

## **Simulation of A Cloud Oriented Learning Environment at An Educational Establishment**

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### **Abstract**

The analysis and systematization of scientific and practical experience has made it possible to determine the following: requirements of the pedagogical and student community to the learning environment of an educational establishment are constantly increasing, which is caused by intensive development and active use of information and communication technologies both at educational establishments for solving educational problems and beyond. It is recognized that development of the Internet, transition of the general secondary education to various services contributes to rapid introduction of cloud-oriented learning environment for improving organizational and educational activities of subjects of education, which in the future may lead to improvement of the general secondary education system.

**Keywords:** cloud-oriented learning environment, information and communication technologies, educational establishment, competence, virtual learning environment.

### **Introduction**

The relevance of the study is due to the fact that the requirements are growing for organization and quality of the educational process by the society, new opportunities emerge for comprehensive development of a student in the XXI century, new and more effective information and communication technologies (ICT) are rapidly developing, including cloud oriented learning environments (COLE), introduction of which into the general secondary education system will create the kind of management and training structures that will provide not only unrestricted access to e-learning resources, but also innovative conditions for communication and collaboration to those educational establishments that do not have relevant strong IT divisions, material and technical resources.

In a modern society open to everyone and aimed at development of general secondary education, the key role belongs to the teacher, who is entrusted with a comprehensive development of students, discovery of their potential and formation of a successful person. In addition, it is essential that professional and competent teachers with a high level of motivation work in schools, always ready to help their students. Professional activity of the teacher becomes more complex: new pedagogical technologies are introduced, the content of education is changing, new

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activities are emerging, which in turn requires a systematic development of the IC competence of all subjects of learning.

In recent years, interest in education has considerably improved and educators increasingly turn to the Internet to use ICT to communicate, collaborate and organize corporate work, and rapid development of cloud services has become a leading trend in addressing the educational mobility challenges of all educational process participants.

Solving these problems are socially important tasks of the pedagogical science.

Therefore, the basis of the cloud oriented learning environment is a series of scientific findings reflecting implementation of ICT in general educational establishments.

## Literature Survey

Research on development of the learning environment of a general educational establishment is still relevant.

Interpretation of the concept of "learning environment", specifics of formation and development of learning environment, the importance of this concept for development of education is reflected in the works of scientists: Alsaadani, S., Bleil De Souza, C. (2019); Becker, L. R., Hermosura, B. A. (2019).

In the 21st century, the problem of environmental impact on development and formation of a student's personality becomes relevant, which is associated with implementation of personally-oriented learning.

In accordance with development of informatization of educational establishments, updating of the material and technical resources, emergence of computer classes, opinion of scientists regarding the term "learning environment" develops, and appear varieties characterizing its certain aspects (Yang, D., et al. (2018)).

Thus was defined the term "information and learning environment". The information and learning environment refers to a system-organized set of means of data transmission, information resources, interaction protocols, hardware, software and organizational-methodological software, focused on meeting the educational needs of users (Luo, N., Zhang, M., & Qi, D. (2017)).

Information and learning environment is defined as a set of conditions that contribute to emergence and development of processes of informational-educational interaction between students, teachers and means of new information technologies, as well as formation of a cognitive activity provided components of the environment are filled with proper content of a specific educational course (Raspopovic, M., Cvetanovic, S., Medan, I., & Ljubojevic, D. (2017)).

There are three main aspects of the "information environment": activity, communication, infrastructure (Huda, M., et al. (2017)).

The first aspect is participation of a person in the communication process, who, upon perceiving information, transforms it again into his personal knowledge.

The second aspect is communication, in which the level of education, awareness, human development is coordinated.

The third aspect is the infrastructure that enables communication activities (Internet, publishing, electronic libraries, information centers).

Scientists have identified the main types of learning environment (Machado, M. C., et al. (2018)): dogmatic learning environment (promotes development of passivity and dependence of a child); creative learning environment (promotes free development of an active child); career learning environment (promotes activity and dependence of a child); carefree learning environment (promotes free development and determines a passive life position of a child).

Some scholars (Cebrián, G., Palauand, R., Mogas, J. (2020), Lamb, R. L., Annetta, L., Firestone, J., & Etopio, E. (2018)) emphasize that the network (the Internet) led to emergence of the "network learning environment" concept. Such an environment is characterized by creating connections between people through the use of communication

technologies to achieve learning-related goals. Network learning involves storing and providing various information, email, message boards, software for organizing educational conferences, etc.

The advent of online learning games and simulators led to emergence of the concept of "virtual learning environment" (VLE) - a software system designed to support the process of distance learning with the emphasis on learning, as opposed to a managed learning environment, which is focused on managing the learning process. To create such an environment, it is typically necessary to use the Internet which provides assessment tools (in particular, an automatic assessment, e.g. a multiple-choice task), communication, downloading materials, returning assignments to students, peer evaluation, managing student groups, collecting and organizing assessment of students, surveys, etc.

## Methods

To solve certain problems, a number of methods were used, in particular theoretical, methods of systematic and comparative analysis of pedagogical, psychological, philosophical, sociological scientific references, methodical, specialized literature to determine elaboration of the problem of designing a cloud oriented learning environment of a general educational establishment; legislative and regulatory documentation on development of general secondary education; analysis of pedagogical experience of using cloud oriented learning environment in education; synthesis, generalization and conceptualization for formulation of main provisions of the research; designing and modeling of cloud-oriented learning environment of a general educational establishment as a set of related components.

## Results

To ensure functioning of education as a basis for sustainable development of a country, its competitiveness at the international level, it is necessary to ensure creation of new forms of organization of educational activities, transformation of organizational and educational practices, technical adaptation to new conditions of existence and activity.

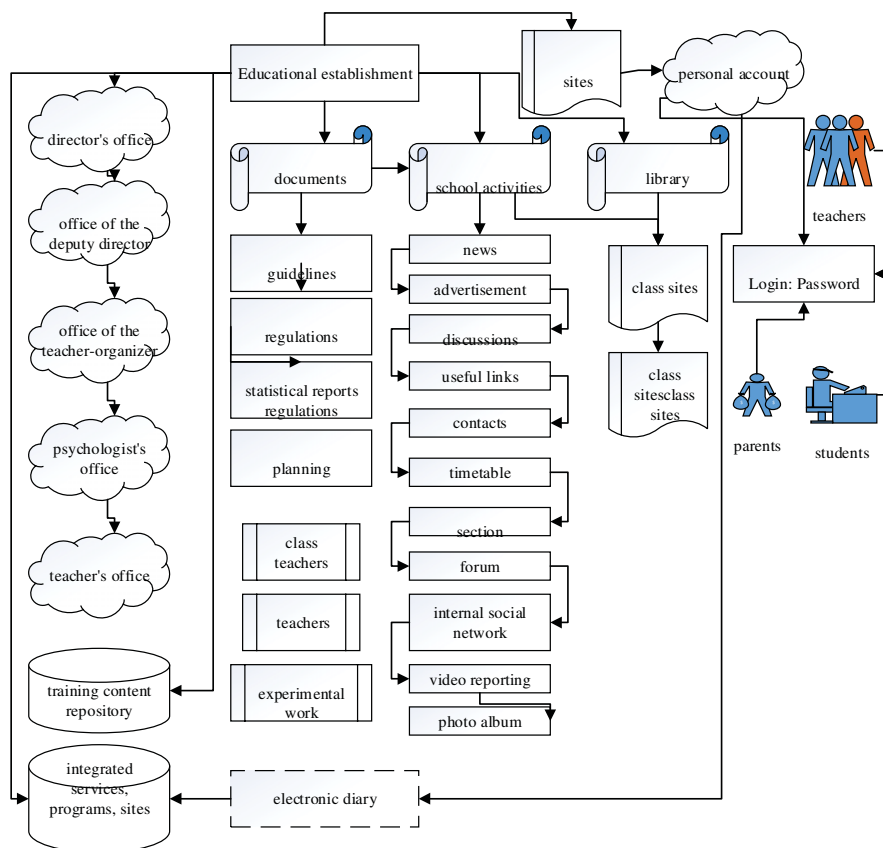
An effective cloud oriented learning environment is developed on the basis of relevant policy of a general educational establishment, which defines basic aspects of comprehensive development of a student's personality and provides educational activity, is pedagogically balanced, creates conditions for educational mobility, develops IC competence, forms 21st century skills with the subjects of education and relies on both general scientific and specific principles and approaches.

Cloud computing is a progressive and promising solution, one of the elements of the revolutionary third IT platform. Its rapid spread is now a key trend that in the coming years will significantly affect the global development of education in general and secondary education in particular.

Today, it is obvious that even compared to the grid systems, not to mention the previous generation "hardwired" networks, the cloud service architecture is much more concise, more productive and less expensive.

First, cloud computing can significantly reduce capital costs for building data centers, purchasing server and network equipment, hardware and software. Most of these costs are borne by the cloud service provider. Additionally, a user saves on keeping IT staff and administration.

Second, cloud technologies provide the ability to quickly change configuration of the corporate IT infrastructure based on current needs, consuming (or buying) as many resources as needed at a given time. Cloud resources are usually enough to order a virtual "supercomputer" or infrastructure for a large corporation, and there are no problems with software updates (the latest versions are always available), compatibility of different operating systems.



**Figure 1: Space-semantic component of cloud oriented learning environment (COLE) (author's design)**

Third, cloud services literally allow to "carry one's workplace with oneself" – if a proper gadget is available and there is access to the Internet, a user, regardless of his location, always has access to his own virtual computer, corporate networks, databases.

Fourth, the range of services offered by manufacturers and providers of cloud solutions is constantly expanding. Usually, their range is fully in tune with the ever-increasing capabilities of modern computer technology.

Significant cost savings for software acquisition; availability of resources regardless of location, type of computer hardware, and operating system; increasing opportunities for collaboration and communication; reducing data storage and backup issues – all this takes secondary education to a new level of development.

Along with the widespread adoption and development of cloud technologies, there is a problem of pedagogical design and development of a cloud oriented model of a learning environment for a general educational establishment and the use of Office 365 capabilities to ensure educational mobility of all participants in the educational process.

In the process of designing a cloud oriented learning environment, its structure and components play one of the most important roles and determine its internal organization, interconnection and interdependence between components, which determines its further use by subjects of educational activities of different ages, with different levels of educational achievements and IC competence.

Designing such COLE component as space-semantic (Figure 1) is aimed at taking into account capabilities of the above components, which will ensure functioning of the learning environment of a general educational establishment and create conditions for universal access to objects.

## Discussion

Such components include a training content repository that is filled with electronic educational resources and can contain a number of elements:

electronic textbooks that include theoretical material, a glossary, as well as topics of laboratory and practical works, sample control questions;  
lesson plans and practical assignments;  
assignments for an independent work;  
assignments for a final academic assessment;  
various instructions for laboratory works;  
electronic data bank of test forms;  
mini-tutorials and reference notes;  
links to online resources and additional services;  
additional training materials (textbooks, manuals, journals, etc.).

## Conclusion

At the present stage of development of general secondary education, it is necessary to ensure functioning of the learning environment, which makes it possible to implement conditions for educational mobility, communication, collaboration and cooperation between the teacher and the students. It is necessary to introduce such models of learning environment that would allow to satisfy the needs of teachers for organizing and conducting lessons of a new type, activating students' learning activities, forming IC-competence and comprehensive development of creative personality. Such opportunities are provided by the use of a cloud oriented learning environment.

Creation of cloud oriented offices for subject teachers and filling of information repositories is a means of managing normative-methodical, didactic provision of activity of a regular school, contributes to mobility of all participants of the learning process, improving quality of education.

The model of integration of various services allowed to analyze directions of prospective development, forms of combination of various services and methods of their integration in COLE.

A necessary prerequisite for learning by means of COLE is implementation of a personally oriented educational paradigm. It doesn't need to absolutize standard teaching methods. Specifics of planning subjects' activities in COLE are determined by different aspects of the learning process and by three frames of access (shared, group, personal).

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