

# DEVELOPING AN INFORMATION EDUCATIONAL ENVIRONMENT BASED ON CLOUD TECHNOLOGIES

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## ABSTRACT

*The main purpose of the formation of an information educational institution is to provide a background for improving the quality of education, its openness and accessibility. The information educational environment should provide the educational process with the organizational and methodological support, the resource provision, the effective solutions of managerial tasks and the modern procedures for collecting, analyzing, storing and broadcasting the management information. Cloud computing is one of the most emerging technologies that allow creating in the institution a safe and secure information educational environment ensuring the implementation of the Federal State Educational Standards requirements. We had presented the projects of the school #27 (Dzerzhinsky, Nizhny Novgorod region), Nizhny Novgorod Industrial College and the Department of Applied Informatics and Information Technologies at the Nizhny Novgorod State Pedagogical University named after Kozma Minin as examples of formation the information educational environments on the base of the Google Apps for Education package, which is a universal tool for organizing an effective interaction of all participants in the educational process, planning joint activities, competent allocating resources and providing the tools necessary for solving any teaching problems.*

**Keywords:** Information Educational Environment, Cloud Technologies, Joint Activities, Collaboration.

## INTRODUCTION

Recently, the term "information educational environment" is widely discussed in the scientific works devoted to the development of informatization education conceptual apparatus. This concept has already become the part of the scientific and pedagogical turnover and denotes one of those realities of the day that express the current world trends in education related to the development of information and communication technologies.

The research works of (Zakharova, 2013; Ivanova & Osmolovskaya, 2011; Korotenzov, 2010; Raitskaya, 2011) and others, are devoted to the problem of the formation of information educational environment (IEE) (Ivanova, 2011; Korotenzov, 2010; Raitskaya, 2011; Zakharova, 2013). The authors focused their attention to the pedagogical and psychological aspects of the information educational environment.

We agree with Korotenzov, that the main goal of forming the information educational environment of an institution is to provide the transition of education to a new quality, to a state appropriate the information society (Korotenzov, 2010).

The task of IEE is the accumulation, the streamlining and the provision with all necessary educational, methodical, scientific and cognitive information; the organization of an effective search system and convenient communication.

This is a network interaction space of all the educational process participants, in which the learner's personality is developing.

It is also the "automation" of the leader's and the teacher's work the provision of personal activity, the activities of the students and the environment with "an electronic management". In our research we will interpret the information educational environment as a complex open pedagogical system that is a systemic integration of structural, procedural, resource, subject-activity and culture-based components that ensure the integrity and continuity of the educational process at all levels and in all parameters.

Nowadays, many educational organizations build their information environments on the basis of cloud technologies (Asio & Khorasani, 2015; Khorasani & Almasifard, 2017). The US National Institute of Standards and Technology has defined "the cloud computing" as a calculation model that allows an easy access to a common pool with customizable computing resources through the network (for example, networks, servers, storage systems, applications, services); the cloud model promotes the accessibility and is characterized by the basic elements: self-service on-demand, broad network access, pooled resource, independent location, fast flexibility and measurable services (Mell & Grance, 2011).

The usage of cloud technologies for building IEE makes it possible to abandon the necessity of maintaining the complex infrastructures for storing and processing data in the information environment by the organizations or on individual computers and to organize an effective network cooperation between teachers and students.

The active implementation of cloud technologies has led to the creation of new generation products and an increasing number of Google Apps for Education application suite' users for solving managerial tasks and supporting the educational ICT process among Russian educational organizations,

This is a free package for educational institutions, which provides students and teachers with the tools necessary for effective communication and collaboration.

The authors of this article have had the experience in projecting the information educational environments at schools, colleges, departments, basic educational programs, disciplines; the construction of personal information educational environments for teachers, based on the Google Apps for Education package.

## **Problem Statement**

Nowadays, the formation of the educational environment at the institution becomes one of the main conditions for improving the quality of education and successful competition at the market of educational services.

The authors of the article of Slepukhin & Starichenko (2014) emphasize that the functioning goal of any information educational environment could be defined as complete and prompt satisfaction of information needs among all subjects of the educational process, related to the management and implementation of the educational forms, types and activities envisaged in the university (Slepukhin, 2014).

We attribute the accent of the above formulation had been placed on the priority of the didactic functions of the environment in relation to the technical ones, so the needs of the implementation of the educational process should be primary when selecting technical and technological solutions for forming the information educational environment.

The information educational environment of the educational institution should provide organizational, methodological and resource support of the educational process, effective management tasks and modern procedures for collecting, analyzing, storing and broadcasting management information.

It is possible to use cloud technologies to resolve that issue.

Today the Cloud Computing concept is one of the most popular trends in the development of information technology. It could provide the educational institutions with the following advantages: savings concerning the purchasing of software and payment for technical specialists; decreasing in demand for classrooms; making many types of academic work, monitoring and evaluation on-line; saving disk space; the openness of the educational environment for teachers and students (Yarmakhov, 2015).

The largest developer of cloud solutions is Google, which provides the following collaboration tools: mail service Gmail, Google Calendar, Google Maps and Google Docs & Spreadsheets, Google groups, YouTube video service, Google sites and much more.

Google Apps for Education is a free educational package developed for educational purposes.

The information environment built on its basis provides the necessary organizational and pedagogical conditions for the productive joint activity of students and teachers.

We consider as an actual scientific and practical task the justification of the opportunities for building an information educational environment based on cloud technologies.

## **LITERATURE REVIEW**

Before considering the possibilities of cloud technologies for building an information educational environment that will ensure effective management of the educational process and, therefore, the improvement of its quality, first we will focus on the concept, purpose and structure of this phenomenon.

Let's refer to the concept of "environment". In the explanatory dictionary of the Russian language by Ozhegov & Shvedova (2006), it is defined as "surrounding social and living conditions, conditions, as well as the totality of people connected by the commonality of these conditions". "Educational environment" is a variation of the social environment. "The educational environment is a system of conditions that affect the formation of the personality, as

well as the totality of the opportunities for self-development of students in the social and spatial-objective environment" (Asmolov, 2001; Ozhegov, 2006).

Using the term "information educational environment", we thereby emphasize the importance of modern information and communication technologies as the basis for building information educational environments.

Creation and development of the information educational environment at various educational organizations is one of the most discussed problems in the process of informatization the general and higher education for more than two decades.

The transition to new educational standards in both general and higher education has put everything at their places, having fixed the responsibility for fulfilling the requirements of the Federal State Educational Standards concerning the formation of an information and educational environment for educational organizations.

For example, the federal state educational standards of higher education contain the requirement of access to the information educational environment of the university from any point where there is the Internet.

The problem of constructing the developing information and educational environment at the school is devoted to the study of (Korotekov, 2010; Krupoderova, 2009) shows how the development of ICT competence of the teacher occurs in the context of the information educational environment at the school (Korotekov, 2010; Krupoderova, 2009).

Kanyanina (2009) reveals the possibilities of an information and educational environment for the development of creative abilities of students (Kanyanina, 2009). Kulakova (2014) substantiates the pedagogical conditions for the formation of the information educational environment at the modern college (Kulakova, 2014).

Henner (2014) argues that the development of internal information and educational environments in Russian universities is an important factor in the success of reforming the national higher education (Henner, 2014). The author proposes to allocate the following subsystems of the university's information educational environment: material and technical, information technology, resource, methodological, organizational subsystems, the subsystem of staffing. Raitskaya (2011) studied the patterns, structure and technologies of the Internet as an information educational environment for the implementation of independent student cognitive activities in it. Samerkhanova & Imzharova (2014) consider the quality management of the educational process in the information educational environment at the innovative university (Raitskaya, 2011; Samerkhanova, 2014). The organization of the network project activity of students in the information educational environment at the university is devoted to the research of Krupoderova (2013). The research works devoted to the organization of the information educational environment on the basis of cloud technologies are of the special interest for our research (Krupoderova, 2013). Among them the works of (Bryksina, 2014; Krupoderova & Slepysheva, 2015; Seydametova et al., 2012; Slepukhin & Starichenko, 2014; Yarmakhov & Rozhdestvenskaya, 2015) and others (Bryksina, 2014; Krupoderova Slepysheva, 2015; Seydametova, 2012; Slepukhin, 2014; Yarmakhov, 2015).

The relevance of the research work had been determined by the opportunities offered by the usage of cloud technologies for organizing collaboration of participants in the educational process in the context of the information educational environment.

## **THE RESEARCH GOAL**

The goal of research is to substantiate the didactic power of cloud technology to create a safe and secure educational environment organization providing the implementation requirements of the federal state educational standards, allowing to organize the effective interaction of all participants in the educational process, plan to work together and intelligently allocate resources to provide the necessary tools for solving various educational tasks.

## **RESEARCH METHODS**

The methodological basis of the study is:

1. Theoretical and methodological analysis and synthesis of existing special domestic and foreign scientific and methodological literature, a conceptual analysis of scientific articles and publications on the topic;
2. Study and generalization of both domestic and foreign developments and implementation of projects on building information and educational environments based on cloud technologies;
3. Application of methods of generalization, comparison and forecasting.

## **RESULTS AND DISCUSSION**

A characteristic feature of the federal state educational standards of both general and professional (secondary and higher) education, along with the requirements for the structure of the basic educational programs, the results of their development and the educational environment have become an important component of the standards.

In this regard, the basic principles of the formation, functioning and development of a new information and educational environment based on the use of modern means of information and communication technologies in education have been developed in recent years. Russian software developers offer a number of ready-made solutions for formation the information educational environments. For school, they are the following: Dnevnik.ru, Avers and Net School, 1S: KhronoGraf Shkola, etc. For forming the information educational environment of the college, the developers offer the following software products: "1C: College PROF", the author's development of the Moscow's College of Communication No.54 staff-the "College" system, the "BARS. Education-Electronic College."

Examples of information systems for universities: "Galaxy. Management of the university", "Comcon: University. Dekanat 8", "Info-suite. Management of an educational institution".

One of the signs of the effectiveness of the information educational environment of the educational organization is, as a rule, providing an access to the distance learning system, the availability of LMS (Learning Management System).

As for distance learning systems, at the moment Russian universities use such systems as "Moodle", "WebCT", "Net-School", "LMS-school", "Network city. Education ", " GPA Teacher "and others, integrating services for the automation of the creation and modification of educational materials, access to educational materials, remote pedagogical communication, collection, accumulation and statistical processing of information about participants in the educational process, management of training, electronic document management. These systems have undoubted advantages, but they are not always convenient for teachers and students, primarily because of the limited communication of subjects, taking into account the ideology of the network community; Difficult implementation of joint activities of students. An alternative

solution to the construction of IEE is the creation by the school, college, university, department, teachers and students their own information systems based on cloud technologies. Creation of the information educational environment of a school, college, university based on the package of Google Apps services will solve the following tasks:

1. Ensuring effective management of the educational institution through the use of modern procedures for the collection, analysis, processing, storage and presentation of information based on Google services;
2. Organization of information and methodological support of the educational process by using a set of effective, safe, free tools from the Google Apps package;
3. Organization of network project activity of students;
4. Increase the network competence of teachers and students;
5. Active use of distance educational technologies;
6. Creation of electronic network portfolios of teachers and students;
7. Formation of networked pedagogical communities.

As an illustration of the didactic capabilities of Google services for building an effective information educational environment at a school, we will analyze the project of creating an IEE on the basis of the Google Apps service package at School No. 27 in Dzerzhinsk, Nizhny Novgorod Region (Tolchina, 2016).

The pedagogical staff of the school No. 27 in Dzerzhinsk, Nizhny Novgorod region, has been actively working over the creation of an information educational environment for the past few years. For this purpose, the necessary computer equipment and appropriate software are purchased as well as advancing of the ICT competence of teachers is organized.

The scientific advices developed by the Department of Applied Informatics and Information Technologies in Education at Nizhny Novgorod State Pedagogical University (NSPU) and the Department of Information Technologies at Nizhny Novgorod Institute of the Education Development (NIRO), participation in the networked pedagogical communities "Nizhny Novgorod Education" and "Dzerzhinsky Education" are important for teachers and students.

With the help of various Google services, the school teachers develop electronic educational materials; create portfolios in the form of sites and blogs; the network project activity is used; the school workflow is repositioned into the "cloud".

Within the framework of the school information educational environment, Google documents are used for the following purposes:

1. Discussing problems, work planning, brainstorming, joint preparation of reports, monitoring and various training documents;
2. Using of lessons and home tasks through interactive worksheets;
3. The collective aggregation of information in the project activities, fixing the course of experiments and observations in different places, including the usage of mobile devices for formative and final evaluation;
4. For the preparation of various creative works, their annotation and commenting;
5. On-line research presentations and various school events;
6. Conducting all kinds of inquiries.

Examples of using Google-calendar: the schedule of classes, consultations, examinations; duty schedules; calendars of observations, conferences, Olympiads, projects, exhibitions, significant dates, various events.

Another example of Google services usage for building an information educational environment is the project of a virtual methodical room for the Nizhny Novgorod Industrial College (Dudin, 2016), also carried out under the direction of the Department of Applied

Informatics and Information Technologies in the Education of the National Pedagogical University (Dudin, 2016).

The virtual methodical cabinet is the working environment, intended for internal communication and interaction of the personnel of the college, as well as the solution of a number of internal organizational and management tasks. It is a place of collection and storage of internal documentation; "Entry point" in various information channels of the college; "Meeting place" for joint planning of projects and events; Environment for meaningful communication and information exchange; the environment for the study and development of teachers. In the virtual methodical room, developed in the form of a Google-site, each teacher could publish his ad, article, news or materials.

Recommendations for the effective use of cloud computing in universities are given in the technical report of the research group of the University of California at Berkeley (Armbrust, 2009). The information and educational environment based on the Google Apps package had been created at the Department of Applied Informatics and Information Technologies in Education of the Nizhny Novgorod State Pedagogical University named after Kozma Minin (Krupoderova & Slepysheva, 2015).

The purpose of creating at the department the IEE, based on Google Apps is the organization of effective network interaction and collaboration of all teachers at the department in solving important issues for preparing students had been studying in the areas of training "Information Systems and Technologies", "Applied Informatics in Management", "Information Technologies in Education", etc., Provision of the necessary tools for solving various problems of educational, scientific and methodological activity. At the same time, a high degree of information security is ensured by using the appropriate Google Apps tools.

The organization of collaboration between students and teachers within the ITS of the department, the use of Google services for the organization of joint educational, project, research activities are rather important too.

Teachers of the department actively use the services of Google to build information and educational environments of their disciplines, personal information and educational environments.

The experience of organizing the network (on the basis of Google Apps) of educational, developing and research activities of students within the IEE at the department is described in the work of Krupoderova (2013) (Krupoderova, 2013). Students create portfolios of their creative work with the help of Google-sites, conduct joint brainstorming in Google tables, draw up joint reports in Google documents, plan collective events in Google calendars, etc. In the course of such joint network activity there had been formed the developing information environment, where on the one hand created conditions for the free development of creative individuality, the activity of participants and, on the other hand, the upbringing of collectivism, comradeship and mutual assistance.

## CONCLUSION

A fairly large number of information systems that automate one or another sphere of activity at educational institutions is represented on the market of software products today. But there are alternative solutions for building information and educational environments. This is the use of cloud technologies. A universal tool for building the information and educational environment of a modern educational institution is the Google Apps package. The main reason for success of its package is the variety of its services and the flexible management of users' access to its resources.

Several tools are available in Google Apps for construction of information educational facilities at schools, colleges, departments of the universities and disciplines. Effective management of the educational institution is achieved through the use of modern procedures for the collection, analysis, processing, storage and presentation of information based on Google services. High-quality information-methodological support of the educational process is ensured by the use of a set of effective, safe and free tools from the Google Apps package. There had been created conditions for the organization of productive network project activities, accumulation of advanced pedagogical practices, increasing the network competence of students and teachers, active use of remote technologies and formation of networked pedagogical communities.

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