NATIONAL MUSEUM OF SCIENCE AND TECHNOLOGY "LEONARDO DA VINCI", MILAN, ITALY

Transport and movement transformation

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Part 1 Basic Information

Istitutions involved

National Museum of Science and Technology "Leonardo da Vinci", via San Vittore 21, 20123 Milano, Italy, www.museoscienza.org. Contact person: Enrico Miotto, miotto@museoscienza.it.

IRRE Lombardia – Istituto Regionale di Ricerca Educativa, via Leone XIII 10 - 20145 Milano, Italy, www.irre.lombardia.it. Contact person: Roberto Cerini, ceriani@irre.lombardia.it.

Primary schools

- *Duca degli Abruzzi*, via Cesari 38, 20162 Milano, Italy. E-mail: scuolacesari@libero.it, www.gessetto.it. Contact persons: Stefania Bianciardi fuldima@tiscalinet.it, Gabriella Fontana gabriella.fontana@fastwebnet.it.
- *Rinnovata-Pizzigoni*,Via Castellino da Castello 10 - 20155 Milano. Contact person: Franca Zuccoli francazuccoli@libero.it.
- *Direzione Didattica Statale*, piazza Castello 5, 27025 Gambolò, Pavia, dgambolo@tin.it, WebSite: www.supercampus.it/marconi. Contact person: Giuliana Arcuri, arcu@libero.it.
- *Amal-Tikwa*, Via Quasimodo 20082 Zibido San Giacomo Milano, Setikwa.amal@tiscalinet.it, www.bambinoautore.it/iclacchiarella/. Contact person: Maria Teresa Intonaci, g.isidoro@tin.it.

The project presented in this chapter has been elaborated and carried out with Stefania Bianciardi of the primary school *Duca degli Abruzzi*. A detailed presentation of the project is included in the CD.

Aims

- To find things referred to the physical concept of movement.
- To understand how to transport and transform movement by means of gearwheels, pulleys…
- To take suggestions for activities in classroom.

Materials

No specific material is needed.

Part 2 Description of the project

Preparation of the visit

The preparation of the visit is part of the teaching process. Students are not only involved in a traditional learning process (lesson, study, visit to the Museum, class work, evaluation...), but also in the preparation of the visit to the Museum. This choice is based on the idea that learning is a process involving the whole person from many points of view. The preparation of the visit can be divided into phases:

Introduction to museum services (location: museum)

Teachers meet the museum educator in charge for the project. He/she:

- Introduces teachers to the museum collections.
- Introduces the activities that will be developed with the children during the visit.
- Presents what she/he will do with the children during the visit.
- Discusses with teachers particular requests connected with local problems and projects.

In-service training for teachers (location: museum or training institution)
The institutions involved in the project (museum and/or training institution) organize a meeting with the teachers of all the schools in order to:

- Study the concepts and the terms of the theme *movement*.
- Prepare a pattern on the basis of which to observe the pupils during the activity in the museum (behaviour, participation, interest...).

Preparation work in schools (location: participant schools)
Children are initially involved in the practical organization of the visit. For example they:

- Look up the museum in the city map (development of self-orienting abilities and geographic competences).
- Decide which is the best means of transport for matching the museum (development of cooperation abilities).
- Calculate how much every child has to pay, including the trip, the price of the ticket and the cost of the guide (development of organizational and math competences).
- Phone the museum to book the visit, following a common agreement of the class on possible dates (development of personal responsibility and relational abilities).
- Discuss together and decide some common behaviour rules to be followed during the visit in the museum (social education).

Moreover, the previous experience of children is appreciated: children who already visited the museum (with the school or with their parents) share their memories with their peers. Children with no previous experience share their expectation from the future visit.

Visit to the museum
Organization
Children reach the museum on time and date and are welcomed by a museum guide.
The visit led by the guide lasts 2 hours and is divided in two parts:

- 1 hour of visit/activities in the permanent collection.
- 1 hour of activity in the interactive laboratory.

For organizational reasons, the school was asked to bring two classes at the same time. In this way the visit can be organised according to this scheme:

- First hour: class A develops activity in the interactive laboratory, while class B visits the permanent collection.
- Second hour: class A visits the permanent collection while class B develops activity in the interactive laboratory.

Contents / activities
The contents and the activities developed during the visit are different in the two different parts of the visit: permanent exhibition and laboratory.

Permanent exhibition
Children are divided in groups and they receive the following instruction: "As you see, around us there are carriages, bicycles, motorcycles, cars and so on. Go around and look for all what concerns the movement. Choose the object that you like best: then you will show it to your classmates, explaining his bond with the movement and why you like it". Children have 20 minutes for the exploration. At the end of the time the guide assembles together the children and they cross all together the section: when a group of children meets one of the chosen objects they point out it to everybody and they motivate their choice. The guide gives some information about the object, explains its operation and answers the children's questions.

Workshop
The guide asks the children:

- To look at a set of objects (mainly of daily use, i.e. in the kitchen).
- To identify the device more similar to the object previously selected in the permanent collection.

The object is put into operation. The guide:

- Shows gears and other devices to transform and to transfer the motion.
- Shows also some models of Leonardo's devices.
- Ask the children to describe the movement of each working object.

After that, the guide turns on the light of a stroboscopic lamp and rotates a clear rope. One of the children changes the frequency of the lamplight, while the other ones describe the movement of the rope.

Follow-up work

After the visit, children are asked to continue a practical work in the museum and/or in their classroom. This work involves interdisciplinary aspects and is based on a scientific and technological approach. Suggested work:

- Children build cogwheels of different dimensions of the same footstep.
- They study with which number of cogwheels geared among them happens the inversion of the rotation and the multiplication of the motion, in order to use the divisions to foresee the multiplication of the motion.

Evaluation tools

Children evaluation

At the end of the work the children are asked to discuss together these points:

- What we liked more.
- What we didn't like.
- Were the explanations clear.
- What did we learn.
- Our emotions.
- Vote to the museum.

Teacher's evaluation

Some weeks after the visit, two people from the *SMEC* group went to the schools:

- To meet the teachers.
- To interview them.
- To understand how the visit to the museum was inserted in the didactic process.

Appendix

- Teacher interviews.
- Observation pattern for students and for teachers.
- Power point presentation of the activity realized by the schools.