Development of Innovative Informational and Educational Framework in Technical Subjects

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The paper analyzes the problem of development and introduction of informational and educational framework into the teaching situation. This potential framework is supposed to use both modern information technologies, such as electronic books and educational Internet portal, and innovative methods of distance education, organizational and methodical resources, complex of hardware and software for storage, processing and transfer of data which provide on-line access to the information important for teachers and provide the opportunity for students and professors to communicate.

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The change of state and society educational requirements is caused by modern strategic guidelines in economics, politics and social service development. Institutions of higher professional education have to be ready to meet contemporary conditions with keeping fundamental polycultural priorities available.

To provide necessary conditions for high-quality education there are major priority goals and set of measures for implementing educational policy at all management levels proposed in the "Modernization concepts in Russian education up to 2010", in the "Federal Targeted Programme of education development for 2006-2010", in the project "Russian education – 2020: educational model for knowledge-based economics".

National educational doctrine of the Russian Federation sets the strategy and guidelines of educational system development at the state level, identifies needs for modernization processes in the whole educational sphere.

Impelling need for integration into the world educational system, based on Convention on the Recognition of Qualifications Concerning Higher Education in the European Region (Lisbon, 1997) and Bologna Declaration (1999) ideas, also actualizes educational system modernization. To progress to the next stage of professional education development it is necessary to use innovative methods in education, frequent application of modern information technologies and development of new variative learning models [1-7].

For the educational system to meet modern requirements we have to get through certain reformations based on using modern information technologies. In this respect many scientists connected with educational sphere professionally are extremely bearish on the development and maintenance of informational and educational framework in on-site and distance education,

on development of electronic books and multi-agent techniques in educational Internet portals [1-7].

At Polytechnic Institute of Novgorod State University the "Automobile vehicles" the department staff have developed and implemented the informational and educational framework (Figure1), which uses both modern information technologies, such as electronic books and educational Internet portal, and innovative methods of distance education.

In scientific literature the term "informational and educational framework" has the following definition: it is a software-telecommunication framework based on computer technology deployment and providing students and professors with qualitative information support by means of unified technology vehicles and their interrelated nature. The definition guarantees that such a framework is to include organizational and methodical resources, a complex of hardware and software for storage, processing and transfer of data which provide on-line access to the information important for teachers and provide the opportunity for students and professors to communicate [1-7].

It should be noted that the framework given was developed and introduced into a number of subjects for the specialty 190601.65 "Automobile vehicles and vehicle fleet":
- Fundamentals of reliability engineering and preliminary treatment;
- Technical maintenance of automobile vehicles (Parts 1 and 3);
- Functional software of automobile vehicles;
- There were also introduced some subjects for the specialty 080502.65 "Economics and company management" students:
- Fundamentals of production works and auto service;
- Industry-specific factory management;

Hereafter it is necessary to study the development of informational and educational framework in studies of techniques by the example of the subject "Functional software of automobile

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Figure 1. Here you can see a scheme of the informational and educational framework.

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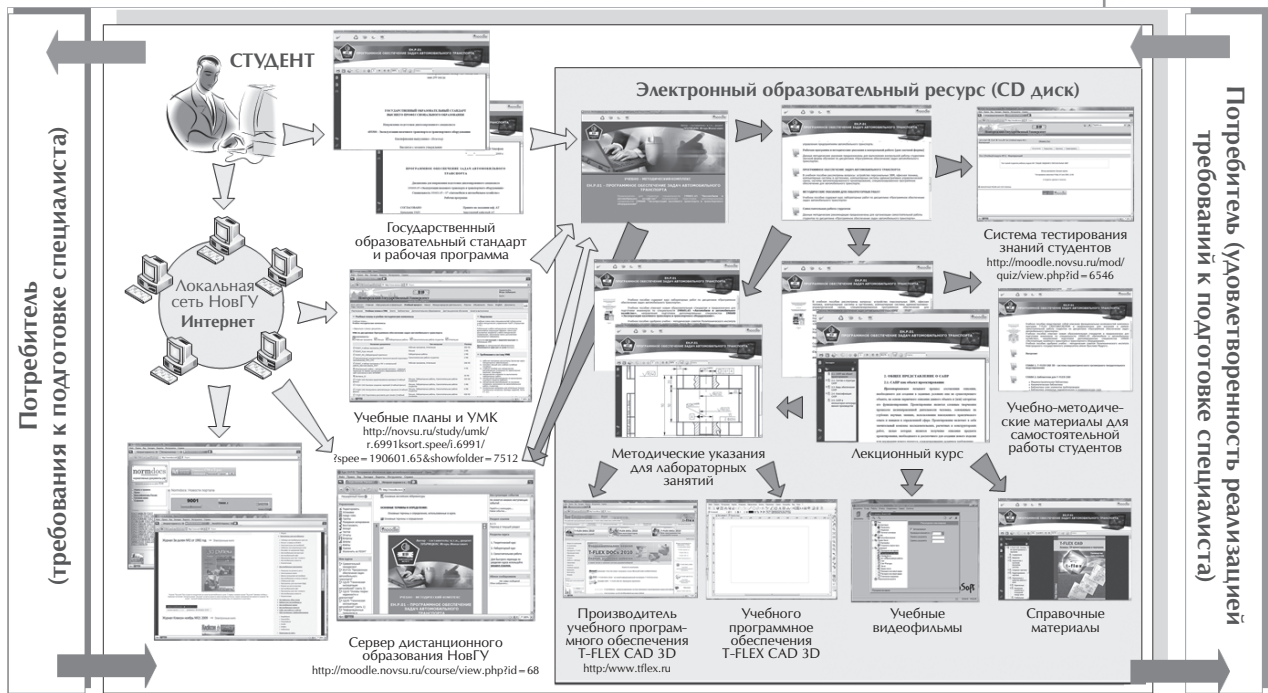
vehicles" for the specialty 190601.65 "Automobile vehicles and vehicle fleet".

The basis of this informational and educational framework is an electronic educational resource – electronic book (Figure 2) – the interlink which unites different educational and informational resources, distance education resources and means of education quality control.

The electronic book represents a compact or digital video disc (CD or DVD) which students can use both at university and at home. The disc appears to be a full-range electronic educational resource consisting of several main parts. These are:

- certain subject syllabus;
- theoretical part which outlines the backbone of the subject;
- laboratory operation manual;
- laboratory tasks with task performance examples;
- information for students' solitary work;
- educational software;
- educational videos;
- references;

The theoretical part represents Package Definition Files (.pdf) which suit technics best due to a great number of formulas and symbols. For the instructors to hold in-class learning there is a presentation file which allows introducing the subject theoretical part to students in layman's terms (Figure 3).

The electronic book has all the properties necessary for academic material, as follows:

- completeness of statement, defined as adequateness to the subject accepted syllabus;
- intelligibility of information statement;
- scientific character of information which represents adequateness of the information to the current condition and the latest advances in the corresponding academic field;
- logic nature and coherence of the information statement;

Moreover, the electronic book has a number of other specific properties, such as:

Figure 2. Here you can see a welcome page of the electronic book.
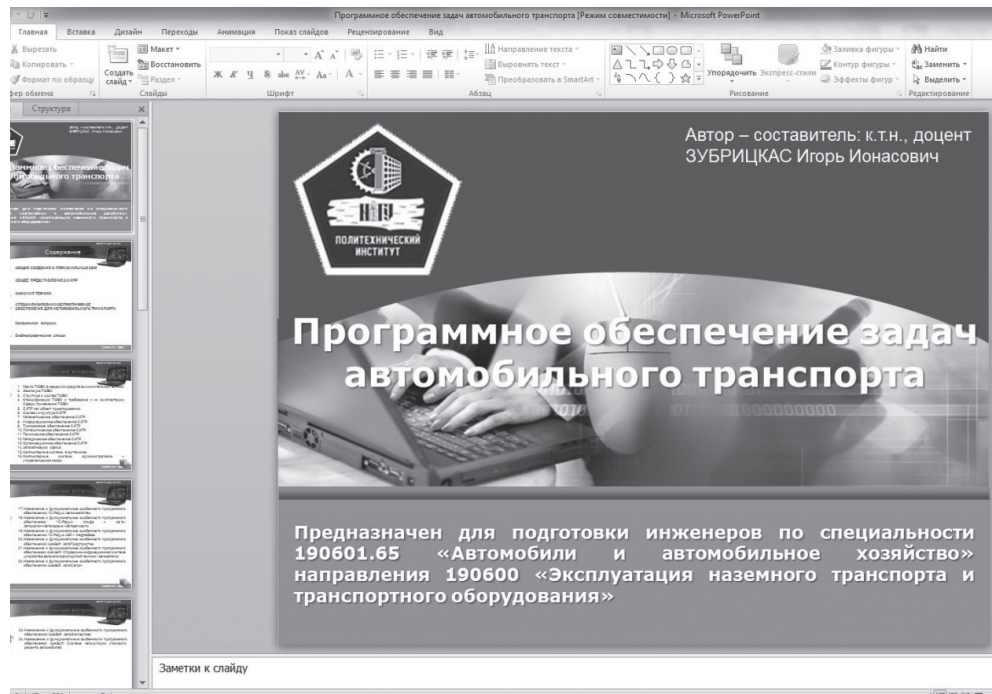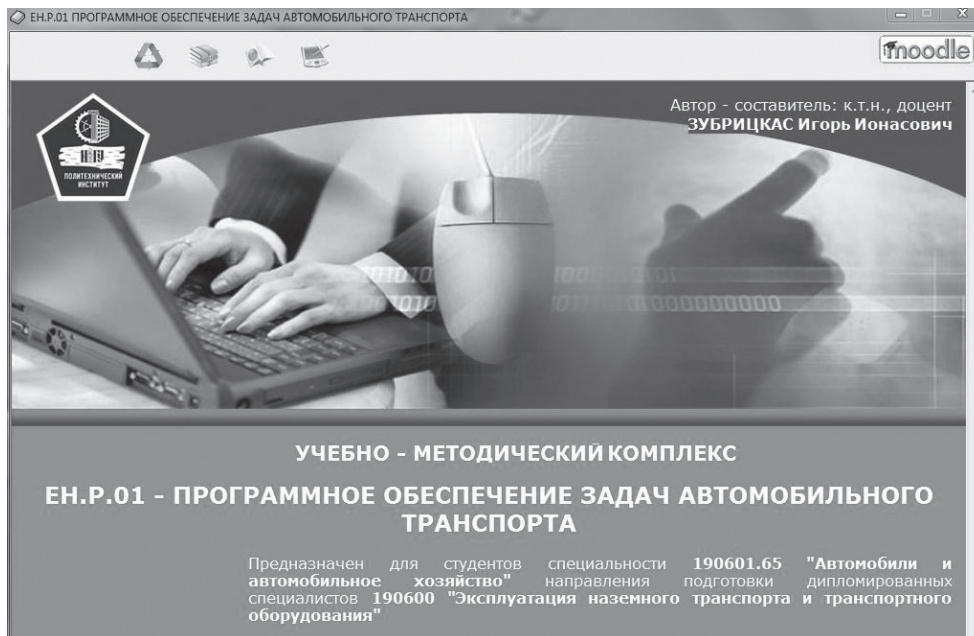
Figure 3. A welcome page of the theoretical part – presentations.

- demonstrativeness;
- interactivity;
- adaptivity;
- intellectuality;

Thanks to combination of the properties mentioned above we can improve speed and quality of the class material digestion, while implementing modern toolbox results allows the teachers to present the material in a needed way and makes the book use easier.

One more strand of this informational and educational framework is the educational portals and their frequent application (here "portal" means a user-centric informational web-system with the unified access point to a wide range of information concerning certain subjects). User access to the portal is possible through the browsers in client PCs. There are two types of educational portals in the educational framework given: firstly, it is Novgorod State University portal itself which grants access to the subject academic material (Figure 4); secondly, it is a   specifically developed educational portal dedicated to the certain subject (Figure 5).

And, finally, there is the third cornerstone in the informational and educational framework - distance education server (Figure 6) which is based on the MOODLE platform and represents a combination of technologies providing:
- students with the main information necessary;
- interactive communication of students and professors in educational process;
- an opportunity for students to master the subject material independently and while studying;

Modern distance education uses the following basic elements:
- information-carrying media (e-mail, information and communication networks);
- the ways dependent on the information sharing engineering environment;

Figure 4. Here you can see the portal of NSU – the page is dedicated to the curriculum and academic material of this university.
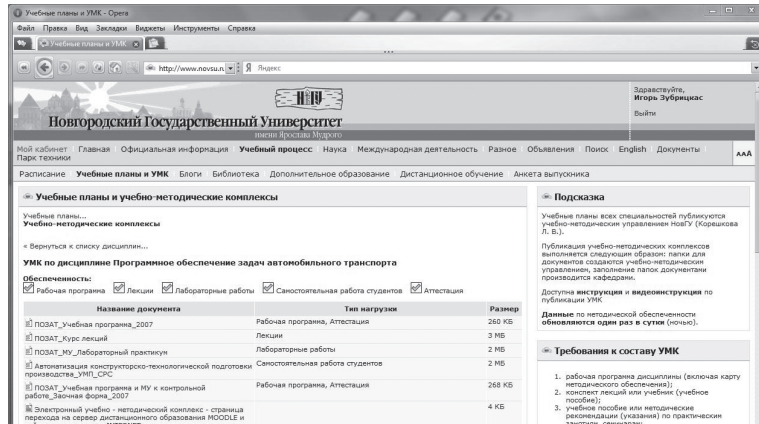

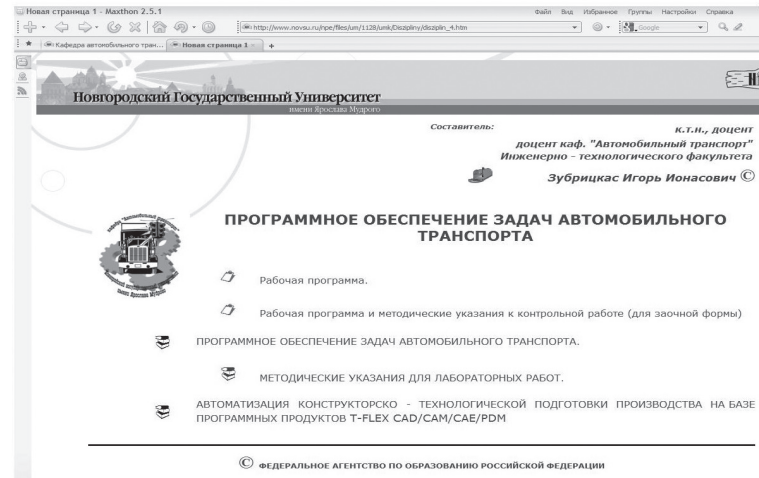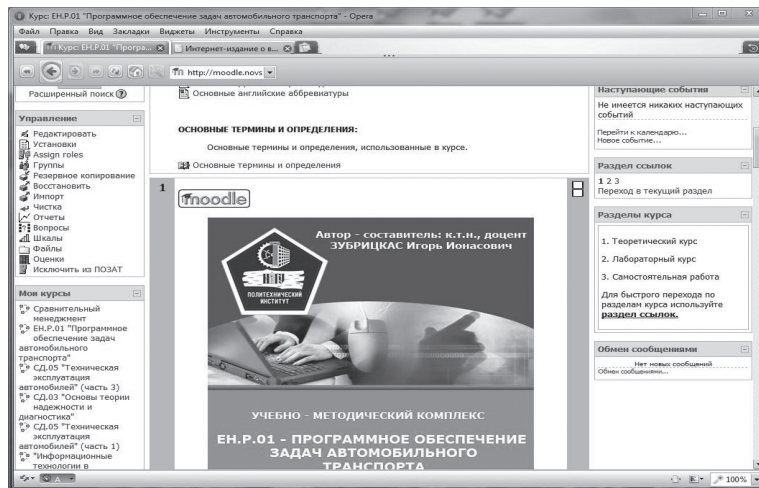**Figure 5. A welcome page of the portal.**

Figure 6. A welcome page of the distance education server.

Distance education technologies allow:

- to reduce education process costs (rent of premises, professors and students' commuting, etc. are not required);
- to teach a great number of students;
- to improve education quality by means of implementing modern resources, large electronic libraries, etc.;
- to create a universal educational framework.

There is one more argument for using such an informational and educational framework: according to the Order №137 by the Ministry of Education and Science of the Russian Federation dated 05/06/2005 "About implementation of distance education technologies", implementing distance education technologies while teaching we can give final tests both on-site and in absence. It allows us to monitor constantly students' knowledge level and syllabus time schedule; also such a system provides us with a number of communication means which ease significantly the dialogue "professor - student" during the education process.

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