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THE ROLE OF INFORMATIONAL AND ANALYTICAL SYSTEMS IN ACHIEVING THE STRATEGIC INDICATORS OF THE UNIVERSITY (on the example of Al-Farabi KazNU)

This article covers the development and application of information systems in the aspect of the formation of the information and educational environment at the university, on the example of the al-Farabi Kazakh National University. The authors of the article analyze the existing information programs – «Univer 2.0», «Science», the accounting and personnel records system «1C: Enterprise 8.2», the time accounting system «Perco 2.0», the electronic document management system «Directum», the statistical reporting system, contact – center «VoIPTime Contact Center», on the basis of which the Corporate Information System al-Farabi KazNU. According to the authors of the article, an integral part in the formation of the information and educational space, as well as a key factor in achieving the strategic indicators of the al-Farabi KazNU is the implementation, application and development of the information and analytical system Power BI of Microsoft.

Key words: information and educational environment, information systems, al-Farabi Kazakh National University, Power BI, strategic university indicators.

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Университеттің стратегиялық көрсеткіштерінің бастығында ақпараттық-аналитикалық жүйелердің рөлі (әл-Фараби атындағы ҚазҰУ мысалында)

Осы мақалада университет аясында ақпараттық жүйелерді қалыптастыру аспектісінде ақпараттық-білім беру ортасында әзірлеу және қолдану мәселелері ашылады, мысалға әл-Фараби атындағы Қазақ ұлттық университеті.

Мақала авторлары – қолданыстағы ақпараттық бағдарламалар – Univer 2.0 жүйесі «Ғылым» жүйесі, бухгалтерлік және кадрлық есеп»1С: Кәсіпорын 8.2» жүйесі, жұмыс уақытын есепке алу «Perco 2.0» жүйесі, «Directum» электрондық құжат жүйесі туралы» статистикалық есеп беру байланыс орталығы «VoIPTime Contact Center» әл-Фараби атындағы Қазақ ұлттық университетінің Корпоративтік ақпараттық жүйесі негізінде қалыптасқан талдаулар жасайды.

Мақала авторының пікірінше, интегралды буын қалыптастыруда ақпараттық-білім беру кеңістігін, сондай-ақ стратегиялық көрсеткіштерге жетудің негізгі факторы ретінде әл-Фараби атындағы Қазақ ұлттық университетін енгізу, Microsoft компаниясының Power BI ақпараттық-талдау жүйесін қолдану және дамыту.

Түйін сөздер: ақпараттық-білім беру ортасы, ақпараттық жүйелер, әл-Фараби атындағы Қазақ ұлттық университеті, Power BI, университеттің стратегиялық көрсеткіштері.

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Роль информационно-аналитических систем в достижении стратегических показателей университета (на примере КазНУ им. аль-Фараби)

В данной статье раскрываются вопросы разработки и применения информационных систем в аспекте формирования информационно-образовательной среды в университете на примере Казахского национального университета им. аль-Фараби. Авторами статьи дается анализ существующих информационных программ – Univer 2.0, система «Наука», системы бухгалтерского и кадрового учета («1С: Предприятие 8.2»), система учета рабочего времени «Perco 2.0», система электронного документооборота «Directum», система статистической отчетности контакт-центра «VoIPTime Contact Center», на основе которых сформирована Корпоративная информационная система КазНУ им. аль-Фараби. По мнению авторов статьи, интегральным звеном в формировании информационно-образовательного пространства, а также ключевым фактором в достижении стратегических показателей КазНУ им. аль-Фараби является внедрение, применение и развитие информационно-аналитической системы Power BI компании Microsoft.

Ключевые слова: информационно-образовательная среда, информационные системы, КазНУ им. аль-Фараби, Power BI, стратегические показатели университета.

Introduction

Today, in modern society, in almost all spheres of human life, significant changes have taken place, which have required advanced development from the higher education system, incorporating the latest trends in theoretical and practical didactics. In this regard, the educational environment of modern universities has become dependent on information technology, which has led to the search for new tools, forms and methods of both the learning process and the management of the university.

In the literature devoted to the informatization of education, there are terms such as "information-educational space" (IEP), "information-educational environment" (ILE). The study of literature has shown that ILE is treated as a systematically organized set of information, technical and educational support, which is inextricably linked with a person as a subject of the educational space (Belyaev, 2000) [1]; a common information and educational space built using the integration of information on traditional and electronic media, computer-telecommunication technologies of interaction, including virtual libraries, distributed databases, educational and methodical complexes and advanced didactics, etc. (Soldatkin, 2002) [2].

As we see, in these definitions the emphasis is on the informational nature of the environment, since informational knowledge flows form the basis of human-computer interaction.

Information infrastructure is represented as a set of solutions of the university's own developments, which are mainly aimed at automating educational activities, using distance learning technologies, information sites and individual local developments, with third-party solutions such as automation of financial and economic activities, electronic document management systems, use of management software for the administration of key resources and services, educational software and resource management solutions IT services.

Formulation of the problem. Today, requirements for university management are increasing, which leads to the inclusion of information and analytical systems in the control loop.

Information and analytical system in the management of scientific and educational activities (GCD) of a university must not only provide administrative management of the university with information about the current and future state, but also identify problem areas of the university's functioning, and develop corrective actions to enhance work in this direction.

Research questions. Information and analytical systems, as well as business analyst, are a fairly new direction. Kazakhstani studies related to the use of ICT in education and vocational training are devoted to the introduction of information and communication technologies in the educational system Mutanov G.M., Mamykova Z.D. (2011), general problems of informatization of higher education in the context of international cooperation Kunanbayeva S.S., Nurgaliyeva G.K. (2006) [4], methodologies and technologies for creating electronic methodical systems in the conditions of informatization of edu-

cation Kurmanalin Sh.H. (2002) [5], the influence of information technology on the research activities of future teachers Taulanov S.S. (2005) [6] and etc.

Speaking about the practical implementation, it is in the practice of Kazakhstan universities that automated information management systems are successfully functioning on certain aspects of their application. In many universities of Kazakhstan – E.A. Buketov KarSU, KarGTU, L.N. Gumilyov ENU and etc. information systems and databases are used, such as "Applicant", "Student", "Personnel", "Scholarship", "Library", "Academic Performance", "Orders", "Finance", etc.

You can also note the experience of automation of management of the Kazakh-Russian University. At this university, accounting and evaluation of learning outcomes is carried out by the "Beam" program, which captures the data and generates information packages for all important student learning events: enrollment, restoration, expulsion, graduation, leaving for academic leave, transfer, retraining, changing data, individual training schedule, preferential training, etc. (Modern learning technologies…, 2000) [7].

The question arises of the relevance of the use of information systems in the management of a higher educational institution, the need to form a unified corporate information system to support management and strategic decision-making.

Purpose of the study. The purpose of this study is to summarize the experience of the practical implementation of information systems of the

al-Farabi Kazakh National University, the integration role of the Corporate Information System in shaping the information and educational environment of the university, and also reveal the importance of Microsoft's Power BI project in achieving the strategic indicators of the al-Farabi Kazakh National University.

The information environment created on the basis of high-tech means of information, is an integral part of the environment of the learning process at the university. Universities that have an informational and educational environment that corresponds, first of all, to the latest educational technologies, as well as to the modern level of development of information and communication technologies, successfully implement the full range of university policy issues.

Research methods

In the process of research, a complex of theoretical and empirical methods was used. The analysis of scientific literature on the research problem, theoretical modeling, study and synthesis of practical experience were carried out.

The results of the research

Al-Farabi Kazakh National University (KazNU) currently has a number of local and regional information systems, a modern Corporate Information System has been formed. The corporate university management information system (EIS) is a set of programs aimed at automating and managing various university business processes based on the process approach, which allows you to systematically develop each school activity and organize the creation and maintenance of software for university departments.

The information infrastructure of the university uses such information systems as:

Information system "UNIVER 2.0" is designed to solve the problems of automation of the educational process, satisfying modern industrial standards in the field of development and security of computer systems; the introduction of full-fledged credit technology training opportunities at the university organization of synchronous work of all participants in the educational process. It represents a single point of access to operational and reliable information on the main activities of the subjects of the educational process – the teacher and the student. The system is a portal solution for organizing the educational process, which consists of modules aimed at automating the main operations to provide various types of training, monitoring performance, monitoring the educational process, and also serves as an information site to provide information describing the main educational activities of the university, representing a communication platform of students, teachers, staff and management of the university;

Information system "SCIENCE" (here in after IS) is an integrated information system that provides: information support and automation of the main functions for the operational collection, analysis and monitoring of the results of research and innovation activities of the university in the following business processes:

- management of scientific personnel and intellectual potential of the university (integration with existing databases for students and employees of the university, statistical information on the degree of teaching staff and scientific personnel, obtaining information on positions, academic degrees, titles);
- preparation and certification of doctoral students and scientific personnel (accounting

system of scientific training, monitoring, analysis, management system of training and certification, updating of regulations, updating the library of normative documents);

- management of research and development work at the university (keeping records of the number of research projects at the university, republican and international levels, taking into account important scientific results, and forming a reporting system, recording the results of scientific research and design work, and taking into account the necessary resources (material, financial), etc.);

- management of patent and licensing activities (accounting of all scientific developments, statistics, library of regulatory documents, updating of the bank of scientific developments);

- management of scientific works and publications (accounting of articles in newsletters, in personal profiles of teaching staff, counting articles from impact factors through the analysis of other Internet resources), generating statistics, monitoring and quality of work, and more. others;

- management of conferences / olympiads / seminars / events for the development of research and innovation activities (accounting, registration, analysis, statistics, results);

• *Information system "Directum"* – an electronic document management and interaction management system aimed at improving the efficiency of all employees of the organization in various areas of their joint activities. DIRECTUM system belongs to the class of ECM-systems (Enterprise Content Management) and supports the full life cycle of document management, while the traditional "paper" office work seamlessly fits into the electronic document management;

• *Information systems for accounting and personnel records ("1C: Enterprise 8.2");*

• *Perco 2.0 time attendance information system,* which is designed to protect against the entry of unauthorized persons into the university, as well as the delimitation of employee access to the objects of the al-Farabi Kazakh National University;

• *Information system of statistical reporting of the contact center "VoIPTime Contact Center"* – on the basis of which the incoming and outgoing relevant information is received, processed by the university's contact center.

Management of the university, improving the quality of the scientific and educational process is a complex task that requires systematic and timely analysis of comprehensive and reliable information about the state and problems of the university, which is possible only as a result of the introduction of modern information technologies in the university management process and their continuous improvement. Therefore, higher educational institutions are constantly searching for effective ways of managing scientific and educational activities (GCD), in connection with which the information infrastructure of the university is being developed.

The purpose of developing IAS in the contour of the Corporate Information System (EIS) of a university: to create an aggregating system for extracting data from various sources of EIS, their conversion and uploading to the repository, in order to build operational and intelligent data analysis for effective perception by consumers.

The Information and Analytical System (IAS) is a modern, highly efficient tool to support strategic, tactical and operational management decision making based on the visual and operational delivery of the entire required data set to users responsible for analyzing the state of affairs and making management decisions (Alekseeva, 2005) [8].

For the proper organization of data, and configuration of monitoring panels, as well as the formation of data processing scenarios, a data structure model was developed in the IAS of the university (Fig. 1).

In this data model in the contour of the university KIS there is a system of indicative planning and rating system aimed at evaluating the activities of faculty, departments and faculties (Fig. 2).

This model allows the integration of the IC «UNIVER» and «SCIENCE», systems for automating the statistical reporting of the educational process and accounting for research and development activities are implemented. From such systems as: "1C: Enterprise 8.2", "Directum", "Perco 2.0", "VoIP Time Contact Center", the primary data is unloaded to build operational reporting forms. For each category of data, an indicator calculation method is provided to configure data processing scenarios and build dashboards for the business intelligence cloud service.

These information systems were integrated with the PowerBI cloud platform, in order to build an IAS in the contour of the CIS KazNU.

In al-Farabi KazNU in 2016 launched a unique project of an information analysis system based on Microsoft's PowerBI program, which is implemented by the Center of Situational Management in conjunction with the Center of Information Analysis and Processing. Power BI is a cloud-based business intelligence service that provides a unified view of the most important business data.

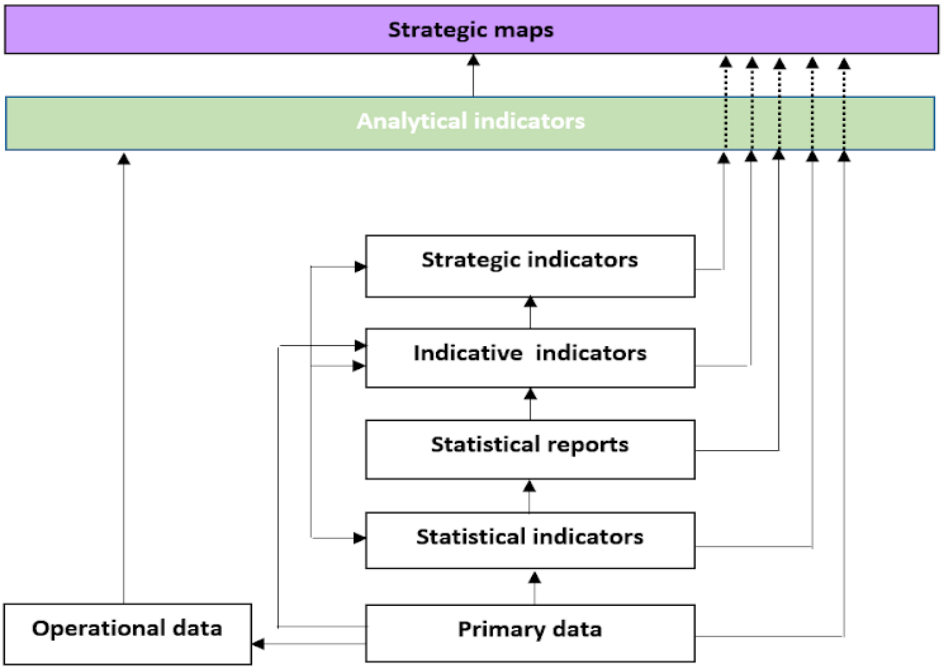


Figure 1 – Model of data structure in the IAS KazNU (Mutanov G.M., Mamykova Zh.D.)

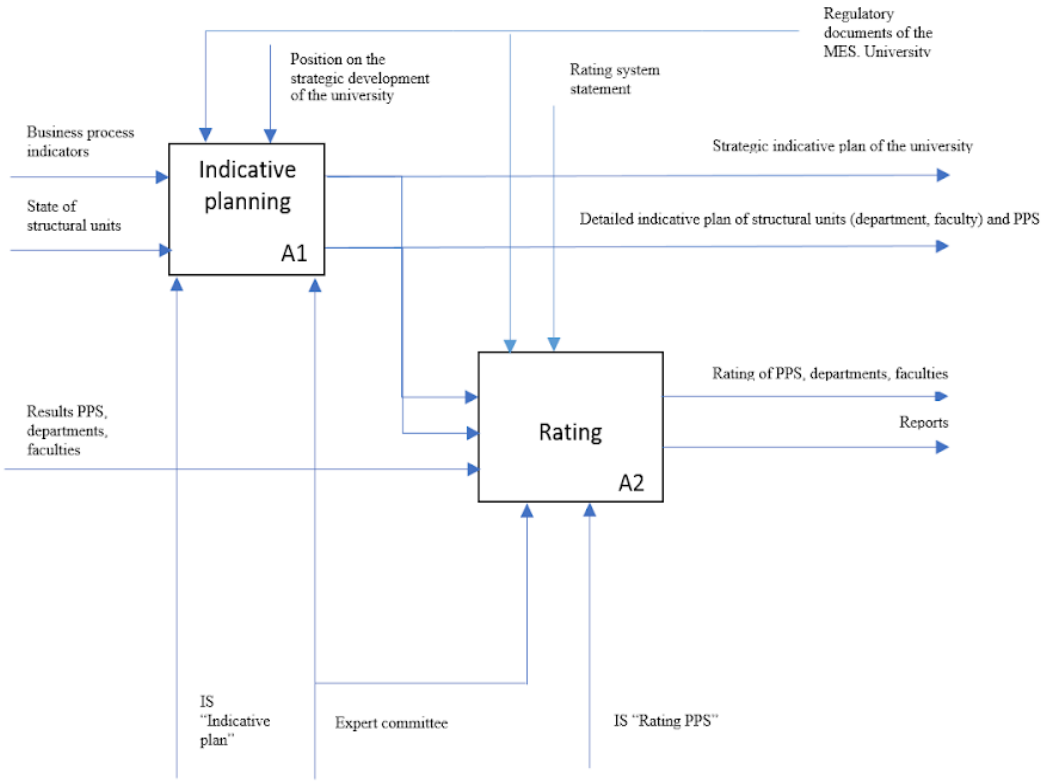
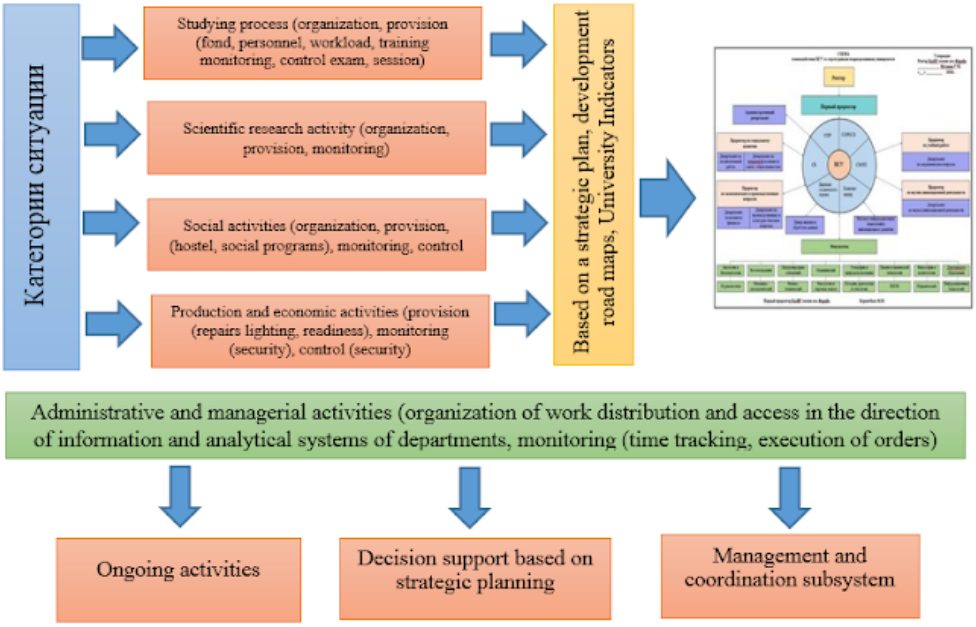


Figure 2 – The system of indicative planning and rating system of the al-Farabi Kazakh National University

Allows you to track the performance of your organization using dynamic dashboards, create detailed interactive reports using Power BI Desktop, and access data using Power BI Mobile applications.

Cloud platform for business intelligence allows you to make the results of data processing and analysis available, quickly integrate the results of the analysis in the business processes of the organization. Thus, we believe that for the development of IAS in the contour of the university's information infrastructure, it is necessary to use a cloud service of business intelligence, like Microsoft Power BI (Fig. 3).



Information and analytical system of KazNU based on the program Power Bi

Data source system	**Power Bi Directum US "Scince" Perco 2.0 VoIP Time Univer 2.0 Table files Excel**
Information flows	Lows RK, decrees of the President RK, resolution and orders Government RK, regulatory documents MES RK, university (Academic policy, Strategic development plan, Road maps), current operational information of regional services, University departments
Process participants	Indicators; Internet content; Social networks; Audio, video; Students, staff, parents; Enterprises state authorities

Figure 3 – Activities of the Center of Situational Management for the formation of the information and educational environment of the al-Farabi Kazakh national university

As a system of indicators for building a cloud service, business intelligence has used such categories of indicators as:

- statistical indicators;
- financial and economic indicators, personnel records;
- indicators of indicative planning and rating;
- indicators of administrative and organizational activity;
- indicators of accreditation of the university;
- indicators of the university strategy;
- indicators of operational monitoring of production and business activities and security services, etc. (Fig.4)

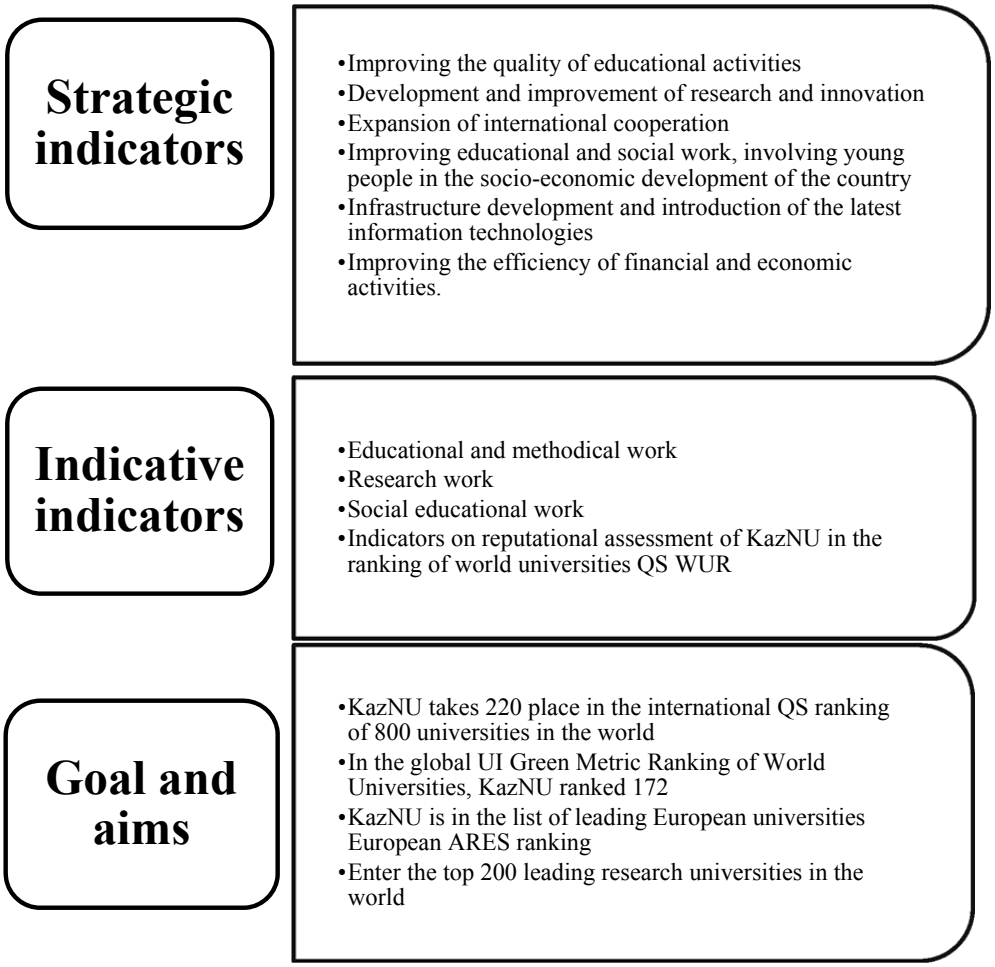


Figure 4 - Indicators of development of Al-Farabi KazNU

Conclusion

The goals of the university are developed on the basis of the state of the indicators, and an indicative plan for the development of the university for the future period is being formed on their basis. The expression of the targets in the form of indicators characterizing socially and scientifically significant results of the university's scientific and educational activities will make it possible to evaluate and plan the desired state of development of the educational system, create a monitoring system including a process of collecting, controlling and making management decisions in real time, which will allow solve the problem of measuring the achievement of a goal through the result.

The strategic development plan of the university is developed on the basis of the global, important and meaningful goals of the university, as well as on the basis of development priorities.

Along with performing analytical functions, indicators are a powerful instrument of control action. Indicators fix what is controlled in the controlled system, what changes in system characteristics become the subject of reporting and, accordingly, the priority attention of management bodies. The target values of the indicators give the system development vector: some changes in the characteristics of the system are encouraged, while others, on the contrary, are improved.

We believe that all the above results of the university and will be strategic indicators in the promotion of the al-Farabi Kazakh National University in international university rankings.

References

1 Belyaev G.Yu. Pedagogical characteristics of the educational environment in various educational institutions. – M.: ITSKPS, 2000. – 157 p.

2 Basics of open education / Ed. ed. V. I. Soldatkin. – T. 1. – Russian State Open Education Institute. – M.: NIITS RAO, 2002. – 676 p.

3 Mutanov G.M., Mamykova Z.Zh., Kumargazhanova S.K. Results-based management: on the example of the educational system of EKSU D. Serikbayeva. – Edition 2.– Almaty, Kazakh University, 2011. – 120 p.

4 Kunanbayeva S.S., Nurgaliyeva G.K., Chaklikova A.T. Creating an information and learning environment in the university system education. – Almaty: RTSIO, 2006. – 119 p.

5 Kurmanalina Sh.H. Methodology and technology of creating an electronic methodological system in the conditions of informatization of education. – Almaty: Alem, 2002.– 316 p.

6 Taulanov S.S. Professional and Value Orientation of Future Officers in the Process of Teaching Military Pedagogy on the Basis of Information and Communication Technologies // Monograph. – Almaty: RZIO, 2005. – 160 p.

7 Materials of the I-st International Scientific and Practical Conference "Modern learning technologies in the single educational space of the XXI century: problems and prospects." – Astana, 2000. – 152 p.

8 Alekseeva T.V., Ameridi Yu.V., Luzhetsky M.G. Information and analytical systems. Moscow: Moscow Academy of Finance and Industry, [Electron. resource], 2005 URL: http://www.e-biblio.ru/book/bib/01_informatika/IAS/Book.html

References

1 Belyaev, G.Yu. (2000). Pedagogical characteristics of the educational environment in various educational institutions. Moscow: ITSKPS, 157.

2 Soldatkin, V. I. (2002). Basics of open education. 1. Russian State Open Education Institute. Moscow: NIITS RAO, 676.

3 Mutanov, G.M., Mamykova, Z.Zh., Kumargazhanova, S.K. (2011). Results-based management: on the example of the educational system of EKSU D. Serikbayeva. - Edition 2. Almaty, Kazakh University, 120.

4 Kunanbayeva, S.S., Nurgaliyeva, G.K., Chaklikova, A.T. (2006). Creating an information and learning environment in the university system education. Almaty: RTSIO, 119.

5 Kurmanalina, Sh.H. (2002). Methodology and technology of creating an electronic methodological system in the conditions of informatization of education. Almaty, Alem, 316.

6 Taulanov, S.S. (2005). Professional and Value Orientation of Future Officers in the Process of Teaching Military Pedagogy on the Basis of Information and Communication Technologies: Monograph. Almaty: RZIO, 160.

7 Materials of the I-st International Scientific and Practical Conference "Modern learning technologies in the single educational space of the XXI century: problems and prospects" (2000). Astana, 152.

8 Alekseeva, T.V., Ameridi, Yu.V., Luzhetsky, M.G. (2005). Information and analytical systems. Moscow: - Moscow Academy of Finance and Industry, [Electron. resource]. – 2005. Retrieved from URL: http://www.e-biblio.ru/book/bib/01_informatika/IAS/ Book.html