Scenario title: Environmental project: Incursion into the world unseen by us, bats world

Learning Unit: Conservation and environmental protection,

Type of the scenario: structured

Short description: People with visual impairments are special because they integrate in the surrounding world through a compensatory development of other senses: hearing, touch, smell etc. Among people with visual impairments and bats, there are similarities regarding the perception of the environment and orientation in the dark. Seeking to capitalize on these skills that make them special and to deepen the knowledge acquired in school, through personal experience, students of Special School for the Visually Impaired Cluj-Napoca made numerous scientific experiments with a researcher from the Institute of Speleology of Cluj-Napoca.

Keywords: visually impaired, bats, transversal abilities, local horizon, environmental protection.

Target group: students from XI grade.

Age group: 15-16

Location: Local park" Simion-Bărnuţiu" in the center of Cluj-Napoca

Time required: 4 hours

Expertise of the author: The purpose to involve students with visual impairments in such projects is to form transversal competences in terms of studying the local horizon and its integrated creatures.

The connection to the curriculum: updated curriculum knowledge regarding the interrelation between biotic and abiotic elements.

Scenario goals: At the end of the activity pupils will be able to:

-To know the specifics of new urban habitat of bats as nocturnal mammals,

-To reproduce in tactile form the skeleton of the mammal based on materials provided by Institute of Speleology Cluj,

-To understand the lifestyle of bats, their importance in the food chain and to adopt measures to protect them.

Guidelines for preparing the scenario:

- the teacher will prepare a tactile map of Cluj-Napoca and a map of the park "Simion-Barnutiu"

- students with visual impairments will be informed how to orientate on the tactile map of Cluj-Napoca, will identify the main roads, the means of transportation used to reach at the area of experiment
- With the help of the scientific researcher from the Institute of Speleology Cluj they will locate the instruments for the study: bat detector, headphones, recorder, laptop, skulls bat.

Pre-visit

Phase 1. Generating questions

a) challenge the curiosity -related discussions about bats as nocturnal mammals.

b) Question: ,,can bats live in the city of Cluj-Napoca?

Phase 2.Proper investigation

Assumptions proposal: About bats in urban areas as mammals, we have a few information, there are some unfounded fears concerning them.

Planning and coordination of simple investigation:

1. Documentation: studying relevant literature, computer documentation, selecting the informative material,

2. Organizing meetings in school with a specialist from the Institute of Speleology ``Emil Racovita,, and have open lessons about the unseen world of bats,

Visit- the proper investigation,

Experimental plan 1. Observation in the local horizon flying bats over the urban environment. The experiment involved moving students at sunset in Central Park ,,Simion-Bărnuţiu" in order to observe the integration of bats into the urban habitat. Students have used auditory, tactile and olfactory senses to identify the bats and to know their natural life.

They performed the following activities:

-they've identified trees of different species and ages, by touch, using as a landmark the structure of the crust under the bark cracks where might shelter bats.

-they identified olfactory, trees housing bats, because on the bark of these trees are leaking bat droppings/excrements (guano), emanating an odor.

-they've appreciated the size of the lake, surrounding it with ultrasound,

-they've recorded the presence of bats, auditory, by using helpful aids /tools like ultrasound detectors,

-they've identified different intensities and frequencies of ultrasound emitted by bats

Experimental plan 2. Identification /recognizing some bat species, based on skulls.

This experiment was conducted in the laboratory and consisted in the analysis of residues bone and identify bat species based on skulls. Students analyzed the long bones of the front limbs and skulls from four bat species, well differentiated morphologically. Students had the chance to:

-understands how forelimb skeleton was transformed into a wing,

-they felt the fragility bones of the bat,

-they identified based on morphological dimensions, the following species Nyctalus noctula, horseshoe ferrumequinum, Myotis myotis.

Phase 3. Creation

-Collecting evidence based on observation by applying evaluation questionnaires

Based on the knowledge gained from experiments, students were able to develop a personal perception on bats and their habitat. Along with questions aimed at testing information built up, the test has appealed to the artistic side of students, which was expressed by a drawing. In addition, students were encouraged by a questionnaire, to be involved in developing recommendations for bat population growth. Recommendations came from some children who by age and sensitivity can be very useful to people involved in environmental protection.

For this experiment, students learned that bats are useful animals which require protection.

Phase 4. Discussion

Explanation based on evidence

The teacher proposes the following game: *Learn whether there are links/similarities between how bats and blind people orientate in space.*

Two groups are formed consisting of 15 students from which five blind students (the experimental group) and 10 students with low vision (the control group). In the pre-experimental stage, questionnaires at both groups were applied, in order to diagnose students' attitudes about these mammals.

In the experimental stage, exercises with blind students were achieved, while the control group performed common tasks by applying traditional assessment strategies. Blind students have met repeatedly with a speleologist from the Institute of Speleology" Emil Racovita ,, Cluj and identified tactile the weak bones of bats. For low-vision students this stage was a simple one. they were able to see bats wings visually

The second phase of the experiment took place in the Central park of Cluj, blind students were very responsive in handling the instruments. Visually Impaired students have identified by hearing, helped by ultrasound detectors, the flying of these mammals. Thus, they accumulate new knowledge about the behavior of these mammals in urban areas. They achieved the following information:

- Bats- unique creatures. Creatures of million years, bats have evolved to the stage of one of the most successful groups of mammals on earth. The ancestors of today's bats could get acquainted with dinosaurs. So bats inhabit/populates the Earth for about 50 million years, being the only mammals capable of active flight. Around the world there are 1000 species. In Romania there are 31 species of bats of 45 species existing in Europe.
- Bats in search of housing. Hardly can anyone think that our homes have been hundreds of years a refuge for wild animals. Thus, dark bridges, narrow spaces from the supporting structure of buildings, cracks in walls, wet basements and other not arranged spaces, can be suitable shelters for bats.
- Why bats fly? .Because of the transformation of forelimbs in wings, bats have conquered the skies millions of years ago, and to avoid competition with insectivorous birds, they are active at night. Bats use ultrasound transmission and reception for orientation and hunting in the dark.
- Hibernation is a very economic life style. Because of loss of food sources (insects) due to low temperatures, bats from temperate regions hibernate. Hibernation is for bats, an economically way of life, is how they survive during the cold season, using small amounts of energy.

c) Communicate the results of the investigation:

- new information were obtained about the specifics of these nocturnal mammals. Visually impaired students perceived by themselves with the compensatory senses the local horizon, the habitat of bats, the main species of bats in this horizon and hunting flights they have at sunset.

-using the tactile sense they managed to identify four of the most common bat species.

-the assessment of new knowledge encouraged students to express fillings about nature and bats.

Phase 5. Reflection

Communicate the explanations:

Through this environmental project, students with visual impairments have managed to acquire transversal skills, developing their initiative in teamwork, to document, use the research equipment, respect and protect nature.

Follow-up activities and materials:

Didactic materials: physical and political map of Romania, geographical atlases, video projector, bat detector, headphones, skulls bat.

Sustainable contact

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Overall assessment

Through experiments conducted in local horizon, pupils from Special School for the Visually Impaired in Cluj formed and developed transversal skills:

-Ability to work in a team,

- Ability to document the bibliographic using the Internet on a specific problem

-Ability to explore the environment,

- Ability to use materials and research equipment (detectors ultrasonic- bat detector type, bats skulls).

-Took initiative to elaborate measures to protect bats in the habitat in which they live,

-recognize elements of natural heritage values and developing respect for nature.

Following the documentation and the results of students involved in experiments, they synthesized and presented in the project environment, the following aspects from the life of bats that live around us, without being truly known by many of us.

Besides this written assessment of information, they learned, students have conducted exercises of knowledge through games, stories with a specific message.