Science Education for Children in France: The La Main à la Pâte Programme

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Abstract

In 1995, after visiting Leon Lederman’s Hands-on schools in Chicago, Georges Charpak, Nobel Prize winner in Physics, Pierre Léna, an Astrophysicist and Yves Quéré, a Solid State Physicist, launched the La main à la pâte programme, intended to revitalize the teaching of the sciences in the French primary schools. This initiative received, through a unanimous vote, the support of the Académie des sciences in July 1996, which support has been unceasing since then.

In order to realize this objective, a team was created (Lamap team: presently around twenty full time persons), as well as a Scientific Council composed of outstanding persons of research and education, and as a Committee of partners which is intended to give ideas and financial support to the action of the Académie.

Starting from about 3% of the children receiving a scientific education in 1995 in elementary schools, we have reached now (2005) about 35%, a proportion still far of satisfactory but steadily increasing.

What is La main à la pâte?

The general idea of La main à la pâte is to cause children to participate in the discovery of natural objects and phenomena, to bring them into contact with the latter in their reality (outside of virtual reconstructions), directly through observation and experimentation, to stimulate their imagination, to broaden their mind and to improve their command of the language. More precisely, here is a scenario of a typical La main à la pâte session.

A child has asked a question about his/her environment, inanimate or living. Instead of replying immediately, the teacher throws the question back to the class, “And you, what do you think about it?”, eliciting the hypotheses of the children and thus firing their imagination. A simple experiment (observation, manipulation, measurement...) is then begun. Led by the children in small groups, it must in principle provide the answer, doubtless making them return to the initial hypotheses, and giving rise to the dialectic of reasoning and experiment which lies at the very heart of all research work. Finally, the
children will be invited to express their thoughts (short statements, writing in an experiment book) on the little adventure they have just experienced together, being thereby obliged to enrich their vocabulary and refine their logic and, hence, their syntax.

Of course, this is an ideal scenario which, in many cases, may be severed from one of its elements. For example, experimentation on living things (or on astronomical objects) raises specific problems. The experiment may even fail, in which case the teacher will give the answer to the initial question ex cathedra. Nevertheless, the fact remains that a personal engagement by the child, appealing at the same time to both his/her senses and intelligence, tends to encourage an enjoyment of science and bring it to life for him/her.

Based on these general ideas, a number of partners were sought, actions were initiated and tools created. At the same time, stimulating relations have been established with foreign colleagues working in the same vein, thus leading to collaborations and enriching comparisons. On all these points the Académie has contributed greatly to the progression of these ideas and to the facilitation of contacts between the partners in the operation.

The Académie’s partners

- The first of these is of course the French Ministry of Education. The launch of La main à la pâte in September 1996, was by Ministerial decision and involved 450 primary school teachers in five French départements. The proportion of teachers linked to La main à la pâte is currently (year 2005) of the order of 35%.

Encouraged by the Department of School Education (Direction de l’enseignement scolaire, DESCO), the experiment led to the setting up by the Ministry, in June 2000, of a plan directly derived from La main à la pâte to revitalize the teaching of the sciences, in all French schools at cycle 3 (final two years of primary school), the idea being to then extend it to all primary education, including preschools.

The Instituts universitaires de Formation des Maîtres (IUFM) are essential partners because that is where the teachers are trained. The Académie has established excellent relations with the IUFM, concretized in the creation of a network of La main à la pâte “Corresponding Members”, with a presence in each Institute. A national Symposium for the = one hundred IUFM of the country was held place in Marseille, March 2003, and workshops of trainers were organized in Erice (Sicily) in 2004 and 2005.

The Institut National de Recherche Pédagogique (INRP, National Institute for Educational Research) has been involved from the beginning through research staff, IT support (see The site)...

The Corps des Professeurs des écoles (ensemble of schoolteachers) is a crucial interlocutor for the Académie. This dialogue is established at numerous sessions, conferences, education days..., when the promoters of La main à la pâte, invited to talk science, receive comments and ideas in exchange.
The École Normale Supérieure (ENS-Ulm) has thrown itself alongside the Académie in this approach, involving agrégation candidates (the highest competitive examination for teachers in France), and making offices available to the Lamap team.

- The Ministry of Foreign Affairs is an important partner of the Académie for the international part of the programme (see later).

- A number of the Grandes Écoles (which teach Science and Engineering) have joined the movement: l’École Polytechnique some of whose students spend half a year in primary schools; l’École de Physique et Chimie Industrielle de la ville de Paris, whose Director, Nobel Winner Pierre-Gilles de Gennes, has encouraged it to be involved in scientific support, together with a number of other schools like l’École des Mines de Nantes and l’École des Mines de Saint-Étienne which generate educational material.

- Various Bodies and Associations, both public and private, support La main à la pâte in diverse ways, every one very effective.

  The Department of Technology (Direction de la Technologie, DT) of the Ministry of Research, and the Interministerial Commission on the Town (Délégation Interministérielle à la Ville, DIV) have contributed to the financing of some of the Académie’s activities.

  The Fondation des Treilles, with its hosting of seminars, and through the publication of books, has been a partner from the beginning, together with the Société Française de Physique, Électricité de France, France-Télécom...

  Many Institutions are striving towards the popularization of science among children. La main à la pâte has positive relations with L’explor@dôme (Paris), Ébulliscience (Vaulx-en-Velin), Science en fête, Les petits débrouillards… and, of course, La Cité des sciences et de l’Industrie (La Villette Museum) and Le Palais de la Découverte, both in Paris.

  In a less institutional way, many laboratories and research centres..., together with engineers and researchers (both active and retired), lend a valuable support, generally involving actions in schools or on the Internet Site (see later).

The educational tools

- The Académie has undertaken to provide French schools with an Internet network, created by David Jasmin and enabling the teachers involved in La main à la pâte to link up with one another, and also linking them to the world of research.

  The site (http://www.inrp.fr/lamap), which has three sections (information, resources, exchanges) and is extensively used by teachers (more than 200,000 contacts per month) has several attached networks:

  The La main à la pâte network: a national site and regional sites display locally produced resources and general information.

  The network of scientific consultants: a group of ≈ 120 high-level scientists and engineers have agreed to answer – within 48 h and in simple words – science questions raised by teachers or students.
The network of training officers/teaching specialists: questions on teaching and education are dealt with here.

- Since, in the beginning, the availability of educational documents corresponding to the approach described here was only fragmentary, American Hands-on texts have been translated and made available to teachers on the Site. Then, the generation of French texts, books, experimentation packs,... has been encouraged. A “Seal of approval Committee” has been created. Chaired by Academician Marc Julia, it examines documents seeking to achieve the *La main à la pâte seal*, via a classical reviewing procedure, which guarantees their good scientific quality.

- An Autumn University has been founded, with the support of the Fondation des Treilles, which brings together schoolteachers and researchers. The reports of the latter are published in the Graines de sciences collection (Le Pommier, Editor).

- *La main à la pâte* prizes are awarded annually by the Académie to ≈ 10 classes of primary schools from all over the country (teacher and children) for high-quality achievements in science teaching and learning. The ceremony of prize giving takes place in the palace of the Institut de France in the presence of the Minister of Education or of the Minister of Research.

- A travelling exhibition on the History of the teaching of the sciences in schools has been set and has been touring France since 2004.

### International implications

Numerous countries, including both some of the richest and some of the poorest are also facing the need to revitalize their system for teaching the sciences. The *Académie* has established a large number of collaborations on this theme, all the more so because the IAP (InterAcademy Panel for international issues, the Association, worldwide, of the Science Academies) and the ICSU (International Council for Science) have made this one of their priority tasks.

Among these collaborations, it is particularly pertinent to mention those established with Serbia, thanks to Prof. Stevan Jokic who has translated a number of documents into Serbian, but also with Afghanistan, Brazil (especially via the programme Mao na massa), Chile, China (via the programme Learning by doing: existence of a mirror-site, exchange of numerous teachers...), Columbia, Egypt, Israel, Malaysia, Morocco, Mexico, Switzerland, the United States, Vietnam..., and, more generally, with the ICSU through the CCBS (Committee on Capacity Building for Science). Various actions have been launched which imply children of various countries, in particular the measurement of the Earth’s radius via Erathosthene’s method by children of a number of European, African and Middle East countries; or the historical and experimental issues of *L’Europe des découvertes* (“Europ of discoveries”).

An international website for teachers has been opened in 2003 at the request of ICSU and IAP under the responsibility of the Académie, aimed at giving resources to the teachers and opening a forum of discussion and exchange between them.
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References

Participants of School from Albania, Turkey, France, Sweden and Serbia in front of a Hotel in Zlatibor