

MODEL OF PROFESSIONAL DEVELOPMENT OF STUDENTS ON THE BASIS OF NETWORK AND MULTIMEDIA TECHNOLOGIES

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Abstract

The research is acute due to the mainstreaming of innovative teaching methods into the educational process of a higher school based on the modern educational network and multimedia technologies. The article presents a structural and functional model of professional development of HEI students with the use of network and multimedia technologies and reveals its main components. It considers functions and peculiarities of network and multimedia technologies when teaching vocation-related subjects to the mathematician students. The work uses the techniques of theoretical and empirical study. It presents and analyses the results of model testing and experimental teaching of mathematical subjects to the students.

Keywords: network technologies, multimedia technologies, professional development, educational process, higher education, student.

1. INTRODUCTION

The modern stage of development of the world society raises new strict requirements to the level of the preparation of any specialist. The aim and the tasks of education are changing, as well as technologies used in the educational process. The greater part is assigned to the modern training resources based on the network and multimedia technologies which represent a system of hardware and software allowing user's communication with computer combining different media (video, sound, graphics, text, animation) in the net.

The analysis of the research results content devoted to the problem of using network and multimedia technologies in the educational process allows making a conclusion that the pedagogical sciences, especially Russian teaching practice, underestimate the opportunities of e-learning systems, including multimedia ones.

The change of representation of the learning material determines the structure and the content of a new generation of learning and teaching provisions where the main role is played by e-learning materials, as well as a distributed information resource of local and global networks (Robert, 2008). Mobile learning connected

with such technologies is gaining popularity at present time; its main advantage is a possibility to use mobile devices for learning, at any place and any time (Bondarouk and Ruël, 2011). An opportunity of immediate access to information necessary for the solution of a definite learning task with the help of mobile devices allows improving efficiency of the learning process (Toktarova et al., 2015).

It confirms the primary importance of the use of network and multimedia technologies when arranging learning session.

2. NETWORK AND MULTIMEDIA TECHNOLOGIES IN PROFESSIONAL TRAINING OF STUDENTS

2.1. Multimedia technologies in the learning process

The term 'multimedia' is formed of the words 'multi' - a lot and 'medium' - environment, transmitter, communications means, and in the initial approximation it can be translated as 'having a lot of environments'. The word 'multimedia' has two universally recognized meanings.

First, *multimedia* is a modern computer information technology which allows combining text, sound, video image, graphic picture and animation (animated cartoon) in computer system; and second, it is a sum of technologies which allow computer to input, process, store, transmit and display (output) such types of data as text, graphics, animation, static digital images, video, sound, speech (Lebedev, 1999).

Such dual meaning of the term indicates that multimedia is primarily a technology of preparation and presentation of information to the student with the help of computer, i.e. the method of preparation of e-documents including visual, audio effects and multiprograming of different situations under single control of an interactive software.

Main multimedia components are (Fig.1):

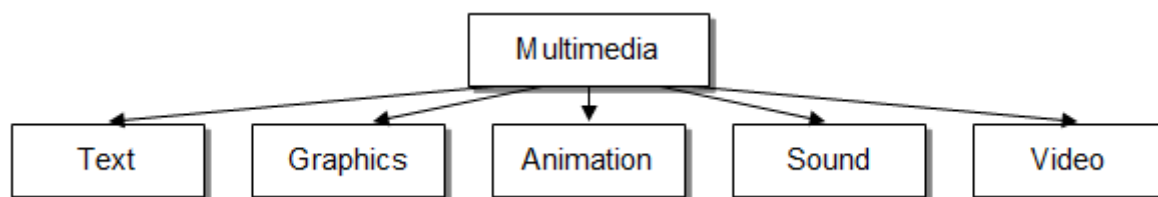


Fig. 1. Multimedia components.

Text. Textual content takes a significant and dominant place among learning communication means, including e-sources. Texts are a tool of thinking, a human being thinks predominantly in the form of 'text'. This circumstance makes the text (including oral text) an irreplaceable multimedia object.

Graphics. The use of graph images in the learning process not just increases the information transfer speed among the students and improves the level of understanding, but also provides the development of such qualities as intuition and visual thinking. There are two graph functions: illustrative (allows embodying in a visual form what exists in the surrounding world or in the researcher's head as an idea) and cognitive (with the help of an image to get new knowledge which does exist even in a specialist's head, or at least to promote an intellectual process of receiving this knowledge).

Animation. It is giving an ability to move or visibility of live to the objects. A teacher gets an additional opportunity to focus student's attention on the necessary object or the process, to enliven the lesson and in some cases to speed up the memorization procedure.

Sound. Training recordings intended for self-guided work are the most efficient for studying. In general they are materials recorded by the teacher using sound-recording devices.

Video. The usage of video materials serves for presenting knowledge, as well as for their control, consolidation, reviewing, compilation, systematization and, therefore, accomplishes all didactic functions successfully. The usage of video materials is predominantly based on the visual information perception. The efficiency of using the movie clip in the learning process is determined, first of all, by its correspondence to the content of the lesson. Information presented clearly is more comprehensible, as well as easier and faster understood.

Multimedia, implementing the clarity principle, allows effecting visual, audible and speech perception at the same time increasing the level of efficiency by means of implementing comprehensiveness.

Jan Amos Komenský in his fundamental work 'Large Didactics' wrote, "The golden rule for the students is the following: everything what can be imagined for sensory perception, in particular visual - for visual perception, audible - for auditory perception, smell - for smell perception, taste - for taste perception, subject to touch - for touch perception. If any objects can be perceived by several feelings at the same time, let them be covered by several feelings" (Komenský, 1989). Multimedia possibilities allow implementing the key approach in practice, which is proved in classical didactics as a complex perception of the training material by all organ of senses.

Main advantages of using multimedia technologies in the educational process are

- increase of visibility of the material demonstrated and, as a consequence, simplicity of perception and acquirement;
- imitation of real processes and possibility of creating the virtual environment of inaccessible reality;
- possibility of visible modeling;
- increase of interest (motivation) in studying;
- possibility of interactive communication with the user;
- development of visual thinking;
- increase of personalization of the educational process;
- activation of the learning process.

2.2. Network technologies in the learning process

At the present stage of the development of world society in the field of education great attention is paid to the integration of opportunities of multimedia and network technologies.

Network technologies are Internet-based technologies needed to provide students with learning and training materials, as well as for interactive communication between teachers and students (Polat et al., 2004).

Network technologies allow changing the relation to the getting of education and the necessity of continuous increase of the cultural and educational level during the whole life (Greshilov, 2008). Main capabilities of the network technologies are the following:

- development of a system of distant and open learning and the accessibility of education;
- unlimited opportunities for collection, storage, transmission, conversion, analysis and application of different information;
- development of student-centred education, additional and forward-looking education;
- increase of participants' activity in the arrangement of the educational process;
- provision of continuous education and lifelong learning;
- significant extension and perfection of the organizational and methodological arrangement of the educational process (virtual schools, laboratories, universities, other);
- provision of opportunities of individual learning path;
- development of the independent creative search activity of a student;
- increase of motivational side of learning;
- independence of an educational process from the place and the time of learning.

The Internet and its different social services allow an efficient implementation of these advantages in practice.

Numerous investigations of didactic capabilities of such services showed that the use of network technologies can help to implement all the constituent components of the educational process effectively: information (presentation of theoretical training material), practical (work with learning material directed to activation and strengthening of the skills received), communicative (discussion of the learning material, implementation of the joint learning activities and feedback with the teacher, consultancy) and evaluation (intermediate and final check) (Chernyak, 2007).

Main network technologies oriented to the use of network communities are the means for bookmark storage, social network services for storing multimedia services, blogs, WikiWiki, social geoservices allowing to arrange the joint work with different types of documents, knowledge maps, webinars.

Means for bookmark storage allow the users to store the collection of their bookmarks-references to the web-pages. References can be added from any computer connected to the Internet and they will be accessible from any computer connected to the Internet as well. Private network collection of references to the web-pages is a part of a group collection gathered by all participants of service users. They can be used in the pedagogical practice as a source of learning materials, storage of the references to the learning materials.

Social network services to store multimedia resources are Internet means which allow free storage, classification, exchange of digital pictures, audio and video recordings, textual files, presentations, as well as organizing the discussion of the resources. They can be used in the learning process as a source of training materials, to store video, picture and audio archives and creative works, for joint learning activities. The teacher can post files to such services which are intended for tasks doing, or the students can post the finished works for grading.

Blogs is an Internet service which allows every user to make any notes. Blogs give great opportunities to reflect a theoretical component of the course. The usage of blogs allow showing such functions as communicative, self-presentation, unity, self-development or reflection. Blogs are the sources of the training materials which were published by the teacher in advance using the program for organizing discussions (seminars) on the topics of the curriculum program, as well as the program for control based on the publications and discussion of works and tasks of the students.

WikiWiki is a means of quick creating and editing the collective hypertext. It can be used to present and announce the materials, to create joint virtual excursions, to create collective creative works, students' encyclopedias, to hold local and network seminars.

Social geoservices are Internet services which allow finding, marking, commenting, supplying with pictures different objects in any place on the image of the Earth with high enough accuracy using real data received with the help of near-Earth satellites.

Social services which allow organizing the joint work with different types of documents are integrated Internet services oriented toward the arrangement of joint work with textual and tabular documents and planners. They can be used in the pedagogical practice to transmit theoretical materials, materials for practical works and students' knowledge control.

Knowledge maps allow structuring information, singling out the reference terms, modeling the interactions between them providing better acquirement and memorization. They can be used in the pedagogical practice at the stage of knowledge updating, in the course of self-guided work with learning materials when checking primary acquirement, in the course of the work on the project.

Webinar is a video conference transmitted via the Internet. The participants of such video conference can see and hear the speaker, as well as ask questions and get answers in online mode. During the webinar all participants see the speaker and presentation materials, hear the speech; they also can ask questions and get answers. And everything happens in online mode. Everything is as during usual seminar, the only difference is that communication occurs with the help of computer.

2.3. Integration of network and multimedia technologies into the educational process

Due to its capabilities, network and multimedia technologies has found application in all main structural components of the learning process which are lectures, seminars, practical lessons, laboratory-based practical lessons, control system, research and self-guided work of students. All these forms of arrangement of the learning process allow materializing into action flexible combination of students' self-guided cognitive activity with different sources of information, prompt and systematic interaction with the leading teachers of the course and students' work in the group.

Taking into account all the above mentioned, let's build a model of the professions training of the students on the basis of network and multimedia technologies (Fig. 2).

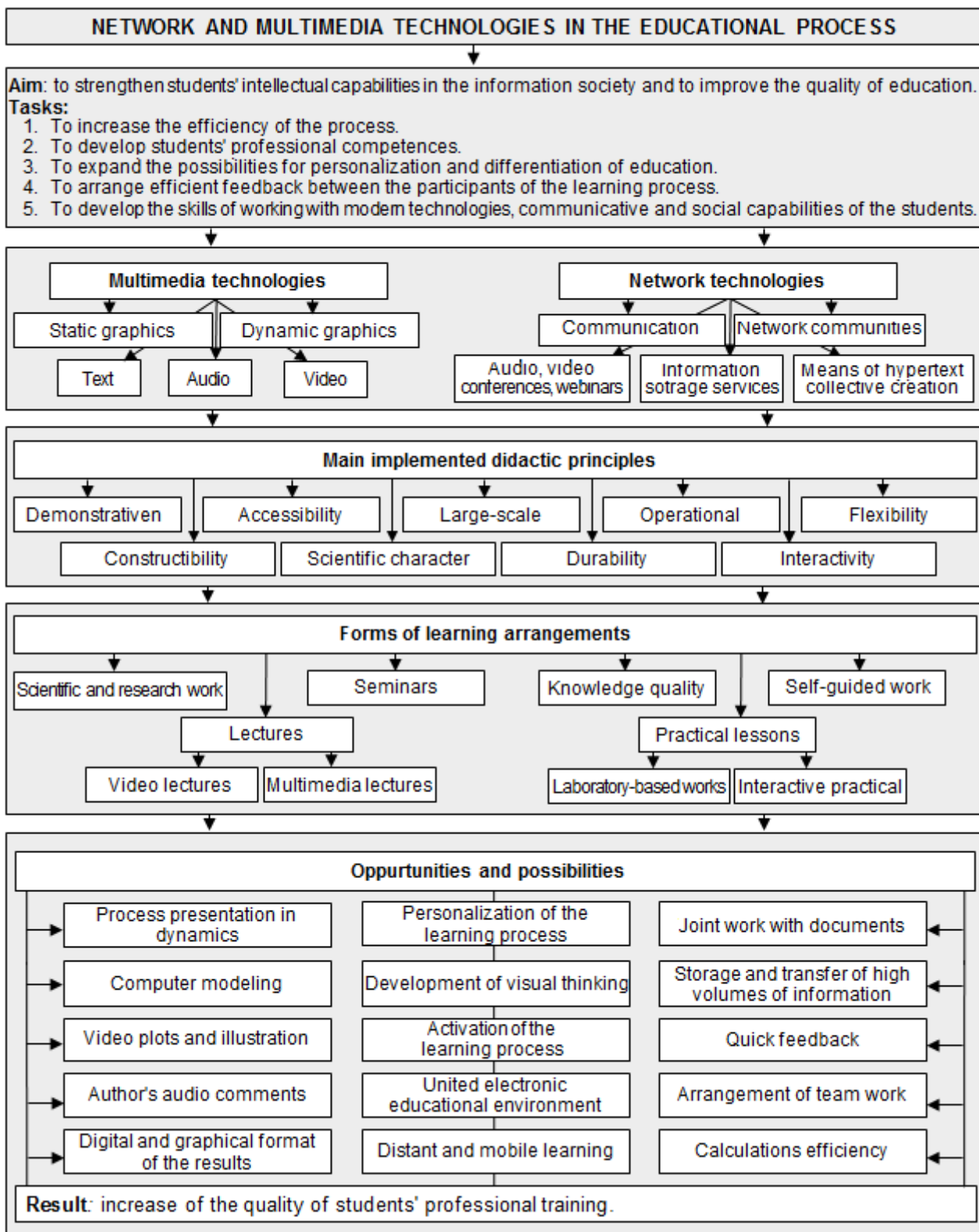


Fig. 2. Model of professional training of the students based on the network and multimedia technologies.

The experimental work and approbation of the model on the student of the majors Mathematics and Applied Mathematics and Informatics detected the level of usage of network and multimedia technologies by the students when doing their homework (Fig. 3).

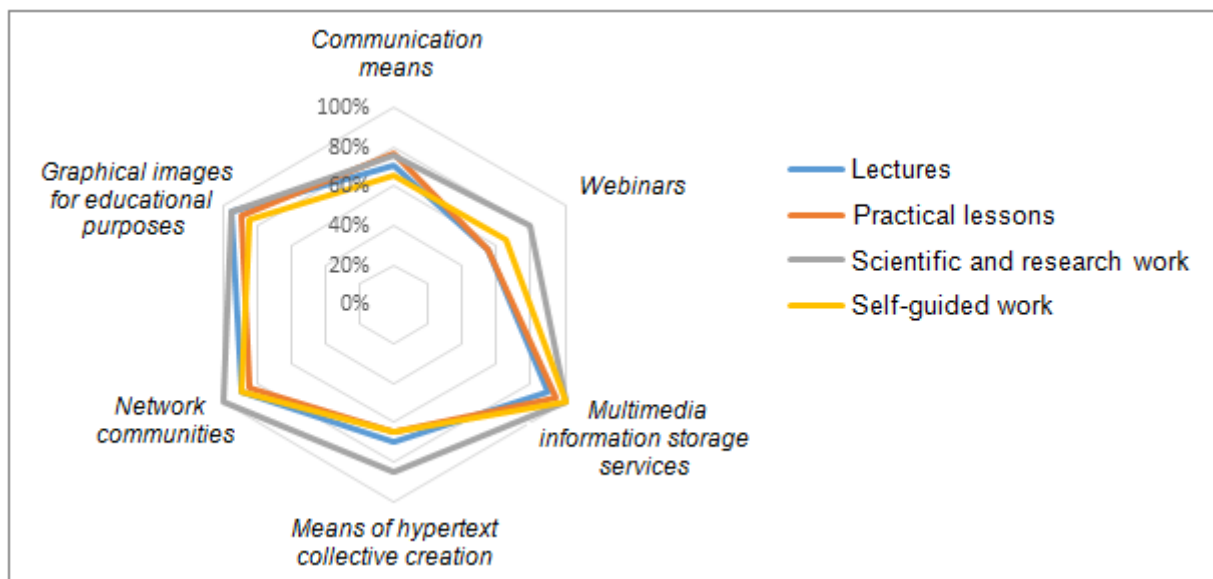


Fig. 3. The level of usage of network and multimedia technologies by the students when doing their homework.

The analysis of test answers and questionnaires allows making a conclusion that the usage of network and multimedia technologies in the learning process has increased the quality of preparation of HEI students in mathematical disciplines. The usage of network and multimedia technologies in the learning process has not just helped the students to systematize and control their knowledge, but also allowed perfecting their knowledge independently which in turn promotes developing of interest to the subject, activates and personalizes the learning process.

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