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The practical usage of the created complex of programs for the automation of research tasks of the adaptive information-educational environments

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The intensification of growth the diverse sources of information in the environment of its consumption actualizes the problem of rational organization of the information exchange causes the need of creation, distribution and use of the information resources, products and services for the providing of the increasing of efficiency of the production and nonproduction activity of scientists, trainees and different specialists.

The limitation of communicative duplexity due to the indirection of information interaction between the subjects and components of the automated and virtual educational environment acts as the significant lack of any existing remote training system, which needs to be researched and technologically eliminated by means of introduction of the means of automation.

The formal description of the automated training environment with the properties of adaptation based on the cognitive models allows to distinguish the trainee and training him system: the training influences have a significant impact in relation to others; the former of a portion of training influences generates the information fragments from the database based on the addresses and optimal parameters of displaying of the information for a certain trainee; the algorithm of training calculates the optimal parameters of visual representation of the information based on the goals, tasks and requirements of the technological process of formation of knowledge and the parameters of the parametrical cognitive models block; the former of portion of test tasks displays the question-answer structures from the database based on the addresses and links on the information fragments.

The structure of the complex of programs for the automation of tasks of the system analysis and research of the information-educational environment on the basis of the developed cognitive modeling technology is made by the block-modular principle, includes the adaptive electronic textbook, the basic and applied diagnostic modules.

The components of the complex of programs provide the iterative three-step mode of authentication of the user: at the first step,- the choice of localization and the method of research (test); at the second step,- the primary registration of data of the account of new and the subsequent registration of the existing user in the system; at the third step,- the activation of the mode of functioning (the administrating of database with the parameters of the method of research and the accounts of users, the diagnostics, the training and the analysis).

The electronic textbook realizes the individually-oriented generation of sequence of educational influences by means of the innovative adaptive representation of information fragments processor, providing the calculation of optimal combination of the values of parameters of the displaying of information taking into account the individual features of personality of the contingent of trainees and the potential technical capabilities of the means of training based on the parametrical cognitive models block.

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The semantic model of saving and extracting of information is based on the information model of the subject of studying, which acts as the hierarchical structure of data and includes the quantified set of sections, subsections, paragraphs, modules and elementary information fragments, and also the related with it control questions for the realization of monitoring in the course of the current and final testing.

The parametrical cognitive models block contains the cognitive models of two types: the cognitive model of the subject of training – accumulates the parameters, reflecting the individual features of perception (the private physiology of sensory systems), processing (cognitive psychology) and understanding (applied linguistics) of the content of information fragments by the trainee; the cognitive model of the means of training – concentrates the parameters of background and font, color scheme of compensation and substitution for the complete and partial dichromates, characterizing the potential technical capabilities of the means of training at the visual displaying of information fragments in the view of text, static and dynamic flat and volumetric schemes, video- and audio-stream.

The basic diagnostic module realizes the automation of the process of estimation of the level of residual knowledge of trainees by means of a set of tests in the subjects of studying based on the rough scale taking into account the sum of correct answers on the questions and the exact scale taking into account the sum of scored points for the correct variants of answer on the question at the potential possibility of choice of the standardly single or several variants of answer.

The applied diagnostic module provides the automation of the process of diagnostics of the individual features of trainees by means of a set of applied methods of research of the parameters of the physiological (the monocular and binocular abnormalities of refraction, the perception of space and the color-perception of the visual sensory system, the absolute auditory sensitivity and the thresholds of auditory sensitivity of the auditory sensory system), the psychological (the convergent and divergent intellectual abilities, the type of learning-ability and the cognitive styles) and the linguistic (the level of proficiency in the language of statement and the elements of interface) portraits of the cognitive model.

The primary statistical analysis allows to reveal the non-significant emissions and artifacts, to check the compliance to the normal law of distribution of the sequence of numbers in the samples of data based on a posteriori results of testing, and the secondary mathematical processing of data using a set of statistical methods allows to calculate the coefficient of multiple determination, to form the linear equation of multiple regression, to represent the position of the centroids of classes of the trainees in the system of canonical functions with very high informativity.

Since 2003 y. in the course of the scientific-research work it was possible to independently create the methodical support of the discipline “Informatics”: the theoretical course of lectures, three methodical instructions to the laboratory works, the textbook “Informatics” (it was received the author's certificate in RAS). The practical use of the apparatus of the cognitive modeling technology and the complex of programs for the automation of the tasks of research has been carried out in the learning process of “SPbSETU "LETI"” since 2003 y. and “IBI” since 2004 y., and in the given scientific direction I personally prepared six and prepare two diploma-students.