Application of the Computer Testing in the Architectural Education

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Abstract: The article deals with the newest trends of the computer testing, applied in the field of the knowledge evaluation. The author uncovers the essence, specific features and the structure of the computer testing. The introducing of the computer testing into the system of the architectural education is viewed as leading perspective for the improvement of the learning process. The special attention is devoted to the Moodle system as an effective way of the knowledge evaluation.

Key words: Computer test · Moodle · Knowledge evaluation

INTRODUCTION

Modernization of the Iranian system of higher education needs special measures on the upgrading the technical tools, optimizing the educational methods and the enhancement of the professional level of the professors staff.

The whole complex of criteria was always used to evaluate the level of the higher education institutions; one of these criteria was aimed at the exposing basic knowledge and the newly obtained knowledge.

One of the directions in the enhancement of the educational process is directed into the creating of the fast reacting operational system, aimed at the control of the obtained knowledge and practice experience of the students. Such a system has to evaluate and detect the real volume and presence of the knowledge as well a s gaps in it. Taking into account all the above mentioned problems of the educational process, these questions can be defined as issues of the actual interest for the scientists, researchers, pedagogues, programmers, working in the sphere of the higher education. Nowadays there are a lot of testing systems, applied in the traditional as well as in compute education. Contemporary trends are searching for the optimal harmonic unity of the traditional direct, non direct educational methods of interaction between a teacher and the students. These methods are based on the internet, telecommunication and CASE-technologies [1].

The systems for testing the level of knowledge had been already created in the 90s of the 20th century. At the initial stage these systems correlated with the simple and widely used DOS system and till now such systems are working at some educational institutions or at some cathedras and departments. Contemporary up to date technical methods, tools for the visual projecting, programming languages of high level and simplicity of the mathematical apparatus make possible the programming of the higher class for the creation of the test tasks and application and introducing them into the educational systems and systems of adaptive testing.

CASE (Computer-Aided Software Engineering) system is widely used for projecting of the complicated programming software; it is an intricate complex, combining methodological analyses, projecting, creation and operational support of the complicated systems. Modern techniques of programming software creation enable support of the above mentions technology. Thus the projecting and realization of the complicated programming systems become easy accessible matter for any qualified specialist in the field. In comparison to the more complicated system an difficult tasks and means of the automatic control (CAD, CAM), the overwhelming majority of the existing systems for test and control of the knowledge have a minimum of demands of the apparatus part of the system (it is also true for IBM and APPLE compatible personal computers).

Types of the Control System and Their Comparison: Nowadays almost all educational institutions have computers, local networks and internet access. This fact enables the transition from the traditional educational methods and evaluation techniques to the innovative educational technologies. It would be reasonable to

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define two main trends of the evolution of the control systems development, which uncover their forms of organization and the role of the teacher in them.

The Traditional Control of Knowledge: In the arsenal of the traditional educational approach there are such types of control and check methods as a control work, colloquium, seminar, laboratory work, course project, course test, research paper, home work, testing, intermediate testing, examination, diploma research. The teacher prepares variants of tasks, then checks and evaluates students' results. This process demands more time and work, but it implies an individual approach to the student. In the case of the controlling by means of the paper (printed) materials specially made forms are used, where the control tasks are printed. The students fill in the forms by answering the questions or finding solutions for the other tasks. The teacher checks results, using own potential of the knowledge and special tables and carts of the proper answers. Approved standard format plays an important role in this case.

Control of Knowledge by Means of the Technical Equipment: In this case the student is given a special list of tasks according to the number of the variant, chooses the answers and technical device controls the procedure, analyses the answers, checks and evaluates them. The device can be used to input test tasks, to check correct answers, output of the results of the check and evaluation. Organization of control is aimed at the easing the testing procedure, to free the teacher from the routine work (more time is left for the individual lessons).By using this method The speed and objectivity of testing are also improved.

In comparison to the traditional types of testing the computer method shows more priorities: application of the innovative technologies and software, contemporary programming updates, more versatile adaptation to the special characteristics of the individual students and groups of the students.

The significance of the test control could hardly be overestimated: under the premise of the effective management it performs three main functions of the educational process: educational, developing, pedagogical functions.

The testing is one of the ways of control of the obtained knowledge and practical skills and the range of its application is unlimited. In the system of the architectural education it is possible to point to two trends of testing: testing of the knowledge and testing of the practical skills.

It is evident that the testing process had not always been automatic or semi automatic, regarding different positions of the teacher, student and a computer in it. On the contemporary stage of the education development the student completes tasks in direct dialogue with a computer. In the case when students are proposed the tasks of the open type, some problems can occur, which are not solved yet (for example with the answers, given in voluntary form).

Under taking an over view of such method of control it is possible to expose its pluses (Fig. 1).

Character and types of the testing can be various. Sometimes a test, containing from fifteen to twenty tasks can be sufficient, in other cases the aim of testing will need several dozens of tasks. It is evident, that the more tasks, given for students, serve the better evaluation, but it will more time and amount o work both for the students and for the professors' staff.

The control of the knowledge is supported and provided by the complicated computer software, which create an individual list of tasks, present them on the monitor, analyses of answers and evaluation of the test results, archives the test results, which later can be interpreted by the professor. One of the another modes of control is the application of the telecommunication systems, sending data via internet, that is a chance both for student and professor staff to choose time and place for more precise and accurate evaluation of the knowledge.

Computer system of testing is an information system for the testing of the knowledge within the frames of the educational process (Fig.2).

Such a system features specific characteristics of the technical automatic means for the control and check of the obtained knowledge and their correlation with the practical skills.

- Securing in the general data base a huge variety of tests on the different disciplines, a direct access to any test for the creation of different scenarios
- Fixing any temporal range on any test, or on the number o tasks
- Fixing certain criteria of the evaluation of the test results (number of right answers or proportion between right and wrong answers)
- Automatic check of the test results and creation of the general report on it.
- Printing and archiving the results of tests.
- Unification of the filing in the standard format
- Comfortable interface, based on the object oriented instrumental devices.
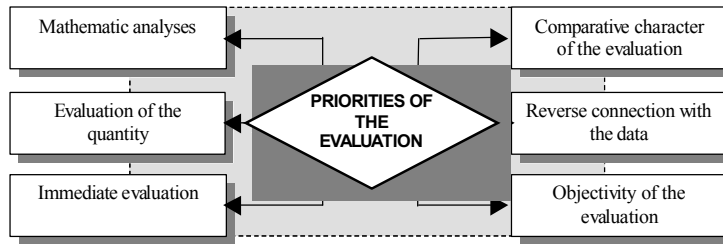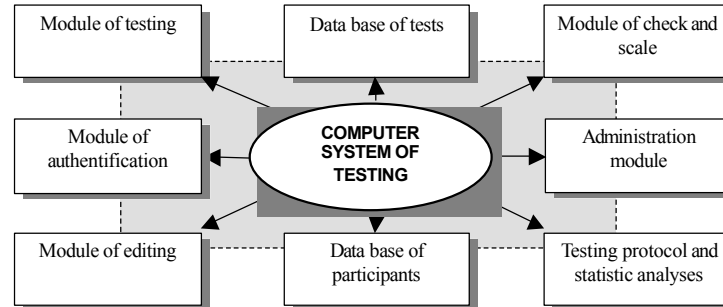
Fig. 1: The priorities of the computer testing

Fig. 2: The component parts of a computer-based system

Application of computer testing, internet and intranet communications rounds the circle of the specific problems, rising in the process of implementation of the system. The following premises are necessary for the providing and supporting the computer testing.

- Technical base (a personal computer and a printing device).
- Necessary software.
- Skills of computer and software use.
- Unified rules of the creation of the computer tests and analyses of the result.

Introducing of the innovative information technologies into the educational process demands more precise and adequate definition of the aims of control, data selection for the purpose of testing the knowledge and the skills. So we can outline basic foundations of the models of control and evaluation of knowledge.

- Strict formalization.
- Standard format tasks and their completion.
- Estimation of the obtained results and structuring them according the chosen scheme.
- Interpretation of results according to the defined criteria.

The reasonable and professional approach to the testing structure implies the reverse connection of the testing process with the classes' procedure, presenting the initial data base for the students. During the analyses of the computer testing it is desirable to fix a share of the right answers given for one task, or a group of tasks, related to one or another topic. If this share comprises 50% or less, this fact should serve as an indication to review the certain topic in the next lecture or to give another type of task, considering the review. It is a significant point to pay attention during the intermediary control, after presenting certain topic, before the final examination. These procedure enables the professors' staffs to overlook and make necessary corrections in the presented data, at the same time the students are able to evaluate objectively their own knowledge and skills [2].

At the contemporary stage the following problems exist in the sphere of the architectural education.

- The absence of the sufficient amount of the testing data.
- The difficulties in the sphere of the decision making on the basis of the large amount of the information, consisting of various elementary factors.
- The absence of criteria, applicable to the automatic control systems, formalized for mathematic and programming realization.
- The difficulties in testing of the creative potential, some forms of the distance testing.
- The difficulties in the creation of the testing programs, meeting the needs without any external support.

Testing plays an important role in the process of the education, but not all activities are limited to the testing. Other forms of control should be added to the testing elements. The tests have their own specific features. The testing does not expose the emotional attitude of the students; it does not reveal the place of the obtained knowledge in the individual hierarchy of the values. The testing does not show the level of the students' activity and application of the obtained theoretical knowledge in the practical experience. The results of the testing could be easily falsified without special precautions. Some answers could be chosen by "passive recognizing" or intuitive guessing. At the same time the testing is to take into account all the above mentioned possible gaps and the tests can propose false answers to the students, "attracting them to the traps". The results of the test do not point to the ability of the students to use the obtained knowledge in the new situation, different from the presented in the testing tasks. The high testing rate does not mean absolutely the adequate mode of the logic and creative thinking.

Besides the above mentioned problem, introducing of the testing in the everyday, intermediary and final control procedure limits the language skills of the students; hide their ability to articulate the questions, to discuss the matters of the topic. The proper argumentation in the process of the dispute, precisely formatting of the problems should be necessary professional skills of all the graduates (especially future science researchers).

Traditional tests can not control the level of the knowledge and skills, which students obtained fulfilling research projects, participating in team work and discussions, individually searching for the information. There is a problem how to evaluate individual characteristics of the students, the specific modes of the personal logic and oral skills.

The new diagnostic methods (the technique of description conclusions, behavioral interview) should comprehend to the radically different characteristics of the new testing (in comparison to the traditional one). They should detect the specifics of the individually obtained experience and be applied only just within the adequate educational environment, to take into account individuality and various levels of skills and creative abilities, fix the dynamics of individual development [3].

During the arranging of the testing we should distinguish the two possible modes of it: the control procedure engages local computer, server and intranet and the one which engages internet communication. This difference leads to the usage of various programs software; the choice of it depends on the type of the testing. The general scheme is shown on the Figure 3.

Specifics of the Computer Testing: The general specific characteristics of the computer testing can be described in the following list:

- The computer testing is recommended to use for the intermediary and the final evaluation of the knowledge, also for the valuation of the left basis of the knowledge. The results of the computer testing are used for summing up the examination rate (the level of 70%)

- The results of testing are used by the corresponding departments for the purpose of making corrections in the educational process.
- There is a need to update the data base of the testing regularly, to check their comprehension and actuality.
- The computer programs should be of immediate and easy access for the professors' staff and for the students. The students should be notified in advance on the topic, date and place of the testing.
- Easing of the psychological pressure on the teachers and the students, at the same time maintaining the high ratings of the testing. The competition between students should be encouraged [2].
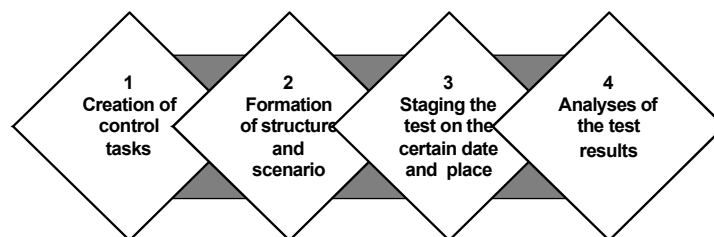

Fig. 3: The principal scheme testing organization of knowledge

The test tasks are posted on the web page, with date and time notifications, an exact number of trials. Test includes tasks and variants of answers (wrong and right). An exact number of questions are defined by the teacher. After that the time limit is put and variants of the "undo" steps. The disposition of questions and answers is voluntarily chosen for mixing wrong and right answers, which excludes formal succession and the tasks should be adapted to the individual characteristics of students.

The protocol is completed in accordance with the results of the tests. The protocol includes names of the students, the title of the course, a number of the right answers, a number of the wrong answers and percentage share of the wrong and right answers, commentaries of the teacher.

During "the construction of the test" the attention should be paid to the following aspects.

- Transparent and precise formulation of tasks for the non ambivalent interpreting them by the students and obtaining proper answers (it especially actual for the questions of the "open type"), to avoid misunderstanding when using the language of input and translating of terms, using number instead of letters, switching the register of the keyboard, interpreting the drawings. A number of the questions input into the data base should be optimal and not over step the necessary limit.
- The time limit for the fulfilling of the test tasks. Test tasks should be formulated in such a way that the amount of time will be sufficient for the effective completing the full test.
- The test should include tutorials on how to complete the test.
- Optimal account on answering one question (in minutes), saving of time adds to the time limit for answering succeeding questions.
- During the procedure of the testing the teacher should look at the individual work of students, maintain necessary discipline.
- Before introducing the test for the first time, the teacher should check it thoroughly, to avoid mishaps and errors.
- Estimated number of questions that apply to each student in one discipline are recommended to set at the discretion of the teacher, but not less than 15-20.

The computer testing is not only the method which allows by minimum of spending time to check objectively the knowledge obtained by the majority of students.

Proper planned schedule of testing is a good stimulus that challenges the students to the system and regular work during the semester. The computer testing is welcomed by students. Moreover the researches showed that students do not regard a teacher as an opponent during the testing. The testing can be performed during the regular classes and as well as during the individual work of students [4].

The procedure of testing does not suppose the necessary presence of the teacher in the class room, for this purpose there are special premises with the service personnel, who maintain discipline and objectivity during the testing.

One of the variants of the distance knowledge evaluation implies the use of the telecommunication internet technologies, which gives the student the free choice of the time and place and the schedule of the education.

Moodle (Modular Object-Oriented Dynamic Learning Environment) is a system of testing via internet, it is part of the global system of the distance education. Moodle system is a freeware, distributed free of charge, it was started up back in the 90s of the 20th century. This project is constantly improving and upgrading and now it works in more then a hundred of countries [6].

The goals of using this system are versatile. They are defined as following: the creation of the comfort learning environment, application of the numerous educational technologies, the selection of the students according to the profile modules, organization of the temporal working teams for the creation of the educational project, check of the control tasks with the help of the students, creation of the students' portfolio, the portal of the discussions and disputes on the arguable scientific, pedagogical arguable questions, basics of the learning resources, the creation of the virtual courses (distance education), obtaining the practical experience in the certain field of the activity. Moodle sustains the competition with the well known commercial programs of testing (LMS), but the priority of Moodle lays in its free distribution by means of the initially open code. This enables to adapt it to the specifics of the certain concrete educational project and to introduce in it the new modules [1].

The Moodle system can be described by such features:

- Reliability of the protection mechanism (securing from hacking).
- Analytical features and reverse working links, upgrading the tests, according to the analyses of the results statistics.

- Free and constant access to the results of the testing.
- Limitations on the amount of tasks in the tests, the rating of the completion, a number of the right answers, the time spent on it.
- Variability – the selection of questions by chance.
- Mathematical apparatus of the statistic analyses of the test results, verification procedures, similarity of the alternative answers.
- Universality of the testing application and free access via internet.
- Flexibility and variety of the visual techniques.

Leading higher educational institutions of Iran (and Ukraine) undertake research and application of the Moodle system alongside with the using of their own computer systems of testing. According to the coordination programs of the world communities of the higher educational institutions and the statements of the national ministries of education are implementing the computer testing systems into the educational process, engaging the departments of the information technologies. It is an important step towards the new stage of the knowledge evaluation in the sphere of the architectural education, establishing the new standards of learning [7], [8].

The Perspectives of the Computer Testing of the Obtained Knowledge: Thus it is possible to assume that the creation of the effective system of the computer testing is one of the main criteria for the construction of the system aimed at the proper evaluation of the students' knowledge learning at the higher educational institution. Automatic process introduced into the decision making in the sphere of the knowledge and skills testing in higher educational institutions leaves more time for the intellectual and professional of the teaching staff, for their scientific and practical researchers. Appliance of the computer testing programs allows shortening financial spending too.

It is very important to circle around the exact sphere of the introducing the computer testing, it is an acute problem for the application in education of the students of the humanitarian specialties (artists, sculptures, musicians, designers, architects, journalists etc.). The numbers of the disciplines eligible for the computer testing of the knowledge vary in each case and also depend on the specifics of the chosen course. When the students study a certain amount of the theoretical knowledge (a transparent system of the categories,

notions, facts, regularities, general and specific laws) the application of the computer testing of the obtained knowledge and practical skills seems plausible and the computer testing expose adequate results and allow judgments on the effectiveness of the education. The special function of testing is the defining the level of the obtained skills, using the scenarios, imitating real situations.

The testing of the individual creative potential is an extremely difficult task, sometimes it is substituted by tests on associations, rapid reaction etc. A special attention should be paid the research of creative abilities of the individuals, uncovering their hidden heuristic features. The creative process should be investigated with the purpose of the stimulating the innovative activity of the students and post graduate students.

But implementing of the computer methods of knowledge and skills testing should be taken up precautious, to avoid unification and the standard classification of the individuality.

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