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INTRODUCTION OF INFORMATION TECHNOLOGIES KNOWLEDGE CONTROL FROM ECONOMICAL DISCIPLINES

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In article basic aspects introduction integrated environment verification knowledge students from economic disciplines are ehpounded. It is resulted list modules given environment and classification assignments in relation to control knowledge students from normative economical disciplines. It is noted advantages arplication information technologies at different types current and final control knowledge students different forms teaching.

Keywords: *distance learning systems, institutes higher education, economical disciplines, testing, tasks, current control knowledge, final control knowledge.*

Development of current, module and final control tasks of knowledge is one of basic elements of every educational discipline, that is teaching at universities and is a feedback for a teacher with students in future development, planning and perfection of disciplines. For conducting of current knowledge control at many universities a Work Book with different types of tasks after the themes of discipline is used. Implementation of tasks in these books allows to follow the progress dynamics of student on assignments of course, gives the feedback to the teacher about to complication of the tasks. Work books also are one of means of knowledge control from economical disciplines generally and microeconomics in particular. By examples most known in world practice work books there are « Workouts in Intermediate Microeconomics » H. Varian [1], and also W. Nicholson [2] and O. Shy [3]. The given instrument of knowledge control allows well to control and to estimate knowledge of students of daily, correspondence, distance learning, external studies and also during work with the listeners of Center of rising and retraining of qualification. Modern development of information technologies allows to perfect the system of students knowledge verification of any form of teaching and simplify the process of verification for the teacher (tutor).

For the sake of improvement of the checking system of students knowledge from economical specialties in 2008 by the authors collective of the Research Institute of Information Technologies (RIIT) of the Kherson state university (KSU) the project of the 'Working out of control knowledge integrated environment of students from economical and mathematical disciplines of normative part for higher educational institutes for specialty 6.050100 «Economy of firm», 6.050101 «Economical Theory»'. The collective of authors of RIIT KSU has a rich experience in relation to successful introduction of software products which were led to the practical use [4-7] and teaching of disciplines of economical and mathematical cycle [8-10].

Introduction of the given project will allow to minimize the level of plagiarism among students at implementation of the same type tasks through differentiation of these tasks and establishment of the limited time on its implementation (by a timer or by a teacher-tutor). Distance control environment will allow to take into account at the evaluation not only right answer of test but also appropriateness and expedience of the applied methods for tasks on daily, correspondence, external and distance forms of teaching in higher educational institutes, where economical disciplines are studied, that confirms its actuality and novelty.

Goal – to describe development within the distance portal of the integrated control and verification environment of tasks, graph exercises, tests and problem situations controlled from distance by means the creation of the built-in modules.

Achievement of this goal is related to implementation of the following tasks:

Task 1. Creation of educational instruments of the integrated knowledge control environment of students in composition: 1) instruments for students; 2) facilities of communication; 3) instruments of evaluation.

Task 2. Development of tasks, graphic exercises, tests and problem situations on the normative program for economical disciplines.

Task 3. Development of methodical support of teaching and document for users.

Fundamental program modules of software are included:

1. **Module «Help»** (educational and thematic plan from disciplines, table of finding of derivatives and integrals, formulas from the themes of economical disciplines of normative cycle).

2. **Module of «Testing»** (bank of tests with the single or plural variants of answers of current and final knowledge control from economical disciplines).

3. **Module «Book of problems»** (library *of tasks* of current and final control from economical disciplines).

4. **Module the «Mathematical editor»** (templates of formulas – derivative, integrals, systems of equations).

5. Module the «Graphics editor» (templates of the graphs).

6. **Module «Calculator»** (addition, deduction, increase, division, getting up to the degree, finding of natural logarithm, logarithm, finding of exponent, saving in memory of calculator and receipt from memory).

7. **The module «Decision Environment»** (the field for the decision with built-in graphics and mathematical editors, calculator).

8. **Module «Problem Solver»**: automatic verification of rightness (accessible only for teacher-tutor): answers for tests; transformations during the decision of task; functions of algebraic expressions necessary for construction of the graphs.

Audience of the given project: students of daily, correspondence, distsnce, external forms of teaching, listeners of centers of retraining and in-plant training.

Forms of control: current, modules, final control of audience and students' individual work from economical disciplines.

Means of control: tests, graphs exercises and tasks.

Classification of test tasks

1. **Theoretical test (**the opened or closed type on knowledge of theoretical positions and laws, determination of notion, maintenance of economical processes and phenomena, their descriptions, does not need computations).

2. **Test-task (**it is necessary to solve the put task and choose a true variant from the offered variants of answers).

3. **Test-graph** (graph exercise, where the statement of test is presented by the graph by means which it is necessary to give an answer).

4. **Test-table** (the statement of test is represented by table, that contains economical indicators which are needed for finding of unknown indexes or for formulation of conclusion or recommendation in relation to the noted situation).

5. **Test-accordance** (the condition of test is presented by two columns between data of which it is necessary to set accordance, thus the quantity of elements in each of columns can be different).

6. **The combined test** (can include descriptions the two or more of definite above types of tests).

In the given list a theoretical test can have both single and plural choice, while the other tests will have, as a rule, only single true variant of answer from offered.

Tasks are the second basic element of knowledge verification of students. ***The structure of task*** includes:

1) statement (problem definition) – «Book» of problems is found in the correspondence module;

2) decision (motion of decision is carried out in the environment of decision by means mathematical and graphic editors, calculator);
3) answer (it is added to the prepared template).

The following are <u>advantages of the integrated system of economic knowledge verification of students (ISEKV):</u>

1. An answer for a test is to be confirmed by the proper computations or explanations.
2. The module «Calculator» has the complete set of functions necessary for the decision of tasks and tests from the proper modules «Book» of problems and «Tests».
3. Application of graphic to the editor saves time on implementation of graphic constructions.
4. The templates of denotations allow to make unification the system of denotations in economical disciplines.
5. Time saving of teacher-tutor on verification of tests and search of errors in the decision of tasks.
6. Random selection of test and succession of answers, which minimizes possibility of plagiarism for the performers of the same type tasks.
7. Differentiation of tasks for students with a different preparation that will do this environment more flexible in work with students.

Of course, the system of knowledge verification can have <u>limitations</u> in the use during exploitation:

1. On the initial stages of introduction ISEKV there will be the take time for the acquaintance with his functions and interface of users that will compensate the economized time on the future stages of knowledge verification.
2. Technical terms – presence of permanent uninterrupted access to the Internet.

For development ISEKV it is necessary to create following structure of economic discipline after the following component parts:

I. Fundamental classes of functions, that are used in tests tasks (for a graphics editor).

II. Basic types of transformations for the decision of tasks (for a mathematical editor).

The examples of operations with functions are:
1) construction of point on the graph after its coordinates;
2) finding of coordinates of intersection functions;
3) construction of tangent to the set function in a definite point.

Examples of operations with mathematical expressions:
1) finding of function derivative;
2) calculation of extremum of function;
3) computation to the integral of function;
4) solving the system of equations.

Below the resulted example of functions for mathematical editor from discipline «Microeconomics».

1.1. Economic interpretation:

Finding of marginal utility of user $MU_x(x)$ from a commodity x on the basis of function of his total utility $U(x)$.

1.2. Mathematical interpretation:

Finding of derivative function $U(x)$ with one variable.

$$U(x) \rightarrow MU_x(x) = \frac{dU(x)}{dx}.$$

Total utility functions	Marginal utility functions
$U(x) = a \cdot x$	$MU_x(x) = a$
$U(x) = a \cdot \sqrt{x}$	$MU_x(x) = \dfrac{a}{2\sqrt{x}}$

$U(x) = a \cdot \ln x$	$MU_x(x) = \dfrac{a}{x}$
$U(x) = (x+a)^r$	$MU_x(x) = r(x+a)^{r-1}$
$U(x) = x^a$	$MU_x(x) = a \cdot x^{a-1}$

a, r – real numbers, constants.

An example of functions is farther made for graphics editor from discipline «Microeconomics».

ALGORITHM OF CONSTRUCTION

1. The formula of function of total utility $l(U = f(x))$ is copied from a reference book in the field of formula (decision environment) or taken by an user in formula field.

2. The values of constants are set.

3. The graph of function in the system of coordinates of «$x-U$» by means the command to «Execute» is built. In field of the graph given function is represented.

Function of total utility $U = f(x)$	The graph of total utiality function $l\big(U = f(x)\big)$
It is given: constants a, b, function $U = a \cdot x + b$, U, x – variables.	**To build:** function equation $l\big(U = a \cdot x + b\big)$
It is given: constants a, b, function $U = a \cdot \sqrt{x} + b$, U, x – variables.	**To build:** function equation $l\big(U = a \cdot \sqrt{x} + b\big)$
It is given: constants a, b, function $U = a \cdot \ln x + b$, U, x – variables.	**To build:** function equation $l\big(U = a \cdot \ln x + b\big)$
It is given: constants a, b, function $U = (x+a)^r + b$, U, x – variables.	**To build:** function equation $l\big(U = (x+a)^r + b\big)$
It is given: constants a, b, function $U = x^a + b$ U, x – variables.	**To build:** function equation $l\big(U = x^a + b\big)$

a, r – real numbers, constants.

Therefore development and setting ISEKV for the knowledge control of students grounds to formulate such conclusions:

1. Specification of maintenance of discipline taking into account practical tests and tasks which it will be necessary to execute to the student in the process of current, thematic and final knowledge control.

2. Practical orientation of discipline – application of knowledge, abilities and skills from discipline in a practical economical situation, that will allow to explain a student not only to the audience, but also to the independent prosecution of basic and additional material of economical discipline.

3. Development of intra-disciplines connections – the combined application of economical, mathematical knowledges in combination with information technologies will allow a student to become a competitive specialist at labor market.

4. Introduction ISEKV will allow to put in order and strengthen the control above individual students' work in the conditions of distribution of requirements of the Bologna process.

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