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# THE COMPUTER SUPPORTED TEACHING AND STUDYING PHYSICS

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The present paper informs about the experience with using computers, multimedial CD-ROM and the World Wide Web in physic practicing and individual studying of the students. The opinions of the students and their experience with this way of teaching when mainly the student's individual or group creative activity is accentuated can help in increasing the effectivity of the teaching process. The contribution can also serve to the teachers as a motivation to diversify and enliven the teaching process in physics and in this way to help in the cognitive process to the students to whom, as resulted from a survey, the physics lectures appear often as tedious or boring.

*Keywords:* Physical Education, E-learning

## 1 Introduction

At the present time, when the students experience absence of technical literature and the high quality foreign literature is for them (sometimes even for the pedagogue) inaccessible because of its price, the e-learning appears to be an effective method of studying that is accessible to all students at almost no cost. The only condition is an unoccupied computer with an installed and functioning browser html, php and other documents in the library or in the PC center of the school or university. A question is remaining, though, whether the student spends the time at the computer playing games and having fun or obtaining for him so necessary information.

## 2 Physical education

Last semester I suggested to my students to take part in physics practicing in computer laboratory. All students agreed with this idea and I could say they were curious about this form of practicing and it captured them.

We carried out our physical education processes in a small computer laboratory and students could continue educating themselves at home because of all materials needed for studying and e-books they could find on www [1,2] or off-line web version on CD-ROM [3].

In the laboratory the students worked in pairs, independently of other pairs and could use any studying materials, which they found on www. Their task was to solve physical problems given from various parts of physics, which they had in their lectures. At the beginning of practicing we all together solved one example, repeated basic equations and physical laws and then students could start to work independently in pairs. My task was to consult and assist in partial problems individual students encountered. An award for the students who have solved all the problems before the end of the practice was an interactive and fun physics with using physical applets [1], where students could simulate some physical problems, charted behaviour of systems after change of initial conditions.

### **3 Public opinion survey**

Before the end of semester I decided to know the opinion of the students about this form of education. I prepared some questions for the students and tried to do public opinion survey. Students in every question could pick one choice (a, b, c, d, e) or could write something what they thought about problems asked. In this survey took part 21 persons. Students answered the following questions:

1. What impression made on you teaching with using e-books and other e-materials in physics practicing?  
The student's answers (relative in %):
  - a) it was excellent (17.6 %)
  - b) it was very good (58.8 %)
  - c) sometimes it was good, other times no (23.5 %)
  - d) more often I did not like this form of studying (0 %)
  - e) I didn't like it at all (0 %)
2. Did the course of practice suit you, when you on the basis of one or two (sometimes more) solved example the problems solved other tasks in pair independent of other colleagues?
  - a) it suited me very much (29.4 %)
  - b) it suited me quite good (41.2 %)
  - c) sometimes it suited me, other times it didn't (29.4 %)
  - d) it didn't help me in solving the problems (0 %)
  - e) it didn't help me at all (0 %)
3. How much time did you spend with preparing on the practices with using e-materials in comparison with the traditional preparation?
  - a) shorter time (70.8 %)
  - b) longer time (5.9 %)
  - c) the same time (11.8 %)
  - d) I never prepared on the practices (11.8 %)
4. Which kind of form of the practices for the subject Physics II would you prefer in the next semester?
  - a) in multimedial laboratory with using computers (82.2 %)
  - b) using classical forms of studying in classroom (11.8 %)
5. Would you like to cooperate in preparing the educational e-materials?
  - a) I would like to cooperate (0 %)
  - b) perhaps I would like to cooperate (82.4 %)
  - c) I never would like to cooperate in preparing (17.6 %)
6. Did you use the physical educational CD-ROM (off-line version <http://hockicko.utc.sk/>) in studying physics?
  - a) yes (88.2 %)
  - b) no (11.8 %)
7. What are your observations about the education carried out by using computational technique?
  - a) positives
  - b) negatives
8. What is your overall evaluation of this form of physical education in this semester?

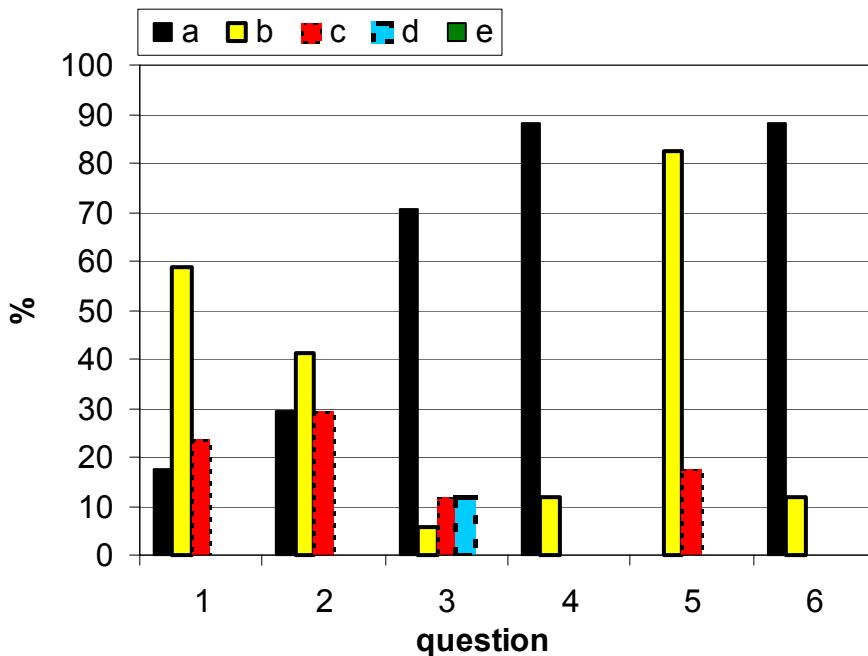


Fig. 1. Graphic representation of the public opinion survey

In question 7 students wrote about their observations of the education carried out using computing technique. What do they consider as positives in this form of education:

- quick explanation of the principles of problems, quickly going through, quick and clear form of the studied problems, saving time in solving the problems,
- accessibility of information (equations) and solved problems, also instructions for solving new problems, an opportunity to find information in a short time,
- clearness (picture information),
- big number of solved problems during the practicing,
- using computational technique, everything, what we needed, we could find in the computer immediately, we could access all the educational materials also from home,
- cooperation with the teacher, individual professor's approach to every student, supporting the self-reliance of the individual,
- not only one student was solving a problem at the blackboard, but all students worked independently on solving the problem using the computer,
- a very advantageous form of learning, if I don't understand something, I can ask promptly, but I have to think and find the information independently of the others.

And what the student considered to be the flaws in this form education:

- very hot and small room,
- technical equipment in this laboratory, slow and outdated PC,
- it was unusual to study using this form of education.

And finally, the overall evaluation of this form of physical education in this semester by some students (question 8):

- it was very good, congenial atmosphere, gingering us up, something new for us,

- the learning was very good, lively, it was quite a good change, I was pleased with this form of learning, I liked this form of learning,
- I think that it will be good to continue in this form of education,
- I have learned and understood a lot, but the exam will show if it was enough.

#### 4 Summary and conclusion

As we could see in the presented public opinion survey and other surveys [4,5], the students (about 200 asking) like to work with the computer. If we connect the work on computers with studying physics, this form of education will become very attractive for students and we can suppose that their knowledge in physics will be better. Studying using computer (e-learning) compels the students to work in an independent and creative way. It will be the task of us, pedagogues, to lead the students, by means of the right motivation and by setting suitable projects, not only to obtaining of new information but also to the creative valuation and application of the obtained knowledge in practice.

Today, multimedia technologies have shown their potential in the teaching of scientific subjects. Multimedia techniques attract student's attention, enabling an easier and rapid process of learning. Physics and technology are often considered to be difficult subjects. The main reason is that it is not easy to explain empirical laws and dynamic phenomena in textbooks. Interactive multimedia tools, with simulation and movies, are particularly effective in teaching physics. It is very important to use these tools in other subjects, including basic education, to make science and technology more appealing and address the scientific apathy crisis of young people [6].

And finally, I would like to quote warning by Christoph von Rhöneck in 1996 [7]:

„Don't let physics to be the Latin  
of the outgoing 20th century.“

#### References

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