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# SAFE INFORMATION ENVIRONMENT AS A QUALITY INDICATOR OF EDUCATIONAL INSTITUTION MANAGEMENT

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# ІНФОБЕЗПЕЧНЕ СЕРЕДОВИЩЕ ЯК ПОКАЗНИК ЯКОСТІ УПРАВЛІННЯ ОСВІТНЬОЮ ОРГАНІЗАЦІЄЮ

**Purpose.** The study of safe information environment as an indicator and a factor of influence on the quality of management in the educational institution.

**Methodology.** Theoretical techniques include theoretical and methodological, scientific and theoretical analysis of the literature on the problem under study, simulation, and forecasting. Empirical techniques are the study and generalization of pedagogical experience of systematic approach application in educational professional institutions, participant observation, questionnaires, and expert evaluation.

**Findings.** Conceptual provisions of a safe information environment creation in the educational institution are formulated, their essence revealed, and presented in the form of management objectives. It is established that the implementation of the presented in the study approaches of effective management in educational institutions provides the necessary conditions for a comfortable professional training of future specialists in higher professional institutions. The course "Information security of educational institution" is developed. It aims at professional development in the field of information security of employees in educational institutions.

**Originality.** The notion "safe information environment of the educational institution", considered as a dynamic indicator of the quality of educational institution management, is clarified. Perspective directions of innovative transformations in the system of educational institution management are defined. The main parameters of a safe information and educational environment are established in accordance with the objectives, results and management of pedagogical systems that ensure the effective application of the system approach as the basis for the design of a management system of the educational institution.

**Practical value.** The obtained results allow improving the quality of the innovative development of the management system by the educational institution and thus raise the results of professional training of future specialists to a new level.

**Keywords:** *information security, quality of management, safe information environment of educational organizations, professional retraining*

**Introduction.** Modern educational institutions are complex systems of organizational type whose main purpose of functioning is the implementation of educational activities, the transmission of knowledge and the development of students' personality.

The implementation of the key social function, which is the subject of observation, analysis and criticism of society, the existence of competition in the field of education create preconditions for continuous improvement of the forms and methods of training, new educational technologies, and for creation of an educational environment stimulating professional growth and personal development of students.

According to many educators (Y. I. Bogatireva, E. N. Boyarov, A. N. Privalov, V. N. Karmakova, A. B. Ma-lofeeva, E. Y. Tikhonov, etc.), in the educational environment there occurs certain interaction of different orientation and intensity, development and reproduction of social and socio-cultural experience of a person are realized. Therefore, in our opinion, a holistic understanding of the category of "educational environment" is necessary.

Having reviewed and analyzed several definitions of "environment" and "educational environment" offered by Russian scientists (S. M. Vishniakova, L. S. Vygotsky, L. V. Maksimov, E. N. Boiarov, etc.), we note that pedagogy considers "environment" as a multidimensional phenomenon influencing training, education and personal development.

For example, L. S. Vygotsky understood the environment as a complex of human relations, the whole objective outer world in which a man lives, develops and acts.

Vishniakova S. M. considered the environment as a set of social, cultural and other conditions in which edu-

cational activities of the individual are performed, and also as a complex of educational services, reasonably available to members of a specific territorial community.

Maksimova L. V. stated that the environment is a complex construction involving a number of interrelated components of the natural and social nature.

Work experience in higher education shows that "... in recent years there has been some blurring of the distinction between different types of environments. Integrated environments are formed, including the educational ones, which are a source of knowledge in a specific area and at the same time a highly structured environment for organizing different forms of independent work of the individual. Along with that, they are opened both for the teacher and for the learner" [1]. Therefore, one of the characteristic trends in education nowadays is the establishment and active use of information educational environment (IEE). The content of this concept is formulated in standard documents of the Ministry of Education and Science of the Russian Federation.

In particular, it is stated that "...there should be created conditions for the functioning of electronic information educational environment while implementing the educational programs using information and communication technologies, e-learning and various forms of distance learning in organizations engaged in educational activities, including electronic information and educational resources, the complex of information and telecommunication technologies, appropriate technology, providing the study of educational programs in full volume irrespective of the location of students" [2].

Along with the advantages of information educational environment such as wide access to educational content anytime from anywhere, individualization of training and supervision, rapid spread of best educational practices, we note that it is important to provide information security of all the subjects of educational process and the organization itself as the educational environment can act as the object of management, monitoring and quality improvement of specialist training in an educational institution.

**Analysis of the recent research and publications.** The study of the problem of safe information environment of the educational institution is based on the works of Russian scientists-educators S. Y. Batyshev, V. N. Karmakova, A. M. Novikova, V. A. Romanova, G. M. Romantsev, V. A. Slastenin, V. A. Fedorov and others in the field of multilevel professional education and professional pedagogy. General scientific and methodological problems of information security have been studied in the works of Y. I. Bogatyrev, A. P. Kovalenko, R. V. Meshcheriakov, V. I. Yarochkin, etc. Theoretical and practical aspects of education in the field of information security are presented in the research of A. A. Altufiev, E. B. Belov, A. A. Maliuk, V. V. Melnikov, B. A. Pogorelov, and others. Problems of information security and information protection at an enterprise are considered by A. S. Greenberg, R. I. Koneev, B. I. Skorodumov, M. D. Tarnavsky, J. M. Shubin, and others.

Problems of informatization and computerization in modern society are revealed in the research of S. A. Be-

shenkov, Y. A. Vagramenko, O. A. Kozlov, A. A. Kuznetsov, V. P. Poliakov, I. V. Robert, etc. Understanding of conceptual approaches to the quality management in education is due to the research of V. V. Afanasiev, Y. A. Konarzewsky, V. P. Simonov, G. N. Serikov and others. M. L. Agranovich, G. V. Golovicher, A. N. Maiorov, A. I. Sevruk, P. I. Tretiakov, etc. were engaged in the study of information support of quality management in education in different social systems.

Averianov O. A., I. I. Antonov, A. J. Zubets, V. V. Karavaiev, E. V. Krylov, I. S. Kostman, S. A. Leonov, E. I. Pister, N. F. Rugov, V. I. Freiman and others have devoted their scientific work to the review of management as an effective strategic work technology of the organization.

Baidenko V. I., I. V. Blauberg, G. A. Borovskoi, B. L. Vulfson, Y. K. Itin, E. M. Korotkov, D. W. Seaman, L. L. Redko, A. I. Subetto, S. E. Shishov, etc. have made a significant contribution to the understanding of the theory and methodology of quality management in professional training. Such researchers as M. A. Abasova, Y. I. Bogatyreva, E. N. Boiarov, A. I. Gorbunov, E. P. Dimov, V. P. Poliakov, A. N. Privalov, etc. have been engaged in the creation of a methodical system of training students in information security and information protection.

The abovementioned research works deal with the problems of functioning of the quality management system, monitoring the quality of training, quality training of managers and teachers in vocational education. They point out that the development and implementation of optimal models of management activities based on the integrated use of management technologies certainly improve the quality of professional training of future specialists.

**Unsolved aspects of the problem.** One of the most important tasks in the life of the University is the task of organizing the process of management, as modern information technologies allow realizing and contribute to the improvement of existing ways of working with information. Information technologies fundamentally change the methodology of managerial activities. The integration of information resources allows using modern methods of research and analysis of the educational process, managing the scientific, methodological and educational activities in educational institutions effectively.

Taking into account the fact that the important way of influencing the quality of education, the possibility of its improvement is the process of management of an educational institution, we agree with the point of view of modern educators on management in education. Consequently, we consider this phenomenon in three aspects: as an activity; as an impact of one system on another system, group, and person (of a trainee); as an interaction of subjects of the educational process.

**Presentation of the main research.** Understanding of the quality of management of an educational institution is associated with the indicators characterizing the potential of an educational institution (professional level of research and educational personnel, resource provision,

material and technical resources, etc.); qualitative results of training. These indicators can be considered as characteristics of the educational institution, not as components of a system evaluation of managing the quality of education in general and quality of higher education in particular.

From the standpoint of a system approach, the quality of an educational institution system is defined by all its components, among which we distinguish the quality of information security of educational institutions. Based on the analysis of scientific-methodical literature information educational environment can be presented as the "safe information environment of the educational institution" (SIEEI). Under the information educational environment we mean an environment which is complemented by hardware, software and organizational means and methods of protection from negative information, to ensure safety and the protection of personal data environment of all the subjects of the educational process in order to create conditions for more complete development, self-development and self-realization.

Therefore, the process of management of educational institution focused on achieving planned performance of quality should be aimed, among other things, at establishing and maintaining the safe information environment of the educational institution as a condition of ensuring information security of all the participants of the educational process. It is obvious that this component is functioning not for its own sake, but to ensure the final quality (of functioning, educational activities, and management) of the educational institution.

The experience of the authors in the higher education system confirms our assumption that the environment of the educational institution must provide:

- protection of students from the information harmful to their health and personality development;

- protection of the information system of the educational institution;

- protection of personal data of all the subjects of the educational process.

For each of these areas, we suggest a list of steps required to solve these problems. For example, to protect students from information harmful to their health and personal development, the following set of measures implemented in educational institutions is suggested:

1) measures of regulatory-administrative nature: standard acts, rules, procedures, regulations protecting personal data of the students on the legal basis for implementation of the state policy in the sphere of protection of children from information harmful to their health and development taking into account specificity of a certain educational institution;

2) measures of moral and ethical control. It means that students carrying out information activities do it in compliance with legal norms and rules of behavior in society, as well as network culture, and ethics, which are formed due to the spread of information technologies in the modern information society;

3) measures to protect the psyche and health of the individual are connected with the needs of students in good health, physical well-being as a means of achieving vital goals. They include reduction and prevention of computer and Internet addiction among students, pedagogical and psychological assistance in reducing informational threats to the life and activities of students;

4) disciplinary measures should be aimed at the formation of the culture of safety, responsibility for actions in the information space (the information environment), education and strengthening of the spiritual and moral values, patriotism among rising generation;

5) technical and software information security measures involve the use of different hardware and software means to prevent causing pecuniary and non-pecuniary damages of personal data, including the use of parental control, network filters, technical means of information protection.

Using the whole set of means and methods, teaching staff should carry out consistent and focused work to create safe information environment of the educational institution.

External conditions (nature of information security threats, regulatory framework, technical and software protection, etc.) and internal conditions (development of information and telecommunication complex of the educational institution, security protection, the development of the given educational institution, the information services etc.) constantly develop. Consequently, it is important and urgent to organize advanced training of heads of educational institutions which are responsible for the safety of the information environment.

Understanding of the above-mentioned facts leads to the realization of the need to create conditions that ensure the required level of training and acquisition of competencies required for the management of this process. At the same time, we draw your attention to the fact that the problem of quality of training of such specialists, which is in direct proportion to the quality of management in the educational institution, has become most acute because of the following reasons:

- an artificially created shortage of specialists who are able to work in conditions of market relations in the quantitative redundancy of market of specialists in general;

- unstable (often inflated) demand for specialists on the part of the consumers;

- unreasonably high requirements of the unified state examination and the introduction of the concept of "educational services";

- significant reduction of budgetary financing of scientific, methodological and educational activities (vocational education);

- elimination of the system of state distribution of graduates of professional educational institutions, etc.

University professors are to answer the question: "What is primary in creating a system of quality management of specialist training: the provision of services or the quantity and quality of the manufactured product?" i. e. "Is education a service or a specially organized process?" The answer to this question is known by all the teachers, because the activities of the University differ from the activities of the industrial enterprises. Its object includes different types of social relationships be-

tween people, and, above all, those that provide personal development in the training process.

Defining scientific approaches to the content of the category of "quality of management", in our opinion, we should use multi-level principle of the research object description. We should view it as a hierarchical structure, for example: the quality of management of the institution; quality of management system of the institution; quality of management of a certain object (department, division, etc.); quality of managing functional areas: scientific, teaching, training and research; distribution of graduates; quality of resource management: informational, financial, etc.; quality of professional and everyday activities of the teaching and assistant educational staff, etc. [3, 4].

Considering safe information environment of the educational institution as a measure of quality of management, it is necessary to determine the understanding of the term of "quality of management". Quality of management is a focused strategy of the institution featuring certain resources and effective technology, actively functioning in the system of managing information, educational, employment and other processes, that have clear goals and objectives of meeting the requirements of internal and external socio-cultural environment. Quality and management efficiency are considered as the sum of all characteristics that determine the possibility of creating favorable conditions for the effective functioning and development of educational institutions.

For that purpose, Tula State Pedagogical University named after L. N. Tolstoy developed a program of further training and professional retraining of pedagogical workers "Information security of educational institution and protection of personal data". The main objective of the course is training of employees of educational institutions in the field of information security. The program also provides for professional development of heads of educational institutions. The aims of the training course "Information security of educational institution and protection of personal data" are:

- mastery of theoretical knowledge in the field of information security;

- developing skills in selecting methods for protecting personal and academic information;

- obtaining practical experience on issues of information security of individuals, families, home, educational institution.

Students get acquainted with modern concepts of information security, organizational and legal aspects of information security, objectives of personal data protection and intellectual rights of the individual, as well as with major trends and directions of formation and functioning of information security systems in educational institutions.

Academic course includes 72 academic hours. The students obtain professional competences in educational, administrative and managerial activities. The program provides teaching in the form of lectures in classrooms equipped with computers, video projector, e-manuals in five basic modules:

*Module 1.* Basic concepts of information security of the individual.

*Module 2.* Protecting students from threats of information impact.

*Module 3.* Information security of hardware and software.

*Module 4.* Information security of personal data.

*Module 5.* Information security of institution representation on the Internet.

In addition to the lectures, the program of the course includes laboratory and practical classes with students using electronic educational resources (20 academic hours). The list of laboratory works for the course is as follows: Classification of information system of personal data. Legal aspects of the activity on the Internet. Security and privacy on the Internet. Password protection. Set passwords, access control. Deploying a secure VPN network by means of ViPNet. Working with firewall protection, software: anti-spam anti-spy. Ways of protection from viruses. Anti-virus programs. A comparison of the features of parental controls and anti-virus programs. A catalogue of Internet resources useful for the education and development of students.

Independent work on the course of no less than 36 hours includes out-of-class independent work of students in preparation for laboratory and practical training, including work on the project of "Integrated approach to information security in the educational institution" and tasks for independent work in LMS Moodle e-learning environment. The final test involves the presentation of the individual project.

Experimental verification of the effectiveness of the course of "Information security of educational institution and protection of personal data" is through the use of ranking scores of the teaching staff.

Tests showed that the knowledge characterized by the integrity of ideas about information security of educational institution and personal data protection was obtained by the majority of students. So, the knowledge and skills of 31.1 % of students were rated "excellent", 65.2 % − "good", insufficient ("satisfactory") level of knowledge was obtained by only 3.7 % of the students.

The effectiveness of training of the teaching staff was also evaluated by us at each step of training in the check group quantitatively (mastering of the educational material, the level of the mastering) and qualitatively (integrity and consistency of knowledge and skills).

The marks given to the students of the group were used to define the following indicators: the average score for the mastering of the program of the course, character and quality of changes in assessments of the mastery of theoretical knowledge in the field of information security (x); the variance of the estimates (D); index of variability (standard deviation) (G) coefficient of variation (υ); the correlation of coefficient between ratings of knowledge and skills (R) obtained in the process of educational activity, which showed a high degree of connection between them.

All this testifies to the strong relationship between academic performance of teachers in the period of the

course mastering "Information security of educational institution and protection of personal data" and the level of implementation of acquired knowledge in educational institutions.

The results of experimental verification confirmed the need and effectiveness of implementation of the course of "Information security of educational institution and protection of personal data" in the educational process of TSPU named after L. N. Tolstoy, as well as in the practice of further training and professional retraining of teachers [5].

We can evaluate teaching methods and ways of improving the content of the "Information security of educational institution and protection of personal data" course by the positive feedback of pedagogical workers of educational institutions of the Tula region.

**Conclusions and recommendations for further research.** These study results are the base for the development of technologies for effective design and practical implementation of safe information environment of educational institutions in the system of higher education. The authors developed a program of further training and professional retraining of pedagogical workers "Information security of educational institution and protection of personal data". They validated the parameters of a comprehensive analysis of state and functioning of management in informational, educational, employment systems and other processes. This allowed using the results while implementing the systematic, competence-based and process approaches in vocational training. The program reveals promising lines of scientific research in the system of vocational education and allows considering the safe information environment of the educational institution as the indicator of the quality of management.

While mastering the course the teaching staff acquire theoretical knowledge on the main existing normative legal acts in the field of information security and information protection.

Teachers will learn more about the methods of information content filtration and parental control (this is the line we especially note!) in the global Internet, the principles of organizational security of information flows and how to counteract unauthorized information impact on the person.

Practical skills of the students on completion of the course include: mastery of methods and tools for identifying personal threats and information threats, skills in identifying and destroying viruses, safe use of technology in the teaching activities, designing information security policies of the educational institution.

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**Мета.** Дослідження інфобезпечного середовища як показника й фактора впливу на якість управління освітньою організацією.

**Методика.** Теоретичні методи: теоретико-методологічний і науково-теоретичний аналіз літератури з досліджуваної проблеми, моделювання, прогнозування. Емпіричні методи: дослідження та узагальнення педагогічного досвіду застосування системного підходу в освітніх професійних організаціях, включене спостереження, анкетування, експертна оцінка.

**Результати.** Розроблені концептуальні положення створення безпечного інформаційного середовища у освітній організації, що розкривають її сутність, представлені у формі цілей управління. Встановлено, що реалізація представлених у дослідженні підходів ефективного управління освітньою організацією забезпечує виділення необхідних умов комфортної професійної підготовки майбутніх фахівців у ВНЗ. Для педагогічних працівників розроблено курс „Інформаційна безпека освітньої організації", метою якого є підвищення кваліфікації в галузі забезпечення інформаційної безпеки працівників освітніх організацій.

**Наукова новизна.** Уточнено поняття „інфобезпечне середовище освітньої організації", що розглядається як динамічний показник якості управління освітньою організацією. Визначені перспективні напрями інноваційних перетворень у системі управління освітньою організацією. Обґрунтовані основні параметри безпечного інформаційно-освітнього середовища по цілі, результатам та управлінню педагогічними системами, що забезпечують ефективне застосування системного підходу як основи конструювання системи управління освітньою організацією.

**Практична значимість.** Використання отриманих результатів дозволяє підвищити якість інноваційного розвитку системи управління освітньою організацією й тим самим підняти на новий рівень результат професійної підготовки майбутніх фахівців.

**Ключові слова:** *інформаційна безпека, якість управління, інфобезпечне середовище освітньої організації, професійна перепідготовка*

**Цель.** Исследование инфобезопасной среды как показателя и фактора влияния на качество управления образовательной организацией.

**Методика.** Теоретические методы: теоретико-методологический и научно-теоретический анализ литературы по исследуемой проблеме, моделирование, прогнозирование. Эмпирические методы: исследование и обобщение педагогического опыта применения системного подхода в образовательных профессиональных организациях, включенное наблюдение, анкетирование, экспертная оценка.

**Результаты.** Разработаны концептуальные положения создания безопасной информационной среды в образовательной организации, раскрывающие её сущность, представленные в форме целей управления. Установлено, что реализация представленных в исследовании подходов эффективного управления образовательной организацией обеспечивает выделение необходимых условий комфортной профессиональной подготовки будущих специалистов в вузе. Для педагогических работников разработан курс „Информационная безопасность образовательной организации“, целью которого является повышение квалификации в области обеспечения информационной безопасности работников образовательных организаций.

**Научная новизна.** Уточнено понятие „инфобезопасная среда образовательной организации“,

рассматриваемое как динамичный показатель качества управления образовательной организацией. Определены перспективные направления инновационных преобразований в системе управления образовательной организацией. Обоснованы основные параметры безопасной информационно-образовательной среды по цели, результатам и управлению педагогическими системами, обеспечивающие эффективное применение системного подхода как основы конструирования системы управления образовательной организацией.

**Практическая значимость.** Использование полученных результатов позволяет повысить качество инновационного развития системы управления образовательной организацией и тем самым поднять на новый уровень результат профессиональной подготовки будущих специалистов.

**Ключевые слова:** *информационная безопасность, качество управления, инфобезопасная среда образовательной организации, профессиональная переподготовка*

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# METHODOLOGICAL ASPECT OF SUBSTANTIATING THE FEASIBILITY OF INTERMODAL TECHNOLOGY FOR DELIVERY OF GOODS IN THE INTERNATIONAL TRAFFIC

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# МЕТОДОЛОГІЧНИЙ АСПЕКТ ОБҐРУНТУВАННЯ ДОЦІЛЬНОСТІ ІНТЕРМОДАЛЬНОЇ ТЕХНОЛОГІЇ ДОСТАВКИ ВАНТАЖІВ У МІЖНАРОДНОМУ СПОЛУЧЕННІ

**Purpose.** Development of methods for determining the efficiency of piggy-backed cargo delivery in the international traffic.

**Methodology.** The choice of the rational range of piggyback delivery of goods in international traffic is based on the analytical method and mathematical modeling.

**Findings.** The method of choosing the rational range of piggyback delivery of goods in international traffic is proposed, based on the determination of the equilibrium value of the distance of transportation for alternative options: delivery by road transport through service and piggyback delivery. Criterion of the effectiveness of intermodal technology for the delivery of goods in international traffic under conditions of a certain location of production and consumption is substantiated, which is the unit cost of delivering the goods from the point of departure to the destination subject. On the basis of a detailed analysis of individual elements of alternative technologies, the costs of all elements of alternative options are formalized: delivery by road transport through service and piggyback delivery.

**Originality.** Mathematical models of the process of delivering goods in international traffic have been developed for alternative options: road transport through service and piggyback delivery. The models are based on the system

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