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Networking of Lecturers and Students in the Information Learning Environment of Higher School by Means of Cloud Computing

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ABSTRACT

The main purpose of fostering information learning environment of higher school is to create conditions for raising the quality of education, providing access to education and ensuring its openness. One of the most promising technologies that allows to create a single learning environment and to organize an effective networking of teachers and students is the technology of cloud computing. The article reveals didactic capabilities of cloud computing for construction of information learning environment, which serves the medium for training, project, and research activities of students and for organizing an effective networking of students and teachers. As an example, a draft of the information learning environment developed by the Department of Applied Informatics and Information Technologies in Education of Kozma Minin Nizhny Novgorod State Pedagogical University. A Google Apps for Education package was employed, which is a universal tool for building information environment and which promotes effective interaction of all participants of the educational process, planning joint activities, properly allocation of resources and provision of the necessary tools for solving learning tasks.

KEYWORDS

Information learning environment; cloud computing; Google Apps for Education; joint activities; cooperation

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Introduction

With the development of information society, the ever heightening social expectations suggest that education should bring up an individual that is independent, responsible, communicative, capable to face challenges and ready for self-realization. Considering the fact that formation of common cultural, psychological, social and professional prerequisites for the development of information society begins in the process of

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education, the latter has to stay ahead of other spheres of public activity in regards to its informatisation.

The process of informatization of education is focused primarily on the development of infrastructure of educational institutions, their information learning environment (Competence: Inquires into its Meaning and Acquisition in Educational Settings, 1984; Early, 1992; Jirasinghe & Lyons, 1996). One of the most promising technologies, which allows to create a single learning environment, to organize an effective networking of teachers and students while contributing to the quality enhancement of the educational process, is the technology of cloud computing. According to the recommendations of the National Institute of Standards and Technology (NIST), issued in September 2011, cloud computing is an information-technological concept of providing universal and convenient network access on demand to the shared pool of configurable computing resources, which can be provided quickly and released with minimal operating costs or calls to the ISP (Bonk, 2009; Hoover, 2013; Koomey, 2007; Mell & Grance, 2011).

Today, cloud technologies are being developed with unprecedented speed and have been steadily gaining popularity among users around the world. Whether analysts' predictions come true (Galer, 2016; Reese, 2009; Windhausen, 2008) about the key role of cloud computing in the global IT market in the future or not, time will tell. But today, cloud computing is not just an interesting service, but a firmly established, helpful technology, delivering benefits, educational among them.

Revealing the possibilities rendered by the use of cloud technologies for the organization of joint activities of students and teachers in the information learning environment constitute the relevance of the research topic.

Articulation of Issue

Information learning environment (ILE) is an organized in a systemic way collection of information, technical, training and methodological support, which is inextricably connected with the person as the subject of education (Ivanova & Osmolovskaia, 2011). The main purpose of creating information learning environment in higher schools is to create conditions for rasing the quality of education, providing wide access to education and ensuring its openness.

At present, universities in Russian Federation use such kinds of software environment for creation of ITS as a “Claroline”, “Moodle”, “WebCT”, “Net School”, “LMS-scholl”, “ Net city. Education”, “GPA Teacher” and other systems, which integrate services for automating the construction and modification of educational materials, providing access to learning materials, performing remote educational communication, collection, storage and statistical processing of the data about the participants of the learning process, learning management, e-documents management.

These systems have unquestioned merits, but they are not always convenient for teachers and students, primarily due to limited communication between the participants in view of the ideology of community network, and then, because of much encumbered realisation of joint student activities.

An alternative option for ILE formation is construction by university, department, lecturers and students of their own information systems on the basis of cloud technologies. The concept of Cloud Computing is one of the most popular trends in the development of information technology. The main advantages of cloud computing for educational institutions are: savings on purchase of software and payments to technicians; reduction in space requirements; performance of many types of training

activities, monitoring and evaluation on-line; saving disk space; openness of learning environment for professors and students.

The largest developer of cloud-based solutions is Google, which offers the following collaboration tools: GMail e-mail service, Google Talk instant messaging client, Google Calendar, Google Docs & Spreadsheets tools, Google-groups, YouTube video service, Google-sites and much more.

Google Apps for Education was designed for educational purposes – a free package for educational institutions. The information environment built on its basis provides the necessary organizational and pedagogical conditions for productive joint work of students and faculty members.

Justification of didactic possibilities of using cloud technologies for building information learning environment that serves the medium for training, project, and research student activities, as well as joint activities of lecturers on enhancing the quality of current educational programmes are is considered an actual scientific and practical task.

Literature Review

The terms "information learning medium" and "information learning environment" have become part of academic and pedagogical discourse. The question of designing information learning space of a higher school is raised in the studies by Zakharova (2013), Ivanova & Osmolovskaia (2011), I.V. Robert (2014), E.K. Samerkhanova (Samerkhanova & Krupoderova, 2011; Samerkhanova, 2013; Samerkhanova et al., 2016). E.O. Ivanova & I.M. Osmolovskaia (2011) gives the following definition: "Information learning environment is an indissoluble unity of information, means of its storage and production, performance methods and technologies, which cater for information provision to persons for educational purposes".

In contrast to the concept of "medium", the concept of "environment" includes the subject, and is conceived as a sphere of life activity of a person, its development and education.

The definitions of information learning environment represent both technological and pedagogical approaches. In studies and legislative acts of the late 1990s and early 2000s, the technological approach prevailed. The pedagogical approach has got a wider acceptance since 2003. The pedagogical approach to ILE employs the concepts of "medium", "interaction", "and educational system". The federal state educational standards require both from school and university to foster the necessary learning environment, to create conditions indispensable for a comprehensive development of the individual and preparation of competitive, mobile, initiative, responsible and tolerant professionals able to work in team, to take on different roles and responsibilities.

Of particular interest for our study are the works that investigate into the organization of information learning environment on the basis of cloud computing. These are the studies of I.V. Ananchenko (2015), O.F. Bryksina (2014), E.P. Krupoderova (2015), Z.S. Seidametova et al. (2012), B.E. Starichenko & A.V. Slepukhin (2014), M.A. Sorochinskii (2014), B.B. Yarmakhov & L.V. Rozhdestvenskaia (2015). The authors attach particular attention to the fact that the use of cloud technologies for building ITS makes it unnecessary to maintain complex data storages and processing infrastructure within the information environment of university or on individual computers, or to strive for effective networking lecturers and students.

Purpose of the Study

The purpose of our research was to substantiate the didactic possibilities of cloud computing for effective networking of lecturers and students within the information learning environment of a higher school.

Research Methods

The methodological basis of the study was constituted by:

- theoretical and methodological analysis and synthesis of the available national and foreign scientific and methodical literature on the issue, conceptual analysis of scientific articles and publications on the topic;

- the study and generalisation of both national and foreign developments and experience on implementation of projects for building information learning environment based on cloud computing;

- the use of methods of generalization, comparison, and prediction.

Results and Discussion

Today, university graduates are expected to be committed, responsible, mobile, thinking in a critical and systemic way, creative, ready for teamwork, tolerant, focused on self-development. To bring-up such a graduate, one needs to apply modern educational technologies. That is why it is the top-priority task for a university to update basic professional educational programmes, training and methodical basis, forms of studies and teaching technologies. Joint activities of lecturers in addressing these important tasks are gaining ever more importance. Evolution of information and communication technologies provides a great opportunity to relocate these activities in the Internet. The role of students' individual work is also increasing, and the use of cloud computing for its purposes is very promising.

A universal tool for building information learning environment of a higher school is Google Apps for Education service package developed by Google, which allows to organize the effective interaction of all participants of the educational process, to plan joint activities, properly allocate resources and provide the necessary tools for solving any learning tasks.

Creating Google Apps-based information learning environment will solve the following tasks:

- ensuring the effective management of an educational institution by use of modern procedures of collection, analysis, processing, storage and presentation of information with the aid of Google services;

- organization of information and methodical support of the educational process through the use of effective, safe, free tools from the Google Apps package;

- organization of student network project activities;

- improving the network competency of faculty members and students;

- active use of distance learning technologies by lecturers and students;

- creation of electronic network portfolios of lecturers and students;

- formation of a network pedagogical community.

The problems stated above are solved in full compliance with the requirements of the federal state educational standards. Work with Google Apps provides a quick and easy access to educational resources, creates opportunities for cooperation of lecturers and students. Beneath the opportunities provided by basic online services based on

cloud computing by Google for building information learning environment of a higher school (Table 1).

Table 1. Google services opportunities for the formation of ITS university

Google-service	Key features
Gmail	A full-featured e-mail client with instant messaging, voice and video chat, as well as protection from spam and viruses. The main feature of the postal service is a powerful algorithm for searching through e-mail correspondence. Students and lecturers can use personal settings, shortcuts and filters. To separate the flow of information, one can use mailing groups.
Google Docs	Google Docs is an online office package, which includes tools for creation of text documents, spreadsheets, presentations, drawings, forms, as well as tools for their sharing and publishing on the Internet. As part of the ILE of a university, Google Docs can be used for discussions, work planning, brainstorming, control and monitoring, joint preparation of different academic and scientific paperwork (certificates of competence, work programmes, study packs, evaluation tools, teaching aids, monographs, plans, reports), use of interactive working sheets in the classroom and for individual student work, in project activities for collective information gathering, recording the progress of experiments and observations in various places, including from mobile devices, for preparation of a variety of creative works, their annotation and commenting, on-line presentations and all kinds of surveys.
Google Calendar	Google Calendar is a management and planning tool. Examples of use are: scheduling classes, consultations, examinations; keeping calendars of conferences, contests, projects, competitions and other events.
Google Groups	Google Groups is a management and group work tool on the basis of moderated forums and mailing lists. Teaming for collaboration on certain issues, projects, for "brainstorming", for preparation of contests, conferences, competitions, meetings of chairs, for communication and counselling, finally, for self-expression.
YouTube video service	A service that combines video hosting of users' videos and a search engine for them. It can be used for creating training videos, placing of video-observations, laboratory experiments, video interviews, video presentations, etc. The main advantage of YouTube of the Google Apps domain is that it allows one to create a YouTube-channel that will contain materials from lecturers and students.
Google Sites	A Google Sites service is a website builder. It is possible to add a variety of information to a website – calendars, documents, presentations, and various gadgets, to determine the parameters of the access to the site. It can be used for creation of sites of departments, scientific societies, lecturers' and students' portfolios, for accumulation of teaching experience, for methodical support of disciplines, for distance learning. In project activities, it can be used for preparation of joint encyclopaedia articles, research reports, progress reports, for submission of project portfolios.

Establishing an information environment based on Google Apps in an educational institution is a serious and responsible decision. The authors of the monograph (Yarmakhov & Rozhdestvenskaia, 2015) indentify such steps of the process:

- systematic improvement of the ILE equipment;
- increase the competence of lecturers in the use of network services for teaching;

- activities of the staff members acting as domain administrators on coordinated introducing of Google Apps.

These requirements were met in the Department of Applied Informatics and Information Technologies in Education of Kozma Minin Nizhny Novgorod State Pedagogical University (NSPU), and it was decided to set up the information learning environment based on Google Apps.

The purpose of Google Apps-based ILE creation by the Department of Applied Informatics and Information Technologies in Education of K. Minin NSPU) was to provide effective networking and cooperation of all the Department members in addressing the important issues of training students in areas of "Information Systems and Technologies", "Applied Computer Science in Management", "Information technologies in education", etc., to give the necessary tools for tackling various issues of educational, scientific and methodical work. Thereby, a high degree of information security through the use of appropriate Google Apps tools is secured.

ILE of the Department of Applied Informatics and Information Technologies in Education of K. Minin NSPU should further the following tasks:

- ensuring the effective organization of educational, scientific and methodical work of the department within the framework of respective educational programmes through the use of modern procedures of collection, analysis, processing, storage and presentation of information with the aid of Google services (for example, joint drafting of competencies passports, work programmes, a study packs, evaluation tools, various plans and reports, etc.).;

- organization of informational and methodical support of the educational process through the use of effective, safe, free tools from the Google Apps package;

- joint management of various databases (such as "Lecturers' Publications", "Students' Publications" and other);

- performing permanent news informing of department members about the current educational tasks of the department, competitions, conferences, projects and other news;

- shared calendaring activities of the department;

- developing network competence of lecturers;

- ensuring effective communication of the department staff with the help of user-friendly tools, such as means of instant text or voice exchange, video meetings, Google groups.

Fig. 1 shows the structure of the information learning environment of the Department of Applied Informatics and Information Technologies in Education of K. Minin NSPU. Folders with various department materials are located on the Google Apps cloud on the Google Drive. They contain Google documents, Google Spreadsheets, Google presentations, Google forms. Each item can be configured with appropriate access mode: reading, commenting, or editing. Access may be given to individuals, or anyone provided with the link. It can be given to the participants of the ILE or else to anyone from outside. In addition to Google services, one might use the resources of other developers – partners of Google.

The core of information system of the department is a Google site, which integrates various tools for planning and monitoring, organization of cooperation, analytics, broadcasting and communication.

A universal means for the joint work of the department members on the quality of educational programmes is Google Drive. Providing public access to the folders with

study packs on different courses, evaluation tools, materials on final certification, competencies passports allows for an interdisciplinary approach, organize mutual assessment, cooperation, sharing teaching experience. A convenient tool for planning, "brainstorming", data collection for reports, preparing department meetings are Google Spreadsheets. Joint Google Presentations are good for presenting common developments, introducing new ideas, preparing Doors Open Days for school leavers. Google Calendar is a perfect tool for joint planning of department activities. Google Map can serve a visual report of the department on employment of graduates or demonstration of networking with partners.

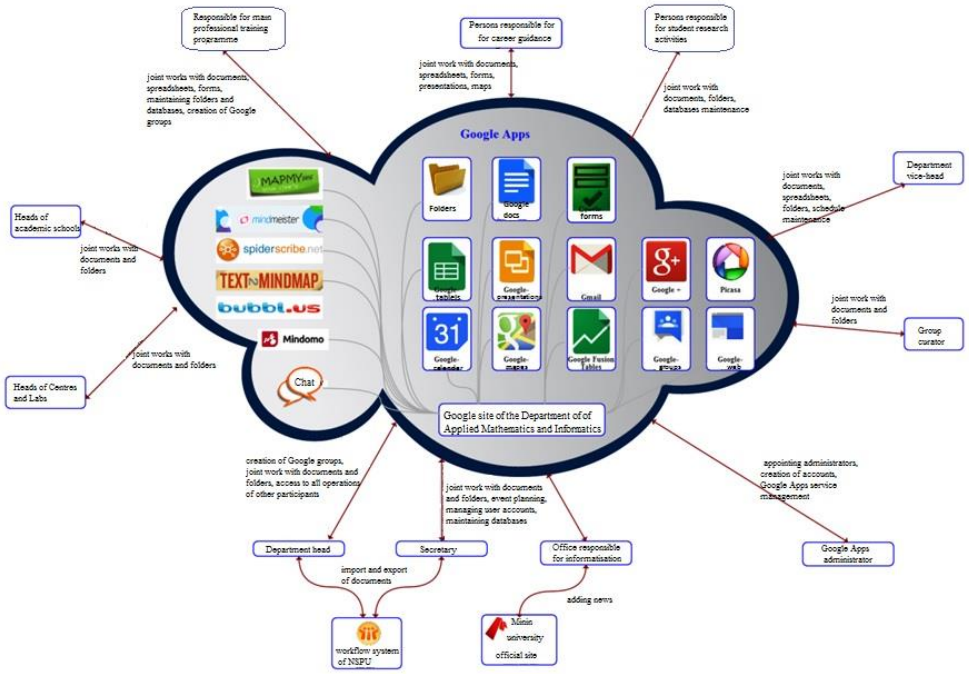

Figure 1. The structure of the ILE of the Department of Applied Informatics and Information Technologies in Education of NSPU.

No less important is the organization of cooperation of students and lecturers

within the department ILE, use of the Google services for the organization of joint training, project, and research activities. An attempt of organising network training, project and research student activities within the department Google Apps-based ILE is described in the works of Ye.P. Krupoderova (2014) & K.R. Krupoderova (2013). Students create portfolios of their creative works with the aid of Google sites, conduct joint "brainstorming" in Google Spreadsheets, draw up joint reports in Google Docs, plan group activities in Google Calendars etc.

During joint network activities an evolutive information environment is generated, which provides conditions, on one hand, for free development of creative personality, activity of participants, and on the other hand, for nurturing collectivism, comradeship and mutual assistance.

Conclusion

Google Apps package is a versatile tool for building information learning environment of a modern higher school thanks to diversity of incorporated services and the option of flexible management of user access to resources.

Due to rapid development of the IT-sphere, today almost any person uses cloud technologies. The principal requirements for work with them are easy to conform with: the Internet is becoming ever more accessible from any device in school and at home; technology market is developing and providing ever more resources, tools, applications, etc., and being unconditionally usable, cross-platform, secure and efficient makes cloud applications even more popular.

Introduction of Google Apps applications based on the cutting-edge cloud computing helps to enhance reliability of data transmission (e-mail, text instant messages, videos), collaborate on documents, perform coordinated planning of university activities by means of shared calendars. As a result of these innovations, problems with mail delivery and spam become non-existent, possibilities for obtaining latest corporate information anywhere in the world are expanding.

Modern computer technologies allow students and teachers to use several devices for communication and work: laptops, computers, smartphones, mobile phones, etc. The services are supported by a variety of devices, so they are a widely accessible and universal IT-technology for work in learning environment.

On the example of the use of Google Apps services for organisation of educational, methodical and scientific work of the Department of Applied Informatics and Information Technologies in Education of K. Minin NSPU, the advantages are showcased of using cloud services for building information learning environment of a modern university and organising effective networking of lecturers for enhancing the quality of educational programmes.

Disclosure statement

No potential conflict of interest was reported by the authors.

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