DESIGNING THE SYSTEM OF REMOTE KNOWLEDGE DIAGNOSING FOR STUDENTS OF TECHNICAL SPECIALTIES

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Abstract. In the article the theoretical aspects of planning of the systems of the controlled from distance diagnosing of level of know ledges of students are resulted on the basis of modern pedagogical theoretical and technological approaches. The practical results of creation of the systems of this type are resulted for organization of testing both in the structure of local networks of higher educational establishments and with access through the global network of Internet.

Keywords: distance learning; system of remote students knowledge diagnosing; free open source software; test

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Introduction

Using Internet-technologies in electronic testing expands geographical frameworks of granting education services to the broad audiences of interested people, and creates additional ratings toolkit of interaction HIGH SCHOOLS teacher's structure with students too. Computer Internet-testing enables to generalize a number of characteristics to access, a local student workplace, and included hardware and software characteristics connect to the Internet and other auxiliary resources, if they are used on workplace from what provide access to the Internet-testing program.

It is necessary to note, that recently Internet – testing programs turn on high-grade system of remote students knowledge diagnosing (SRKD) based on modern testologies and pedagogical dimensional theories [1, 2]. Given applicability systems should meet the requirements of interactive dialogue from learning subjects and adaptability to a level of their needs, a knowledge level and skills.

Advantages and lacks of introduction systems RKD

The distance course developer from some subject domain provides the teacher (tutor) in structure distance learning system with alternative means of the control over a course of testing, instead of the usual control over an audience or together with it. However Internet - testing cannot be considered as absolute alternative of personal student's participation in various kinds of the knowledge level control during learning. On the contrary SRKD considerably expand opportunities of the initial, intermediate control and self-checking of a knowledge level of learning subjects. At the same time the final control, having used the Internet – testing form, often should be added to requirements of the personal tutor interaction with students. Final testing can be carried out within the framework of HIGH SCHOOL or in the certification center with use as traditional and alternative tools of the control over a course of testing.

Important advantage SRKD it is an opportunity of modeling test questions, their sequences, variability, even conditions of test conducting on basis some algorithm.

Other SRKD advantages:
- efficiency at summarizing testing and their publication;
- unbiased results ratings of knowledge level diagnosing;
- smaller labor input at designing and editing test questions;
- simplicity and profitability of test questions duplicating;

- students can pass self-checking of own knowledge level;
- remote interaction from the teaching subject, with taking into account of an opportunity and an individual choice of time and a place of such contact.

Together with advantages of introduction SRSKD in teaching practice of HIGH SCHOOLS of Ukraine, it is necessary to specify and some lacks using the given toolkit.

1. Knowledge level remote diagnosing procedure and even rating, for example at the time account of the answer, depend on a way of connection and the testing server Internet network, congestion of liaison channels.

2. A number of alternative opportunities of the control over a course of testing are realized only for supports of Java-applets and other extensions, which also impose restrictions on realization of high-grade procedure of a learning subject's knowledge level remote rating.

3. Servers of safety (firewall), servers of anonymous access can represent a problem. For example, Proxy-server with some settings does not accept transfer data with cookies; it is a problem for implement systems with session management unit.

The given problems most likely should be related to technical realization problems and introduction SRKD at the present stage of distance learning methods development in Ukraine. The way out is obviously possible, if the final control to spend in HIGH SCHOOL or in the certified center, and for initial, intermediate testing and self-checking of a knowledge level using the WEB standard toolkit and interaction with the server through the interface CGI – common getaway interface, which provide the client queries to a server and transfer results from a server to client.

From the pedagogical point of view also it is not necessary to forget about negative factors which are connected with through measured use of Internet – testing, it is especial at the superficial and thoughtless relation to it:

1. Formation the erroneous purposes: Internet - testing can direct students for the superficial material studying and mechanical memorizing without using as counterbalance traditional knowledge verification methods.

2. Faceless: The student can feel isolated and helpless if he long time communicates only with a computer.

3. Excessive testing can resulted that students will start to avoid testing, abasement its significance.

4. Formation erroneous self-confidence: under the underestimated conditions of successful tests passage. Except for that at independent passage of the automated tests always there is an opportunity to see in a teaching material or receive right answers guessing.

5. Distort in study styles as a result of software imperfection and limitedness, especially if SRKD is built with the elementary simple test constructions using.

On the department of computer technologies in control and automatically systems it is designed and is in introduction stage SRKD d-tester 1.2, which is one of main functional DL system modules for students who learning in "Systems for control and automatically" specialty and it is intended for carrying out of boundary and final controllable actions [3]. System creation and improvement is result of the analysis and experience generalization of introduction a similar systems class in educational process of domestic and foreign HIGH SCHOOLS.

Except the specified system for adequate independent diagnostics of a student's knowledge level using LMS MOODLE and CMS eXeLearning, this is a Free Open Source Software (FOSS).

From the point of DC developer view, the especial attention should be given modeling of test questions in SRKD structure what allow to realize an individual approach to each subject of training, will provide uniqueness of test tasks and will raise flexibility of a rating which it has been received during Internet – testing. Disregard shown possibility Internet - testing transforms in standard procedure without process studying traditional control which comes to disappointment in innovation DL methods.

First of all DC developer needs to remember, that testing is not connected only to final knowledge level diagnosing. In DL conditions the student independently defines alternation of structural - information DC modules and can apply alternative development of other authors.

Types of measures of diagnosing in the structure of the systems RKD

For effective students knowledge level diagnosing in a DC structure must be organize next control actions [4]:

1. Preventive test (test-notice): this can be before some units, and before some DC. He is an illustration of what king of knowledge and skills will be received by students as a result of DC development.

In the test of the given type traditional tasks with modeling the concrete situation, attractive and emotionally bright behind the submission form of a material that provides development of multimedia objects - graphic, audio and video files in structure of the test task should be switched on not. In other words preventive tests should contain the announcement of materials with what it is necessary will meet to students during DC learning.

In fig. 1 it is shown a fragment of the test question for self-checking a students knowledge level of in a subject "the Theory of automatic control" which is realized in eXeLearning environment result of the test task should be comprehension by the student of such fundamental concepts of discipline: observant device, action, excitation, and regulator.
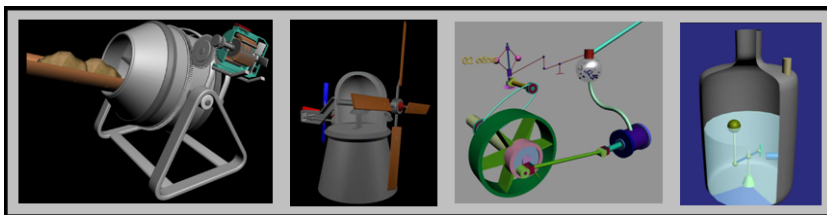

Fig.1 Preventive test question on course "Theory of automatically control"

2. The test control of residual student's knowledge over DC frameworks of the following two forms:

- Checking the minimal knowledge level necessary for learning of a new course (in the DC learning beginning).
- Examination which have been received in a course of studying given DC, necessary for acquaintance from other rates (at the end of learning DC).

Tasks and all test questions are necessary for provide diagnostics of residual knowledge must place in the common database (DB). Any question from DB on check of residual knowledge, should be accompanied by links to a resource which student needs to be repeated in case of the incorrect answer.

Authors of all DC preparations of some direction experts should use the common DB for carrying out of the specified testing type. Educational and methodical committee work, which is formed as HIGH SCHOOL structure department, can help to avoid extra cost and test module duplication for residual knowledge control.

On CTCAS department students master a lot of a cybernetic direction disciplines which will demand interosculation and a deepening of theoretical knowledge and practical skills. For example, it is not possible to imagine, that a student will successfully solve "Object recognition and identification" discipline problem, if he is not learned minimum knowledge in dynamic object modeling, automatic control theory, mathematical statistics and experiment planning theory.

3. Test tasks for knowledge level self-control which must be accompanied the detailed comments and references to the resources of DC in case of false student answer, but not only estimation determinations.

The given kind of testing goes before tests of the intermediate or final control, helping of students adaptations to SRKD. At this case knowledge level self-control test is activated or re-activated and checked up by student, a positive result is not obligatory.

In fig. 2 it is shown a fragment of the test question for self-checking a student's knowledge level of in a subject "the Theory of automatic control" which is realized in eXeLearning environment. The example shows process of active support during testing giving corresponding comments and links to a subject units.
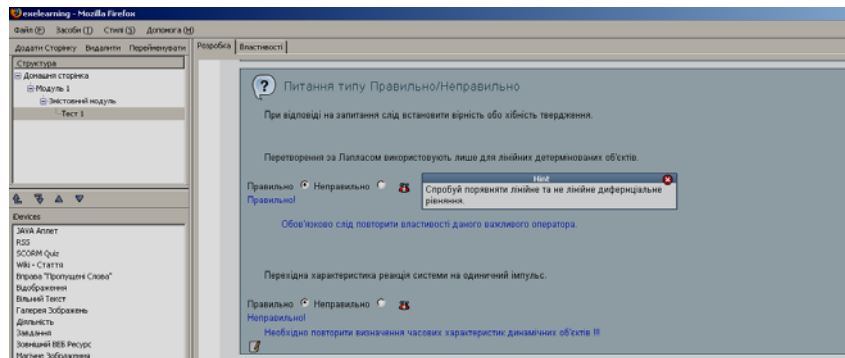
Fig.2 Testing question on course "Theory of automatically control" in eXeLearning environment

4. The intermediate and final control is finished with separate sections or whole DC and demand rigid authorization of testing subjects with imposing time restrictions and a place of carrying out of the given action.

The given type provides individual selection of the test questions list test with performances of results as the generalized rating with necessary structurization after separate sections. Final testing is desirable for spending at association of traditional control forms over a course of testing in HIGH SCHOOL or in the certified center.

Behind the specified principles functions d-tester SRKD which developed by initiative teachers group on the department of computer technologies in control and automatically systems of the National technical university of oil and gas.

In fig. 3 and fig. 4 it is shown the entering new test questions process and testing results order.

Fig. 3 Testing results order

Fig. 4 Test question registration form

The system approach at creation modern SRKD

The system approach at creation modern SRKD enables to avoid duplication during development of various applied applications on the basis of such simple structural units, as a question, the answer, the comment, the link, the block, a circuit, bank of test questions, the test, a key [5].

At designing SRKD use such common elements, as questions and answers. Other elements, for example such as the comment and the link, are added as options depending on concrete purpose of a test question in a course of training process.

1. Question: The effective way of SRKD designing is development of the common database for the control of residual knowledge, over self-testing, initial, intermediate and final knowledge level diagnosing.

Test tasks in database structure can have as own list of answers, comments or links, and using the common structural designs, that considerably facilitates creation of variation same questions, is especial within the framework of one thematic area, so-called meta-courses.

2. Answer should be formally caused by a pattern that defines the form from which students cooperate.

The most popular answers forms **are answer choice from the list,** simple choice – choice one favorite and additional choice some favorites from answers list – multi choice.

The common structural design in this case is the closed list of all possible answers, including incorrect. Such list can be the common for several test questions simultaneously, that raises adaptability to manufacture of development, reduces expenses of DC developer time, and the main thing, is more simple for students from the point of view of answer formation to the put tasks, instead of from the point of view of their contents. Thus it is necessary to specify set of correct answers separately for each of test tasks.

In the simplest case to a test question put one right answer in conformity only. However the SRKD developer can specify some right answers, even with gradation of their correctness.

For efficiency increase of the test control in SRKD the algorithm of casual answers sequence in the list for each student should be realized. Such algorithm switches off the fact of correct answer mechanical storing, for example after numbers, and enables to use identical test tasks in different control forms and over different students.

 3. Test questions block. If different test tasks incorporated by the common subject domain them logically to unit in the block, having concentrated at a block level all their common structural units that simplifies variation tests development.

Advantage of blocks using: inside each block, tasks can get out in any sequence. Moreover, at enough presence of the created blocks and questions in blocks, each testing subject receives different questions from different blocks, in different sequence and with the different answers list.

Very much often choose one of variants of questions association in blocks:

– association thematically questions with different, even general, formulations with counted on questions transposition within testing. In this case, excessiveness of test tasks must be low, and general number of block questions must be not less than five. At correct planning technology of such constructions can achieved high pedagogical test variance at small test questions excessive.

At the intermediate control of a knowledge level it is supposed performances of the test as one block.

– association of homogeneous questions, which difference consists only at the formulation of each test task, the identical list of answers is possible even. In this case, main attention have to pay to the questions excessiveness, student have asked more than one task from a block at general block questions number from two to five.

If in the test it is necessary to unit some blocks, in the testing program it is possible to expect a free choice of blocks inside which tasks can freely get out, but thus it is necessary to provide, that each subject or each block will be chosen for polling.

4. Circuit (variant):

At desire it is possible to mark questions inside blocks especial property of their inclusion in target circuits. Then on every testing stage questions are chosen according to chosen variant different for all blocks. On this basis it is possible to build logically linked tasks.

Other application of circuits consists in an interdiction of a choice of separate test tasks at the certain forms of the test control that raises a level of ratings objectivity during learning. For example, during self-control it is possible to forbid choosing part of tasks variants, but at final knowledge level control it is possible to allow to choose all test questions variants, a student will settle the acquainted and absolutely new for him questions during knowledge level diagnostic.

5. Comment construction arises by the incorrect answer. Naturally, that different test tasks can appeal to the common comment. The comment should not concentrate student's attention to a right answer, and substantially explain a way of his presence.

6. Links also form at the incorrect students answer; they contain the exact index on DC section where methods and algorithms decision of the put task speak.

It is necessary to note, that the link does not replace the comment, and the comment should not repeat DC fragment. A comment exposes the concrete task solution and reference requires the search of general material which exposes ways going for solving. At students self-control commentary constructions are desired in the SRKD structure, at residual knowledge control references are desired, and at final control comments and references are undesirable elements.

7. Testing questions bank. All building designs place in a system database which provides their search, editing and inclusions in different tests.

Thus each test task is considered as the publication, saves the indication of the author and access rights. However DC developer should allocate group of questions without restrictions of access rights which can be used for the control of a residual knowledge level and is accessible to all developers.

8. Test tasks compiling in blocks, and blocks in a test in the KRDS structure consummates instrument creation of students' knowledge and skills level diagnostic. At this level the actual number of test tasks can be set out of every control action, necessity of comments and references including, management answer reaction, time control, estimation scale, date, place and circle of potential testing participants.

9. Key is an effective path of KRDS maximal optimization descriptions achievement. A few keys are created for one test. One key is set of general test descriptions.

Students elect not test, but unique key for testing. The same test can be used for different control forms with the different keys; identical tasks can join in different tests. Exceptions present a question for preventive announcement-testing because they do not contain right answers often and accompanied multimedia files.

Conclusion

At SRKD planning it should be played attention methods and factors which are instrumental in effective application of Internet-testing:

- choice of an adequate level of test tasks complexity - simple test tasks are instrumental in creation of mistaken self-confidence feeling, at the same time difficult test tasks form frustration feeling, that can deprive students of interest to the subsequent studies in the structure of DC;

- enough of links inclusions to educational resources which respond the test questions;

- maintenance with the contact information about the teacher for an opportunity of operative dialogue;

- connection of test tasks with the aims of every structure unit of DC, which has concrete goals and provides moving toward the final goal of DC;

- maintenance of the maximal interest, stimulation and motivation of students;

- simplicity in use SRKD;

- regularity and obligatoryness of testing actions and control for knowledges systematization providing.

In the end of report it should shown the main aims, which can be attained at the effective SRKD planning and active introduction in the HIGH SCHOOL educational process:

1.   Successes rating of students learning.

2.   Help in learning.

3.   Rating of a learning efficiency.

4.   Teacher stimulation to reflections above learning process and a teaching material.

5.   Student's direction to reflections and practical actions.

6.   Student's attraction to questions production on learning topics.

7.   Creating additional motivation for learning.

Thus using testing systems provides following advantages:

1. Time saving: SRKD based on web-technologies easily duplicated and testing results is easily accessible.

2. Reduction of feedback time realization by testing results: results processing of simple testing forms (simple choice, multi choice) can be executed by a computer much faster than the teacher, and computer communications means enable students to receive results instantly, that is feedback realizing in real time;

3. Reduction of necessary resources: The basic critical resource in teaching disciplines is time that is used on knowledge level diagnostics which quickly decreases at use SRKD.

4. Simplification of conducting testing reports: using computers enables to save more testing reports, find necessary of them much faster and by more difficult criteria, than at job with paper analogues;

5. Access convenience: Students can test at any time and any number of attempts, if necessary.

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