

# DEUTSCHES MUSEUM, MÜNCHEN, GERMANY

## Locomotion in the air

Traudel Weber

### Part 1 Basic information

#### **Institutions involved**

*Deutsches Museum*, Museumsinsel 1, D-80538 München, Germany. Contact: Traudel Weber +49 089/2179-462.

#### *Primary school*

- *Grundschule an der Gilmstr.* 46, Martin Spagert, D-81377 München, +49 089/7244 92823.

#### **Aims**

- Discover some characteristics of the air.
- Find out which shape a plane must have to fly.
- Find out how to steer a plane.
- Use the correct terms which describe physical and technological phenomena and build sentences.
- Enjoy the exhibits at the museum, get an impression of the variety of technological solutions for the problem of flight and develop understanding of technological evolution.
- Recognise the differences between three planes, which show important steps in the history of flight.
- Built a model of a sailing plane.
- Discuss problems to make the model fly properly.

#### **Materials**

- Story of Daedalos and Icaros by Alfons Schweiggert, picture of both.
- Material for experiments: balloons, boxes, sticks, cardboard, scotch tape, string.
- Worksheets.
- For the model of a sailing plane: lead, strong corrugated cardboard, coloured paper, wooden balls, adhesive.

### Part 2 Description of the project

#### **Preparation of the visit**

- Reading the story of Daedalos and Icaros by Alfons Schweiggert. Modern version of the Greek myth, in which the son knows a lot about the physics of flight, but the father does not listen to him leading to catastrophic consequences.
- Discover some of the characteristics of the air. With simple experiments the pupils find out that air has weight, air can be felt, air carries, air has power, warm air goes up, air needs space.
- Which shape must a plane have to be able to fly? A photo of a strange plane raises the discussion among the children about which factors are important in the shape of a plane. One important thing is the shape of the wing. Children build a simple model of a wing on a thread, watch it going up the thread. How does this work?
- How to steer a plane? Children make experiments with a paper plane with adjustable elevator, side rudder and aileron. They watch and see how changes in the position of these elements influence the direction of the plane's flight.
- Building a sailing plane.
- Talk about the visit to the museum: when, where, how long, what to bring with you.

## **Visit to the museum (ca. 2,5 hours)**

### *Organisation*

- Introduction. The museum guide welcomes the whole group. Short tour to some zeppelins and helicopters (chosen by the pupils and teacher).
- Exploring the flight department with worksheets.
- Experiments at the flight simulator.
- Short visit to the department of physics.

### *Contents and activities*

#### *Activity 1 Exploring the flight department with worksheets*

The children work with partners on 4 worksheets.

- The first worksheet is relative to the area of "Flight in Nature". The pupils are asked to find plants and animals which have inspired the early pioneers of flight. For three seeds they should find out which flight apparatus was constructed using them as a model.
- The second worksheet leads to the famous German pioneer Otto Lilienthal and his gliding apparatus, followed by the Wright brothers and their early motor-plane.
- Another worksheet invites to compare three planes: Lilienthal`s "Normalsegelapparat" from 1894, the Wright Standard Type A from 1908 and the Junkers F13 from 1919. Children should pay specific attention to the material, landing gear, number of passengers, engine performance and speed limits.
- The next worksheet tries to give an idea of the variety of planes and other constructions for flight and leads to famous or extraordinary exhibits.

On the last page of the worksheets there are some photos of details taken in the department of flight, which are meant to stimulate children`s curiosity to see more of the exhibition.

#### *Activity 2 Experiments at the flight simulator*

At the flight simulator in the exhibition children can develop a feeling of how to steer a plane and they can see how their actions influence the flight of the plane. A special worksheet helps them to structure their experiences.

#### *Activity 3 Visit to the department of physics*

During this short visit pupils can watch a demonstration on the lifting power of a bent wing and a demonstration of falling in an evacuated space reminding them of the information they got at school.

## **Follow-up work in classroom**

At school pupils summarise the visit by talking about it and comparing what they discovered while filling in the worksheets at the museum.

## **Conclusions and evaluation**

Some children say it is too hard to find all the things mentioned in the worksheet; choosing groups of worksheets can prevent this happening. To carry out the whole unit activities means answering to many of the children`s questions on the topic, but it also needs a lot of time which is not always available (not all topics integrated in the unit are part of the curriculum).

## **Facilitators and innovative aspects**

Very close coordination between school teaching and museum visit.

## **Appendix**

- Teaching/learning material for the lessons at school.
- Worksheets.