

DIDACTICAL STRUCTURE OF SUMMER CAMP SCHOLA LUDUS: EXPERIMENTÁREŇ 2011 – METEOROLOGY

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INTRODUCTION

Physics camp SCHOLA LUDUS: Experimentáreň was held in summer 2011 at the Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava for the ninth time. Its scientific program was focused on meteorology. Children aged 8-15 years observed natural phenomena, performed experiments, built their own measuring instruments, discussed and played for a period of five days. The topic meteorology was chosen because of actual increase of weather variances and menace of climate changes.

The general goal of all educational activities realised in summer camps Experimentáreň is to develop cognitive skills: to define the problem, ask questions, produce and verify hypothesis, propose an experiment and perform it, collect and interpret experimental data, solve the problem creatively and, last but not least, to be aware of own cognitive progress – to understand the value of knowledge and value of the way it was constructed. The emphasise is put on development of competencies to obtain, to prepare and to evaluate information; and to development of communication skills including ability to enforce own opinion in an appropriate manner, to argue as well as to listen and accept other opinions.

SCHOLA LUDUS theory of teaching and learning [1] is applied in particular learning activities.

EXPERIMENTÁREŇ 2011: METEOROLOGY - EDUCATIONAL GOALS

The goal of the summer camp was to introduce meteorology as an interesting and worthwhile field of physics that is connected to many other scientific areas such as chemistry, biology, computer science, etc. Our educational goal was:

- to introduce methods of measuring, recording, collecting, elaborating and imaging meteorological data,
- to understand the importance of monitoring the weather, discover basic factors influencing the weather, to know the possibilities of weather forecasting,
- to understand complex character of atmospheric phenomena,
- to support development of civil competencies (the right to be informed, to take part in decision making and to be responsible for own gestio).

CONTEXT OF LEARNING METEOROLOGY

Meteorology is broadly utilised in many fields of our lives, so there are various possible contexts to make learning meteorology meaningful for children.

Based on our experience with summer camps, we decided to motivate children through sci-fi story:

Participants of the camp are extra-terrestrials looking for other intelligent beings in the universe. After an accident they lost the laboratory module, but they succeeded to land on the Earth. They do not have authorization to contact Earthmen. Extraterrestrials – participants of the summer camp, have to discover the weather conditions and their changes in the landing area and schedule the flight away.

Next five days children observed weather, measured meteorological parameters and learned about the atmosphere and atmospheric processes. The learning process was arranged as a series of tasks – creative discovery workshops, games and competitions where children gain the “fuel” for their flight away.

SCIENTIFIC PROGRAM OF THE SUMMER CAMP

The scientific program of the summer camp Experimentáreň: Meteorology consisted of five main parts:

1. What is weather and how can it be measured?

First of all we focused on children’s own perception of the weather. Each group of 4 – 5 participants had to categorize 24 displays of weather (photos, schemes, newspaper articles, movie pictures, songs texts). Most of groups made categories: cold and hot weather, rain and wind. Only one group discovered that categorization of weather is not disjunctive. We discussed how weather affects our lives and which characteristics of weather can be measured. Thereafter we defined the primary meteorological elements: atmospheric pressure, temperature, direction and speed of wind, humidity, precipitation and cloudiness. Finally, each group supposed what elements have to be measured in order to study weather and provide information for the weather forecast. Children did not know measuring methods with exception of measuring temperature.

2. Construction of particular measuring instruments

Children spent most of time constructing their own measuring instruments. In form of creative discovery workshops [2] they investigated wind, dustiness, rainfall, humidity, temperature, and sunshine.

Example: Creative-discovery workshop Investigation of wind

Action: Simple outdoor game that can be influenced by wind – e.g. Frisbee, Badminton, throwing paper airplane.

Description: What characteristics of wind are interesting in weather observing? What are exposures of wind? - discussion on parallel cases (exposures of wind in nature, utilization of wind as power drive), explanation of terms calm, light air, light breeze, gentle breeze,

moderate breeze, fresh breeze, strong breeze, high wind, gale, strong gale, storm, violent storm and hurricane.

Mapping: Small group discussions on indicators of wind directions and possible methods of measuring the speed of wind – What are their advantages and handicaps?

Modelling: Creation of indicators and measuring instruments in small groups, looking for technical solutions, testing the functionality.

Abstracting: What if ... - discussion on measuring very slow and extremely strong wind. Discussion on possibilities how to record wind speed measurements.

Embedding: Where should the measuring instrument be located? - Presence of buildings, in bark, terrain.

Valuation: Using created instruments, comparison of children's measurements with measurement provided by professional anemometer.



Fig. 1. Investigation of wind

3. Weather station and location of instruments

Children visited the weather station at the Faculty of Mathematics, Physics and Informatics, observed the work of an observer and interviewed him – What characteristics of weather does he observe and measure, when and how often? Where are particular instruments located and why? – free, on the ground, in Stevenson screen. Why are some measurements duplicated - manual and automatic.

4. Weather forecasting

The activity was introduced by a game focused on introducing the importance of the weather station network and simultaneous measurements [3]. Afterwards we discussed the importance of coding, collecting and imaging weather information. Synoptic meteorology was introduced. Next activity was focused on looking for reasons of temperature differences in the Earth's surface, origin of wind and effect of the Earth's rotation (Coriolis effect).

Children visited also the Slovak Hydro-meteorological Institute, where they acquainted with the forecasting service and use of satellites in meteorology.



Fig. 2. Weather forecasting service

5. Climate and its changes

In this part children learned about composition of the atmosphere, circulation of chosen chemical elements and compounds (oxygen, carbon, nitrogen, carbon dioxide and water) and changes of climate (details in [3]).

CONCLUSIONS

The conception of the complex science-popularising and educational module Atmosphere for SCHOLA LUDUS virtual platform for science popularisation was presented in [4]. Partial learning activities suggested for 9 – 15 years old students were proved in the summer camp Experimentáreň 2011. The participants' replies showed that the suggested activities responded to their interest, and stimulated their knowledge and skills development.

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