

- The Challenge of Learning -

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INTRODUCTION

A student's book is an educational material for learning which, beside language, ethical, art, graphic and technical standards, must meet the following requirements:

Psychological requirements which should:

- develop the motivation for learning
- develop independent learning and research
- point out important topics and facts
- point out the importance of searching for the information
- ask questions
- point out the application of gained knowledge and skills in problem solving

Didactical – methodical requirements

To make learning a rounded-off process, every educational material must consist of the following psychological – didactical steps:

- a preparation for learning
- learning of materials
- revision and exercising
- systematisation
- application and checking the knowledge

Interactive multimedia digital materials, except for the mentioned ones, should include all disposable possibilities which the application of ICT offer in the fulfilment of psychological and didactical – methodical requirements.

In the continuation of work it has been described how the psychological and didactical – methodical requirements have been realized in making of one interactive multimedia digital material by the application of ICT.

1. What is IDiMaSU?

IDiMaSU is a short name for the example of Interactive Multimedia Digital Material for Self – Learning.

2. What is the purpose of IDiMaSU?

The purpose of *IDiMaSU* is to show how an efficacious educational material should look like; i. e. which parts should be included in it and which methods should be applied with the use of ICT.

It deals with a mathematical topic “*Proportionality and Reversed Proportionality and Percentage and Interest Account*”.

3. What are the parts of *IDiMaSU*?

IDiMaSU consists of several units: Introduction, Explanation, Exercises, Review and the Checking of Knowledge, which represent didactical – methodical steps (elements) in the learning process. All parts are mutually connected and form a rounded-off unit which serves for the acceptance of teaching stuff in the topic: *Proportionality and Reversed Proportionality and Percentage and Interest Account*.

4. How have the parts of *IDiMaSU* with the application of ICT been made?

In making the parts of *IDiMaSU* various interactive and multimedia solutions have been used, such as:

- the possibility of getting the return information in making the questions and tasks
- the possibility of changing parts of questions and tasks
- the use of applet in showing and solving the problems
- the use of animation and films in the presentation of materials
- the possibility of survey and broadening of materials and information
- the possibility of cooperation through interactive forms

In the preparation for learning (Introduction)

Psychological and didactical – methodical requests have been achieved by the application of multimedia elements: a text, a picture, a sound, animation and a film. The purpose of this unit is to develop motivation for learning and to make the preparation for further learning of each unit: Proportions and Ratios, Proportionality and Reversed Proportionality, Percentages and Interest Account. This has been achieved by a method of “problem learning”, which is based on a fact that the concrete problem has been imposed to the user (a student), where the purpose of learning of the set theme has been clearly visible.

The learning of materials (Explanation)

The purpose of this unit is to learn materials in each theme: Proportions and Ratios, Proportionality and Reversed Proportionality, Percentages and Interest Account. To learn this unit successfully by the application of ICT, special methodical solutions have been applied.

To learn this unit, the method of “programmed learning” has been used in *IDiMaSU*. According to this method, the learning process goes on in several steps, with explanations and questions connected to the problems. This way of learning encourages the users (students) to learn independently, to spot important notions, to check the hypotheses and to conclude.

To apply this method successfully, it has been necessary to achieve the possibility of obtaining the return information, i. e. to check the correctness of the solutions to the questions and / or the examples (true – false).

For that purpose, special functions have been programmed, by which the possibility of obtaining the return information (a feedback) has been achieved. By the mentioned functions the possibility of changing the parameters of the questions and whole tasks has been achieved.

To achieve other psychological and didactical – methodical requirements, interactive and multimedia elements, such as: a text, applets, a pictures, a sound, animations and films, have been applied.

Due to the existing differences among users (students), it is recommended methodically to have more levels of learning.

The materials in *IDiMaSU* have been selected into two levels. *Level I* is easier and dedicated to all users (students), while *Level II* (for those who want to learn more) is dedicated to those who want to broaden their knowledge in a specific theme.

Repetition and exercising the materials (Exercises)

In this unit the application of programmed *IDiMaSU* functions distinguishes itself very much. They enable the change of parameters of the tasks and whole tasks, with the confirmation of correctness (true – false).

By the application of the method of change of tasks and of parameters of tasks, the possibility of endless exercising the problems from specific unit (Proportions and Ratios, Proportionality and Reversed Proportionality, Percentages and Interest Account) has been achieved, with the elimination of the effect “*learn by heart*”. The exercises have been sorted out into two levels according to their difficulty: *Level I* is intended to be for everybody, and *Level II* (for those who want to know more).

The systematisation of materials (A review)

This unit is meant for the review of the learned material. Except for the learned materials, it gives the review of formulas, definitions and symbols. In making the review, except hyper - textual documents, the animations, crosswords and jigsaw puzzles have been used.

This unit contains links (connections) to the other materials in Croatia and the world, which are connected with each theme separately (Proportions and Ratios, Proportionality and Reversed Proportionality, Percentages and Interest Account).

The application and checking of knowledge (the checking of knowledge)

To make the learning process complete, it is necessary to make the qualitative checking of the learned materials (the checking of knowledge) after learning and exercising the materials. The checking of knowledge for each theme separately consists of several *checking of difficulty*. The tests are organized from the easier to more difficult one, respecting the differences among pupils.

For making the tests the programmed functions of *IDiMaSU* have been used, by which the changeability of parameters of tasks and whole tasks has been achieved.

By changing the parameters and tasks, the need of the student to get the check of the same difficulty, but different tasks in testing his knowledge, has

been achieved. The effect of *learning the tasks by heart* has been eliminated, whereby the high level of quality of testing the knowledge has been achieved.

5. What makes *IDiMaSU* different from the existing digital materials on Web?

In search for similar educational materials nothing similar has been found on Web. Neither the complete educational material, (with all psychological and didactical – methodical elements fulfilled), has been found, and therefore the comparison couldn't be done.

But, taking in consideration what the student's book as a teaching material should have, and taking in consideration the possibilities which could be achieved by ICT in the realisation of the same material, *IDiMaSU* is a special and different from the existing educational materials on Web because:

- it represents the rounded – off didactical – methodical unit which deals with a mathematical theme Proportionality and Reversed Proportionality, as well as the Percentage and Interest Account in an interactive and multimedia way.
- it uses new, interactive and multimedia methods and ways in the learning process (applets, films, the possibility of obtaining the return information, the change of questions and the tasks in the process of exercising and checking the knowledge, interactive forms for cooperation).

6. Conclusion

Although all primary and secondary schools in the Republic of Croatia have a certain number of computers and the access to Internet, still in the majority of schools the traditional ways of learning have been applied.

IDiMaSU is an example which shows how to make the effective educational material with the use of ICT, which could be applied in the teaching process for enlargement and improving the existing ones, and in the development of new methods and ways of learning, teaching and testing the knowledge.

References:

1. *IDiMaSU* Web site: www.tssibenik.hr/idimasu
2. "Udžbenički standard"; Ministry of Education and Sports; NN br.63, April. 2003.

Biography

My name is Saida Deljac.

In 1991 I graduated of the University of Zagreb at the Faculty of Electrical Engineering and Computing, a branch of Telecommunications and Computer Sciences.

I work as a teacher of Computer Sciences and Computer Sciences in civil engineering in the Technical School in Šibenik.

On the CUC2000 I presented a paper work "New Possibilities Internet Offers in Education" and on the CUC2001 "Programming League - A competition in Computer Sciences".

In September 2003 in cooperation with CARNet and my colleagues I started an educational pilot-project: *An Example of Interactive-Multimedia Self Paced Learning Digital Content on the Theme of Proportionality and Reversed Proportionality and Percentages and Interest Account.*

I am interested in studying the possibilities of learning by Web and applied of educational digital contents in process of learning in Croatian schools.

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