Virtual Educational Sphere: Teachers' Smart Working Places

Esfera educativa virtual: lugares de trabajo inteligentes para docentes

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ABSTRACT:

The relevance of the article is caused by the fact that in the 21st century the world community entered a post-industrial era of rapid changes, new information technologies, global dependencies and uncertain situations. Transformation of educational and scientific and technical potentials into sources of social and economic progress occurs under the influence of increasing the share of intellectual property in the aggregate national product in connection with the information revolution in the world and rapidly changing educational technologies. The main conceptual imperative for modern Russia in the field of education is seen in innovative design, development and implementation of the model "Virtual educational environment of the modern University".
Keywords: IT environment, remote education, smart working places, virtual educational sphere

RESUMEN:

La relevancia del artículo está causada por el hecho de que en el siglo XXI la comunidad mundial ingresó a una era postindustrial de rápidos cambios, nuevas tecnologías de la información, dependencias globales y situaciones inciertas. La transformación del potencial educativo y científico y técnico en fuentes de progreso social y económico se produce bajo la influencia del aumento de la participación de la propiedad intelectual en el producto nacional agregado en relación con la revolución de la información en el mundo y las tecnologías educativas que cambian rápidamente. El principal imperativo conceptual para la Rusia moderna en el campo de la educación se ve en el diseño innovador, el desarrollo y la implementación del modelo "Entorno educativo virtual de la Universidad moderna".
Palabras clave: entorno de TI, educación remota, lugares de trabajo inteligentes, esfera educativa virtual

1. Introduction

Recently virtual model of education is actively forming and developing with the usage of virtual educational sphere. As V.P. Tikhomirov (1997) mentions this sphere harmonically integrates the system of remote education and intramural form of study.

Virtual educational sphere is getting more and more important socio-cultural phenomenon of reality as educational configuration is changing in direction of its continuity, innovation and

priority of IT usage.

In the 21st century the world community has got into postindustrial epoch of blistering changes, new IT, global addiction, and indefinite situations. Modifying educational and sci-tech potential into sources of social-economic progress is conducting driven by rising of intellectual property in the joint national product due to the fact that informational revolution is being held and educational technologies are changing quickly.

In native and foreign practice the main role plays researches of M.E. Vaindorf-Sysoeva (2011), Yu.A. Afonin and V.I. Dobrenkov (2017), A.V. Hutorskoy (2008), A. Taurisson and A. Senteni (2003), devoted to the elements of virtual educational sphere as an instrument of teachers' activity increasing in remote education for communication and experience exchanging. The questions of using information and communication technologies in education, organizing the system of open and remote education are included in the works of A.A. Andreev and V.I. Soldatkin (2003), N.V. Apatova (2009), V.S. Gershunsky (2011). Researches devoted to the creation of indicators of information and communication implementation evaluation in educational organizations are discussed in the works of G.K. Nurgalieva, A.I. Tazhigulova (2010), R.B. Kozma (2008), A. Sokół and I. Figurska (2017).

Unification of virtual spheres of educational organizations and centers on the Internet will let people form open and single virtual educational system, improve the tasks of making managerial decisions, use international experience. From technological point of view virtual educational system – informational sphere of correlation of educational process participants which is created by information and communication technologies including the complex of computer instruments and technologies which helps to accomplish management of educational sphere content and participants' communication.

2. The project of model creation "Virtual educational sphere of modern Russian university"

This project is devoted to the creation of innovative modern information infrastructure of university for preparation of highly qualified specialists of XXI century in the system of continuous remote education. There is need of creation new educational technologies in the system of remote education with the help of international cooperation as well as constructing educational approaches based on active and interactive methods of education with implementing educational courses in electronic sphere (creation informational educational content to every subject on international and native platforms), as well as transaction all procedures of students' evaluation into electronic format.

Apart from it, transaction to the research degree of a new type, including constructing of educational model of interactive and remote students preparation of all training programs. This will help to create university interactive base of scientific results and innovative projects, maximum available (informative) for transferring of scientific results into real sector of economy, and, thus, to increase effectiveness of commercialization of products of intellectual property.

2.1. Steps of the project

The main steps of the project include:

- research of the best world experience on the creation of virtual educational sphere;

- creation of software Smart working places for teachers;

- organizer of a teacher, planning of educational process;

- creation of situational analytic center for conducting webinars, remote consultation and on-line scientific international conferences, conducting situational analysis as well as with the usage of group expert procedures;

- creation of software "Hybrid intellect" based on the one hardware and software complex "Eureka", which doesn't have analogues in the world and provides with decisions making of semistructured managerial tasks.

- creation of demonstrational template of educational class for working on the 3-D equipment;
- creation of typical system for interactive electronic workbooks preparation;
- creation of electronic library for remote education;
- creation of electronic journal "Smart working places";
- creation of modern site of the unibersity based on 3-D technologies;
- creation of on-line formal of expert communities;
- creation of the system of ranging-measure of task completion evaluation: monitoring of the resuts (the system of competence growing), electronic portfolio, certification;
- providing with post-graduation continuous education;
- conducting the work of co-working-center;
- realization of patent strategy in the organization of modern informational sphere.
- creation of the standards complex of virtual informational educational sphere and educational activity;
- implementation of innovative technologies in the educational process adopted to the innovative virtual sphere;
- automated system of creation and formation of requests on inventions (patents and certificates of authorship) through Block Chain/ Blockchain (Piscini et al., 2016);
- creation of hardware and software suit Blockchain of University;
- PO "Platonus";
- Situationally-analytic center of the university: co-working-center, children's technopark, virtual tour around the university, robototronics, work with large data, center of 3-D prototyping (Prensky, 2001).

The subject of the project is also "smart" analytical technologies (hybrid intelligence), techniques and software designed to address weakly structured, large-scale management tasks and problems. One of the features of this activity is its creative conflict character, weakly amenable to formalization, but at the same time it requires a concrete final solution. The general principle of this work is to greatly facilitate the solution of such problems by including its creative activity in the framework of the opportunities that present today's available cognitive models of human activities, when there is an exchange of knowledge between specialists (experts) in different fields, developing a common language, and coordination of the problem, interests and capabilities of the parties, as well as methods and tools for automating knowledge representation and problem solving ("smart" jobs for the individual and collective works). At the same time, significant additional difficulties are introduced not only due to the complexity and inaccuracy of the problems under consideration, but also due to the heterogeneity of the team of specialists participating in the work, different views on the same situation, the absence of a common language, different interests, thinking styles, psychological compatibility and etc. For all participants of such work, a system analyst is offered, which allows to work effectively at all stages of the management cycle. Such analysis based on intelligent technologies for managing business processes, as well as a unified information environment and information and communication space (Drucker, 2014).

 The project is directed to specific tasks within the framework of the problem:

- organization, formation, training of teams and management of effective individual and team analytical and expert work in situational and analytical centers (CAC);
- the solution of personnel tasks, the formation and assessment of personnel (complex rapid diagnosis of divisions/teams: team roles, assessment of managerial potential, psychological compatibility of participants, moderation / facilitation of team work in real time, formation of the team creative field, and the placement of staff, the formation of a staff reserve, attestation and competitive work, team work in projects);

-management analysis in the organization: the vision of the organization by employees, the

identification of managerial mistakes and organizational pathologies, the analysis of management decisions, the diagnosis of organizational culture, stakeholder analysis, the formation of the problem field of the organization

-strategic analysis and network expert forecast of the development of problem situations, the formation of the problem-target area of the situation in the form of network of key objectives and sub-goals, monitoring and operational dispatch management of the implementation of decisions;

- Marketing planning and management, financial-economic and functional-cost analysis;

- Development, evaluation, forecast of socio-economic efficiency and choice of "package" of optimal solutions.

This problem is urgent because it is necessary to equip workplaces with modern automatic and communicational facilities to make managerial or professional decisions quickly. These facilities ensure not only the collection of necessary information, but also give its in-depth analysis and propose algorithms for the optimal solution of the problem based on the best world achievements.

Today most of the automated workspaces perform the accumulation, storage and processing of information, as well as its visualization.

Decision-making, their analysis and determination of the efficiency factor are carried out manually. In addition, 90 percent of all software development is foreign software products. These include competitive products Outlook, MindManager, as well as domestic development of 1C: enterprise. However, these software products solve the problems of electronic document management, management accounting and do not provide analytical solutions. For this reason the scientific novelty of the problem is related to the domestic development of unique analytical technologies for smart workplaces.

Automation of a large number of functional areas is required to achieve the final goal of the project. In view of the considerable complexity of some areas, it is proposed to choose a complex functional-modular and step-by-step approach to solving the task.

This means that the entire information environment of the organization based on the purpose will be divided into a number of systems and functional environments. In this case, the functional of systems and environments can be implemented in stages in different cases on the basis of a single technical entity (software product, equipment complex, etc.) and using several entities (for example, several software products).

As a result by consistently implementing infrastructural, service and information systems, it will be possible to increase discretely the capabilities of the functional environments built on their basis.

2.2. The final goal of the project

The target state of the information environment of the University in the context of the functional environments of service and infrastructure subsystems is presented in the Figure 1.

Figure 1
Target state of the information environment of the University in the context of functional environments

	Web-portal of the University	Service systems			
functional environments	Manager Organizer	ACS, fire and burglar alarm, video surveillance	Corporate e-mail and instant messaging	Corporate time management system	corporate telephone system
	Corporate portal and knowledge management system				
	The environment for managing meetings, adopting and implementing decisions				
	ECM Environment				
	Accounting, Budgeting and Treasury Management Environment				
	Human Resource Management Environment				
software infrastructure	Information Security System				
	IT management system (infrastructure and data management, CMDB, Service Desk, monitoring)				
	Infrastructure software (OS, virtual environment, Active Directory)				
Physical infrastructure	infrastructure of the situation analysis center				
	User and Peripherals Devices				
	Server and network equipment (servers, storage, routers, LAN, VAN, network of security systems, telephony)				
	External telecommunications (communication channels)				
	Systems for ensuring guaranteed food, climate, fire extinguishing in the premises of both data centers				
	Premises of the main and backup data center				

Figure 2 shows the same target state, but instead of functional environments, it shows the technical entities (information systems) on which these environments will be implemented. Technical entities are grouped by the orders of implementation.

Figure 2
Technical essence of the target state of the information environment of the University

information systems (technical entities)	First line				Second line					Third line					Service systems			
	university website	university intranet portal	electronic document management system	accounting system, budgeting and treasury	curriculum management system	BI system	mobile manager application	human resources management system	resource and transport management system	knowledge base and electronic library	system for managing the implementation of the strategy (management by objectives)	project management system	business-moderation system	intellectual decision-making system	ACS, fire and burglar alarm, video surveillance	Corporate e-mail and instant messaging	Corporate time management system	corporate telephone system

software infrastructure	
	Information Security System
	IT management system (infrastructure and data management, CMDB, Service Desk, monitoring)
	Infrastructure software (OS, virtual environment, Active Directory)

physical infrastructure	
	infrastructure of the situation analysis center
	User and Peripherals Devices
	Server and network equipment (servers, storage, routers, LAN, VAN, network of security systems, telephony)
	External telecommunications (communication channels)
	Systems for ensuring guaranteed food, climate, fire extinguishing in the premises of both data centers
	Premises of the main and backup data center

Elements of the hardware and software infrastructure, service systems are implemented in parallel to the information systems. These systems are part of the functional environments. The processes are synchronized in such way to ensure the necessary degree of the infrastructure's readiness to start the implementation of the next information system.

In practice, this means that the functional environments will be a set of integrated functional of one or more technical entities.

2.3. Approaches to and the general plan of the functional environment step by step implementation

As an example let's look into the Meetings management, taking decisions and their implementation environment. After implementing the first part of the project only infrastructure systems, corporate time management system and the intranet portal are going to be used within the environment.

The meeting will be arranged in the corporate time management system and the notification on the meeting will be e-mailed to each participant and will contain the link to the portal page where they can see the agenda and all the materials necessary for the meeting. It will also contain the Minutes of Meeting and other documents, links to the related events and information. Following the MoM points the assignments will be made and monitored in the workflow.

As the information systems are deployed and developed their application will gradually increase enhancing the Environment general functionality. After the targeted state for arranging meetings it achieved it will use the functionality of:

- all the infrastructure systems including situation analysis centre,

- corporate time management system,

- corporate e-mail and instant messages services,

- workflow systems,

- intranet portal,

- Business intelligence (BI) system,

- knowledge database,

- intellectual system of decisions making.

After the appointment of the meeting in the corporate time management system, its participants will simultaneously receive through their personal cabinet on the intranet portal (with duplication via e-mail and SMS) an announcement of the time and place of the meeting, as well as the instructions on preparing for it in the electronic workflow. Using various information systems, knowledge databases and BI system, participants will prepare the necessary analytical materials and place them on the meeting or project page on the portal.

At the appointed time participants will gather in a situation analysis center, some of them will be connected remotely over telecommunications networks. Using pre-prepared materials, and also, if necessary, real-time materials from the BI system and the knowledge database, the participants will submit prepared questions. If necessary, an intelligent decision-making system will be used that allows using various methods of business analysis online (PEST, SWOT, Isikawa, FAST, hierarchy analysis method and others).

The results of the meeting will be logged, the MoM will posted in the electronic document management system, from where it will be available through personal accounts and the meeting or project page on the portal. On the points of the MoM in the electronic document management system, instructions will be formed and put on control.

Managers will be able to use the full functionality of the environment from mobile devices, also in a remote way.

In addition to meetings management and facilitating decision-making, the Environment in a targeted state includes functions of:

- management basing on targets, appointment and control of completing of long-term system management tasks;

- project management;

- business modeling (strategy formalization, hierarchically connected indicators, designing and regulating internal business processes.

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3. Discussion

The most important tasks of the state policy of supporting the innovative modern information infrastructure of the University for the training of high-class specialists of the 21st century are to create enabling environment for the formation of an integrated innovation sphere of the country that seamlessly embraces the entire set of innovative structures; in the formation of an effective innovative educational environment that provides favorable prerequisites for the creation and operation of innovative projects in the conditions of digitalization (Orlova & Afonin, 2015). The main conceptual imperative for modern Russia in the field of education is seen by the authors in the innovative design, development and implementation of the "Virtual Educational Environment of the Modern Russian University" model.

Based on research into the direction of the development of virtual space and the components of the virtual educational environment of such scientists as A. Taurisson and A.

Senteni (2003), M. Kaszap, D. Jeffrey, G. Lemire (2001), D. Tiffin and L. Rajasingham (1999) educational environment of the modern Russian university "as a sample-analogue of the activities of the faculty and students of the university.

The model developed in the framework of this study is based on a number of conclusions reflecting the features of modern business processes based on intelligent management technologies, as well as a unified information environment and information and communication space (Dobrenkov et al., 2017):

- the organization and functioning of educational systems based on virtual reality technologies will realize the openness and "scalability" of these systems, integrativity and adaptablity of technologies for smart workplaces;

-to rationally make important management decisions, it is necessary to equip workplaces with modern means of automation and communication that would ensure not only the collection of the necessary information, but also give its in-depth analysis and propose algorithms for the optimal solution of the problem on the basis of unique analytical technologies for smart workplaces;

-to implement the project, automation of a number of systems based on functional environments and a complex functional-modular approach to solving the task is required.

4. Conclusion

To sum everything up, we can draw the following conclusions in the field of development and implementation of the model "Virtual Educational Environment of the Modern Russian University".

The modern virtual educational environment significantly expands the range of educational opportunities in such areas as the formation of individual educational trajectories and self-realization of students, immersion in the environment modeling the professional sphere of activity and the possibility of performing trial actions of different levels. In such an educational environment, the principle of individual student achievement is realized. All tasks are activity-oriented, and the results are recorded on the student's personal website in the electronic portfolio. In addition, there is access to the development of the students of the most advanced profile training programs, regardless of where they live and study. Here every student has the opportunity to get an expert opinion from a specialist who works in another city. Within the virtual environment students turn to the storages of the best examples of professional activity. Tasks and materials here are always the most modern, as they are constantly updated. And students learn new technologies within the framework of certain professional spheres in the current regime.

The introduction of the new model will allow to modernize the available technologies of the educational process and make a breakthrough in the training of personnel, dramatically increase the efficiency and productivity of labor.

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