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Database – Students' achievements in high school and thereafter

Abstract:

Computer infrastructure represented in the Croatian educational system is rather developed nowadays. It would be necessary to develop an integral information system (IIS) within the competent Ministry (Ministry of Science, Education and Sports) for the purpose of more efficient and high-quality management of the educational process itself as well as process control. In this paper by the proposed database "Students' achievements in high school and thereafter" we describe a possible model of data acquisition, processing and display of results. The data in question (grades and absence from classes – as the output of the educational system) are processed in schools at the end of each semester (analysis of students' achievements after each semester), but they disappear with time. By using a web-application homeroom teachers would be able to feed the data on students' achievements into the IIS in just 2-3 days for more than 500 schools in Croatia, and in that way "time series" of data on achievements would be created.

Such database would contribute to better management in education. To scientists dealing with this field of research it would offer "easily attainable and relevant data" for their research that would improve the system itself.

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1. Introduction

In the Županja High School, where I have been working as a computer science teacher for the last seven years and where I used to be a student as well, there is no unique database that would comprise data on students, teachers, grades, personal information, extracurricular activities, and students' achievements upon high school completion.

Only from my generation of high-school students there are people who were or still are top scientists. surgeons, sportspeople, etc.

This information has not been recorded anywhere in the school that was established some 50 years ago, and even today we cannot get any information concerning their achievements in relation to school, extracurricular activities, as well as further education and employment.

Grade books and attendance registers were removed from school archives long time ago so that there is no possibility of getting any relevant data.

Every school, its teachers and students, cities having such schools should be extremely proud of such former students of theirs.

With respect to the former economic and computer education as well as business policy, my aim was to make all subjects interested in this matter, and at the same time to make this concept a sound fundamental ground for the development of the students' database, that would be standardized for all primary and secondary schools in the Republic of Croatia.

Such standardized integral school database would provide interesting and important information very quickly and with minimum costs to the school itself, students, teachers, and the competent Ministry.

Through such reports related to time series in the last five to ten years we would be able to discover many trends in schools regarding education.

Following my database drafts, a high-school senior Dalibor Oršolić contributed to this paper by creating a concrete database in Access, with test data referring to two departments, within which one class was selected.

2. Monitoring school achievements in the last 5 years

In the Županja High School students' achievements were mostly recorded in grade books, that used to be placed in school archives at the end of every school year. Upon completion of each semester homeroom teachers would prepare tables referring to achievements of both every student individually and the class in general, where they would specify students' achievements in every particular subject, their overall success, number of periods they were absent from school, and calculate a grade point average for every subject, every student and the class in general. The whole procedure requested a lot of manual work. Neither computers nor any modern software such as e.g. Excel were not used.

Five years ago computer equipment in the school consisted of 8 PCs 486, without any access to the Internet. Secretary's office and accounting office were not equipped with computers. Salaries were calculated by means of simple calculators.

Two years ago the then Ministry of Education and Sports equipped a modern computer classroom in the school with 17 computers (Pentium 4) that were networked, and connected to the Internet via LAN. Old computers became part of the administration office equipment.

Bookkeeping and calculations of salaries are now done by means of computers. Secretary's office has a computer connected to the Internet. Following the needs of teachers in the school, last year the staffroom was equipped with an Internet connected computer and a printer.

Guidance counsellor's office has also a modern PC with a laser printer and the access to the Internet.

A year ago the Ministry donated to the school an LCD projector for presentations of graphical data. In addition to the donation of a modern computer classroom, the Ministry also donated 120 free Internet hours to students every month. In the last five years school's computer trained personnel comprised two BS holders in computer science, one of whom is both computer science teacher and school's guidance counsellor.

The level of computer literacy of both teaching and non-teaching staff has been increased, but it has not reached a satisfactory level yet. The gap between increasingly computer literate students and their illiterate or semi-literate teachers deepened gradually and it was noticed by the competent Ministry.

Last year the Ministry equipped the computer classroom with an air-conditioning unit, so that this classroom is still the only air-conditioned classroom in the school.

Last year an Excel software was created that automatically recalculates GPA, various cumulative data and other necessary calculations concerning students' achievements and absences from school. Those are simple databases. There is no possibility of getting synthetic data at the department and school level. Both possibilities of going back to a certain period in the students' education and those of connecting the data in time series are limited. There is no unique database referring to students and teachers and their joint achievements.

3. Analysis of the present situation

3.1. Equipment

At the moment the Županja High School is well equipped. Inconsiderable investments would be necessary in order to reach the optimum regarding hardware.

Computers that are not in the computer classroom are not networked, and that should be done in near future.

In addition to the computer classroom that is completely equipped, there are computers in accounting office, secretary's office, and guidance counsellor's office. The High School has one laptop, which is in headmaster's office.

3.2. Software

Based upon the contract between the Ministry and Microsoft the Županja High School has all versions of Microsoft products.

It also has its own web page www.gimnazija-zupanja.hr created by students good at computer science.

Concerning business software, the school uses a program for salary calculation and another one for finance matters.

Within the guidance counsellor's office there is a program written in Excel and used for the calculation of students' achievements at the semester end (a simple database). Data relative to students, teachers and students' achievements are not stored in relational databases, wherefrom they could be searched and processed via network.

3.3. Organization

The High School has two departments. Science and mathematics program high school comprises four classes, whereas general program high school has twelve classes. The classes take place in two shifts. There are 30 teachers and some non-teaching staff.

Grade books and attendance registers make the administration basis for students. Information on teachers is available at the secretary's office, the accounting office and the competent Ministry.

The Ministry does not have any integral database that would synthesize data relative to the overall success of students and their teachers at the level of the Republic of Croatia, although almost all primary and secondary schools are equipped with computers, ISDN, Internet. The organizational scheme of schools is mostly of traditional character (ordinary mail, fax), although the competent Ministry sends a lot of instructions and information to schools by e-mail.

4. Proposal of the optimum solution (students' database)

In addition to the above-mentioned proposal regarding networking all scholl computers, another organizational proposal would refer to an integral database containing relevant information on about students, teachers and their achievements in particular semesters. Design and development of any database is a time-consuming job.

Thinking about activities in the educational process, subjects in the teaching process, and the way how students' achievements are recorded today, I have reached the following proposal.

Relational database would be made up of 11 simple tables. These would be: teachers, classes, students' activities, subjects, students, competitions, grades, departments, schools and thereafter.

These tables would be mutually connected by relations enabling interdependency of data from different tables, which furthermore enables numerous queries concerning the database as well as many interesting reports.

Input would be done through such forms that could simultaneously be used for table searching, changing and searching according to certain criteria.

Data queries can be divided into the following groups: school in general and departments, particular classes, students and teachers. Some standard reports can also be put at the same levels: school, departments, class, student, and teacher.

Every table has its primary key. It is usually a code. It is the relations that enable numerous quick queries and reports.

In the organizational scheme of schools the competent Ministry already has codes for schools, and it is connected with all schools via modems.

A possible proposal would be that this school database becomes a standard for all schools in the Republic of Croatia, but at the same time the input of data for the database of the overall educational system in the Republic of Croatia.

Assuming that the competent Ministry has synthetic data on students' achievements (received from schools as forms filled in after each semester), we can presume that is insufficient for some high-quality analyses of students' achievements.

Such records are not sufficient for some deeper and more comprehensive research, and especially for the research into some regularities in the educational process.

Data on grades, absences, awards, measures against students, results from competitions, homeroom teachers' remarks, etc. can be easily collected from schools via modems to the competent Ministry's server, where there would be the central integral database of all schools in the Republic of Croatia.

According to the law of large numbers, trends in particular educational categories could be detected in time and with certainty, which would then lead to the improvement of management in education and a decision-making basis of high quality.

5. Database structure and updating

5.1. Schematic diagram

Figure 1. Relationships
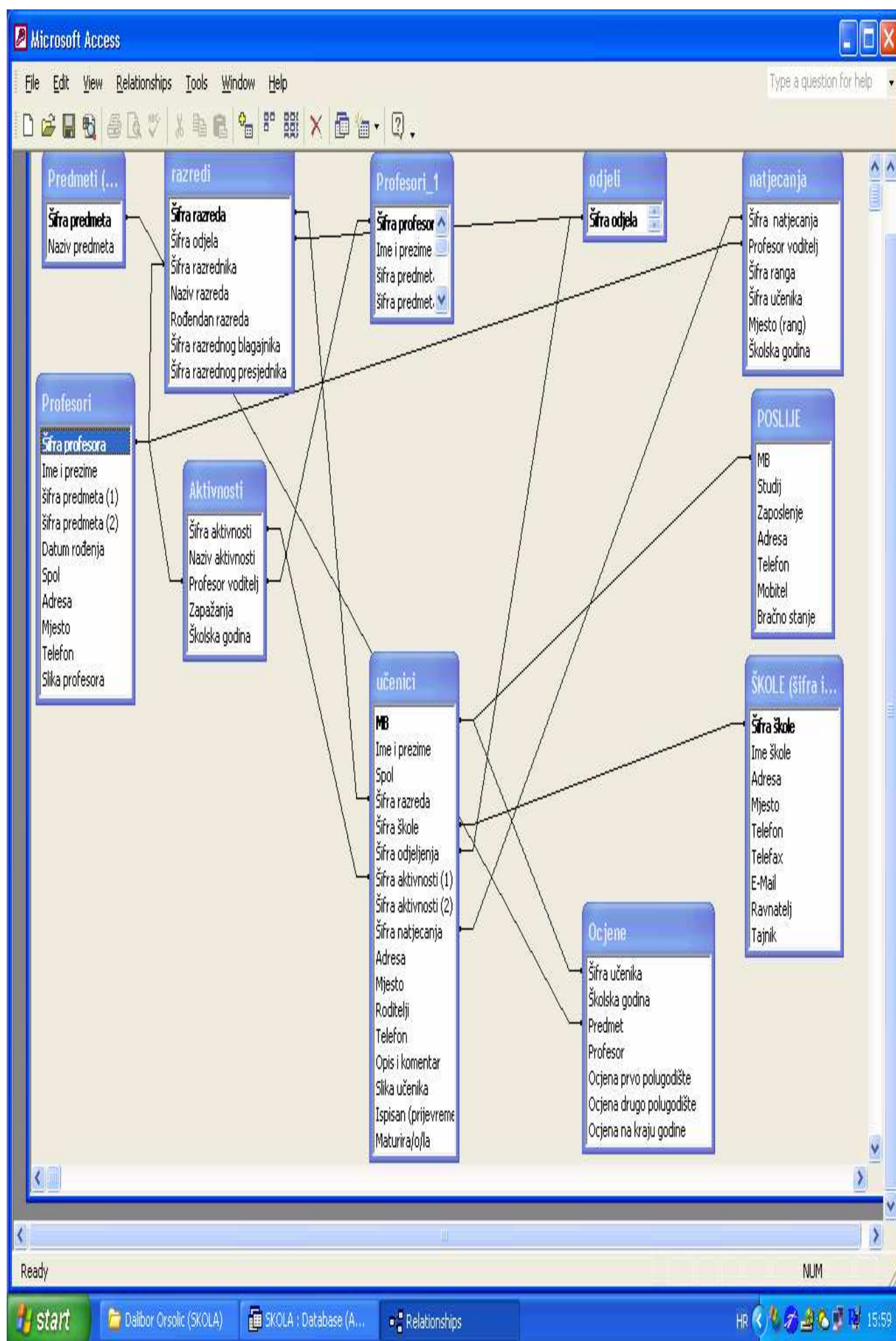
5.2. Database updating

Key persons important for updating the database are homeroom teachers in secondary schools.

The obligatory records homeroom teachers keep make a sound basis for the input and change of data in the database.

Homeroom teachers are able to make necessary corrections in the database referring to further achievements after students finish their secondary school education, since they keep meeting with their former classes on the occasion of reunions.

Every homeroom teacher would get his/her password by means of which he/she could be able to update the database with the information relevant to only his/her present or former students.

Photoes of high-school graduates could be saved in the database as well.

Input and changes would be fed twice a year, once after each semester.

At the moment, homeroom teachers enter these data into Excel tables, in order to obtain averages, sums, percentages, in relation to students, subjects, grades, and absences.

Students' database should have a possibility of access via network. That would enable homeroom teachers to simultaneously update the database from computers at different locations (computer classroom has 17 networked computers).

5.3. Queries of interest

School:
- How many students fail
- How many students have two failing grades
- How many students failed and had to reattend the same class
- How many students have all grades excellent (all subjects graded A)
- Names of A-students in particular subjects (select a subject)
- Students who have more than 6 unexcused absences
- Students who did not take the school-leaving examination in the last (type in how many years)
- Students who withdrew from school in the last (type in how many years)
- Subject most students fail
- Students who participated in state competitions in the last (type in how many years)
- Advisors who participated in state competitions in the last (type in how many years)
- Number of students in each department
- Number of students in each class
- Department grade point average
- Class grade point average
- A-students in departments and classes
- Simultaneous GPA for different departments

Class:
- Class grade point average in the last (select 1-4) years

- Subject with the highest GPA
- Subject most students fail
- Students according to the number of absences from classes
- Students according to the number of unexcused absences from classes
- Number of absences per student

Student:
- Student's grades for each subject (for one school year)
- Student's absences (excused/unexcused)
- Grades for the period (1-4) for a particular subject
- Student's grade point average for period (1-4)
- Student's personal data
- Homeroom teacher's remarks about a student

5.4. Reports of interest

School:
- Report on the overall success of the class
- Report on the grade point average for the class
- Report on the grade point average for individual subjects
- Report on the number of failing grades for individual subjects
- Report on the number of A grades for individual subjects
- Report on the number of absences for every class
- Report on the number of unexcused absences for every class
- Report on students and advisors according to subjects that were represented in county competitions during the school year
- Report on students and advisors according to subjects that were represented in national competitions during the school year
- First 20 students according to their achievements

Class:
- Report on the overall success of the class classified according to subjects and students
- Report on the number of absences per each student
- Rank-list of average grades per subjects for all classes

Student:

- Report on student's overall success for the school year
- Student's personal data
- Report on homeroom teacher's remarks about a student

6. Database instruction manual

The database is made in Access. By clicking on the icon placed on the desktop a Microsoft Access software is activated, which enables us to work with relational databases, then the students' database is loaded into the working memory.
This database is created in such a way that a user is easily led to his/her final goal through numerous menus. The main menu can be seen in Figure 2.

Figure 2. Main application menu
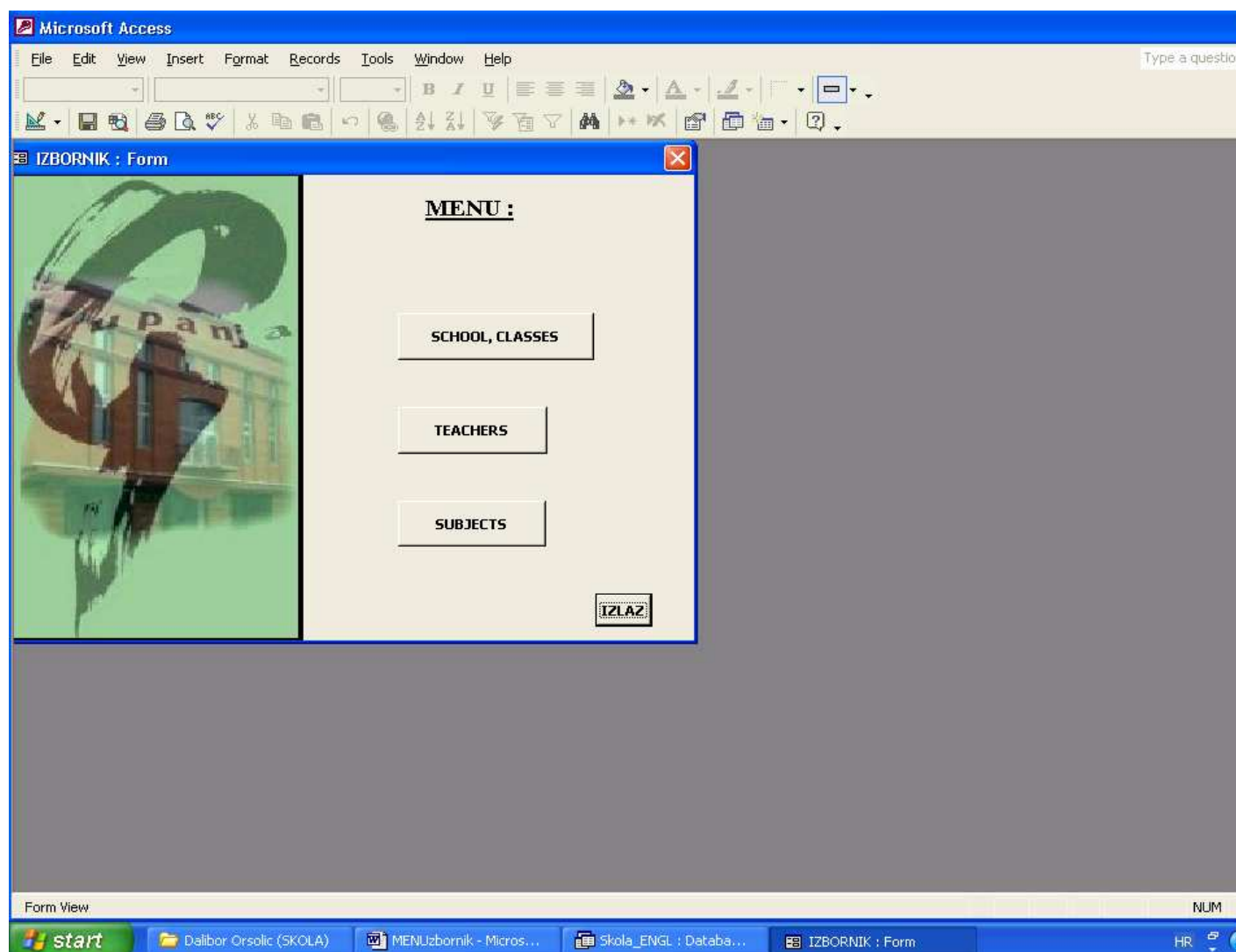
made by :
Dalibor Oršolić, Županja High School senior

7. Conclusion

If we look at the proposed queries and reports, we can draw a conclusion that the proposed way of thinking represents a step forward in the past practice in education regarding records of achievements, students, teachers, etc.
We would obtain even better analyses of education if there were an integral database in the competent Ministry, which would be updated through the Internet by homeroom teachers (by using a password).
In that way it would be possible to get a complete overview of more than 1,000 primary and secondary schools in the Republic of Croatia in just 2-3 days.
It is possible that certain queries are made through school web pages or even by students or former students themselves.
On the basis of data from the integral database, according to the law of large numbers, regularities in the educational system could be detected in time and with certainty.
Such database would contribute to better management in education, and to scientists dealing with this field of research it would offer "easily attainable and relevant data"
for their research.

8. References

1. Michael Halvorson and Michael Young, Kako koristiti Office 97, Znak, Zagreb, 1998.

2. Ivica Kartelo, Access 97, Sjedi i radi 31 aplikacija, Škola E-92 Split

3. Krešimir Raič, Računalstvo I, Pentium d.o.o., Vinkovci

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