Information Educational Environment of a Technical Higher Educational Institution

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Abstract

Society periodically faces the requirement of high-quality changes of educational system, the educational environment. The problem of higher educational institutions includes intensive updating of the educational environment, tools, educational technologies and integration of infrastructure. System approach is necessary for development of the educational environment of a higher educational institution. For society on knowledge not only observance of requirements of educational standards, but also motivation of the identity of the student to professional self-development are important matters. Researchers try to consider environment conditions (evolutionary potential) and conditions of students (motivation). Self-development of the technical specialist – a part of his professional activity, a way of independence in professional community in this activity. Self-development – activity of the person in disclosure of personal potential. Information and the educational environment of a technical higher educational institution form directly knowledge, personal qualities of the student.

In this article the system analysis of a problem of creation, structure, contents and updating of information and the educational environment of a technical higher educational institution is made. It is considered that the environment is innovative, stimulates pedagogical qualities. She unites educational resources and tools, technologies of management of educational process. In a technical higher educational institution a creative component of training - the corresponding part of training. Creative, competent technical specialists are required for society. Society wants to use the personified adaptive strategy of support of creative activity. The system analysis of a situation, the description of some methods of development of infrastructure of a technical higher educational institution and also the choice of strategy of self-training of the student are made in article. In her both strategic, and tactical targets of the technical higher educational institution participating in development of electronic economy are considered.

Decisions which have to provide, in particular, development scientific and methodical, information and communication resources of infrastructure of a technical higher educational institution in situational modeling are provided. Some applied decisions are described.

Keywords: *Information, Educational, Technical Higher Educational Institution, Infrastructure, Self-Development, Motivation.*

1. Introduction

Development of education requirements of society leads to growth of requirements for training of the expert, his knowledge. In higher educational institutions there is an intensive updating of the environment of the tool, educational technologies. There is an integration of educational and scientific resources, the rate of integration of scientific and applied problems also grows. Are especially important problems - problems of cross-disciplinary character which develop the educational environment of a technical higher educational institution?

Higher educational institutions have to turn on new approaches to professional education. Not only the fundamental character, observance of requirements of educational standards, but also and development of the identity of the student are important. His motivation to professional self-development, all life education is important.

Researchers focus attention on professional activity, considering a condition of the environment and students: Kalimullina A., Islamova Z. [1], Nahid S. Bidabadi, Ahmmadreza N. Isfahani and Rouhollahi A. Khalili [2], Anderson A. [3], Klug J., Bruder S., Kelava A., Spiel C., Schmitz B. [4], Ostroumova E. [5], Dooge J. [6], Khnyfr H. [7] and others.

There is no unambiguously understood category "information educational environment of a higher educational institution". Often, she is connected with the software, procedures which imitate educational processes with assessment of options of use of new educational technologies.

2. Problem statement

Continuous self-development of the expert – the most important part of professional activity. It is the modality of action in professional community directed on self-development. Self-development – category of pedagogics, it is defined as activity of the person in disclosure of the opportunities, personal potential [8]. Information and the educational environment of a higher educational institution - the educational infrastructure surrounding educational process, students, teachers in which personal professional qualities are formed. From the point of view of provisions of the system analysis [9] it is a set of dynamic educational situations which provides realization of model of professional and personal self-development of the student, future expert, professional [10].

For the system analysis of a problem we will offer understanding of the information and educational environment of a technical higher educational institution as the innovative pedagogical environment

uniting educational process, information and communication resources, tools. They include also technologies of management of educational process, formation of intellectually developed, competent creative person. In a technical higher educational institution, the creative component of training must be formed – and it is important. Not only competent engineers, technical specialists, but also creative competent professionals are necessary.

Problems of the system analysis of the information and educational environment of a technical higher educational institution, his educational potential, consider subsystems, components, resources:
1) information and education (libraries, web classes and web laboratories, educational and methodical digital providing, testing and other tasks, creative projects and others);
2) the computer, network (the equipment, programs, the interface, the automated system of training, control and others) [11];
3) management of training (educational and methodical modules, courses, technologies of training, organizational principles and others);
4) self-organizational (self-preparation, self-training and others).

It is important to consider the possibilities (managements, training, technology, etc.) which can't be reached in traditional education. For example, development of algorithms of the solution of intellectual, inventive tasks (TRIZ and others) – everything that has to be developed in an innovative higher educational institution [12]. The problem facing the information and communication environment of a technical higher educational institution consists in compliance to evolutionary needs of all students and teachers. It is necessary to consider requirements of modern production necessary for this purpose for electronic economy. The personified adaptive strategy of training, the systems of support of creative employment of students are necessary [13].

3. Research objectives

Strategic objectives of our research:
1) a research of methods (techniques) of activation of creative abilities, for example, testing (uncommon, research, training to decision-making);
2) situational modeling;
3) application of brainstorming, Delphi method (training by him);
4) analytics (including and to web analyst);
5) application heuristic and expert procedures, etc.

It is necessary to develop independence, self-training with use of intellectual systems, the training systems. Skills independently to be guided in the education environment, they to choose is adaptive the strategy of self-training for the student – an important part of vocational training, adaptation in society   [14].

The following main tactical targets are considered for achievement of strategic objectives:
1) the adaptive testing (training, controlling, certification);
2) ability "to take root" harmoniously into the unfamiliar remote electronic educational environment [15];
3) formation of a self-assessment of students;
4) adaptive management of process of training, self-training (diagnostics, adjustment, simulation);
5) situational creative modeling.

Our purposes are directed to realization of professional and personal self-development of future engineer, technical specialist. Speed of changes of technical knowledge requires from technical higher educational institution effective solutions on preparation, retraining of [16] experts capable quickly:
1) to adapt, to study independently;
2) to think critically, to see problems, ways of their effective decision on the basis of modern technologies;
3) to take, process, statistic information sufficient for the solution of tasks;
4) to work with experts of various directions and levels in one team.

4. Research methods

Mobility, dynamism, updating "on the fly" educational resources, distance learning, the distributed access to resources, educational resources in clouds, data processing centers, personalization of educational model, continuous formation and updating her support to IT – necessary signs of a digital stage of development of a higher educational institution [17].

The methods used in article - pedagogical, psychological, neurobiological, technological, the system analysis, the mathematical analysis and others. State standards and programs of training are supported. Innovative, author's methodical courses, for example, "Applied programming of systems of electronic economy and business" are considered.

Technical aspects, the software, methods of activation of infrastructure are also very important. For infrastructure of a technical higher educational institution subsystems are key:
1) servers (the file, mail, network, network protocols, distance learning, local area networks, classes, multimedia support, for example, teleconferences during the work on discussion of the creative project, educational television, etc.);
2) switchboards, switches, network intermedia, video surveillances, scientific and educational laboratories;
3) open software products as "Server of electronic training", "Participant", "Student", "Testing of educational progress", "Flow of the electronic document", "Office of electronic training", "Branch of a higher educational institution", "Big data", "Cloud computing", etc.
4) specialized packages ("Moodle", "1C", "Consultant Plus", etc.).

5. Results of a research

As a result of the comparative and system analysis of a problem, the following results are received:
1) a system concept of category "information and educational environment of technical college" which is connected with educational processes, options of use of new educational technologies;
2) classification of problems of training of the strategic and tactical plan has focused on problems of training of technical specialists of electronic economy;
3) not only mobile devices, BYOD methodology, but also and mobile programs of training, educational research groups are necessary;
4) scientific and methodical, didactic and software of infrastructure of a technical higher educational institution.

We will consider results of the last point in more detail.

First, the complex of situational test tasks for support of the training imitating modeling by students of a technical higher educational institution is developed. For example, for the forecast of consequences of technogenic operations which are performed by the person (especially, negative). In them it is impossible to make mistakes as they can lead to harmful consequences ("point of no return"). Because of limited information opportunities of the person of a mistake are possible. Therefore, it is important to train students in situational modeling to predict various situations, to make the decisions connected with the organization of work, information assessment, the choice of the best option. To train in constructive actions for achievement of the goals. Technical solution more effective if less the cost of expenses is high probability of achievement of the goal. It also defines full value of the decision.

We will carry out the state-of-the-art review of popular tool systems for creation of educational infrastructure of a technical higher educational institution.
1. Moodle (Modular Object-Oriented Dynamic Learning Environment) – the popular, freely extended object-oriented modular learning management system providing the distributed access for users [18]. Is suitable for distance learning, support of resident instruction. Training materials are created in the visual

environment where only the sequence of studying of discipline is set. Individual tasks, educational elements, projects, webinars log in.

Moodle works on "the client-the server" technology. The administrator or the teacher places material on the server, students work with him on the computers. In infrastructure of a technical higher educational institution on the basis of Moodle it is possible realized the portal of distance learning. The standard of paperwork of XML is supported.
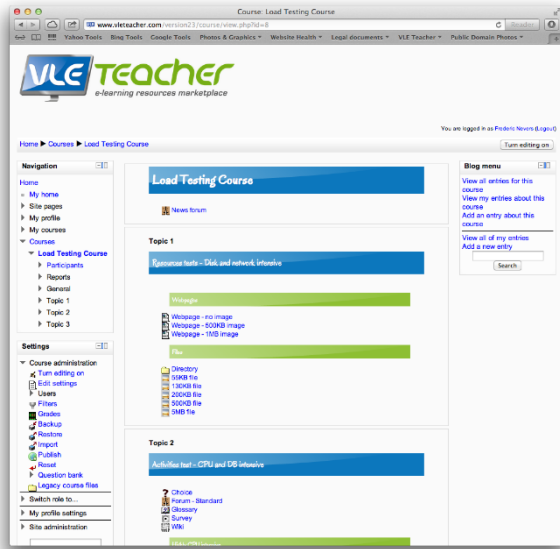
As the universal system, Moodle possesses also a shortcoming: it is difficult in development and use. She concedes to the German similar ILIAS system which is based on Apache, PHP, MySQL, XML.

2. Lotus Learning Space – a development tool of the multimedia training courses. The basic package consists of the following modules of lists, library of multimedia, information on participants (summary), the tutor (testing, assessment, recording).

"The client – the server" is based on Notes Server technologies, the hypertext. Hypertext pages can be received from the server any Web browser (Internet Explorer, Netscape Navigator, etc.). Therefore, it doesn't demand additional training.

The Learning Space package can support three ways of training:

1) independent, without tutor and control (educational content is on the web server);

2) with use of the forum Lotus Learning Space Forum (instant messaging, a chat, sharing of documents);

3) in a virtual class, in real time, using technologies of transfer of video, audio-information on the Internet (the client – Java applet functioning in the user's browser).

The family of the Learning Space programs is based on Lotus Domino. The Domino/Notes technology allows to store diverse information: text documents, graphic files, spreadsheets, etc. The Domino server provides collective access to these databases, irrespective of an access point.

The tools which are built in Domino/Notes for work with documents, the technology of databases of collective access and e-mail create the general universal environment for training automation, develop multy platforms (Windows, Macintosh, UNIX, etc.) infrastructure of technical college. Has multilevel means of protection, differentiations of access, authentication and enciphering, scaled (more than ten thousand of at the same time working users, there are no difficulties with expansion of infrastructure of higher education institution), etc.

The teacher himself forms structure and the schedule of a training course. The Media Center module – the database of educational multimedia content. The student performs tasks, gets access to content, including, out of Learning Space. The teacher provides the required training material, forms information filling of the module, structures educational content, adds new materials to the module.

The Course Room module – the environment of collective work on projects, especially important part for technical specialties. Allows to choose confidentiality levels, supports communication of teachers, students. For example, the student can answer questions, send to the tutor of a task, receive comments.

Profiles (Profiles) – databases with personal home pages of students and teachers.

The Assessment Manager module – the module of teachers, development of tests and tasks, trackings of results.

3. Tool Book – a tool for the training multimedia-applications. Consists of the following tools (modules): interactive content (HTML, JavaScript), visualization of content in Windows applications, interactive behavior of pages.

Has the built-in language of scenarios for development of interactive content which allows to use languages of high level. By means of the module of interactive content it is possible to create tests, then to build in them educational content, to test. There is also a set of standard tests which are easily built in the created content.

This module supports many various formats of multimedia, for example, of Flash, Windows Media Player.

In the Multimedia Tool Book system there is an opportunity to create hypertext applications and a prototype of future project, the software product. Design and prototypes allow to test products at early stages of development.

Teachers by own efforts can create individual programs of computer training.

4. eLearning Office – the environment for development of multimedia of textbooks, the presentations, etc. The package consists of three modules:

1) creations of electronic textbooks and grants;

2) creations of remote training courses (Lectures, Dictionaries, Tests);

3) managements of interactive web lectures, seminars, conferences. The section Tests turns on modules of interactive testing of knowledge, including multimedia fragments, graphic objects (with a testing verification regime). The teacher puts down marks, controls answers.

The client server technology is used, has five levels of access: Administrator; Dean's office; Teacher; Trainee; Entrant.

5. Media View – the popular development tool of multimedia applications distributed for free. The package consists of three main tools:

1) libraries of different function, for example, programming of proprietary applications;

2) compiler;

3) editors.

Media View supports the main technologies: hypertext, multimedia, hypermedia, full text search, etc.

There are also other similar systems. For example:

1) tTester – the wednesday allowing to create and edit tests, supporting Drag and Drop technology;

2) ACT-Test – the wednesday, adaptive testing on the basis of OLE technology, multimedia, with functions of verification, identification, import-export, scaling;

3) Auto Tutor – the dialogue environment with the training pedagogical agent (interlocutor);

4) NetOp®School – a package for creation of training materials, tests, the systems of assessment of knowledge, etc.

For integration of "agents of training" into educational infrastructure of a technical higher educational institution it is possible to use a number of standards. For example, Extensible Markup Language (XML) (language of creation of the structured documents), Resource Description Framework (RDF); Ontology Web Language (OWL), etc. For these purposes also distributed models with equal knots without obvious use of client server technology, multi-agent P2P-models serve ("point-to-point" models, "person person").

6. Conclusion

It is important to develop interest in creative studying of situations, processes on the basis of the curiosity covering all aspects of a profession – from special knowledge and stimulating training all life. Technical higher educational institutions have to experiment with flexible programs, settings by the formed ("scalable") adaptive methods of knowledge.

The information environment, infrastructure of a technical higher educational institution has to give to each student chance of the separate choice of additional creative works on all objects, personally prove correctness and efficiency of the choice. The analytics which is considered by us and the concepts offered by us are directed to form the person, professionally competent, cultural in every respect, with own, correct professional prospect. Only such expert will be able to compete in dynamic labor market.

The educational information environment is beyond educational institutions, services. It is useful also in the large companies, at the enterprises occupied with performance of preparation and professional development of personnel.

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