

# The Global Microscience Experiments Project

## Practical Teaching Aids for Secondary Schools



- UNESCO-associated Centre for Microscience Experiments
- Countries and territories where UNESCO workshops have been run



United Nations  
Educational, Scientific and  
Cultural Organization

UNESCO  
Natural Sciences Sector  
Division of Basic and Engineering Sciences

## The project

**Within the framework of the International Basic Sciences Programme and the Intersectoral Platform for Science Education, UNESCO implements the Global Microscience Experiments Project in promotion of science education.**

The Global Microscience Experiments Project is a hands-on science education project that gives primary and secondary school pupils (in some countries university students as well) the opportunity to conduct practical work in physics, chemistry and biology, using kits that come with booklets describing possible scientific experiments. These kits are veritable mini-laboratories. They are cost effective and safe, in so far as pupils never need to use more than a couple of drops of chemicals for each experiment. The kits

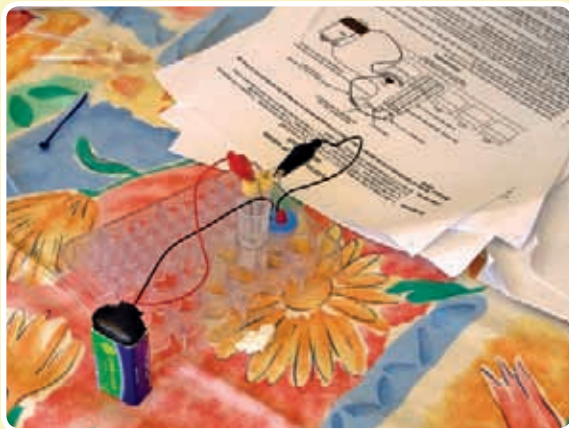
are also affordable and far cheaper than conventional laboratory equipment and materials. Each kit is compact, can be reused and is unbreakable. In addition, the small quantities of chemicals used make the methodology environmentally sound. The pedagogical importance of this practical science education tool for capacity building in scientific thinking is high.



Pupils learn to ask questions about the natural world, to set up experiment to answer their questions, to observe and record results, and then to draw conclusions. Teaching of scientific thinking can be achieved with this methodology in contexts where no laboratory facilities are available. The microscience approach not only helps to develop scientific thinking in students but also provides developed and developing countries alike with new teaching tools.

## Main objectives

- ◆ To promote practical science experimentation using Microscience as an advocacy tool amongst policy makers
- ◆ To improve science curricula by inclusion of hands-on experimentation for a better understanding of science
- ◆ To increase the interest of young people in science so as to promote gender equality, scientific literacy and the choice of a scientific career
- ◆ To promote capacity building for science education and enhance development of scientific thinking and experimentation for pupils



## UNESCO's Teaching and Learning materials on Microscience Experiments

The project provides a full range of educational materials on microscience experiments in different fields of chemistry, biology, physics (electricity) and primary sciences in combination with the use of microscience kits. A full set of the educational materials is available on the webpage of the UNESCO Natural Sciences Sector, Division of Basic and Engineering Sciences and is free for use by all internet users. All these teaching and learning materials have also been prepared in Russian and some materials in chemistry exist in French, Spanish and Portuguese.

These materials can be duplicated by any country for free distribution through the educational community. All UNESCO's teaching and learning materials on Microscience Experiments can be

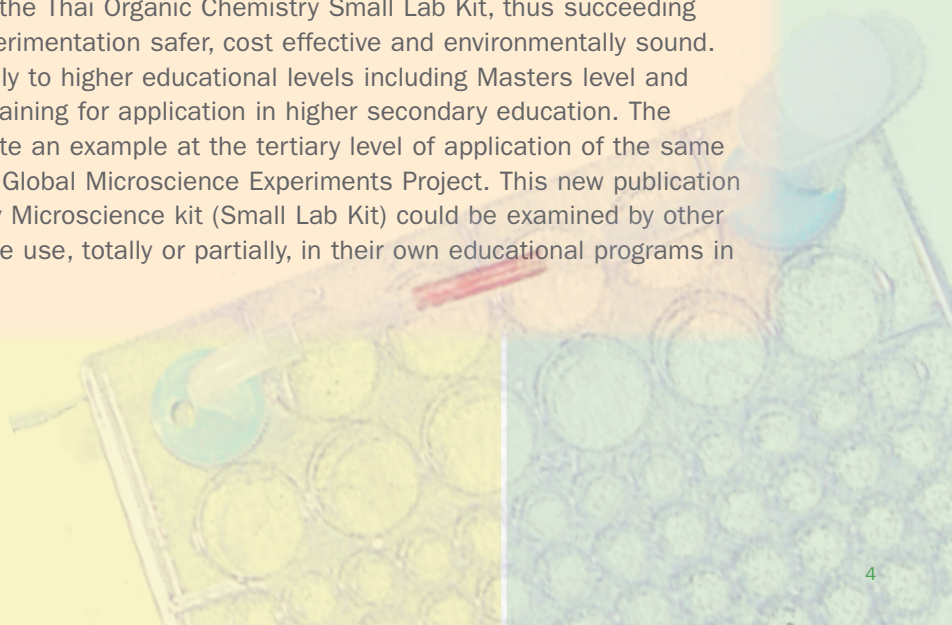
very easily adapted to any national curriculum by local specialists. Consequently, they can be considered as universal models for easy adaptation for any educational needs.

As an example, in Malaysia, parts of the educational materials are being adapted in order to fit the national needs. The adapted version of the UNESCO learning materials in microchemistry 'Microchemistry Experiments: Adaptation to Malaysian National Curricula' is available on UNESCO's webpage. This new material contributes to a new phase of the Global Microscience Experiments Project whereby such adaptations become important components of the teaching and learning materials available to all.

## UNESCO Educational materials in Organic Chemistry for Tertiary Level

(Department of Chemistry in the Faculty of Science of Chulalongkorn University of Thailand)

A new workbook containing instructions for practical experimentation in organic chemistry and using a Small Lab Kit has been developed by Chulalongkorn University, Thailand. The experimental parts of the workbook have been translated in English and are available for free use by anyone interested on the UNESCO website. The experimentation described in the workbook proposes the use of the Thai Organic Chemistry Small Lab Kit, thus succeeding in the challenge of making experimentation safer, cost effective and environmentally sound. The publication corresponds fully to higher educational levels including Masters level and can also be used for teacher training for application in higher secondary education. The experiments published constitute an example at the tertiary level of application of the same methodological concept as the Global Microscience Experiments Project. This new publication and the Thai Organic Chemistry Microscience kit (Small Lab Kit) could be examined by other interested countries for possible use, totally or partially, in their own educational programs in chemistry and biology.



### Centres for Microscience Experiments

In other parts of the world UNESCO Associated Centres for Microscience Experiments have been established with a view to developing the project nationally and to creating a network of Centres. As examples, such Centres exist in South Africa (RADMASTE Centre of Witwatersrand University), Cameroon (Centre established by the Ministry of Education), Norway (Centre established in the University of Bergen), Tatarstan Republic of Russian Federation (Centre in the Kazan State Technological University).

### Activities to promote Microscience Experiments

The strategy for this hands-on practical science education project is to introduce the microscience methodology to countries by means of a 2-day introductory workshop for policy makers, curriculum developers, teacher trainers and teachers. The final reports from these workshops have concluded that this innovative methodology of using inexpensive microscience kits for practical hands-on science meets well the needs of practical science teaching and learning in a cost-effective and environmentally sound manner. To date, training workshops in microscience have been organized in more than 80 countries (see the world map showing where introductory workshops have been organized).

The creation of a pilot phase of the project is then the next step in implementation in an interested country. While UNESCO-organised introductory workshops receive seed funds from the regular program, national implementation depends on extra-budgetary contributions of partners or donors worldwide who are interested in science education and in developing the project in specific regions.



## Microscience Kits

For the needs of the training activities, the UNESCO Division of Basic and Engineering Sciences purchases microscience kits that match the UNESCO educational teaching and learning materials. A variety of kits are produced by a South African company (Somerset Educational).

Some countries that have decided to develop a pilot phase of the Microscience Experiments project have examined the different types of kits available and have composed their own science kit from components available from Somerset Educational covering different disciplines to suit their national curriculum needs. Other countries have adapted locally available materials to develop science kits based on concepts similar to those of the Microscience Experiments methodology.

