

THE ADAPTIVE INFORMATION ENVIRONMENT OF THE AUTOMATED TRAINING BASED ON THE COGNITIVE MODELS

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In the post-industrial society the high rates of scientific-technical progress and the exponential growth of diverse flows of information as a antiderivative of the aggregate of knowledge on a wide spectrum of subject areas actualize the development of approaches, methods and technologies of the increase of efficiency of the creation, distribution and use of the products of information industry among the participants of information process.

The informatization of educational establishments accents the attention on the consideration of a wide spectrum of scientific aspects: regional, economic, organizational, technical, implementation, pedagogical, methodical, ergonomic, psychological, physiological and linguistic.

The state and international bodies, regulating the politics in the sphere of education, are interested in the problematics of individual-oriented and adaptive education, and also the introduction of the means of training, allowing to take into account the individual features of personality of trainees.

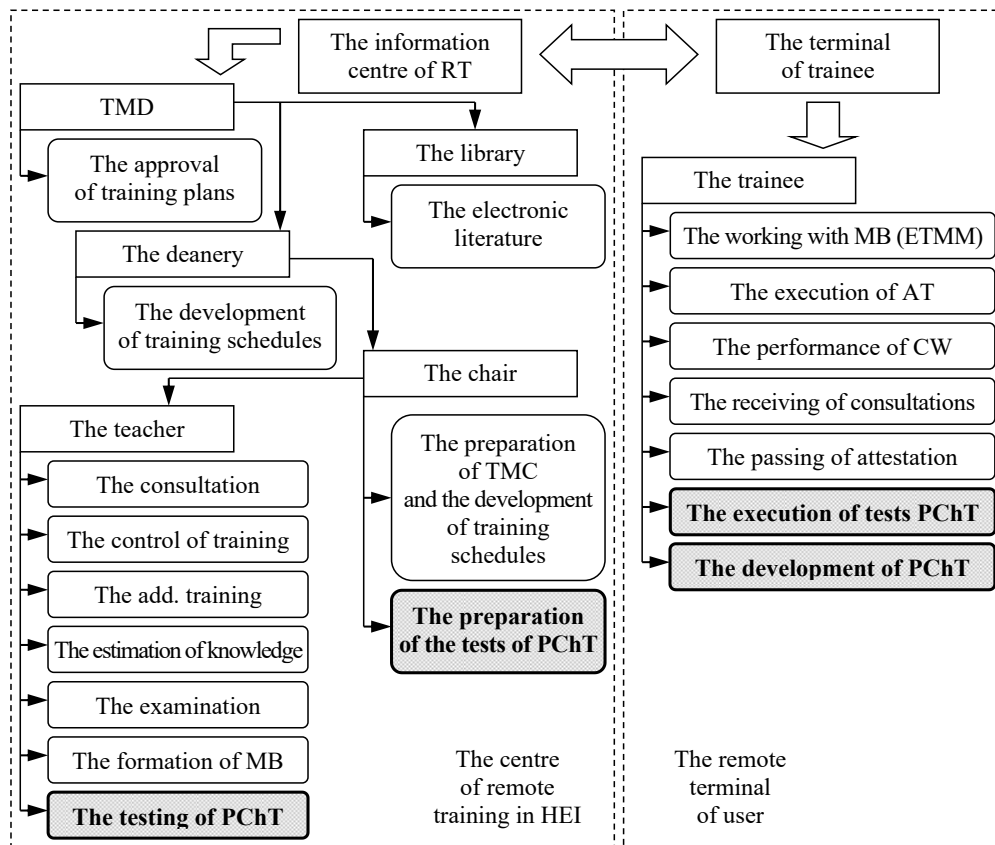
The traditional information and educational environments (IEE) of the automated (remote) training systems practically do not take into account the individual features (characteristics) of the personality of the subject of training, which significantly affects on the level of quality of the (re)training of specialists.

The individual orientation of information interaction between the subjects and means of training in the automated IEE is achieved by means of the use of a row of technologies: the technology of individual training – realizes the scheme “subject – means of training or teacher”; the technology of individualized training – allows to take into account the individual features of personality of the subjects of training in the educational process; the technology of adaptive training – the generation of educational influences is carried out on the basis of an invariant model.

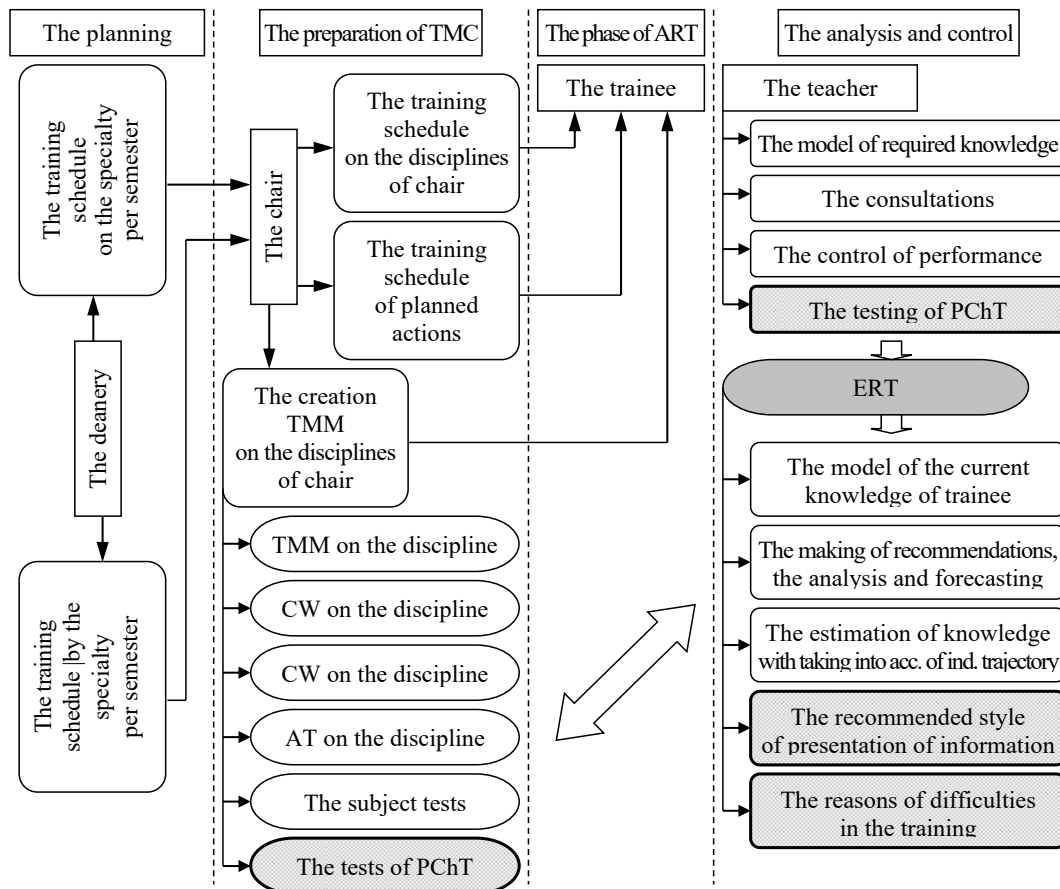
The development and introduction of the technologies of personal-oriented training initiates the consideration of personal characteristics (features) of subjects of training (PChT): physiological, psychological, linguistic and etc.

The adaptive generation of information-educational influences according to PChT the environment of automated (remote) training (ART) is realized on the basis of the cognitive model (CM), to the structure of which is presented a row of requirements: the relevance – to form the model with a set of personal characteristics of the subject, taken into account by the means of IEE and essential for the achieving of the purposes of training; the adequacy – the compliance of the received model to the original, the validity – the support by the means of IEE of the quasi-dynamic analysis and updating of the parameters of model due to the systematic accumulation of data about the condition of subject.

The organization of IEE of adaptive training based on the block of CM has a row of specific features (pic. 1): the regular units of the information centre of educational establishment need to support the preparation of tests of PChT and to conduct the testing of PChT, and to the trainee it is needed to perform the tests of PChT and tasks, developing of PChT (at necessary). The innovative modifications at the creation of adaptive IEE reflect also on the structure of training as a technological process of the formation of knowledge of a trainee (pic. 2), having a row of gaps (stages and phases): the planning, preparation of training-methodological complex (TMC), the phase of training, analysis and control.



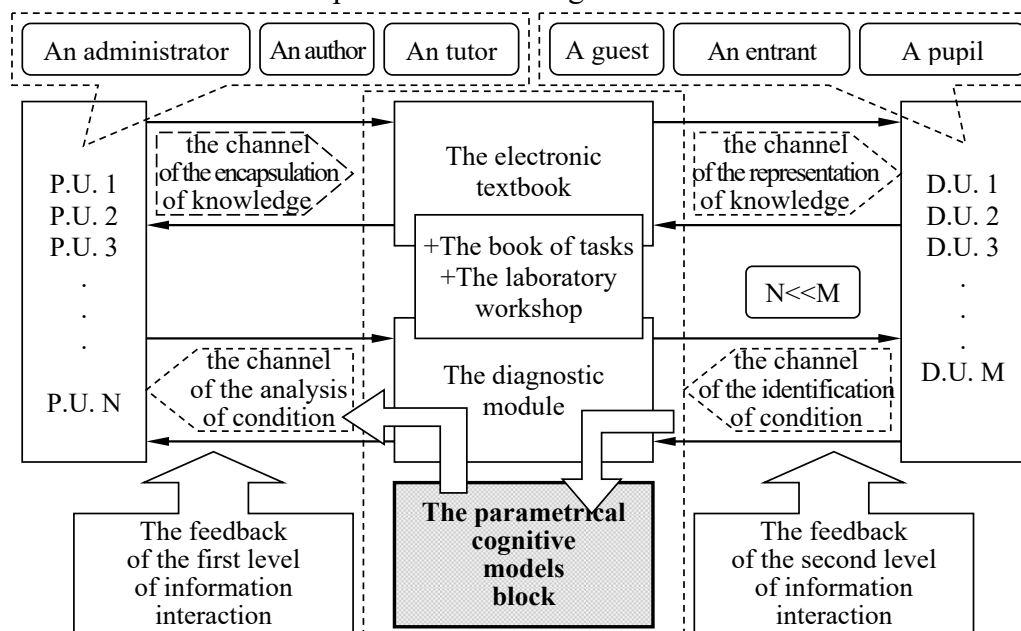
Pic. 1. The features of the information environment at the organization of adaptive training based on the parametric cognitive models



Pic. 2. The technological features at the organization of automated (remote) training based on the parametrical cognitive models

At the stage of the preparation of TMC it is necessary to prepare the tests of PChT, at the stage of the analysis and control to test PChT, and then to reveal the recommended style of the presentation of information, the reasons of difficulties of the trainee in the process of training and to record the results into the electronic record book (ERB).

The structure of the system of ART with the elements of adaptation based on the block of CM (pic. 3) is present inside a closed loop, including the two levels of information interaction: the first level is represented by the channel of encapsulation of knowledge and the channel of the analysis of condition, the second level contains the channel of the representation of knowledge and the channel of identification of condition of trainee.



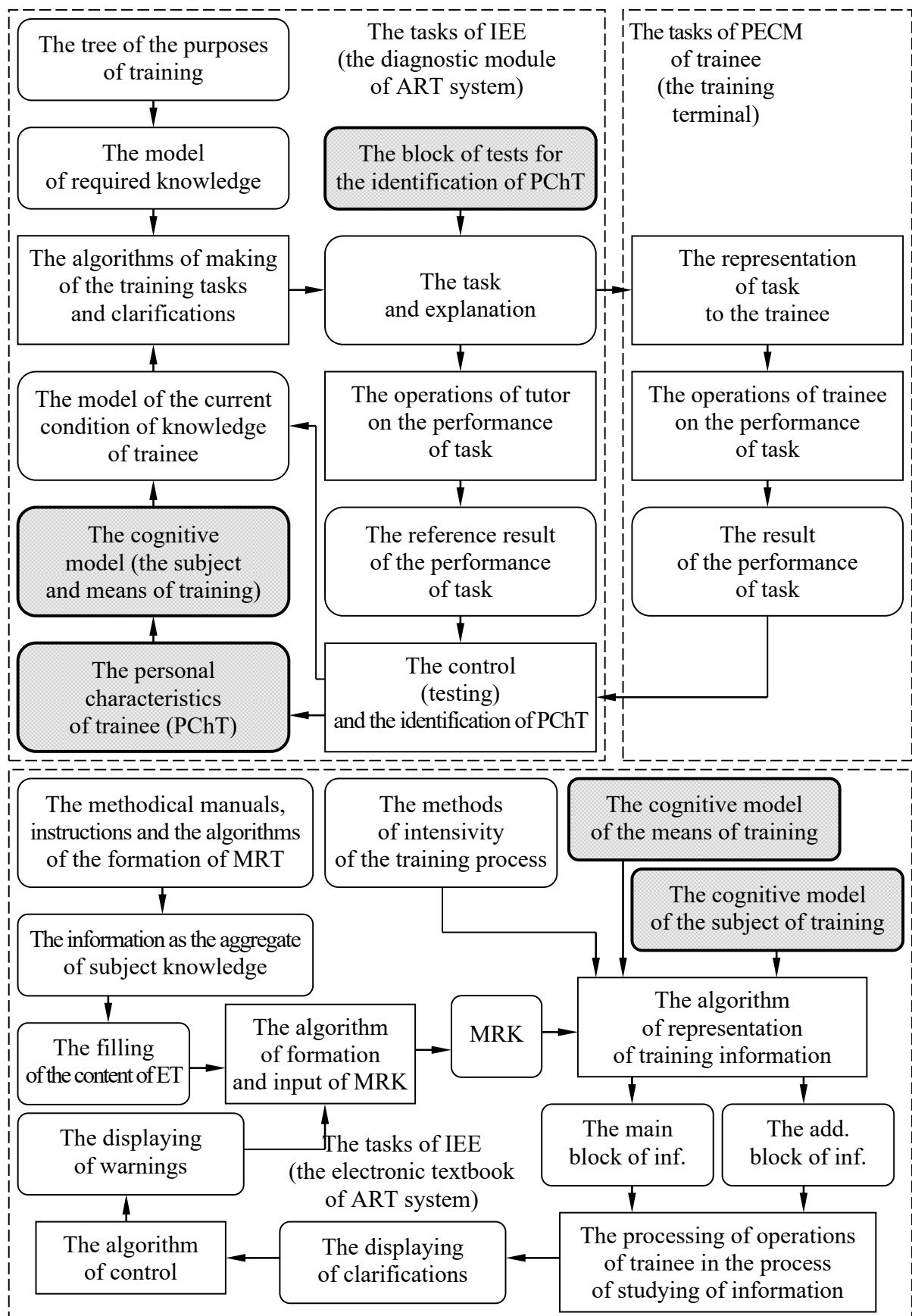
Pic. 3. The structure of the automated (remote) training system with the elements of adaptation based on the parametrical cognitive models block

In relation to the process of formation of knowledge the subjects of IEE of ART system are differentiated the level of access, acting in the various roles: the profit units (P.U.) – an administrator, an author, a tutor; the deficit units (D.E.) – a guest, an entrant and student. The virtual dialogue between the subjects is carried out by means of the means of IEE of ART system and therefore has the significant drawback – the limitation of communication interaction (in a wide sense), which need to be technologically eliminated.

The training (pic. 4, above) is considered as the process of controlled transfer of subject knowledge into the consciousness of trainee and includes a sequence of stages of the processing of information (the visual representation, perception, understanding, formation of skills, the aggregation of received information into the knowledge), therefore the level of the residual knowledge of trainee depends on the quality of perception and understanding of information fragments.

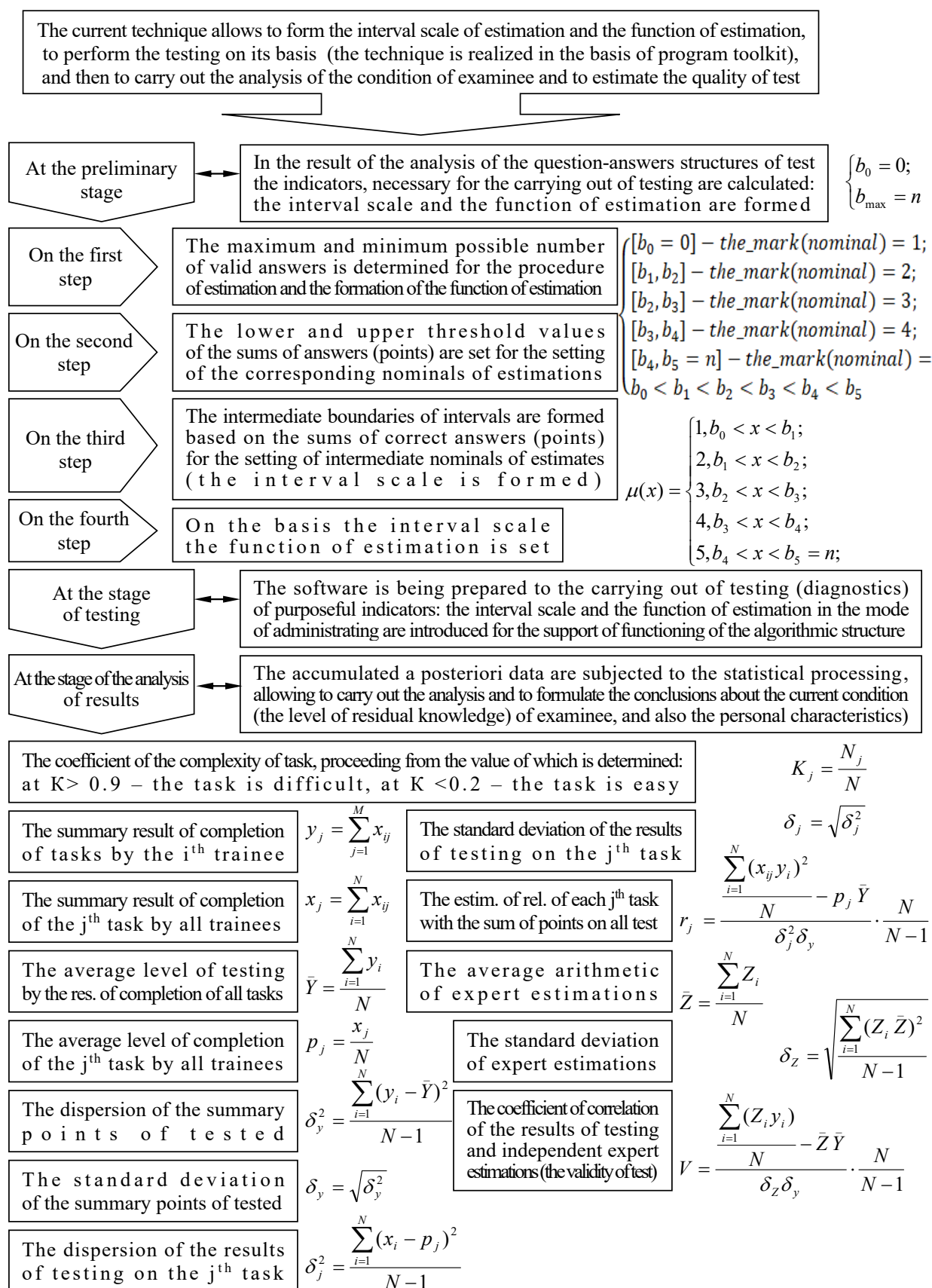
The control by the displaying of information fragments (electronic book, section, chapter and paragraph) by the various ways realizes the linguistic processor of electronic textbook (pic 4, below) based on the structural (semantic) meta-model of subject and the parametrical CM block. The structural (semantic) meta-model of subject is necessary and sufficient for the filling by the subject content on the cycle of disciplines.

The diagnostic module of ART system is intended for the initial, intermediate and final control testing of the level of residual knowledge of trainee, also realizes the initial and quasi-dynamic research of the parameters of PChT for the filling of CM of the subject of training. For the automation of research of the level of residual knowledge, the program tool has been developed, allowing to carry out the estimation on the basis of two scales: “the rough” – the calculation of the sum of correct answers on the questions; the extended – based on the sum of scored points on each variant of answer on the question.



Pic. 4. The general scheme of training as a controlled process with the adaptation based on the parametrical cognitive models block:
the principle of functioning of the diagnostic module and electronic textbook

For the processing of a posteriori results of research the technique of estimation of the level of knowledge of trainee and the analysis of the quality of test (pic. 5) is proposed.



Pic. 5. The technique of estimation of the level of knowledge of examinee and the analysis of the quality of test based on a posteriori results of testing