

## **A WAY HOW THE INTEREST IN STUDYING PHYSICS AND TECHNOLOGY CAN BE INCREASED**

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If the teaching process is changed using experiments, information and communication technologies (ICT), interactive lectures, more children like the natural sciences subjects in comparison with normal class work. And this is the basic way how to build in the students positive relation to the future study of physics and technology – to inspire and to motivate a young people to be interested in science. One of the innovating learning activities of pupils is the Children's University. The purpose of the Children's Universities is to awaken the interest and the enthusiasm of children and young people, to increase knowledge about science and to promote the interest in science, to improve face to face contact of children and scientists. In order to enhance the existing Children's Universities and their further growth throughout Europe, the EUCU.NET (European Children's Universities Network) has been established this year. Other possibility to increase the interest of students in studying physics is to apply nontraditional lecture forms using ICT.

*Keywords: ICT, Children's University, EUCU.NET*

### **INTRODUCTION**

The common factor in most educational environments is the use of highly interactive computing and communication tools. Advances in computing, communication, and cognition provide both new educational opportunities and new educational challenges. A website will not replace talented faculty. Instead, the faculty reach will be extended through technology and their effectiveness enhanced by interactivity [1]. For that some interactive learning courses provide an attractive alternative for those universities which want to provide a high quality educational environment. Some authors write about the need to reduce the emphasis on lectures, to improve the relationship between the lecture and the laboratory [1]. Other university educators try to change the learning process by setting up supplementary courses of physics and using new modern educational methods such as: computer presentations, simulations, animations, experiments, and qualitative tasks [2]. Utilizing of ICT in physics education helps the students to work more actively and supports developing of their creative thinking [3].

In order to increase the effectiveness of the learning process, some teachers use innovative teaching methods and format of lecture, for example Peer Instruction (PI), the Couple Physics Studio, etc. The PI survey results indicate that more than 300 instructors (more than 80%) implemented the Peer Instruction successfully, over 90% of them using the method plan to continue or to expand their use of PI [4]. Many students agree that they enjoyed the studio courses as compared to the traditional lecture/lab format [5]. Students in these courses are performing as well as or better than students in the traditional courses in spite of the 33.3% reduction in class contact time [6].

Some of the students who have attended an introductory physics course at our university (and other technical universities) don't like this subject because it is difficult for them. They had physics classes in the primary school for the last time. They haven't discovered the

beauty of nature so far and their mental attitude to physics isn't positive. As a consequence, the introductory course of physics can be an intimidating experience for them. How can we change this situation and prepare students for the study of physics? We have tried to find the answer through realizing of the Children's University for young people.

## **CHILDREN'S UNIVERSITIES AND EUCU.NET**

The Children's University (CU) consists of the organisation of various activities in the form of lectures, exercises, excursions or workshops which are specifically aimed at the interests and needs of children. Generally, these activities take place at a university campus either during a specified period of time or as a series of events throughout the year. The objective of the CU is to improve the contact with the young people. The primary goal here is to undo the reservations the young people have concerning the scientific and academic issues at large. The long-term goal is to awaken the interest and the enthusiasm of children and young adults as well. The main objective of the CU is to open up the university campus to the public. This description showed the importance of an establishing information network for the Children's Universities as the EUCU.NET - European Children's Universities Network [7] shall be.

## **CHILDREN'S UNIVERSITY OF ŽILINA**

The Children's university at the University of Žilina [8] wants, except for achieving the increase of the education level of the nation with the emphasis especially on the young generation, to show the importance of research and development for the future society improvement. It is necessary to teach young people to think and not only to absorb the presented knowledge. The basic aim of the Children's university of Žilina (CUZ) is to bring technical science to the attention of the school age children (8 – 12 years old), to eliminate their fears to such subjects as mathematics and physics, and to near them the meaning of research and the application of its results in everyday life.

The CUZ takes place at regular intervals: once a year during a week in summer in Žilina and Liptovský Mikuláš. Children attend a series of lectures. Depending on each single activity, teachers, scientists, researchers prepare for 8 – 12 years old children lectures, exercises, demonstrations and excursions. Our lecturers are members of the academic staff of universities, especially from the University of Žilina. We started with this activity in 2005 at the Faculty of Electrical Engineering at the University of Žilina.

Many positive reactions from children which attended CUZ were registered in questionnaires. The results presented in this paper primarily focus on the analyses of the Children's University of Žilina observation data collected from the primary classroom pupils. The total number of the respondents (years of realization 2005 - 2008) were 442 („little bachelors“ (age 8-9): 327 and „little engineers“ (age 10-11): 115). In one of the questions we asked children: „What did you like most about the Children's University?“ Children could choose: a) lectures, b) laboratory exercises c) work on PC d) outdoor games. Nearly half of all the children chose laboratory exercises (47%), 19 % would like more lectures, 18 % wanted to work on PC and 17% wished for outdoor games. As one can see in Fig. 1a), the situation is very similar for each year of realization of the CUZ. It was satisfying for the university teachers to see how the children were motivated in a concrete experimental situation in laboratory. Children like to play, realize experimental activities and finally discover secrets. They learned about their own abilities to perform scientific experiments and had the opportunity to compare their approach with the real scientists in the Children's University.

Experimental activities in the laboratories were highly suitable for “why and how” discussion of young scientists with the teachers. The children enjoyed teamwork (52%), as well as the experimental activities done by themselves (42%). We found another important result when we compared the teaching activities at the primary school and at the CU (Fig. 1b)). We suppose that if we change the technique (the methods) of teaching, the children who “like it sometimes” (at elementary school) will “always like it” (at CU). This approach could be used also in the introductory physics course at the university in order to create the positive relationship of students to natural sciences.

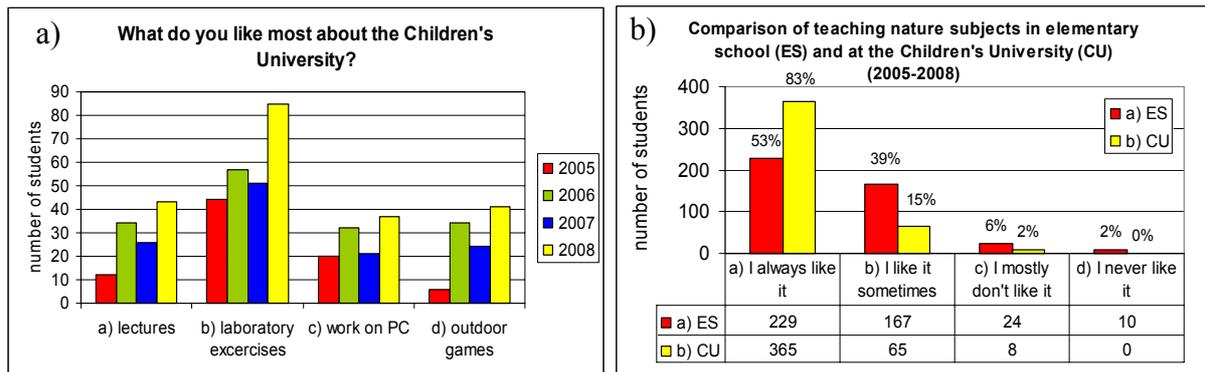


Fig. 1. Answers of students who attended the Children's University of Žilina



Fig. 2. Exercise „Sound and ultrasound“ in laboratory and lecture „How do waves move?“ at the Children's University of Žilina

## RESULTS FROM QUESTIONNAIRES

The children were quite enthusiastic about the course „little bachelors“ and „little engineers“ as measured by responses to the courses surveys. The children learned how to carry out their ideas, how to communicate with each other, how to work in a team, how to learn one from the other, all this with the objective to develop their minds. When we asked, whether they had liked the Children's university, nearly 98% of children agreed. Over 83% children agreed that they enjoyed the CU courses as compared to the traditional elementary school courses (53%). The number of those who enjoyed mathematics and natural sciences was greater than the number of those who disliked these classes. It was absolutely obvious

that the laboratory work was most enjoyed, 78% children preferred more experiments, and only 22% wanted video-clip, computer simulations and models. 85 % children wanted to take part in classes in which they could realize their own ideas and work actively and creatively.

The questionnaires show that it is highly necessary to increase the number of presented experiments, to use multimedia in a larger extent, to develop the children's imagination and creativity, their sense for the team work [9]. Self-activities are also important as well as the possibility to be active and to work creatively.

## CONCLUSIONS

The pupils, students, and even general public love and remember both the best demonstrations and the best demonstrators. Computers, audio and video make the lectures more instructive and interesting. But our interviews with pupils who attended the Children's University of Žilina revealed that the children prefer demonstration ahead of lectures, computer and parlour games. Catch them young! Then teaching science and the relationship of students to physics can change and it can be a challenge. By changing the activities of the teachers during the lecture, e.g. using interesting experiments and including the own activity of the students, one can build in young people interest in studying physics and technology.

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