

COMPARATIVE ANALYSIS OF «INDIGO» AND «DISPACE 2.0» AUTOMATED TESTING SYSTEMS FOR THE CONTROL OF PERSONNEL KNOWLEDGE

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Abstract

Professional tools for automating the testing and processing of results are now developed. The purpose of research – comparison of capabilities and quality indicators of two automated systems of knowledge control (testing systems) personnel in the Novosibirsk region INDIGO and Dispace 2.0. The study showed a wider and adapted functionality of the LMS DiSpace 2.0 testing module compared to the INDIGO testing system. LMS DiSpace 2.0 can be used not only to control staff knowledge, but also to recommend a platform for training personnel of enterprises.

Keywords: e-learning, blended learning, andragogy, testing system, learning management system

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1. Introduction

The field of application of computer technologies in the electric power industry is growing rapidly today. Digital technologies allow you to configure the processes of distribution and consumption of electricity in order to reduce losses, technological processes of generation, to improve financial performance.

In addition, the tasks of training, continuing education and continuing professional training of personnel are solved with the help of information and communication technologies in training centers of energy companies. Is an actual problem both in the whole world and in Russia.

Particularly relevant acquire such forms of education as e-learning, blended learning and distance learning technologies in the era of digital education. These forms are an integral part of the modern concept of "Lifelong Learning" and assume a greater degree of motivation of learners and flexible self-study [1]. Are recommended for application by the Law on Education and Federal Law No. 816 and concern all levels of education in the Russian Federation, and include professional education [2].

Staff training is conducted by simulating the situations in the power system real objects using a variety of *software products, training tools and methods of control (testing program)*. This allows to increase the

effectiveness of training. M. Knowles postulates four principles of *andragogy*, that are important for successful development of opportunities and training of this target group:

- involvement of adults in the planning of training and a common curriculum;
- use of actual experience and work skills for the basis for learning activities;
- *problem-oriented learning*, those training material should be focused on a specific issue, rather than a general theme (is devoted to mastering a new technological process at the enterprise, and not on general problems of mechanics) [3]. These features should be taken into account when training this target group.

Systemic, comprehensive measures using electronic technologies are recommended to facilitate the involvement and awareness of workers in the United States, such as the introduction *Computer – Assisted Collaborative Learning* on *online platforms* used by the enterprise.

E-learning and *blended learning* with the help of the *distance learning technology* are also gradually being introduced in the centers of excellence of adult technical specialties in Russia. However, the use of only online training for technical staff is controversial in connection with the applied, practical nature of the learning process. Perhaps, may need to give preference to blended learning, in which the learning process combines e-learning technologies along with the possibility of traditional

communication with the teacher [4]. In addition, *e-learning* is less system-based, and focuses on the use of some elements of e-learning in Russia (for example, *testing programs*).

2.Experimental setup and study preparation

Testing is the most commonly used method in Russia for monitoring personnel's knowledge in various forms of training. If the current control is usually applied tests of one type (for example, *substitution tests or constructive tests*), then the final control combines tests of different types. The goals, scope and complexity of training are taken into account when determining the number of questions. Final control is carried out at the end of training, and includes questions on all modules (topics, sections). Developed professional tools for automating the process of testing and processing results now.

OAO «Novosibirskenergosbyt» is an electricity supplier in the Novosibirsk region and ranks 1-st in the rating of the best guaranteeing suppliers and energy sales companies of Russia in 2012-2017gg. Leadership in the ratings confirms that the company is stably at the highest level in the industry for such a time. The program of automated testing "INDIGO" is used to check the knowledge of the personnel at the enterprise (<https://www.indigotech.ru>). The program is the most in demand in many industries and organizations, such as OOO «gazprom transgaz» Tomsk», network of gas stations "Top Line", GBU AO "Center for Monitoring in Education" and many others.

"INDIGO" is used to solve a wide range of tasks, starting from the survey "Satisfaction of work in the company" and ending with the organization of staff assessment, is carried out in accordance with the requirements of the International Standard ISO 9001:2015 in OAO «Novosibirskenergosbyt».

The module *DiTest v2.0* is developed - an *automated testing system* that supports the international specification Question & Test Interoperability (QTI) version 2.0 of the IMS consortium to ensure control of students' knowledge, as well as personnel of enterprises on human security issues in the technosphere without interrupting production activities in NSTU. The DiTest testing system is integrated into the general concept of LMS *DiSpace 2.0* and includes modules for assigning, passing testing and creating tests. The tests are created outside the *DiSpace 2.0* at http://dittest.edu.nstu.ru/editor/create_new_test.edu.

3.RESULTS

When comparing the two programs for automated testing, some fundamental differences were revealed. The main, and most important, is that DiSpace 2.0 is a full-fledged learning management system (LMS) with the *testing module*, and the program "INDIGO" is only a *testing system*. Consequently, the programs were created

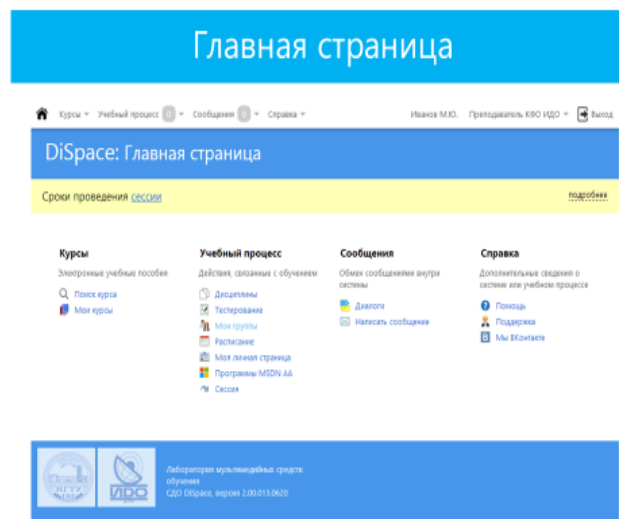
for different purposes and tasks, and have different possibilities.

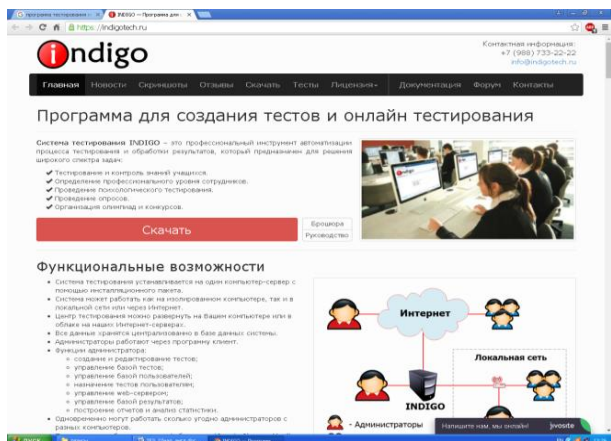
Table 1. Possibilities two compared systems

Possibilities	
LMS <i>DiSpace 2.0</i>	INDIGO
Testing and control of students' knowledge	Testing and control of students' knowledge
Definition of professional level of the personnel	Definition of professional level of the personnel
Carry out surveys	Carry out surveys
Organization of the educational process in LMS, including organization of olympiads and competitions	Organization of olympiads and competitions
Organization of video conferences, webinars	---
One- and two-channel communications (consultations, forums, chats)	---
Creation of the base of electronic educational resources	—

Accordingly, it can be concluded that the LMS *DiSpace 2.0*, which was developed at the NSTU by a group of authors-developers [5]. LMS *DiSpace 2.0* provides a new level of support of the e-learning process in the Lifelong Learning. The concept of workspaces allows you to enter the market of SAAS services.

Figure 1. LMS *DiSpace 2.0* and testing program INDIGO: home pages





We examined the advantages and disadvantages of two automated testing systems, summarized in the table.

Table 2. Analysis of testing systems INDIGO and DiSpace 2.0

INDIGO	DiSpace 2.0
Only, there are no public types, no support for multimedia data in answer options	8 types of questions are available
No formula support	Export of users
Import of Word in simplified form, no graphics, only text information	Sorting and selection of questions within topics
The editor of the questions is not modular	The possibility of providing access to the test at a specific time (minutes)-
The system itself is not support the introduction of new types of questions	Visual text editor WYSIWYG
The format of storage of questions has its own, closed	Assigning access to individual students and the entire group at once
The system has only functional testing, no other functions	The possibility of trial testing
The import format is your own	Developed formula editor
You need to configure access to the server each time you pass the test	Privacy settings
High hardware requirements to the server pass the test	The possibility of several attempts to pass the test
No stylistic monotony, non-standard fonts and color differences	User-friendly interface
More complex and accurate multistage assessment system	—
office-style interface (but requires the installation of additional software)	—

Export of users	—
Information module for the test (theoretical basis for testing) due to lack of ability to create the electronic educational resources	—
User-friendly interface	—

Thus, the study showed a wider and adapted functionality of the LMS *DiSpace 2.0* testing module compared to the INDIGO testing system. Not surprising, that when assessing the quality of *LMS DiSpace 2.0* and the testing module placed in it, a high level of student satisfaction, which allows to organize training in remote access and to recommend LMS NSTU for training of personnel of enterprises [6].

4. Conclusions

- LMS NSTU *DiSpace 2.0* can be used not only to control staff knowledge, implementing the testing function, but also to recommend LMS NSTU for training personnel of enterprises.

- It is shown that, in general, both systems implement a standard set of functionality when passing test tasks;

- It is revealed that in *DiSpace 2.0* there are more opportunities: you can configure the inclusion / deactivation of topics and didactic units, you can assign the number of attempts, the time of passing the tests.

References

- [1] Allen, I.E., Seaman, J., & Garrett, R. (2007). Blending in: The extent and promise of blended education in the United States. Retrieved August 12, 2011, from http://sloanconsortium.org/publications/survey/pdf/Blending_In.pdf
- [2] The Order of the Ministry of Education and Science of the Russian Federation No. 816 of August 23, 2017 "On the Approval of the Procedure for the Application by Educational Organizations of E-Learning and Distance Educational Technologies in Implementing Educational Programs".
- [3] AI Pukukuev Andragogy M. Knowles: substantive and procedural models // Issues of international cooperation in the education of the Southern region. № 3-4: Science Magazine. - Rostov-na-Donu: IPO PI SFedU, 2008. – c. 29-34.
- [4] Yasinsky V.B. On the applicability of distance education technologies for higher education in technical specialties. // It is investigated in Russia: the electronic journal, 2002. C. 171-181. Access mode: <http://zhurnal.ape.relarn.ru/articles/2002/016.pdf>
- [5] Certificate No. 2013613909, ITUC. DiSpace Distance Learning System / O.V. Andryushkova, MA Gorbunov, N.N. Evtushenko, M.E. Ilyin, V.M. Kozlov, A.V. Kozlova, Yu.A. Kotov, M.V. Legan, G.B. Parshukova, E.A. Perfiliev, SG Yun, T.A. Jacević; NSTU - 2013611801; ony6. 18.04.13. Optional: priority from 01.03.13, Russia.
- [6] Legan MV, Yatsevich TA Training under DPO "Fire safety" programs in NSTU with remote access (according to the combined model)// Health and safety, №4, 2015 - c.51-57.