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The Design and Application of Online Exam System Supported by Database#

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Abstract: The fast developments in the computer technology and the internet becoming common in every part of our lives especially in recent years have become indispensable in the teaching and learning field of students and instructors. Web-based studies have brought innovations also in the education field and in this field, various applications have become common. This study covers the technical and functional features of the online exam system carried out and being used in Selcuk University Higher School of Vocational and Technical Sciences. The automation was set up on a database system and the administrator, academician and students can access the system over the web server. The software which is dynamical structure and application simplicity working on the web server (in the web environment) can be applied on the exams of the students who take different courses in the higher school. The Online Exam System (OES) that was created enables instructors to make question banks with the choices of using shapes, multiple choice and multiple answers and to evaluate the applied exams instantaneously. OES, instant evaluation of examinations and gives students the opportunity to watch the performance. Via OES, positive contributions are provided for both the instructors and the students in terms of particularly place and time in the education field.

Keywords: *Online exam system, web-based education, the database application, internet, FileMaker*

1. Introduction

Computer technology developing day by day has begun to be used in every field. For the aim of making the education given continuous and developing it also in the education field, the usage of computer technologies especially the web-based applications has become a must. In this regard, computer technologies especially internet applications have begun to be used in every field of education. Many teaching and learning institutions in the world practice their exam activities and this kind of studies over the web technologies [1, 2].

In the qualified education, the assessment and evaluation process carries importance as the teaching process. The factor making the process assessment and evaluation process indispensable for the education is increasing each study activities of the education process related to testing and evaluation [3, 4]. There are many literature studies over the assessment and evaluation. Kocak and others emphasized the importance of assessment and evaluation process system by taking the theories of Bloom who named them as the theory of mastery-learning into consideration. They stated that the instructor wanting to realize mastery-learning needs to make evaluations at the end of each unit but the classical environments of classes are insufficient in this matter [5]. What is more, when assessment and evaluation are applied accurately, they provide advantages such as motivating students and determining pass grades [6].

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In other words, it is very essential that the assessment and evaluation systems which educators use should reflect the performances of the students somehow in terms of making the learning process more effective. For this aim, today's educational institutions try to force the systems of assessment and evaluation with computer technologies. Because online evaluations made enable students fast feedback related to their learnings about information and concepts, they will provide great contributions to their learning while they are being evaluated [7, 8]. For this reason, the various opportunities the computer technologies have enable the systems of assessment and evaluation to become a more solid structure.

In this study, a web-based model has been created in order to test, follow and evaluate the information of the students of Selcuk University Higher School of Vocational and Technical Sciences which they learn at school. Through OES, exams can be made simultaneously (all the students at the same time) or not simultaneously (students at different times). They were designed in order that model assessment and evaluation stages become more effective in the learning process and depending on this, the system were developed and applied by taking the objectives below into consideration [4, 7, 9, 10].

- Making the students have more exams and keeping their information updated
- According to the previous evaluating process, enhancing and redeveloping the pool of question bank formed (feedback)
- Making evaluations of the students about the subjects each week and depending on this, enabling to keep the information fresh and increasing the learning motivation
- Evaluating the understandability of each subject thanks to the topic-based exams that are made
- That they can be carried out at any time or place as much as desired

• Their being economical (preventing the expenditures such as paper and publishing), online, fast, effective and accessing the previous records electronically over the database
• Their having flexible usage (their suitability for each instructor, different courses and various schools)

This study was successfully applied in the Higher School by making the design with FileMaker Pro software in the framework of determined objectives.

2. Material and Method

The model application, OES was designed using FileMaker that is data-based software for testing and evaluation which is an important stage during the teaching and learning process. What is more, the computer where a Windows Server operating system is set and FileMaker Pro Server software were used in order to operate OES application. OES developed has interfaces at two bases. First interface is administrator interface (instructor). The processes such as that the course whose exam will be made appears active or passive on the web, its deleting or loading can be made over FileMaker Server Admin Console (Fig. 1). Furthermore, instructors can make the processes such as the questions of the determined exam, exam entering code, starting the exam, the students list for the exam, making tables, deleting and editing on the database interface depicted in the Fig. 2.

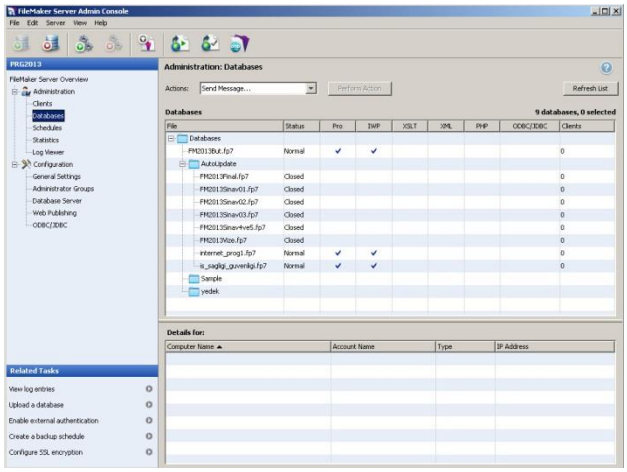

Figure 1. The Administrator Interface of OES Database Server

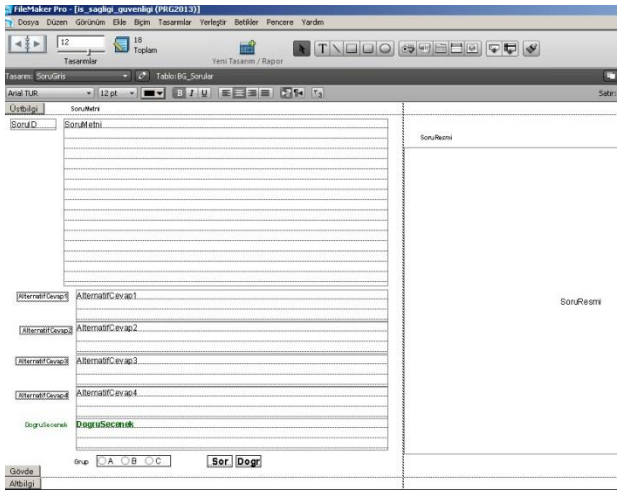

Figure 2. The Design of OES Instructor Database

Second interface is the web environment that the students will have the exams. Depending on the substructures of the laboratories in OES, there are two options for the students to enter the exam system. According to this, the students can directly have the exams (via the internet) over the FileMaker Pro software or they can have the exams through the web browser (Fig. 3). With both options, the students can have their online exams in the network environment or through remote access actually by using an internet substructure.

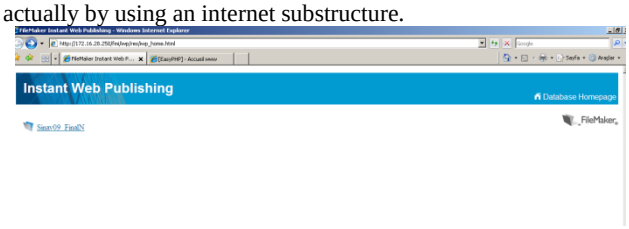

Figure 3. The Design of OES Instructor Database

The exam programme designed and working online basically consists of three tables: the table of questions, the table of students and the answer table including the students' answers.

In the table of questions that is created for forming the question bank, there exist questions, choices and correct answer data. Except from these basic data, there is the information about the fact that each question is answered correctly or wrong by how many students as a result of the relationship with another table. Instructor can prepare the questions as shapes, multiple choices, having multiple correct choices and open cloze in the table of questions.

In the table of students, there exist data including the number, name and surname belonging to the students. What is more, exam results belonging to the students can be accessed from this table because of its connection to other tables (Fig. 4).

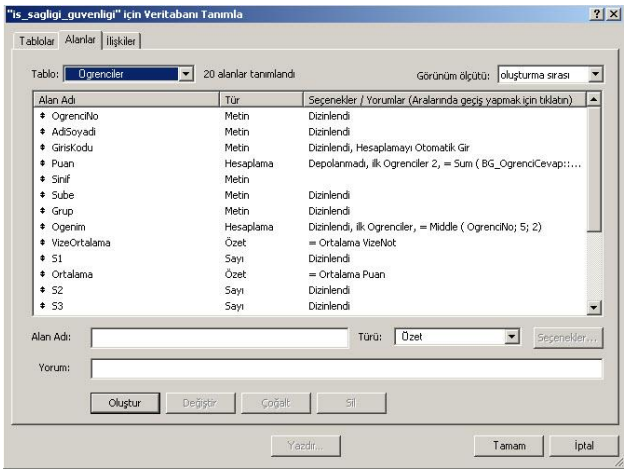

Figure 4. The Table of Students and Fields

Answer data that each student gives to the questions asked exist in the table of answers. The control of the open cloze questions is made through a placement produced from this table.

In prepared OES, the students have to know their student numbers and exam access code belonging to the exam they will attend in order to enter (Fig. 5). After the students enter the system, the exam access code is automatically changed and so the student's reentering the system is prevented.

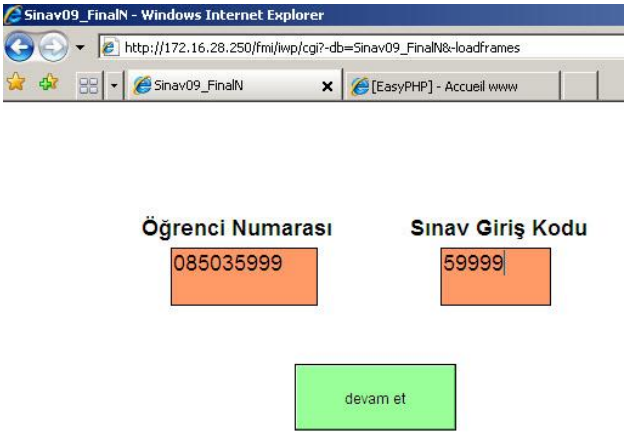

Figure 5. OES Student Login Code Screen

In the system, instructors can separate the students in the exam groups they want. The questions of the groups can be different or the same questions can come to the students' screens at different times. Besides the questions' coming differently and randomly, multimedia questions can be added to the questions and in the multiple choice answers, choices format (like a or b choice) cannot be applied. In this situation, even if two students face the same questions at the same time, their chances of cheating will decrease because the lines of choices are different and the choices do not exist.

After the students enter the system, they can answer the questions that the instructors prepared and continue or skip the questions to answer later when the questions appear for the students (Fig. 6). The system evaluates the exam online during the period when the students answer the questions. Thus, the instructor can follow the students' states from their screen simultaneously. After the exam has been completed, the instructor can revise and list the scores of the gap-filling questions if there are any. Thanks to the filter created in the model, gap-filling questions can easily be controlled by the instructors.

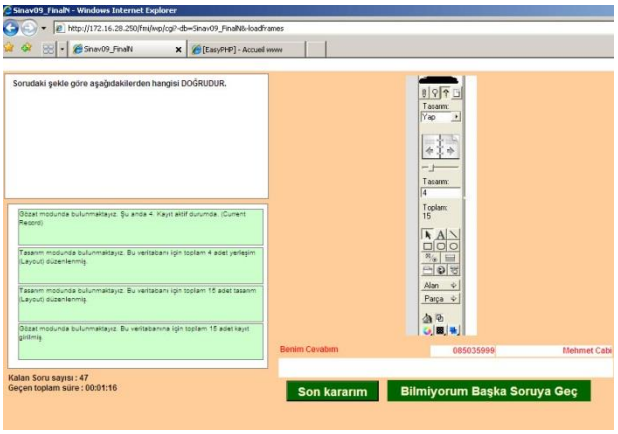

Figure 6. OES Student Exam Module

As previously stated in the programme, there exist statistical information such as by how many students each question is answered correctly or wrong, the time of answering, the number of correct or wrong answers and so forth (Fig. 7). Depending on this information, instructors increase or decrease the difficulty of the questions. What is more, they can determine the subjects the students cannot completely perceive in this way. When a question that is not answered correctly by any of the students is determined by the system, instructors may choose the way of meeting the deficiencies if there are any after firstly analyzing the question in the light of this information or reach a result that the students cannot understand the subject unless the results of analysis determines a problem.

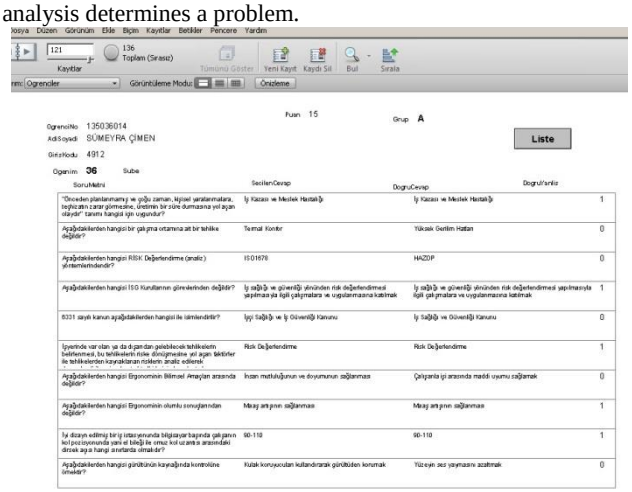

Figure 7. OES Student Result Screen

With OES, online exam results of any course can be saved with all the parameter on the database. When it is necessary, necessary query can be made on the database and reports can be taken. What is more, results can be exported as a PDF document or an Excel document.

3. Conclusions and Evaluation

The system of testing and evaluation carried out through FileMaker database programme has contributions to the learning process in many respects. Because of its substructure depending on the web technologies, it can be accessed and applied from any place. The students' success in exams can be immediately displayed in the system.

That the exam is online, forming the question bank and designing the groups is easy enabling the instructors to examine following the course at the end of each week. Therefore, because of the students' preparation each week, they keep their information updated and because they know that they will have exams, they follow the subjects given carefully. Another advantage of the usage of the system is to remove the expenditures for paper and publishing because the exams are carried out through the network. That different kinds of questions can be prepared enables more clear information about the evaluation of whether students can understand the subject or not.

The long period in carrying out and evaluating classical exams by instructors decreases with OES and it becomes automatic. Thus, instead of routines such as controlling and evaluating the exams, academicians interest in teaching and learning issues and contribute the teaching-learning process to improve.

What is more, thanks to the model, improvements about the questions prepared can be made. Also, the instructors who access the information about learning of the subjects by reaching the ratios of answering the questions can follow the way of repeating the subjects and enable the subjects to be understood and perceived better.

For the operation of the system, a healthy network is needed. The process is possible for the students to read and answer the questions over the server through the web connection. For OES, there may be some pieces of negativeness such as unexpected technical problems' coming out, substructure and hardware

dependency, security problems, students' different usage of computer, needing for especially computers and so forth. No matter how network structure is well, in this structure there may come out problems (such as power cut or voltage change) in some situations and exams can be interrupted. For the solution of this problem, uninterrupted power supply may be used.

Undoubtedly, it is indispensable that the system may be affected by any cut on the network structure. This situation creates problems for online exam applications. However, a solution was developed for this problem in this model created. For this reason, the ability to continue from the remaining questions at any moment of cut against this risk was added. At the moment when there is any cut in the system, the questions the students answered are saved on the database and when the system works again, they can resume the exams. That OES software has a flexible and dynamic usage (appropriate for each instruction, different courses and schools) is also an advantage.

Acknowledgements

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