as the lecturer's: "E-catalog", "General educational platform", "Phonebook", "Schedule of courses", "Survey", "Documents", "User's profiles" (Fig. 10).

The "Learning group" module provides an opportunity to view the list of students of the group in which the student is studying and to send them a letter.

The "Courses" service allows you to view courses for study by semester with the amount of hours and credits provided for studying the courses, the final grade, additional points and the student's rating score (Fig. 11).

The "Evaluation of courses" service allows students to evaluate the teaching level of each course after completing its study. The survey usually lasts up to 3 months after the end of the semester in which the subjects are evaluated.

The "Individual learning path" service allows students to choose selective courses from the given list.

Fig. 10. Student's personal cabinet

Name of the course	Workload		Semester grade		Date of grade
	hours	credits	number of points	according to the national scale according to ECTS	
+ 1 semester 2022/2023 academic year					
+ 2 semester 2022/2023 academic year					
+ 3 semester 2023/2024 academic year					
- 4 semester 2023/2024 academic year					
Pedagogical Practice for Professional Purposes	120	4.0			
The Current State of Scientific Knowledge about the Processes of Machining, Machine Tools and instruments	150	5.0			
Total per semester	270	9.0	Additional credit points 0.0		
			Rating grade 0.00		

Fig. 11. Information about academic courses

When evaluating the lecturer's work, the availability, comprehensibility and logic of teaching the material, the use of innovative technologies in education, objectivity in assessing students' knowledge, etc.¹⁹.

¹⁹ Козак О. М. Оцінка роботи викладача як елемент системи забезпечення якості вищої освіти. *Економічний часопис*. 2021. № 7–8. С. 36–39.

CONCLUSIONS

Contemporary global trends in the development of management of educational institutions are aimed at their digital transformation.

The modern university is necessary to carry out work on the development of a strategy for the creation and development of its own information infrastructure, which is a key factor of competitiveness in the conditions of a market economy.

The information and technical support of a modern university must necessarily include an integrated automated information system, which contains a set of subsystems that provide the main activities of the educational institution.

The automated management system of Sumy State University has shown its viability, especially in the conditions of rapid changes in the field of higher education in Ukraine. It is constantly improved in terms of qualitative improvement and addition of new functions and opportunities.

Currently, the automated management system of Sumy State University contains a significant number of different modules and subsystems. Standardization of basic functional modules significantly simplifies interaction between university systems and systems of the Ministry of Education and Science of Ukraine.

A personal cabinet is a mandatory component of an automated personnel management system that simplifies the work of its users, removes the issue of unnecessary authorization and facilitates access to various information and educational services of the university.

The interface of the personal cabinet is intuitive. The availability of a mobile version of this service provides access to informational and educational resources regardless of the user's location.

A personal cabinet is an indispensable tool for teachers and students in their daily work. Almost 20000 people are successfully using this service.

The automated management system guarantees the successful and sustainable development of Sumy State University, allows not only to increase the efficiency of management due to the automation of various spheres of activity, but also to raise the management culture to a modern level.

SUMMARY

The main attention is paid to the research of existing solutions for automating the work of the management of the educational institution. Automated management systems used by higher education institutions in Ukraine are considered. The main capabilities of these systems are analyzed. The integrated information system of Sumy State University is considered in detail. Considerable attention is paid to the personal cabinet. It is a single point of access to various information and educational services. The personal

cabinet provides access to a general educational platform, an electronic catalog, a telephone directory, surveys, etc.

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Information about the authors:

Bazyl Olena Oleksandrivna,

Candidate of Physical and Mathematical Sciences,
Senior Teacher at the Department of Applied Mathematics
and Complex System Modeling
Sumy State University
116, Kharkivska str., Sumy, 40007, Ukraine

Kravchenko Yuliia Anatolyivna

Candidate of Physical and Mathematical Sciences,
Senior Teacher at the Department of mathematical analysis
and optimization methods
Sumy State University
116, Kharkivska str., Sumy, 40007, Ukraine