



Images of scientists from European children. An action research project



Czech Republic

Introduction

SEDEC-Science Education for the Development of European Citizenship is a Comenius 2.1 project (European cooperation projects for the training of school education staff) aimed

- ◆ to investigate the relationship between science education, citizenship and European identity
- ◆ to help schools use external resources for science education (including museums, research institutes, etc.), considering the whole European territory
- ◆ to produce didactic materials and protocols for activities, designed to enhance the participation of pupils and teachers as citizens in the dialogue between science and society.

A survey of the perception of science, of scientists and of the relationships between science and Europe in pupils and teachers has been the first project step. Without the presumption to carry out a research scientifically faultless, we have used the survey as a source of ideas for activities and as an instrument for involving teachers and pupils of the five countries involved.

Partners of the project are: IRRE (Institute for Didactic Research) Lombardia, Italy (coordinator); Museo Nazionale della Scienza e della Tecnologia Leonardo da Vinci, Milano, Italy; Sissa Medialab, Trieste, Italy; Centro de Formação Dr. Rui Grácio, Lagos, Portugal; I.U.F.M. (Institut Universitaire de Formation des Maîtres) de Lorraine, Maxéville, France; Olsztynskie Planetarium i Obserwatorium Astronomiczne, Olsztyn, Poland; University of Ostrava, Faculty of Science, Ostrava, Czech Republic; Institute for Educational Sciences, Bucharest, Romania.

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Methods

Research instruments were:

- ◆ A "Draw-a-scientist" test, as an individual activity for targets A (9-years-old children) and B (14-years-old teenagers)
- ◆ A conceptual map about Europe, as a class activity for targets A and B
- ◆ Differentiate questionnaires for targets A-B and C (teachers)

The planned composition of the sample was:

Target A - 4 classes x 6 countries (CZ, FR, IT, PO, PT, RO) x 20 pupils (approx.) = 480 drawings; 480 questionnaires; 24 conceptual maps

Target B - 4 classes x 6 countries x 20 pupils (approx.) = 480 drawings; 480 questionnaires; 24 conceptual maps

Target C - 50 teachers x 6 countries = 300 questionnaires for the international comparisons.

We have collected more drawings (1102), more questionnaires answered by children (1158) and less answered by teachers (279).

The drawings have been uploaded to an online database, that has been (and will be) used also as an educational resource (see conclusions). The drawings have been described by keywords, and the emerging topics have been more deeply analyzed (numerically, in comparison with other researches) and discussed. Pupils have also written a short description for their drawings, and these texts have been analyzed.

Women in science



Fig. 1 - Romania - "The Lady scientist is making an important experiment and she is busy"

The number of women scientists in the drawings is comparable to the real presence of women in science in the research countries (if we consider associates and assistants, not full professors). Also male pupils have drawn women. Women in science drawn by pupils are beautiful, sometimes sexy, and successful (fig. 1). The perception of a gender problem in science emerges in the secondary school.

	Women scientists	Women scientists % on total of drawings	Drawn by male	Drawn by male % on total male pupils per country
CZ	24	16%	4	5%
FR	54	21%	15	10%
IT	29	19%	4	4%
PO	42	19%	13	13%
PT	53	34%	16	18%
RO	70	41%	8	27%
TOTAL	272	25%	60	11%

The stereotype

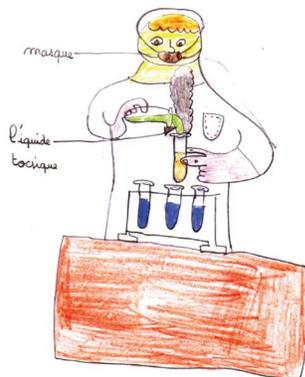


Fig. 2 - France

The stereotypical image of a scientist is a chemist (489 drawings on 1102), who works in a laboratory, and wears glasses (359/1102) and white coats (352/1102) (fig. 2): "The glasses represent the intelligence, the books research and the microscope handling" [France].

Children do not have a rich iconography related to science and scientists, and have difficulties in imaging other settings, actions, instrumentation. Children do not link science with theoretical and mathematical approaches, and do not have any idea of what a model is. Nearly 10% of the drawings represents a scientist who looks like Einstein or is Einstein (in dozens of different spellings!). Einstein-like scientists can be included in the group of the "genial scientists": absent-minded, untidy, dirty... (12%) (fig. 3).

Crazy scientist



Fig. 3 - Poland - "The scientist - 'crazy' and absent-minded, as each scientist should be".

"Genial scientists" can be also dangerous, and become "crazy scientists". Pupils are worried about the explosion caused by toxic liquids, radioactivity, testing on animals, and weapons (11% of drawings represent a science that can be dangerous) (fig. 4). In those "negative" representations real fears, icons and plots coming from the pop culture (comics, films, etc) appear, but also cultural archetypes (the Golem, The Sorcerer's Apprentice, etc.), that often are at the basis of the popular culture.

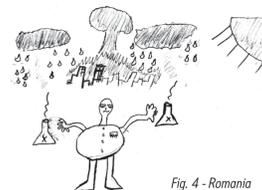


Fig. 4 - Romania

Benefactors

But a scientist is also a very serious professional, and a benefactor, because he/she works against the pollution, fighting illnesses, and improving health. A Romanian child writes: "It is a scientist who thinks of everybody's happiness, and of the well-being of the Planet, and searches the right solution for each specific situation". Children express clearly (in their drawings and in their answers to the questionnaire) that their principal concerns are the environment and health; their expectations on science are most of all for the production of inventions that do not exploit the nature (for example: paper made without trees), and that instead protect the air, the water, animals and plants (fig. 5). The same expectations emerge from the teacher's answers. And the same expectations appear in the conceptual maps, referring not to science but to Europe: pupils (particularly from the new EU member Romania) hope that the European Union will bring more attention to the environment and to sustainable progress.

They are not particularly interested in European research institutions, not in science career opportunities in EU neither in the historical heritage related to science. They consider the EU has a framework for the growth of a science for a better relationship between men and nature.

(much more results in the final report, that will be public in October 2007).



Fig. 5 - Portugal - "That woman is a scientist, who takes care of plants".

Conclusions

Science and scientists are very present in the imaginary of children and teenagers, but this imaginary tends to be poor and often refers to stereotypes. Children need to have more access to real scientists and their workplaces in order to enrich their imagination of instruments, actions, protocols, and professions related to science (as promoted also by the Science in society work programme, DG research).

In children and teens imaginary scientists can be powerful benefactors, or crazy and dangerous monomaniacs; the awareness of real problems connected to science and technology is obviously lacking. Children and teenagers need to have spaces in which to express their fears and their expectations, and discuss the complex relations between science and society.

Environment is a common concern for European citizens (and not only!), as health and quality of life. In relation to these problems, EU pupils can learn to participate and build an international scientific citizenship.

The survey results have already been used in some French primary school classes. Children have explored their image of the work of botanists and astronomers in their drawings and in the drawings of the children of other classes and countries. They have enlarged their imaginary exchanging and analysing drawings, information, and finally meeting real scientists (fig. 6).

Other activities are planned in this project for the next year.

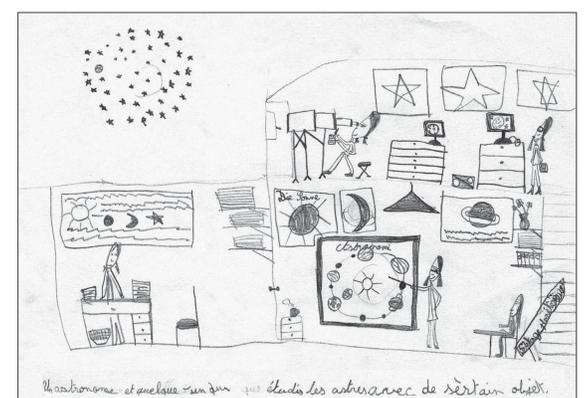


Fig. 6 - France