Automated Information-Analytical System for Training and Methodological Support to the University Courses: Implementation and Utilization

Grytsenko V.G., Podolyan O.M.[*], Gladka L.I., Yustyk I.V.

Bohdan Khmelnytsky National University of Cherkasy, Cherkasy, Ukraine
*Corresponding author: ompodolyan@gmail.com

Abstract   The purpose of this article is the definition and description of the organizational and technical design decisions on the creation and use of web-oriented information-analytical system of the automatic documents generation of educational and methodological disciplines support. The information and communication technologies are widely used nowadays for organization and support of educational process in universities. The management information systems used in educational process are able to fulfill certain organizational, motivational, and supervisory functions. However, there are still pending problems which we tried to solve with the creation of special information system that enable working with the educational and methodological disciplines support.

Keywords: *educational process, EMDS, management learning system*

Cite This Article: Grytsenko V.G., Podolyan O.M., Gladka L.I., and Yustyk I.V., "Automated Information-Analytical System for Training and Methodological Support to the University Courses: Implementation and Utilization." *American Journal of Educational Research*, vol. 3, no. 12B (2015): 20-25. doi: 10.12691/education-3-12B-5.

1. Introduction

The problem of the educational services quality is topical for the universities nowadays as their success in the labor market competition exactly depends on it. The avalanche-like growth of information, that is inherent feature of the XXI century, has great effect on the quality of education and as a result the volumes of knowledge that students have to master at the universities are increased.

While the content of training, especially in professionally oriented disciplines, is increased, the number of educational credits, provided the curriculum for their study, stills the same. So, it is necessary to organize the educational process by means of information and communication technologies [1].

We believe there is a quest for a flexible dynamic system that will provide automation of such processes as: searching, ordering, selection and processing of actual data; development and presentation of educational and instructional materials which form and content meet the applicable requirements; monitoring of the quality of training methodological support, its relevance and etc.

2. Review of Related Literature

There have been a number of researches focusing on the development of automated management systems of the educational process. Our national scientists E. Bereznyak, A. Biloschytsky, L. Vasil'chenko, V. Gamayunova,

L. Danilenko, G. Yelnykovoyi, M. Leshchenko, I. Tregubenko, V. Fedorov are among them [2].

We have analyzed the ICT using for the organization and support of educational process in universities and we can say that of a number of information systems and computer systems that are able to fulfill certain organizational, motivational, and supervisory functions are used today in our country.

Such systems, in particular, solve the following problems: ensuring standardization of the documents circulation, creation of the workstations for the subjects of the educational process, creation of electronic teaching materials and mechanisms for their use, monitoring of students learning and efficiency of teachers work, etc. [3].

However, there are still pending problems: the ongoing support of current data, speed processing and analysis of constantly growing information flows, providing various aspects of educational management.

Large amounts of problems constantly arise in the educational environment and their solutions depend on the availability of resources and the organization of their management.

Important aspects of the organization and supporting of the educational process by ICT are the overcoming of their fragmentary and not systematic application. That's why the design and development of automated information systems should take into account the need for simultaneous support of educational process and ensure the competitive function of the high educational establishment.

Therefore, at the stage of such system designing should be possible to implement a number of problems, among

them one of the main is to ensure the proper management of educational and methodical work of the university.

3. Method and Materials

First of all we define the term Educational and Methodological Disciplines Support (EMDS) as a clearly defined set of instructional documents that are the components of the educational process model and ensure its implementation.

EMDS should contain the following components:

- syllabus of the course - learning program that takes into account the specifics of preparing students for a particular profession and government standards;
- organizational and methodological materials for the discipline study that make up a set of recommendations and guidelines to ensure the optimal organization of its study;
- educational materials for all types of lessons, provided the curriculum and syllabus of the course;
- glossaries and dictionaries;
- multimedia;
- materials for all types of control;
- bibliographic materials.

The automated information-analytical system of documents generation of educational and methodological disciplines support should provide:

- interactivity (to provide the participants of the educational process with necessary information in time);
- relevance (if it is necessary, in time and quickly change the components of educational and methodical complex);
- integrity (easily associate with other automated systems, including systems support training).

Such a system should perform the following functions:

- supporting the development, preservation and systematization of educational materials in all subjects;
- presentation of educational materials in a convenient form for the appropriate user;
- searching for educational information;
- generating documents for organizing and carrying out audits;
- presentation of the current analytical data on the organization of the educational process.

4. Results and Discussion

The information-analytical system automatic documents generation of educational and methodological disciplines support (IAS "EMDS") [4] was created with Moodle integration (learning management system) which provides students access to relevant information. That is why the main users of IAS "EMDS" are lecturers – developers of educational and methodological disciplines support.

After the authorization the assigned training courses are presented to the user. Clicking the left mouse button on the necessary discipline, will lead to the presentation of a list of options with EMDS:

1. Generate EMDS
2. Edit EMDS
3. View EMDS

The new educational and methodical discipline support can be added by clicking left mouse button on the option "Generate EMDS". If the educational and methodical discipline support has been added to the system previously, the button "Generate EMDS" will be inactive.

If editing and updating of data is needed you should click the left mouse button on "Edit EMDS". As the script points of "Generate EMDS" and "Edit EMDS" in system are the same, so we consider the system script in the option "Edit EMDS".

After selecting "Edit EMDS" the page for enter or edit general list of educational and methodical discipline support will be opened (Figure 1).
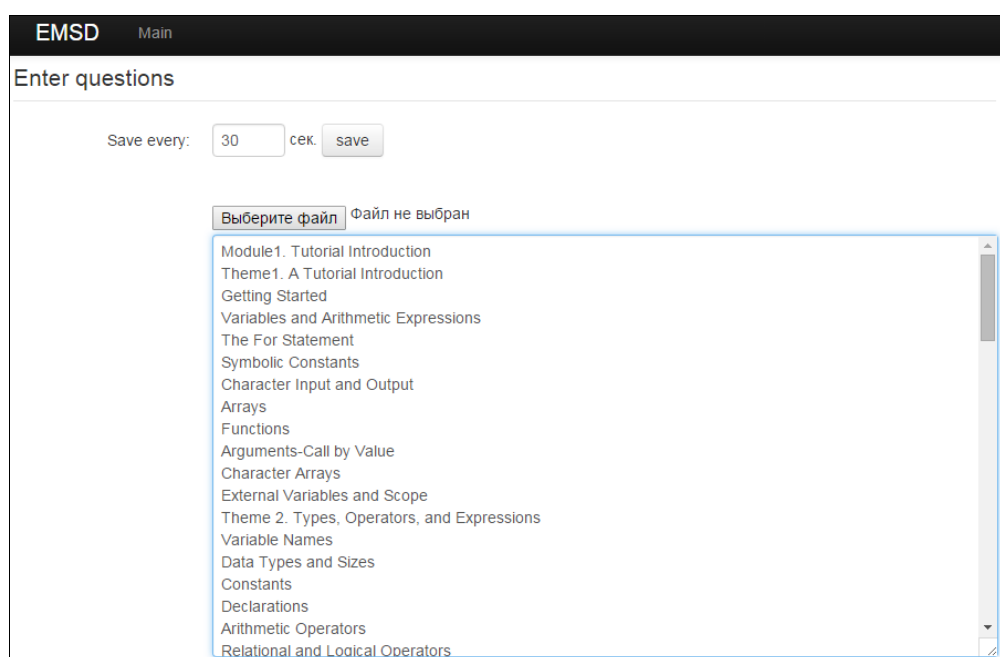

Figure 1. Page appearance for input or editing the general list of questions

The principle of the EMDS documents formation will be viewed through the example of the course creation syllabus.

In the first stage it's necessary to edit or enter the list of issues in the text box. The list should contain a full list of this discipline issues, including the name of the modules and topics.

The following input variants are provided:
1) the directly keyboard input into the text field;
2) the clipboard adding;
3) download the file type of .doc, .docx, .txt.

Each issue should begin on a new line. The blank lines between issues are permitted.

A text field can be quickly cleaned clicking on the top right of the field closing tag -x.

Clicking "Next" we move to the second stage of the syllabus of the course creation. A page marking of issues on the topics of discipline will be opened. The syllabus of the course structure is determined in the second phase.

On the right there is the toolbar with three markers on the page marking. Choosing the marker and clicking the issue, you can determine its type. The page appearance after subject marking on the topics is presented in Figure 2.

Figure 2. Page appearance after markings on the discipline topics

Figure 3. Page appearance after "Back" clicked

You can change the order of the issues (questions) by clicking the left mouse button on it and dragging it to the desired location. Also, it is provided to add, edit or delete questions. You need to return to the previous step by clicking "Return" (Figure 3).

Clicking the button in the top right corner of the field with a module or a question you can roll in the cluster.

When the list of questions editing is finished, again click "Next" and the page with the types of work will be opened (Figure 4).

On the page you can choose what question will be learned at the lecture or seminar, etc. To make a selection, click the left mouse button on the corresponding table cell (Figure 5).

The third phase determines which activities every course item considers.

Also on this page it is possible to search the data in the table. To do this in the box "Question", enter a part of the issue name for the search.

The automatic generation of PDF-files is provided in the EMDS structure. The document format meets the state standard.

To generate the necessary documents you should choose the discipline clicking the left mouse button on the homepage and select option "View EMDS". The next step in the dropdown list "Select document" is to select the document type. Then a created document can be viewed and edited manually using the browser interface for editing the document (Figure 6).

Types:		Lection	Practical	Seminary	Laboratory	Individual	Independent work
	Module1. Tutorial Introduction						
	Theme1. A Tutorial Introduction	☐	☐	☐	☐	☐	☐
	Getting Started						
	Variables and Arithmetic Expressions						
	The For Statement						
	Symbolic Constants						
	Character Input and Output						
	Arrays						
	Functions						
	Arguments-Call by Value						
	Character Arrays						
	External Variables and Scope						

Figure 4. Page appearance with the types of work

Types:		Lection	Practical	Seminary	Laboratory	Individual	Independent work
	Module1. Tutorial Introduction						
	Theme1. A Tutorial Introduction	☑	☑	☐	☐	☐	☐
	Getting Started	✔	✔	✔	✔	✔	✔
	Variables and Arithmetic Expressions	✔	✔	✔	✔	✔	✔
	The For Statement	✔	✔	✔	✔	✔	✔
	Symbolic Constants	✔	✔	✔	✔		
	Character Input and Output	✔	✔	✔			
	Arrays	✔	✔				✔
	Functions	✔	✔				✔
	Arguments-Call by Value	✔	✔				✔
	Character Arrays	✔	✔				
	External Variables and Scope	✔	✔				

Figure 5. Page appearance with the types of work and markings on the discipline topics

Most documents of the educational and methodological disciplines support are very space-consuming, that's why there is a function of selecting pages to print.

On the right of the page there is the item "Download PDF», which lets you download the PDF-document without the possibility of its editing, the document is generated with the default settings.
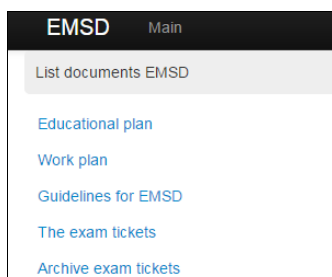
EMSD   Main

List documents EMSD

Educational plan

Work plan

Guidelines for EMSD

The exam tickets

Archive exam tickets

Figure 6. Page appearance with the list of PDF-documents

All PDF-documents which were generated automatically integrated with Moodle system (Figure 7).

Generally, user interface complies with the most regular users of Internet-resources and does not require additional special knowledge and skills while working in the system.

In general, the process of EMDS forming consists of the following steps:

1) getting the information about the discipline from the module "Curriculum" (the number of the credits, types of studies, types of final control, course, semester, etc.) [5,6];

2) inputting the discipline contents;

3) inputting the list of information sources recommended for learning discipline (perhaps using the module "Bibliographer") [7];

4) automated generation of the course syllabuses using templates of the documents;

5) expert evaluation of the quality of generated documents;

6) automated integration of previously prepared information about the discipline with the Moodle (automated generation and structuring of the course, the embodiment PDF-versions of syllabuses) (Figure 8);

7) incorporating the other teaching materials (texts of lectures, plans of seminars, tasks for laboratory lessons, tests, projects, didactic support of student independent work; criteria for rating of student knowledge and skills) (Figure 8).

Figure 7. Page appearance of the course syllabus in PDF-form integrated with Moodle

The advantage of such EMDS generation is the classification and concentration in one place of all the necessary materials of the discipline.

Providing material in a representational form leads to the stimulation of the students' subject-shaped memory, developing their cognitive and creative activity.

Figure 8. Page appearance of course integrated with Moodle

The implementation of the automated information-analytical system "EMDS" in the educational process of the Bohdan Khmelnytsky National University of Cherkasy made it possible in a short time:

- to organize centralized accumulation and storage of information through the creation of automated data bank, which controls one-time data entry into the system and prevents undue duplication;
- to ensure the unification of all forms of documents;
- to provide the participants of the educational process with timely, complete, and accurate information

about educational and methodological support with a minimum cost of its reception, storage, search, processing, and transmission;

- to promote the integrated information processing and decision-making based on formalized monitoring and checking the availability of quality teaching of disciplines.

The efficiency of the implementation of the created system will be investigated further. But as of now we can confirm the efficiency of the use of information produced by the system to perform management tasks, because it was achieved by data automation and integration.

5. Conclusions

It is clear that only a partial review of the established functional system does not provide a comprehensive picture of the benefits of using such kind of software, but the practical experience of its use by the teachers of the Bohdan Khmelnytsky National University of Cherkasy led us to the conclusions that the introduction of the presented system:

- made it possible to standardize and greatly simplify the process of creating documents for the educational process;
- ensured the efficiency of handling and upgrading of these documents;
- gave the possibility to fully use (anywhere, anytime) these teaching subject complexes by all the participants of the educational process;
- created conditions for the formal monitoring of the educational process [8].

But the greatest effect of such type of systems can be achieved only if they are integrated aligned with the basic automation systems of the educational process components.

References

[1] *University Management in the Context of the European Higher Education*: Method. materials. / Ed. Rashkevych, Y.M., Lviv, National University "Lviv Polytechnic", 2008, 64.

[2] Kosiyuk, M.M., Mazarchuk, A.J., Bilovskyy, K.E. "Experience with automated information management system in the educational process University", *Information technologies and means of teaching*, 3 (23), 2011.

[3] Petrovych, Y.M., Rymar, Yu.M., "Information systems management of educational process in high school: a comparative analysis", *Bulletin of the National University "Lviv Polytechnic". Logistics*, 735, 167-175, 2012.

[4] Grytsenko, V.G., Gladka, L.I., "Design of automated control system for teaching work of the Department of Humanities of the University", *Bulletin of Pereyaslav-Khmelnitsky Pedagogical University named after G.S. Skovoroda. Special Issue "Higher education in the context of Ukraine's integration into the European educational space"*, VII (49), 2013.

[5] Grytsenko, V.G., Lutsenko, G.V., "Uml-design of the information-analytical system "Curriculum"", *Information technologies and training tools*, 2 (22), 2011.

[6] Grytsenko, V. G. "Information technology management workload in higher education", *Information technologies in education*, 8, 61-68, 2010.

[7] Podolyan, O.M., Grytsenko, V.G., "Automated information system of the bibliographic documents design "Bibliographer"" in *National Scientific Internet Conference Automation and computer-integrated technologies in production and education: the state, achievements, prospects*, Cherkassy National University, 148-149.

[8] Chuchalin, A.I., Epihin, A.V., Muratova, E.A., "Planning the assessment of learning outcomes in the design of educational programs", *Higher education in Russia*, 1, 13-20, 2013.