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Software System for Distant Education Self-testing *

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Abstract: *A software system for "self-testing" distant educated students is described. The implemented main principles are discussed. The used programming technology allows easy changing of education testing subject without need for any programming skills. The system is implemented for "C programming Language" distant training course and for "Basics of pneumatics" multimedia training course as trainees "self-testing" tool.*

Keywords: *distant education, education in multimedia environment, software systems, educational testing, and "self-testing".*

I. Introduction

The global network Internet has influenced greatly all areas of our life. Distant learning and teaching are amongst areas widely using benefits of the World Wide Web content of Internet. One of the important aspects of distant education is evaluating of the educational results or testing of the students. There are two main types of testing - one made by instructor or teacher and other made by the student itself - "self-testing". The first one is used for final scoring and the second - for currently checking the reached knowledge level in educational process. A developed software system for second type testing i.e. "self-testing", is described and implemented development technology principles are discussed.

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II. “Self-testing” principles

“Self-testing” is a tool to help the trainee or student to evaluate his/her reached knowledge level and to help finding the knowledge gaps in the process of his/her education.

The following principles of educational “self-testing” could be stated:

- “Self-testing” is done in the process of education by the student in any chosen by him/her moment of time.
- The results of “self-testing” are not to be sent to the instructor and are not to be used for final scoring. They are shown to the student only and usually there is no need to be permanently stored. Information about wrong answers (and the correct ones) is shown after answering of every questions set. Sometime it might be useful to create an answers log file for checking it later again by the student. That kind of information could be useful to help the student to assess himself and to fulfill the shown knowledge gaps.
- Test for some chosen topic can be completed if every question is answered. If some is not – a proper warning should be shown.
- Every test topic can be passed just once for current testing session - the system should keep track for every passed topic and should block attempt for other corrective attempts. Nevertheless that the system is for “self-testing” (unofficially testing) in that way it is supposed to help the student’s preparation for the official final testing.
- Some system of scoring should exists in the cases when final exam is based on score level to help the student to decide if he/she is ready for that exam. Usually that means assigning weight (score) for every correct answer. The score sum is calculated for the current testing session only and is not stored anywhere.
- The testing software system could be located on distant education server or could be downloaded and installed on the client-side – on the student’s computer.
- The testing software system should allow easily changing the questions topics sets by the instructor without specialized programming skills. Sometimes it might be useful to give him a possibility to define whether the whole questionnaire or a part of it should be tested.

III. The implemented software technology

All of the above principles are implemented in the developed in the *Institute of Information Technologies of Bulgarian Academy of Sciences* software system for distant education “self-testing”. The system has been developed by tools of HTML and JavaScript languages and runs in the environment of most popular browsers. Because no information is returned back from the client-side there is no need for some specific server programming. The system itself can be located on server-side and can be included in some distant education course. It can be activated by simple HTML hyperlink. If off-line testing is preferred the system can be downloaded on client-side or distributed on CD ROM disk, for example.

IV. The “self-testing” system interface windows

Main starting window is shown on Fig.1. It is loaded after activating the testing hyperlink (included in some distant education course for example). On the left side of the window is the contents of test topics (Fig.1 – pos. 1). It is loaded in a frame of main window and stays there during all the time of a testing session. On the right side of the main window is working frame. At starting of the testing session it is loaded with help instructions for using “self-testing” system (Fig.2 – pos.2).

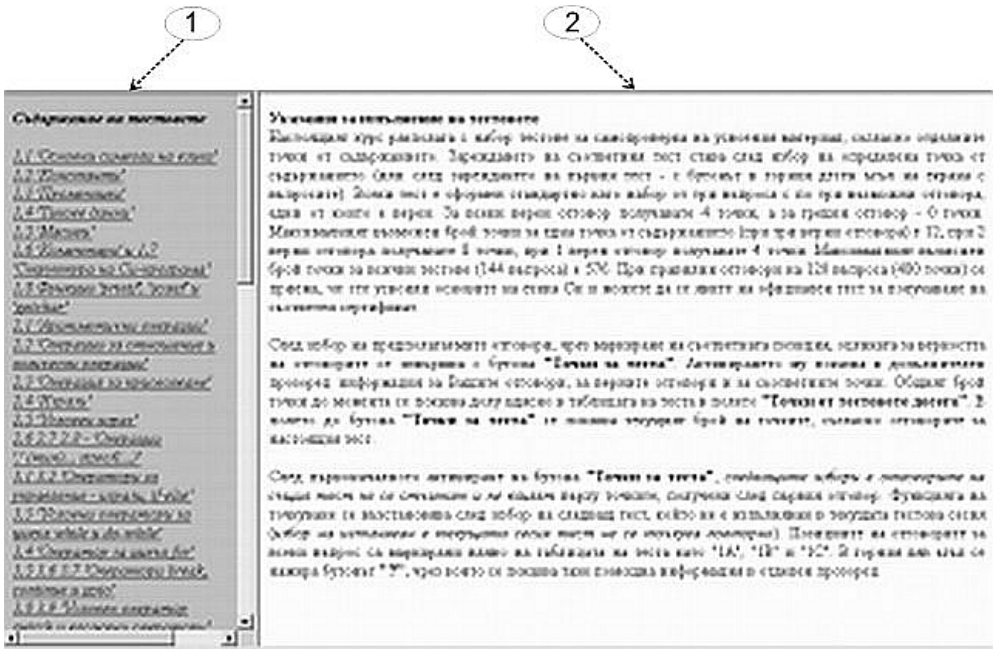

Fig. 1. Main starting window

Main work window is shown in Fig. 2. It is loaded after choosing some test topic by clicking a hyperlink from the left frame contents. The chosen topic is shown as title on Fig.2 – pos.1. The structure of the current testing system is based on *three predefined questions* (Fig.2 – pos.2) with *three predefined answers* for every test topic (Fig.2 – pos.3) chosen by clicking exactly one of the radio buttons. The testing button (Fig.2 – pos.4) activates scoring system. The calculated score for current topic is shown (Fig.2 – pos.5) and the accumulated score for all tested topics to the moment (Fig.2 – pos.6). A help button (Fig.2 – pos.7) and a button for next topic from the contents (Fig.2 – pos.8) are also available.

Pop-up messages windows are used for showing the statistical information about current answers (including correct ones) (Fig.3 - pos.1) and for warning messages if some test is already passed in current session or answers are not complete (Fig.4 – pos.1).

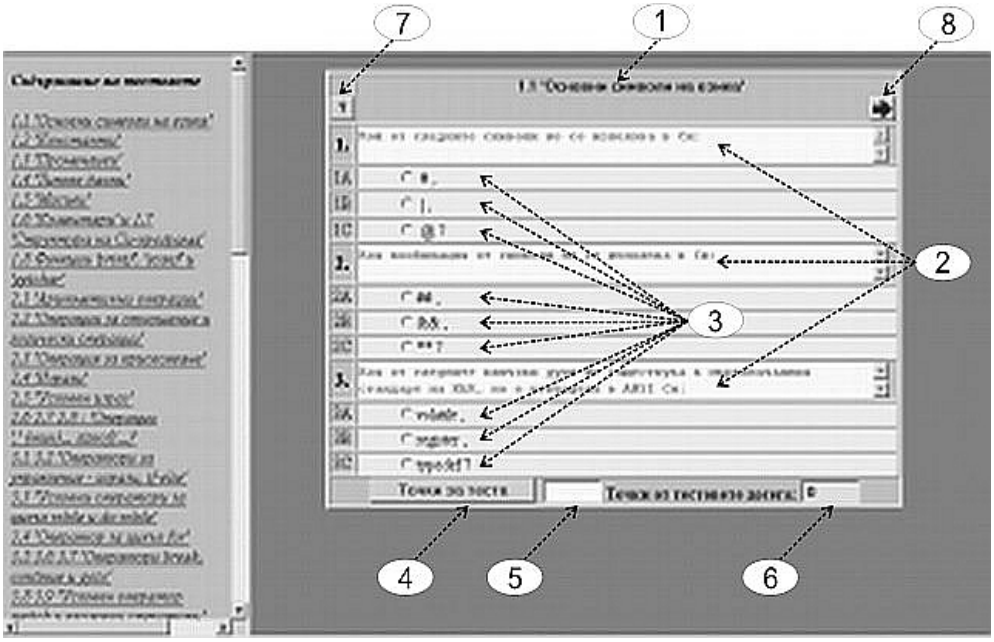

Fig. 2. Test window description

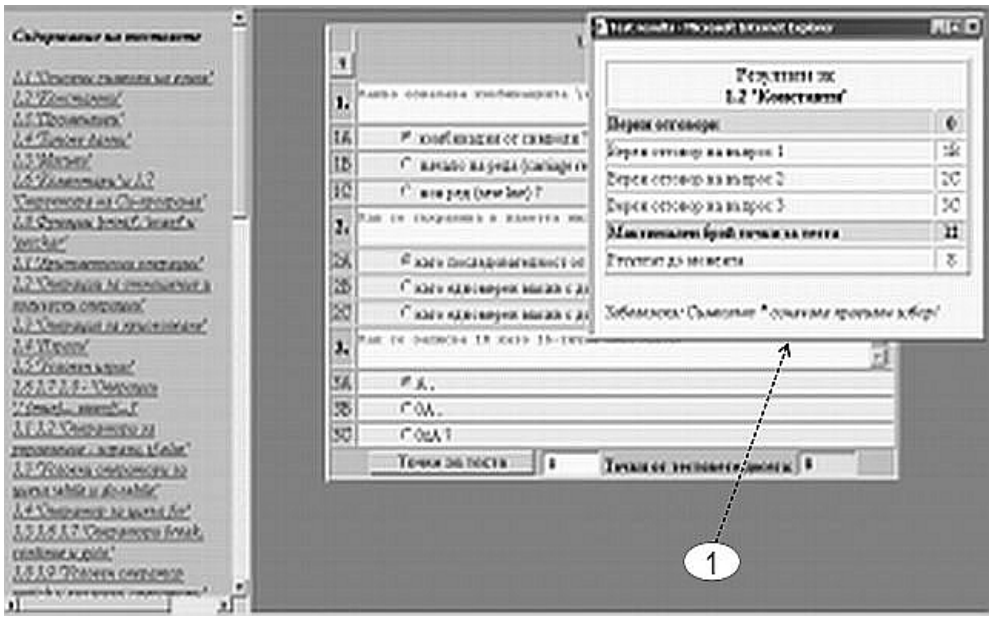

Fig. 3. Statistical pop-up window

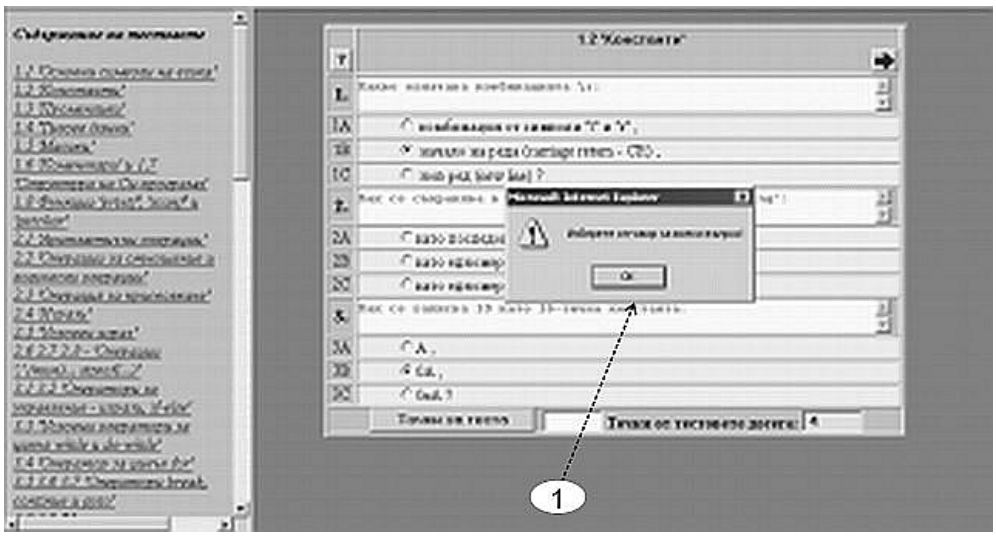

Fig. 4. Warning messages pop-up window

V. Conclusion

The knowledge level testing system is an important part of any educational process. The modern communication and multimedia software technologies influenced the wide using of distant education and the need for proper testing software is obvious. The described "self-testing" system has been implemented in a distant training course on "*C Programming Language*" and in a virtual multimedia-training course on "*Basic of Pneumatics*". Students practice with the system proofs that it is a valuable addition to education process. The system is to be expanded as a "final-exam" testing system for using by the teacher and instructor with keeping score information on the server-side and the proper security levels.

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Програмна система за “самотестване” при дистанционно обучение

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(Р е з ю м е)

Описана е разработена програмна система за “самотестване” за нуждите на обучаващи се дистанционно студенти. Дискутират се приложените основни принципи при разработката на системата. Използваната програмна технология позволява лесна промяна на тестваните учебни теми, без необходимост от специални програмистки умения. Системата е включена в дистанционен курс “Език за програмиране Си” и в курс за обучение във виртуална мултимедийна среда по “Основи на пневматиката” като инструмент за самотестване на обучаващите се.