

DOI: 10.6084/m9.figshare.9783140

UDC 005.8

**Zhu Ting**PhD student Department of Information Systems and Technology, *orcid.org/0000-0002-8492-8409**Taras Shevchenko National University of Kyiv, Kyiv***TECHNOLOGIES OF ORGANIZATION OF THE COMMUNICATION PROCESS  
IN EDUCATIONAL PROJECTS AND PROGRAMS**

***Annotation.** One of the ways to improve the management of the educational system can be the development of the method of information management as a component that initiates the management of any kind in the development of information provision, the choice of sources of management information, formalization and processing of data about the processes of the OS, the formation of educational statistics system by types of implemented educational programs and management levels, creation of informational systems for the support of making managerial decisions that provide information indicators of an educational institution. The problem of management in educational systems is key in terms of achieving a given quality. Management in education, if interpreted broadly, integrates the past (cultural-traditional component), the present (civilization-technological component) and the future (predicted-desirable state of the system). The transition of society into the information stage of development positions the information management as the most relevant instrument in achieving the sustainable development of educational structures.*

***Keywords:** educational systems; information management; virtual university; project management; data processing*

**Introduction**

One of the ways to improve the management of the educational system can be the development of the method of information management as a component, which initiates management of any kind in the development of information provision, the choice of sources of management information, formalization and processing of data about the processes of the OS, the formation of educational statistics system by the types of implemented education programs and management levels, the creation of information systems supporting the adoption of managerial decisions that provide informative indicators of educational organization.

One way to achieve advance in the development of the OS is the ability of modern information and communication technologies, which are currently used only as an OS. In particular, many of the universities have solved the problem of automation and the formation of a single information environment (site), integrating distributed databases of departments, deans and other units for monitoring and accounting of students, providing them with educational materials and organizational information, teaching work, dissemination of managerial information, support of scientific activity, personnel and financial accounting, etc. Their use can meet the current needs of OS practices, such as research, modeling, forecasting, management and development, while providing management efficiency while preserving the information optimum of the system (law of required diversity) [1 – 3].

From the point of view of general informatization in the educational system (ie, increasing the share of knowledge and information as a public resource of the distribution of computers and computer networks), it is necessary to organize such a general resource (information provision) that would allow to freely create and consume information in all aspects of functioning, the interaction of system units at all hierarchical levels in the development of standards and protocols that ensure the interaction of all components. Then, in terms of OS management, the organization of information management OS as an integration of principles, forms, technologies and rules for the formation, processing, analysis and use of information resources. Information management is one of the aspects of managing educational systems in general, providing for the formalization, structuring, processing and storage of pedagogical data, which promotes the adoption of adequate managerial decisions.

Here are a number of conditions under which the implementation of information management OS:

– each institution of vocational education is considered as a separate unit of the OS, while the effectiveness of the education system is defined as their additive result;

– information on the functioning of the institution of vocational education should be formalized, structured and possess the necessary properties (completeness, adequacy, relevance, accessibility, relevancy, etc.);

– information is one of the resources of the educational process and underlies the process of making a management decision;

---

- information management includes office management system, databases, information environment of organization, information management system, dynamic models of management and forecasting;

- the development of a unified system of key indicators of the performance of all institutions of vocational education, taking into account the level of educational programs, is necessary;

- Information management should have the necessary and sufficient information resources, optimizing resources and management costs.

The purpose of the information management of the OS is to provide a proactive development in the structuring of information, which promotes the adoption of managerial decisions to improve the efficiency of the institution of vocational education. The organization of this kind of management is necessary at all hierarchical levels of management (from the ministry to the educational process), in all institutions includes all technological and operational actions related to information in all its forms and states.

The tasks of information management OS can be attributed:

- allocation of external and internal information resources of an educational institution;

- providing formalization, structuring, grouping and processing of information at all levels;

- organization of information provision of organization management processes;

- implementation of strategic and operational management of information resources while increasing their validity and efficiency;

- Providing for the transfer of information flows, storing and updating them;

- Satisfying the information needs of educational institutions at all hierarchical levels, taking into account projected trends.

### **Study of recent achievements**

The problem of management in educational systems is key in terms of achieving a given quality. Management in education, if interpreted broadly, integrates the past (cultural-traditional component), the present (civilization-technological component) and the future (predicted-desirable state of the system). The transition of society into the information stage of development positions the information management as the most relevant instrument for achieving the sustainable development of educational structures [4; 5].

Consider the virtual university as the organizational structure of e-education.

The virtual university, corresponding to a large information system and is an educational information system, has the following technological characteristics:

- the complexity of the description (the set of functions, processes, data elements and complex interrelationships between them), which requires careful modeling and analysis of data and processes;

- a set of closely interacting components (subsystems) that have their own local tasks and goals of operation (for example, traditional applications related to transaction processing and decision scheduling tasks, and analytical processing applications (decision support) using unregulated data queries large volume);

- the need to integrate existing and developing applications;

- Operation in heterogeneous environment on several hardware platforms;

- dissociation and heterogeneity of certain groups of developers in terms of qualifications and traditions arising from the use of certain instrumental means;

- the complexity of the project implementation is due to the limited capabilities of the system developers-contributors and the varying degrees of incentive for the administrative staff to implement and work with such an information system.

.NET Concept with XML. The functional idea underlying this technology is to shift the focus from single web sites and devices connected to the Internet, in the aggregate of computers, devices and services that provide wider and more information-rich solutions at the expense of coordinated collaborative work. . Today, the .NET concept is represented predominantly by Microsoft's system solutions and can be seen as:

Microsoft .NET platform that includes the .NET infrastructure, tools for developing and operating a new generation of services, a custom .NET-based environment for creating information-rich client systems, standard .NET service units, and applications for .NET devices.

Microsoft products and services that may include the Windows .NET operating system with an integrated set of standard services, the MSN.NET web portal, the Office.NET office suite, and the developer kit.

Visual Studio .NET;

Â third-party .NET services that integrate with the two components listed above to meet user-specific queries.

This technology allows to continuously improve the material and technical base of the virtual university in accordance with the development of information technologies, as well as to create and adapt software tools that expand the possibilities of customer service servicing of educational services.

Significance of the virtual university – its construction on the technology of the distributed system. Typically distributed systems are considered to be more than one database server used to reduce the load on the server or to ensure the operation of territorially remote units. For the virtual distributed university, this approach

is better, since the obligatory full synchronization of information, it is enough to bring the database into compliance, for example, once a day, which will significantly reduce traffic in the central office of the virtual university.

The functions of distributed information systems should include the work of data located on different physical servers, various hardware-software platforms and those stored in various internal formats. In this case, the system provides complete information about itself and all its resources, is easy to expand, is built on open standards and protocols, provides an opportunity to integrate its resources with the resources of other information systems.

Thanks to these technologies, the virtual university can be represented as a typical program complex of a territorially distributed and specialized information system, which includes a set of virtual representations with a universal set of educational services for educational purposes.

With regard to virtual representation, it is a territorially remote from the base institution educational institution that implements a typical set of service services that provide the organization of the educational process through the Internet through the curricula of the basic educational institution.

Central University carries out administrative, educational, methodological, informational, technical and legal coordination of works of regional educational structures using network technologies.

Branch (consulting point) – regional center – educational institution, which carries out a full cycle of educational process with the help of network technologies in the region.

Since the construction of distributed information systems, as a rule, uses two basic architectures: Internet-Intranet and client-server, then we will look at the next Intranet technology.

In fact, the virtual distributed university is an Intranet-system, where the Intranet-system is a corporate system for the organization of which Internet mechanisms are used. The Intranet system can be based on a local network of computers, its own corporate global network or a virtual corporate subnet on the Internet, as well as Web services, TCP / IP and HTTP communications protocols, and HTML pages.

Intranet is an opportunity to build a process at the information level and provide educational services to all interested persons. All affiliates and representative offices can constantly turn to central resources and effectively carry out the educational process. Thus, the global network is used not only as a modern way of transmitting information over long distances, but also as an administration tool by a distributed educational organization.

In close relationship with the technology Intranet implemented technology client-server. System information built on client-server technology provides users with a wide range of software and development tools that are geared towards maximizing the computing capabilities of client workplaces.

In general, client-server technology is an information environment in which application processing is distributed between a client and a server. A client is a workstation for one user that provides a registration mode and other procedures required at its workplace for calculating, communicating, accessing databases, etc. A server is one or more multi-user processors with a single memory field, which, according to the user's needs, provides functions of computing, communication and access to databases.

Distributed database is located on several servers, while distinguishing centralized, decentralized and mixed methods of data placement.

In a centralized way, a single copy of the database is located on one server. The advantage of this method is the easy updating of the database, and its drawback – the limited size of the external memory of the database, as well as the need to send all requests to a single server. Hence the restriction to parallel processing, the database itself is not available to remote users in the event of communication errors and completely fails when the server refuses.

In a decentralized way, the division of a common database into several physically distributed databases, each of which may either be part of a common database, or a copy of the database as a whole, is expected, which leads to duplication of information and its preservation.

Given our initial provision on virtual university as a system with high levels of complexity, in the process of its functioning there is a series of issues related to the reliability and manageability of the processes taking place in it.

In this regard, the organization of the virtual university on decentralized technology client-server will achieve the following benefits:

- to provide the transfer of the most complex operations requiring significant machine resources from the computers of employees and users to the server, which has more computing power and speed;
- minimize the possibility of loss of information contained on the server due to the use of its existing internal data protection mechanisms, which include: traceability of transactions, rollback after failure, data integrity tools, etc.,
- to reduce the number of times the amount of information transmitted over the network, thereby unloading channels of communication between the central and peripheral structural units of the virtual university.

## Main material

Analyzing the technological decisions of the virtual university, it is imperative to pay attention to one more important for the creation and maintenance of information systems CASE-technology.

CASE technology is a methodology for designing information systems, as well as a set of tools that allow you to visualize the subject area, analyze this model at all stages of the development and maintenance of the information system and develop programs in accordance with the information needs of users.

Currently CASE refers to software that supports processes for creating and maintaining the system, including analysis and requirements formulation, application software and databases, code generation, testing, documentation, quality assurance, configuration management and project management, as well as other processes.

The main advantages of CASE-technology for the functioning of a virtual university can be defined as:

- the possibility of implementation in the software for its adaptation to the specific conditions for solving emerging problems;
- implementation of collective work of the technical support staff at the expense of the possibility of work in the local network;
- export-import of any pieces of software in order to improve it;
- organizational management of software solutions of educational information system.

Virtual learning is a process and result of communicating participants in the educational process in a virtual environment.

It should be noted that the organization of the educational process in the virtual environment requires new approaches to management that will solve the problems of using the tools of collaboration and effective management of the virtual team, including the issues of trust. A virtual educational environment requires a programmatic and methodological platform that should:

- to provide a wide range of forms of interaction between the participants of the virtual team (students and teachers), including the means of collective work;
- provide the opportunity to receive knowledge from information sources of the Internet, to systematize and process information, to store and apply the acquired knowledge in practice;
- provide tools for creating new knowledge available to other team members;
- provide educational process participants with access to educational content (information and software) at any time regardless of location;
- to support students' motivation to acquire knowledge and creative activity.

The solution to these challenges is the use of social software within the concept of Web 2.0, whose main ideas are [6; 7]:

- orientation to the use of web services (social networks, blogs, forums, wiki pages, tags, bookmarks, etc.) and distributed use of resources;
- socialization, which implies the formation of communities, support for communication and new acquaintances, the use of "collective mind" to the development of a social service;
- the role of the user is transformed from the passive reader into the creator of the content (knowledge);
- "Folksonomy" – systematization of information with the help of keywords (tags);
- application of specialized technical means (syndication of content (RSS, Atom), AJAX technology, mash-up).

Web 2.0 social services are actively used in business. According to Cisco [8], 75% of companies surveyed use social networks for business purposes, and 50% are actively using microblogging. Thus, the Web 2.0 toolkit becomes an integral attribute of the activity of a modern enterprise, especially a virtual one. With regard to the introduction of social networks in the learning process, this will allow not only to solve specialized teaching tasks (for example, control knowledge and provide a flexible interaction between teacher and student), but also increases the interest of students in the process of obtaining knowledge.

In table an attempt is made to bring the elements of the learning process into line with the information resources that serve as a means of ensuring the educational process in the social network [8].

It is worth noting that the effectiveness of the learning process is due to the ability to carefully monitor and analyze the processes of the social network. In order to carry out the control, the mechanism of visualization and analysis, which will allow visualizing the structure of the network and analyzing the nature of the interaction of its participants, is needed first of all. In the case of an educational social network such a mechanism will allow the teacher to promptly manage the work of the virtual student team and timely take the appropriate pedagogical decisions. Analysis of the social network can be conducted using the method of SNA (Social Network Analysis) [9; 10], which allows you to identify the main indicators of the social network, characterizing the intensity, density and direction of the relationship between the participants of the network, and the representation of the social network in the form of graph allows see the network and draw conclusions about the nature of the interaction of network participants. There are a number of software products for constructing graphic models and network analysis [10].

The learning process is realized in a complex, weakly structured system, which includes a set of heterogeneous subsystems that form a complex "web" of bonds [11; 12].



Table – Elements of the educational process and corresponding tools of the social network

Elements of the educational process	Social Networking Toolkit
Lectures Practical training	Web conferencing in Lotus Sametime
	Video recording of lectures
Quality control of education	Sessions for Collective Decision Making at the Lotus Connections Forum
	Webinar at Lotus Sametime
	Wiki pages
Consultation	Testing with the Lotus Sametime chat
	Control questions in the Lotus Connections forum
	Monitoring student blogs
	Student loading of completed tasks through Lotus Connections files
Conducting the curriculum plan (discipline) Educational and methodical complexes	Lotus Connections Forum
	Blogs
	Comments on student work in the Lotus Connections files
	Lotus Sametime
Additional interaction of participants in the educational process	Activities in Lotus Connections
Elements of the educational process Lectures Practical training	Download, save and download tutorials through the Lotus Connections Files
	Bookmarks for placing links to useful resources on the Internet
	Linking materials for seminars and lectures to related entries in Events
	Wiki pages
Quality control of education	Lotus Connections Instant Messaging

The development of an adequate deterministic formal description for such systems, in general, has no solution, since it is virtually impossible to establish causal relationships between results, resources, and methods of organizational and technical interaction. Although it can not be denied that the existing practices of organizing distance learning can reveal the main trends in the development of training systems and quality assessment [13 – 15].

### Conclusions

1. Promotion of international cooperation between higher education institutions of the European Union and other countries is mutually beneficial for all parties and

contributes to the enrichment of nations and better mutual understanding. International cooperation programs offer a unique form of university co-operation and the development of educational programs in accordance with the needs of the labor market in various fields.

2. The development of processes of academic mobility, the diversity of their programs, as well as strategic approaches to studying abroad, the challenges arising from the implementation of academic mobility, increasingly large information flows require, on the one hand, the creation of an effective system for managing these processes, on the other – developing a decision support system for managing academic mobility processes.

### References

1. Beloshchitsky, A.A., Beloshchitskaya, S.V., Bronin, S.V., (2014). *Determination of the proximity of vectors in the design-vector space of educational environments. Management of development of complex systems*, 17, 132–139.
2. Beloshchitsky, A.A. (2012). *Managing problems in the methodology of design-vector management of educational environments [Text] / A.A. Beloshchitsky // Management of development of complex systems*, 9, 104–107.
3. Gukhman, V.B. *Philosophy of Information [Electronic resource] / V.B. Gukhman. – Access mode: [http://www.intuit.ru/goods\\_store/ebooks/8659](http://www.intuit.ru/goods_store/ebooks/8659)*.

4. Novikov, D.A. (2009). *Introduction to the theory of management of educational systems*. Moscow: Egves, 156.
5. Novikov, D.A. *The Theory of Management of Educational Systems*. M.: Public Education, 416.
6. O'Reilly, Tim. *What is Web 2.0 / Tim O'Reilly [El. resource]*. – URL: <http://oreilly.com/web2/archive/what-is-web-20.html> (request date 13.03.2010).
7. Sorokin, A.V. (2008). *Enterprise and the Internet of the Next Generation*. Informatics Systems and Means. M.: Science, 18, 86–117.
8. *Global Learning Reveals for Business and Community Development*. URL: <http://investor.cisco.com/releasedetail.cfm?ReleaseID=437376> (appeal date 13.03.2010).
9. *Everything for the programmer [Electronic resource]*. – URL: [www.codenet.ru](http://www.codenet.ru).
10. Prokhorov, A. (2006). *Computer visualization of social networks [Text] / A. Prokhorov, N. Larichev // ComputerPress, 9, 156–160.*
11. Vaisman, V.A. (2012). *Methodological foundations of quality management: factors, parameters, measurement, evaluation [Text] / V.A. Vaisman, V.D. Gogunsky, V.M. Tonkonogiy // Modern technologies in machine-cutting: zb. sciences. Prat, 7, 160–165.*
12. Yakovenko, V.D., Gogunsky, V.D., (2009). *Management systems by the quality of the school foundation. Systemic data and information technologies, 2, 50–57.*
13. Koja, T.I. (2002). *Definition of necessary and sufficient conditions for the objectivity of the evaluation of test results [Text] / T. I. Koja, V. D. Gogunsky // Proc. OPU, 87–88.*
14. Kolesnikov, O. Ye. (2012). *The main aspects of the distance apart [Text] / O.Ye. Kolesnikov, V.D. Gogunsky // Information technologies in education, science and production, 1, 34–41.*
15. Teslya, Yu. M. (2010). *Information technology management of projects based on ERPP (enterprise resources planning and project and APE) Management of development of complex systems, 1, 16–20.*

Стаття надійшла до редколегії 05.02.2019

#### Чжу Тін

PhD student Department of Information Systems and Technology, [orcid.org/0000-0002-8492-8409](https://orcid.org/0000-0002-8492-8409)

Taras Shevchenko National University of Kyiv, Kyiv

#### ТЕХНОЛОГІЇ ОРГАНІЗАЦІЇ КОМУНІКАЦІЙНОГО ПРОЦЕСУ В ОСВІТНІХ ПРОЕКТАХ ТА ПРОГРАМАХ

**Анотація.** Одним зі способів удосконалення управління освітньою системою може служити розвиток методу інформаційного управління як компонента, що ініціює управління будь-якого виду при розробці інформаційного забезпечення, виборі джерел керуючої інформації, формалізації і обробки даних про процеси ОС, формування системи освітньої статистики за типами реалізованих програм освіти і рівнем управління, створення інформаційних систем підтримки прийняття управлінських рішень, що забезпечують інформативність показників освітньої організації. Проблема управління в освітніх системах є ключовою з точки зору досягнення заданої якості. Управління в освіті, якщо його трактувати широко, інтегрує в собі минуле (культурно-традиційну компоненту), сьогодення (цивілізаційно-технологічну компоненту) і майбутнє (прогнозовано-бажаний стан системи). Перехід суспільства в інформаційну стадію розвитку позиціонує інформаційне управління найбільш релевантним інструментом в досягненні сталого розвитку освітніх структур. Процес навчання реалізується в складній слабоструктурованій системі, що включає безліч різномірних підсистем, які утворюють складну "павутину" зв'язків. Розробка адекватного детермінованого формального опису для таких систем, в загальному випадку, не має свого рішення, оскільки практично неможливо встановити причинно-наслідкові зв'язки між результатами, ресурсами і методами організаційно-технічної взаємодії. Однак не можна заперечувати, що наявні практики організації дистанційного навчання дають змогу виявити основні тенденції розвитку систем навчання і оцінки якості.

**Ключові слова:** освітні системи; інформаційне управління; віртуальний університет; управління проектами освіти; обробка даних

#### Link to publication

APA Zhu, Ting, (2019). *Technologies of organization of the communication process in educational projects and programs. Management of Development of Complex Systems, 37, 132 – 137, dx.doi.org/10.6084/m9.figshare.9783140.*

ДСТУ Чжу Тін. *Технології організації комунікаційного процесу в освітніх проектах та програмах [Текст] / Чжу Тін // Управління розвитком складних систем. – 2019. – № 37. – С. 132 – 137, dx.doi.org/10.6084/m9.figshare.9783140.*