

Pedagogical Project of Teaching in a Digitalized Learning Environment

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ABSTRACT: In this article, the levels and forms of adaptation of adaptable systems are determined and analyzed, a pedagogical project, its content and structure are developed, software is created for a Web system adaptable to the educational process. As well as, the procedure for entering educational resources into a system adapted to the educational process, the methodology for using this system by a teacher and a student, organization and implementation of monitoring of classes is highlighted. In order to determine the effectiveness of education in teaching the discipline "Web programming" in higher educational institutions, experimental work was carried out. The experiment was carried out with the participation of 250 students in the areas of education of the Tashkent State Pedagogical University; National University of Uzbekistan; Andijan State University.

KEY WORDS: adaptive system, Web-technologies, teaching methods, model, project.

I. INTRODUCTION

“Education is the main driving force of progress and an important activity leading to the achievement of sustainable development goals” - this definition is given by the new concept of education until 2030, adopted by international organizations and developed countries of the world. Virtual educational technologies, open educational resources, massive open online courses, mobile educational technologies, educational management systems, e-education and its classical models are effectively used to provide quality education, improve education and improve methods for assessing the results of assimilation. Harvard University and the US Massachusetts Institute of Technology have partnered to create open online courses that provide interactive education over the Internet. In Germany, learning-adaptive systems have been developed that provide appropriate courses by measuring the level of human intelligence. Such electronic educational systems have an important place in the training of experienced, qualified and modern specialists.

A large number of studies conducted in the world are related to the problems of developing adaptation models, creating adaptable robots and adaptable systems, applicable only to one academic discipline. At the same time, one of the significant issues is the development of a pedagogical project of a Web system aimed at creating an integrated information and educational environment, and software for a Web system based on Web technologies for information exchange in the modern process of globalization, built on the basis of dynamic pages. This substantiates the need to develop the structure and content of the Web system, which takes into account the methodology of creating a Web system and implements differentiated learning, taking into account the level of knowledge of the student.

The purpose of research work is to create the adaptive web systems for educational process and improve the methodological foundations of teaching the Web programming discipline.

The purpose of research work to achieve the following objectives:

development on the basis of the improved content of the discipline "Web programming" electronic information and educational resources of various levels (materials for lectures, practical and laboratory classes, the base of test tasks) and their placement in the Web system, adaptable to the educational process;

improving the methodological foundations of teaching the discipline "Web programming" using the technologies "Blended learning" and conducting experimental work using the Web system.

II. LITERATURE REVIEW

Currently, the world community of teachers is actively using web-technologies as an effective tool for teaching and learning.

In the works of scientists from the CIS countries L.V. Zaitseva[1], V.N. Kasyanova[2], , Нопенков И.П., Зимин А.М.[3], Любченко В.В., Нестеренко А.В.[4] and others deeply analyzed the issues of using Web technologies in professional activities, the essence and content of Web technologies in increasing the competence of higher school teachers, developing creative thinking and media competence of students, determining intellectual features of programmers, the possibility of developing electronic education, creating and using electronic information and educational resources and software shells.

In the works of foreign scientists Elvira Popescu[5], Alexandros Papadimitriou[6], Xose Ферејра[7], Marek Obitko[8], Peter Brusilovsky[9] Joseph John Engler[10] Paul De Bra, Lora Aroyo and Vadim Chepegin[11], George Samaras[12], Constantino Martins, Luiz Faria[13], Vijayalaxmi Sirohi[14], Thierry Nodenot, Christophe Marquesuzaa, Pierre Laforcade, Christian Sallaberry[15] Elena Gaudioso, Miguel Montero[16], Ainhoa Alvarez, Isabel Fernandez-Castro[17] Ji-Hyun Lee[18], Ahmed Al-Hmouz[19] and others analyzed the issues of innovation in a complex adaptation system, the placement of individual differences through adaptation, the peculiarities of the new main profile for programming the educational system, the essence and the content of adaptable technologies, their capabilities, adaptable educational systems have been created.

Analyzed are studies in the field of education management systems, adaptable systems and adaptable hypermedia systems, as well as forms of adaptation. Analyzes have shown that most of the adaptable systems created to date, in particular, WELSA (2008), MATHEMA (2010), KNEWTON (2013), and others provide educational material with adaptation to the student. Our research is aimed at introducing a system used in the educational process throughout the country, which implements the integration of normative documents formed by the teacher (individual work plans, work programs, a journal) and the educational activities of students, allowing the teacher and students to manage their activities.

III. METHODOLOGY

The object of the study is the process of teaching the discipline "Web programming" in the areas of bachelor's degree: "Informatics and information technology", "Computer graphics". The experiment involved 250 students from Tashkent state pedagogical university (TSPU), National university of Uzbekistan (NUUz) and Andijan state university (ASU).

The scientific-theoretical and scientific-methodological foundations of the research problem have been studied; the purpose and objectives of the study are determined; the research object and its indicators have been studied and analyzed according to theoretical sources; substantiated from a scientific and theoretical point of view, the need to create a Web system adaptable to the educational process, formed a working hypothesis. In the selected higher educational institutions, curricula were analyzed and an improved content

of the discipline "Web programming" was developed. Educational material, instructions and tasks for the implementation of practical and laboratory classes have been developed, which increase the effectiveness of training Web programmers, test tasks that determine the effectiveness.

The working hypothesis, the goal and objectives of the study have been implemented. A project plan and stages of creating a Web system adaptable to the educational process have been developed. An adaptation model and software for a Web system adaptable to the educational process have been created, and educational material has been posted. A method of using a Web system adaptable to the educational process in teaching the discipline "Web programming" has been developed. An experiment was carried out on the methodological substantiation of the relevance of the problem under study, the implementation of the developed principles.

IV. DISSCUSS AND RESULTS

In the course of the research, the content of the discipline "Web programming" and foreign literature were analyzed. As a result of mastering the discipline "Web programming" students should: have the skills of the basics of the Internet; analysis and use of common and popular Web systems; the correct choice of programming language when creating Web systems; effective use of programming languages; know modern means and methods of designing Web systems, technologies of the system for creating Web systems, methods of protecting information in a database, the integration of management systems for Web technologies and databases.

Based on the results of the study, the need for scientific work to improve the content of the discipline "Web programming", to train qualified and experienced Web programmers, to create Web systems adaptable to the educational process that meets didactic requirements has been identified.

Based on the search results, the improved content of the discipline "Web programming" was developed and included in the work program of the discipline, and also introduced into the educational process.

The Web system is an information product, a collection that links hyperlink pages (Web pages) with a specific idea. It has its own personal address and is located on the Web server under this name. These can be Web sites, portals, distance learning systems, media education systems, adaptable systems, automated intelligent systems, etc. The tasks of Web systems are to continuously provide various information products and provide online services to the entire audience.

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Based on the above, it is possible to propose a definition of a Web-system adaptable to the educational process: "A Web-system is a system that has a structure corresponding to the educational process, which determines the trajectory of education, provides material corresponding to the student's level of knowledge, accelerates the educational process, implements integration activities of the teacher and the learning environment".

Also, in the course of the research, the scientific analysis of Web technologies used in the creation of Web systems and their capabilities was substantiated, the efficiency was substantiated in the creation of Apache Web server systems adaptable to the educational process, PHP, Ajax, JQuery Web, and MySQL database

management systems. The article highlights the advantage of creating a Web system adaptable to the educational process using these Web technologies, not as a static, but a dynamic system and a client-server connection in a dynamic mode.

In the study, the tasks of a team of specialists, such as a teacher-psychologist, a web-designer, a web-programmer, a web-coder, are defined when creating a Web system adaptable to the educational process.

Psychological-pedagogical, didactic, design, technical and user requirements for adaptation to various users and popularization of Web systems, and the structure of the system's plan-project have been developed (Fig. 1).

On the basis of this project plan, the stages of creating Web systems have been developed and introduced into the practice of teaching the discipline "Web programming".

The pedagogical project of teaching in a Web system adaptable to the educational process implements a direct connection between a teacher and a student, as well as an indirect connection between the structure of the learning environment created by a teacher and a student.

At the heart of the goal of designing a Web system that is adaptable to the learning process is the following: full satisfaction of information and educational needs in the student's activities to obtain education;

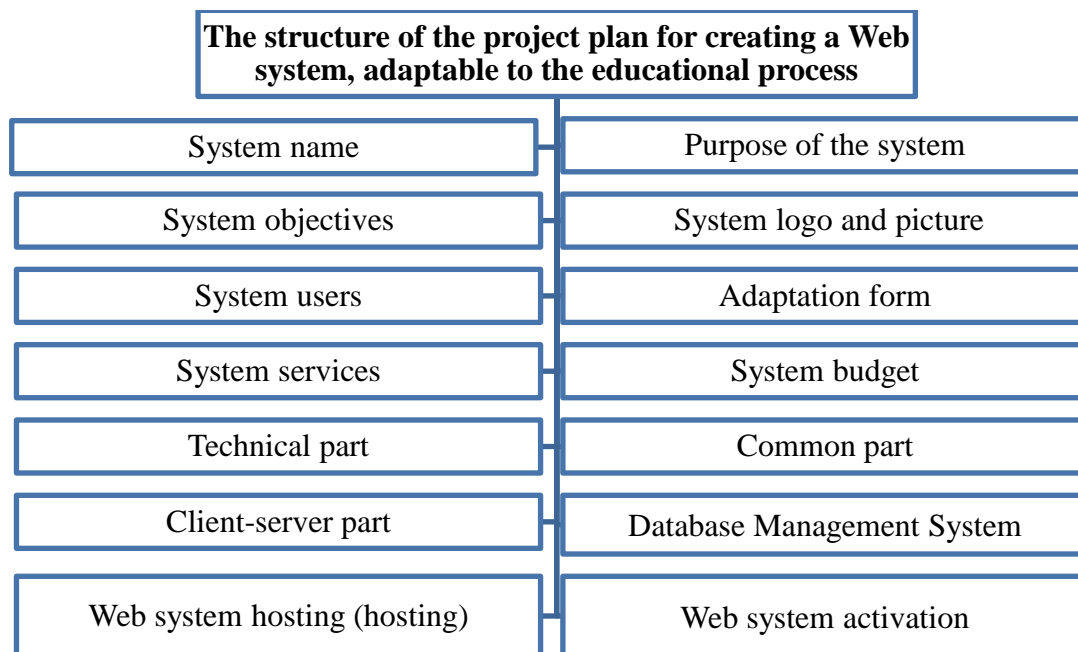


Fig. 1. The structure of the project plan for creating a Web system, adaptable to the educational process

ensuring a convenient relationship between the student and various components of the learning environment;
 individualization of meeting the needs of the student and methods of achieving the educational goal;
 image of information in a form convenient for the learner;
 consideration in the psychological and pedagogical aspect of the learning actions of students;
 taking into account individual styles of educational and cognitive activity;
 organization in the system of various forms of communication;

maximum convenience of the user interface, etc.

Based on the didactic goal of designing a Web system adaptable to the educational process and the multilevel structure of the system's resources, a pedagogical project of the educational environment system is recommended.

For the free action of users in the system, a model for adapting the system to the user is required. In the course of the study, various classifications of adaptation were analyzed and the factors in the adaptation model were identified.

Based on the goal of the educational project of the Web-adaptable system, the multi-level structure of the system resources, as well as the learning model, the pedagogical project of the learning environment is recommended.

A model of adaptation of the Web system adaptable to the educational process, based on certain factors, has been developed (Fig. 2).

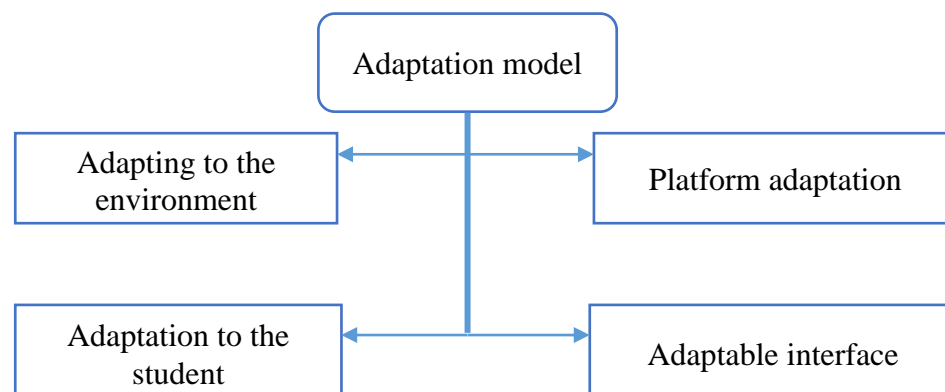


Fig. 2. Model of adaptation of the Web system, adaptable to the educational process

The main goal of the Web system adaptable to the educational process is to improve the quality of education based on the professional potential of leading professors and teachers working in the higher education system, to create opportunities for students to receive continuous education, to learn by determining the trajectory (level) of education, taking into account the intellectual potential, abilities and motivation of the student, the convergence of various forms of education, ensuring the integration of the teacher's activities and the learning environment, organizing training based on the principle of individualization.

The content, structure and software of a Web system adaptable to the educational process has been developed, which ensures the integration of the teacher's activities and the learning environment, expressing the interconnection of the system pages, including the functions of the interface of the administrator, specialist of educational methodological management, specialist of the dean's office, head of the department, professor-teacher and student.

The Web-based system adapted to the educational process, created within the framework of the research, allows: to create a model of the HEU structure and maintain it; register users of the system and maintain the mechanism of their actions in the system; form a curriculum, work program, discipline material (lecture, practical and laboratory tasks); form control and test tasks; conduct initial testing to create a student model and highlight the trajectory of his actions on this basis; constantly determine the indicators of student performance using ongoing testing; receive, analyze various statistical data.

As part of the study. Using a Web-based system adaptable to the educational process, “Flipped learning” and “Online Lab” models of blended learning technologies were selected to organize lecture (theoretical),

practical and laboratory classes, and a methodology for conducting practical and laboratory classes was developed.

Each student who has entered the system, after choosing an academic discipline, is offered input test tasks to determine his trajectory of obtaining education in this discipline or creating a learning model. As entrance tests, tests are given to determine the intellectual potential of the student and the level of his initial training.

After passing the tests set by the system, the trajectory of obtaining education is determined and the student is allowed to study in the learning environment.

To control and monitor the student's knowledge, the following control outputs were used: initial (input), current and final control.

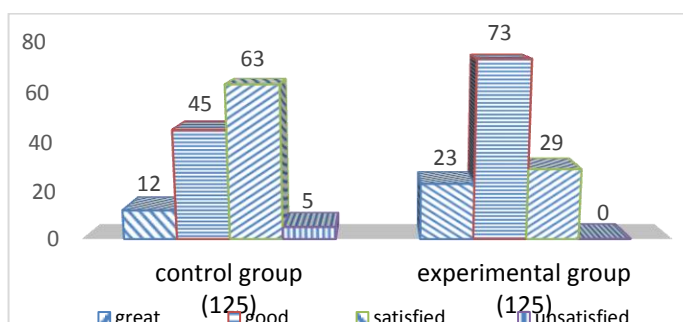
In the Web system adaptable to the educational process, all control methods were applied in teaching the discipline "Web programming", the results were recorded in an electronic journal and a rating sheet was formed

An experiment was carried out in order to determine how the teaching of the discipline "Web programming", organized with the help of a Web-adaptable system for the educational process, had an effect on the progress of students.

In the process of experimental work in the use of a Web system adaptable to the educational process in teaching the discipline "Web programming", several methods were applied: increasing the activity of students in the educational process, independent mastering of new topics, independent creative search and strengthening of knowledge, work on oneself.

The main experiment with the participation of the researcher was carried out on the basis of teaching the discipline "Web programming" in a Web system adaptable to the educational process. The purpose of this work was to study the results of the experiment and their practical confirmation.

In the experimental group, the classes were conducted using a Web system adaptable to the educational process, in the control groups - according to the traditional method.



In the experimental group, the average performance was 3.95, in the control group, the average performance was 3.51. This means that the indicator of the control group is $3.95 / 3.51 = 1.12$ times. The obtained (quantitative and qualitative) indicators indicate that academic performance in the experimental group is higher than in the control group.

The results of the experimental work will be checked by the Student distribution in the SPSS program (Table 1).

Table 1. Experiment Results Statistics student in the "SPSS" program

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	V1	3,5120	125	,72530	,06487
	V2	3,9520	125	,64578	,05776

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	V1 & V2	125	,742	,000

If the Sig value is equal to or less than 0.01, the report concludes that there is a significant difference recorded as $p \leq 0.01^{**}$, i.e. the limit is 0%.

The experiment showed that the organization of the educational process with the help of the created system adaptable to the educational process Web system increased the creativity and independent thinking of students, strengthened their knowledge, skills and abilities, strengthened their interest in the discipline.

CONCLUSION

As a result of the research conducted on the topic "Creation of Web systems adaptable to the educational process" the following conclusions are presented:

The basis of a Web system adaptable to the educational process, created on the basis of a pedagogical project and an adaptive model of a Web system adaptable to the educational process, based on the level of knowledge and intellectual characteristics of a student is made up of new information technologies that contribute to an increase in motivation for learning, solve the problem of learning gaps, as well, provide students with freedom, and create opportunities for them to grow and realize their potential.

In the structure of the Web system adapted to the educational process, an interface of the professor-teacher has been developed for the formation of an individual plan, work program, discipline materials, test tasks and an electronic journal. This part allows you to differentially organize the educational process, increase the teacher's motivation for pedagogical work at the expense of diversity, also allocate your time when choosing a method, and regularly receive information about the results of your work.

On the basis of the improved content of the discipline "Web programming" electronic informational and educational resources were developed, and the textbook "Web technologies" was published. This educational literature is used in higher educational institutions as the main literature in teaching the disciplines "Web programming" and "Web design".

The methodology of teaching the discipline "Web programming" with the use of adaptable to the educational process Web systems based on the technology "Blended learning" has been developed and introduced into the practice of training specialists in programming. As a result, the average academic performance of students has increased by 1.12 times.

The expediency of using a Web system adaptable to the educational process was determined not only in teaching the academic discipline "Web programming", but also in other disciplines of the curriculum, as well as providing instructions on how to work with the Web system adaptable to the educational process in training courses for retraining and advanced training of pedagogical frames.

The research was carried out within the framework of the projects of the research plan of the Head Scientific and Methodological Center under the MHSSE on the following topics: P-1-116 "Development of a methodological system for the development of the creative potential of teachers of higher educational

institutions in the context of informationization of education", MP-5-5 "Creation of a WEB system adaptable to the educational process"

REFERENCES

1. Зайцева Л.В. Методы и модели адаптации к учащимся в системах компьютерного обучения // Educational Technology&Society. – Тайвань, 2003. – №6(4). – С. 204-211.
2. Касьянов В.Н, Касьянова Е.В. Адаптивные системы и методы дистанционного обучения // Информационные технологии в высшем образовании, – Воронеж, 2004. – Т.1, № 4. – С. 40–60.
3. Норенков И.П., Зимин А.М. Информационные технологии в образовании. – М.: МГТУ им. Н.Э.Баумана, 2004. – 351 с.
4. Любченко В.В., Нестеренко А.В. Адаптивность и ее составляющие в обучающих системах // Интеллектуальный анализ информации: Материалы международной научной конференции // http://iai.kpi.ua/_archive/2007/Документ31.pdf
5. Elvira Popescu. Dynamic adaptive hypermedia systems for e-learning. <https://tel.archives-ouvertes.fr/tel-00343460/document>
6. Alexandros Papadimitriou. Adaptive Educational Hypermedia Systems on the Web for the Didactics of Science and Technology <http://cgi.di.uoa.gr/~phdsbook/files/papadimitriouAlex.pdf>
7. Jose Ferreira. Heavy duty infrastructure for the adaptive world. <https://www.knewton.com/resources/blog/ceo-jose-ferreira/heavy-duty-infrastructure/>
8. M. Obitko. L.Kurz, I.Glücksman. A Framework for Constructing Adaptive Web-Based Educational Systems. <https://www.computer.org/csdl/proceedings/icalt/2001/1013/00/10130437.pdf>
9. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.472.6285&rep=rep1&type=pdf>
10. J.J.Engler. Innovation as a complex adaptive system. <http://ir.uiowa.edu/cgi/viewcontent.cgi?article=1418&context=etd>
11. P.D.Bra, L.Aroyo and V.Chepegin. The Next Big Thing: Adaptive Web-Based Systems. <http://wwwis.win.tue.nl/~debra/jodi2004/>
12. P.Germanakos, N.Tsianos, C.Mourlas. New fundamental profiling characteristics for designing adaptive Web-based educational systems. <https://pdfs.semanticscholar.org/18e5/cca5745f7aeb8c8ec93a3dd52e1430bbdc7.pdf>
13. C.Martins, L.Faria, E.Carrapatoso. An Adaptive Educational System For Higher Education. <http://eunis.dk/papers/p57.pdf>
14. V.Sirohi. A Peep into Adaptive and Intelligent Web based Education Systems. http://www.csi-sigegov.org/emerging_pdf/3_14-18.pdf
15. T.Nodenot, C.Marquesuzaa, P.Laforcade, C.Sallaberry. Model based Engineering of Learning Situations for Adaptive Web Based Educational Systems. <http://idee.iutbayonne.univ-pau.fr/publications/WWW2004.pdf>
16. E.Gaudio, M.Montero. Adaptable and Adaptive Web-Based Educational Systems. <http://www.irma-international.org/viewtitle/13093/>
17. A.Alvarez, I.Fernandez-Castro. An Open Adaptive and Multi-Subject Educational System for the Web. http://sydney.edu.au/engineering/it/~aied/vol3/vol3_alvarez.pdf

18. J.H.Lee, H.T.Eissa Dynamic adaptive Web-based model for architectural design education
<http://www.archnet-ijar.net/index.php/IJAR/article/view/230/261>
19. A.A.Hmouz. An adaptive framework to provide personalisation for mobile learners.
<http://ro.uow.edu.au/cgi/viewcontent.cgi?article=4467&context=theses>