TEST RESULTS ASSESSMENT AND ANALYSIS FOR THE INFORMATION SYSTEM OF THE TECHNOLOGY SCHOOL "ELECTRONIC SYSTEMS" ASSOCIATED WITH THE TECHNICAL UNIVERSITY OF SOFIA

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The Information system of the Technology school "Electronic systems" associated with the Technical University of Sofia has been developed and implemented with a module supporting the educational process with the ability to create and fulfill tests in different subjects. Later different test modules were developed and implemented. These modules realize the assessment of the students' knowledge in different way and also gather in a different way the test results of the students. The subjects in the Technology school "Electronic systems" are various. That is why the requirements towards the tools for test work – assessment and results analysis are different. Also the individual characteristics of the lecturers are important. The assessment of the students' knowledge is basically calculated in percentage of correct answers towards the sum of correct answers. The wrong answers are calculated as zero. From the point of view to motivate the student to give answer even when he is not quite sure in his own knowledge it is positive but in some cases it is required to punish this method of playing with the chance. The experience shows that it is better when the lack of knowledge is also calculated in the end mark for some circumstances. In this paper the idea of database changes is considered in order to satisfy the both ways of test assessment. The data saved for the tests done by the students is mainly: student's identification data (name, class, number in class), date of the test, time (for a question or for the test), answer given, correct answer and assessment and so on. The data is basically used to calculate the students' knowledge and skills. An idea for the gathered test results usage is presented. The purpose is to help the lecturer in his work.

Keywords: electronics, e-learning, information systems

I. Introduction

The Information system of the Technology school "Electronic systems" associated with the Technical University of Sofia has been developed and implemented with modules for following educational needs:

- Presentation of information for the students;

- Practical work and exercises;

- Tests and exam preparation;

- Students' result accumulation;

- Discussion forums and communication facilities for all groups of users;

- Presentation of the school and information concerning applicants.

The test module supports the educational process with the ability to create and fulfill tests in different subjects. In order to improve the usage of this part of the

system new test modules have been developed and implemented. These modules realize the assessment of the students' knowledge in different way and also gather in a different way the test results of the students.

II. Test results assessment

All of these test modules allow the lecturers to create tests with questions, definite number of answers for the student to choose from, correct answer and the points for this answer. The subjects in the Technology school "Electronic systems" are various. That is why the requirements towards the tools for test work – assessment and results analysis are different. Also the individual characteristics of the lecturers are important. During the test fulfillment the test modules realize the assessment of the students' knowledge in mainly two different ways – the first way supposes that the lecturer associates with every correct answer a number of points that are appropriate with the difficulty of the question. In this case the difficulty of the question corresponds to the number of steps the student has to perform to reach to the end response.

A variety of this way of assessment has been realized when the sum of all points for correct given answers should be definite (10 or 100 that allows easy calculation of the note and from other side reflects the personal view of the lecturer). That means that the questions in the test have the same level of difficulty.
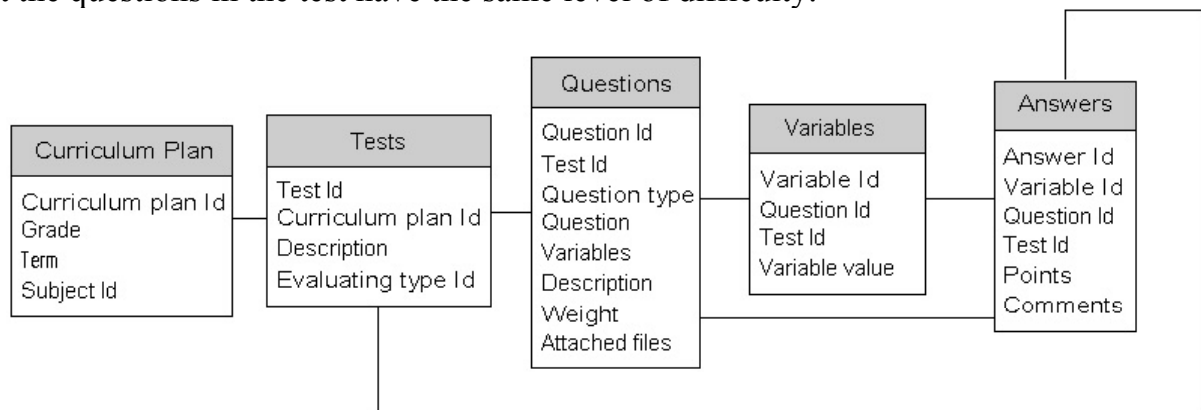

Fig. 1 Tests and exam preparation data in the database structure of the Web based e-learning system for the Technology school "Electronic systems"

Because of the different requirements assessment and results analysis the criteria for the analysis are also different. The experience at the Technology school "Electronic systems" has shown mainly the usage of following criteria for analysis of test results:

- mechanics: spelling, grammar, punctuation

- apparent understanding of characteristics and concepts

- inclusion of relevant data

- responsiveness to assignment etc.

All these criteria are presented in the formulation of the questions and the proposed answers to the student. Further analysis of the answer given by the student is not done. The assessment of the students' knowledge is basically calculated in percentage of the point for correct given answers towards the sum of points of all correct answers. The wrong answers are calculated as zero. From the point of view to motivate the student to give answer even when he is not quite sure in his own knowledge this is positive but in some cases it is required to punish this method of playing with the chance. This problem could be settled in two aspects:

-   negative points for wrong answers. The experience shows that it is better when the lack of knowledge is also calculated in the end mark for some circumstances and that is when for incorrect answer negative sum of point is added to the final amount of points. That means that in Table Answers [1] in fig.1 the Points should accept negative values as well as positive. In this way the calculation of wrong answers stops the manner of just choosing an answer but the reason for giving wrong answer is not analyzed;

-   argumentation or explanation of given or chosen response. In order to be able to make deeper analysis of the answer given by the student because of earlier explained reasons it should be evident which of the following cases occurs:

> - the student gave the correct response with a correct explanation,
> - the student gave the correct response but with an incorrect explanation,
> - the student gave an incorrect response but supplied reasoning that was consistent with that response, and
> - the student gave an incorrect response with an explanation inconsistent with the response.

For realizing the needs for deeper response analysis [2] the lecturer should have the ability to put a number of explanations to the answers. The relation between response and explanations (argumentation for the chosen response) is one to many and is shown in fig. 2.
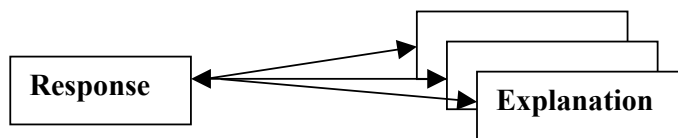

Fig. 2 Relation between a response to a definite question and explanations to this response

For realizations of this idea in the table Answers another field should be added – ExplanationId and additional table Explanations should be created (fig.2). The points in the table Explanations will be added to the points in the table Answers. So for the correct response with correct explanations the student will get maximal number of points.

Answers

AnswerId
VariableId
ExplanationId
QuestionId
TextId
Points
Comments

Explanations

ExplanationId
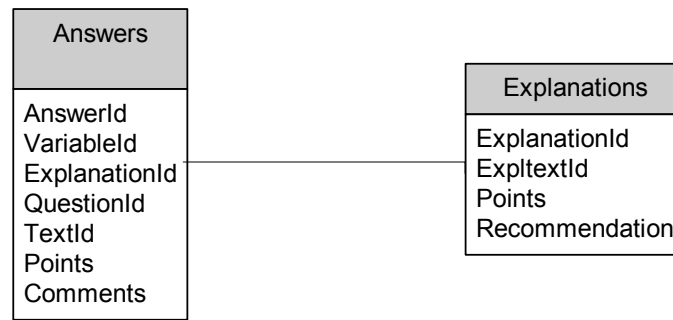ExpltextId
Points
Recommendation

Fig.3 Database realization of response – explanations possibility

These changes in the database would allow more detailed interpretation of the test results. From one side the Recommendation in the Explanations table could serve the student giving him directions for further study. From other point of view the lecturer can receive detailed analysis for the wrong responses of the students. For example the repeated wrong response or correct response with wrong argumentation means that the studied material has not been well accepted.

III. Interpretation of test results

The students result accumulation (fig. 4) has two goals. The first goal is for the student – the gathered results should help the student with his further study.

Results

Student Id
Test Id
Question Id
Answer Id
Points
Correct answer
Date
Time
Time for answer

Students

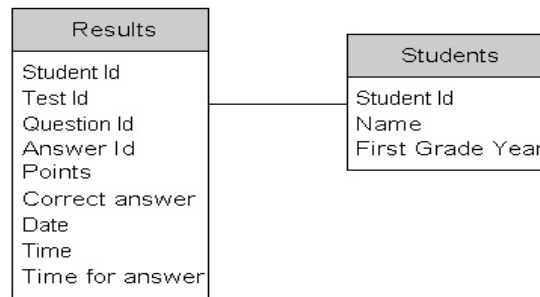Student Id
Name
First Grade Year

Fig. 4 The results accumulation in the database structure of the Web based e-learning system for the Technology school "Electronic systems"

On the base of existing data in the database only statistics for correct or wrong given responses is possible. The above-discussed idea would make it possible to save a number of recommendations for the student appropriate to his responses during the test (Fig. 5).

The second goal is to serve the teacher – he needs the results of every individual in order to take the decision for the marks. From the other side the lecturer should be able to correct and to elaborate his lectures, exercises, tests and so on. That is why on the base of gathered results the statistics should be made for each test and each question of it – the percentage of given correct responses (and explanations if this is the type of the question) and the percentage for the given proposed wrong answers.
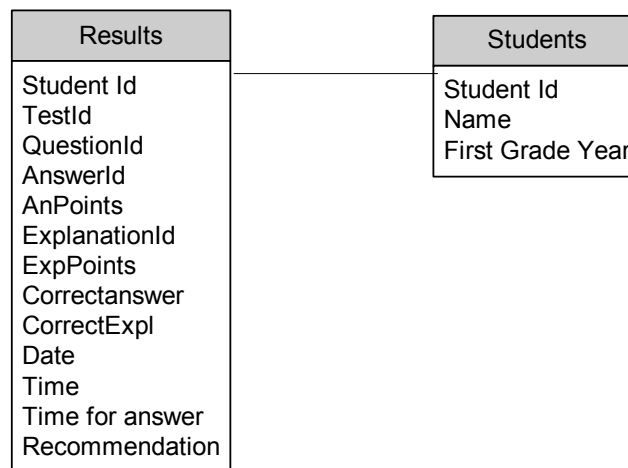
Results
Student Id
TestId
QuestionId
AnswerId
AnPoints
ExplanationId
ExpPoints
Correctanswer
CorrectExpl
Date
Time
Time for answer
Recommendation

Students
Student Id
Name
First Grade Year

Fig. 5 Proposal for results accumulation in the database structure of the Web based e-learning system for the Technology school "Electronic systems"

The developed modules of the database structure are the base for the development of the additional tables for the entire Web based e-learning system for the Technology school "Electronic systems" and the usage of already developed and implemented systems such as the Internet based Information system for the Technology school "Electronic systems" and the integrated to it Konowledge and skills testing system. The developed data base structure acts as a framework for the development of the enhanced application. The aim is to incorporate gradually the subjects that are studied at the school and to help the teachers and the students in the educational process.

IV. Conclusions

In this paper the idea of database changes is considered in order to satisfy the both ways of test assessment.

The data saved for the tests done by the students is mainly:
- student's identification data (name, class, number in class);
- date of the test;
- time (for a question or for the test);
- answer given;
- correct answer;
- assessment and so on.

The data is basically used to calculate the students' knowledge and skills. An idea for the gathered test results usage is presented. The purpose is to help the lecturer in his work.

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