

How to attract the interest of school-age children in science

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I Introduction

The Children's university at the University of Žilina endeavors to conduce to solving an extra important public problem – the increase of the education level of the nation with emphasis especially on young generation to show research and development importance for the future public improvement. It is necessary to teach young people to think and not only to absorb presented knowledge. It is necessary to reduce the quantity of encyclopedic knowledge and to underline the requirement of the knowledge depth and creative mind, too.

The basic aim of the Children's university is to bring technical science to the attention of the school age children, to eliminate their respect of such subjects as mathematics and physics, and to near them the meaning of research and the application of its results in everyday life.

This paper informs about the “holiday studying” organized for the elementary school children at the Faculty of Electrical Engineering at the University of Žilina by the university educationists during the summer holiday.

II Why have we launched the Children's university?

We have been motivated by the following key priorities: “Reasons of low interest of the young in research in Slovakia” and “Improvement of social recognition of the young in research”.

The scheme of the Children's university of Žilina has evolved for the popularization of results of science and technology, the schematic discovery of technical subjects and the elimination of respect for these subjects, the stimulation of independent creative thinking.

The Children's university at the Faculty of Electrical Engineering at the University of Žilina is organized during the summer holiday. The aim of the “holiday studying” is to attend lectures and laboratory exercises in natural sciences, which are led by university educationists in an unusual way. The topics of lectures are based on the professional activities of particular lecturers but tailored to the age and the interests of children. On the contrary to the classical way of studying at the elementary school, children are active participants in these lectures and they work individually and creatively during laboratory exercises.

Our Children's university is based on popularization of science and technology results through lectures and practical exercises.

III How do we run the Children's university of Žilina?

In 2005 the Faculty of Electrical Engineering of the University of Žilina organised "The Children's University of the Faculty of Electrical Engineering" for the first time. Concerning the positive response of this action we expanded the possibility of attendance for more children not only from Žilina region but also from Liptovský Mikuláš, where the Faculty of Electrical Engineering of the University of Žilina has a detached workplace, as well.

The Children's university of Žilina is for 8 till 11 years old children. (Originally the scheme was planned and performed in 2005 for children of the age of 6 - 10. It was found out to be tiresome and difficult for younger children therefore the age of the participants was shifted to 8 - 11.) There are two "degrees" that can be obtained at the Children's university: the first degree can be got in the study program "Little Bachelor" for children who completed the 2nd and 3rd year of the elementary school. After having got this degree, the children can continue in the following year to get the degree "Little Engineer", which is for children who completed 4th and 5th year of the elementary school. Every child obtains a coloured textbook [1], which covers all lectures and exercises.

The Children's University took place during 5 workdays from 8 a.m. till 4 p.m. (one week in the summer holiday (2nd and 3rd week of July)). The children were divided to teams up to 20 children per each team. Each team had three adult counselors, usually PhD students or students of the University of Žilina, to maximise the safety of the children and to provide contact with parents.

Since the very beginning, the education was provided by university teachers and researchers, PhD students, students and other employees of the Faculty of Electrical Engineering of the University of Žilina and the Jessenius Medical Faculty in Martin. From 2006 staff from other faculties of the University of Žilina joined the education. Activities took place in classrooms and laboratories of the University of Žilina, eventually in the detached workplace in Liptovský Mikuláš. The following education methods were used: lectures (Fig. 1), exercises (Fig. 2), object-lessons (Fig. 3). The lecture themes were focused on the field of physics, mathematics, electrical engineering, engineering, fire protection and so on and were adapted to child's age and interests. The titles of lectures were for instance: "How things move", "How waves move", "How I can hear", "How sound is propagating", "Communication with and without words", "How we can see 3D", "How the train is driven", "The fascinating world of chemistry", "About universe, stars and planets", "Science as a game", "How and why we breathe" and so on. Other lectures explained how telephone and television work, how cell phone protects our body against diseases and so on. Totally 43 lectures were realized (30 for the program "Little Bachelor" (in Žilina and in Liptovský Mikuláš), 13 for the program "Little Engineer" (only in Žilina)), which were completed with 25 demonstrations and object-lessons in university laboratories (18 for the program "Little Bachelor", 7 for the program "Little Engineer"). Here the children were able to test their skills by creating models by experimental way. There was also space for additional questions, so the participants could have full conception about themes of lectures. For children were provided object-lessons in Transport laboratory and on Žilina-Hričov airport.

For feeling the real university atmosphere, children obtained the statements of study - student's record book as real university students, where titles of all lectures and lessons were listed. The study of little students was finished with the degree ceremony with parents and relatives presence, where the dean of faculty distributed diplomas to the graduates - "Little

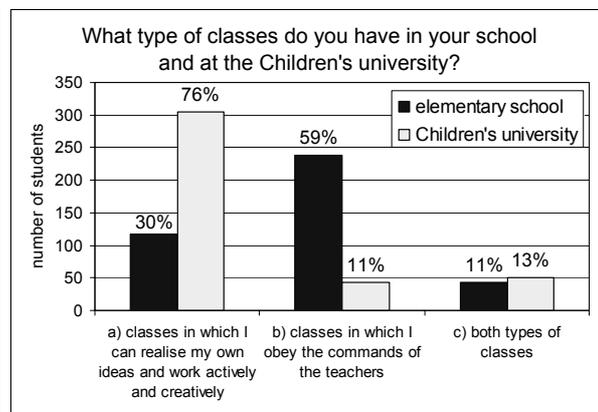
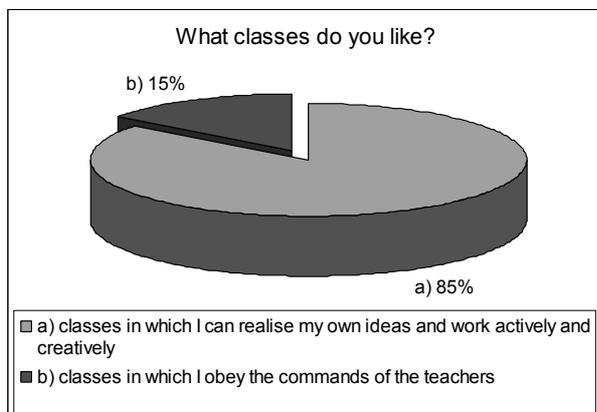
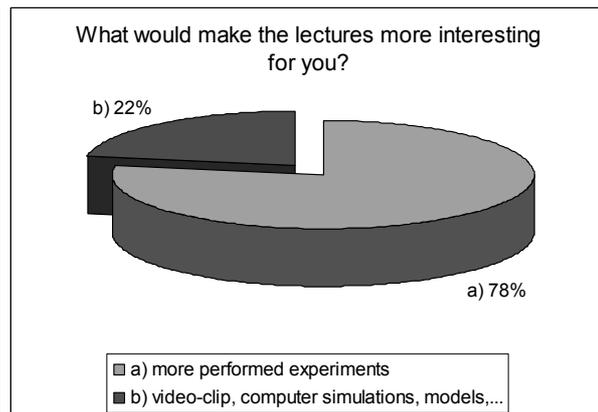
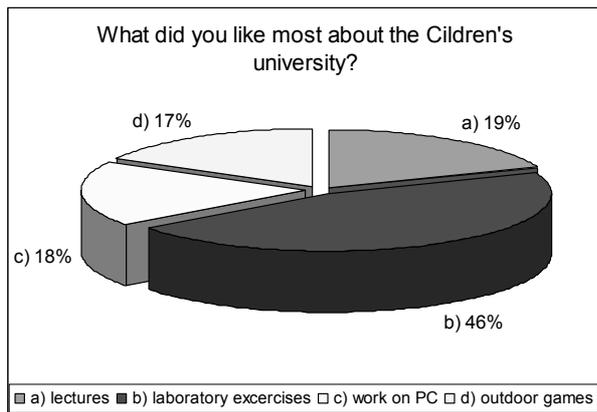
Bachelors” and “Little Engineers”. Detailed information about previous years of Children’s university was published on official internet page of Children’s university of Žilina [2].

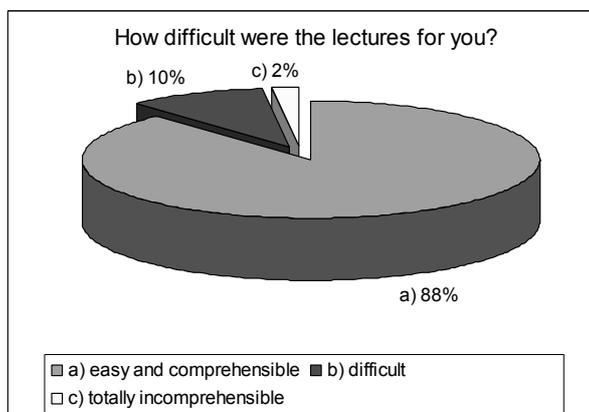
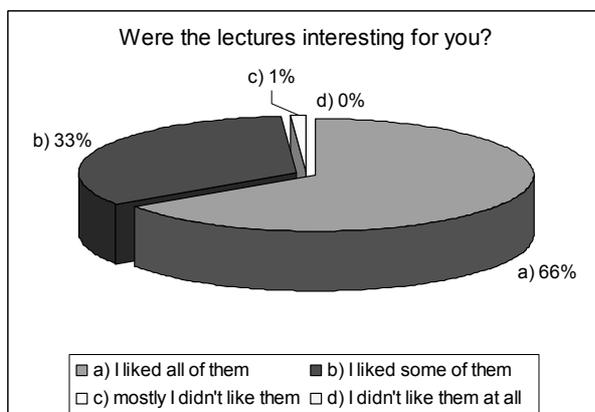
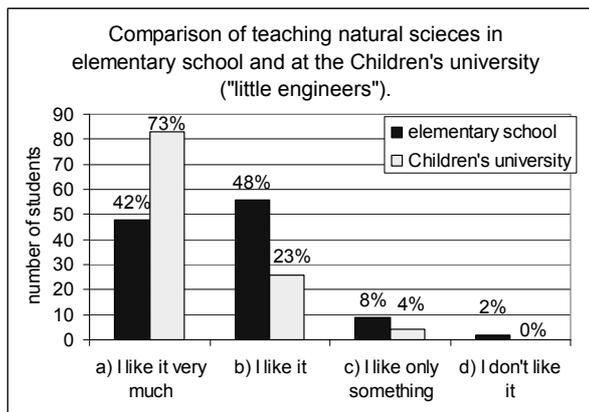
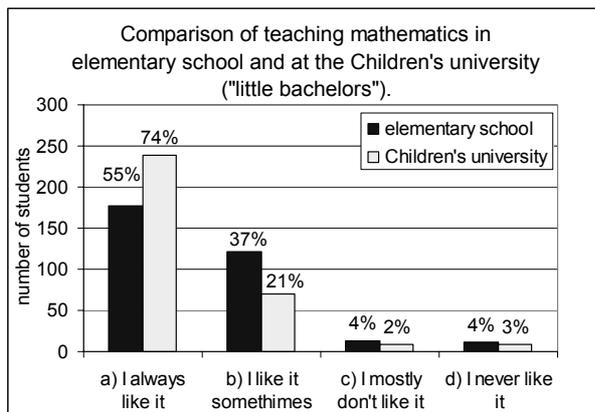
IV Results

Every year at the end of the Children’s university of Žilina children answered several questions by means of questionnaires [2 - 4]. The total number of the respondents (years of realization 2005 - 2008) was 442 („little bachelors“ (age 8-9): 327, „little engineers“ (age 10-11): 115). The total number of questions was 21. Children replied to the selected questions:

“Which lectures did you like?”: Frequent answers were: ... “How things move”, “How we see things” (children’s explanations: “because they showed us how a rainbow can be made”), “How waves move” (“I learned what sounds do the animals make”)...

“Why do you like the Children’s university?”: “... because I understood everything, we were able to carry out experiments and to talk about our ideas, I liked the most the experiments in physics and chemistry, we could try out everything, there could be more experiments, we had the opportunity to ask whatever questions we liked,...”.





V Conclusions

Many positive reactions from children were registered. It was absolutely obvious, that the laboratory work was most enjoyed.

The reason was the active participation in the laboratory lesson. The lectures were good understood and perceived, but they were generally less liked because of the fact that graphic, schematic or realistic instruments were usually used in a smaller extent. Several general observations about children's attitude to natural and technical sciences appeared.

Children expected wide usage of information and communication technologies during education. They eagerly wanted to work in an active way and to carry out their own ideas, to think through problems. Undoubtedly children of age under 10 have a genuine, but hidden interest in natural and technical sciences; they want to become scientist and explorers. However, after several years of education at the elementary level, the situation becomes completely changed.

Children liked the Children's University very much; almost everybody wanted to attend it once more. It was the own initiative of the children to attend the Children's University. The main reason was the ambition to experience something unique, unusual and not experienced so far.

The results of the questionnaire showed that children's interest in mathematics and natural sciences at the Children's University was much higher as at the elementary schools, a greater number of them enjoyed mathematics and natural sciences than those who disliked these classes.

The university staff involved in the scheme experienced the work with school children even in multilevel classrooms, with children at several different learning levels. Therefore it was a challenging opportunity to develop and broaden their educational and didactical skills. Advanced approaches and methodology aimed at holiday activities at elementary school level were proved as suitable. Brand-new knowledge was explained to children by effortless and playful form. They learned how to carry out their ideas, they learned to communicate with each other, work in team, learn one from the other, all this with the objective to develop one's mind.

According to the questionnaire, children gained a lot of new information through interesting lectures and laboratory exercises. The questionnaire for children shows that it is highly necessary to increase the number of presented experiments, to use multimedia in a larger extent, to develop their imagination and creativity, sense for team work. Self-activities are also important as well as the possibility to be active and to work creatively.

Latest computing technologies will help in the transformation of a traditional school to a creative one. This transformation is an objective of the university staff involved in the Children's University and still calls for wider implementation of multimedia and computing technique.

Acknowledgement

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Fig. 1. Lecture „How things move“



Fig. 2. Exercise „Sound and ultrasound“



Fig. 3. Object-lesson „How the train is driven“