

# Mini-laboratories for the Middle East

For a decade now, UNESCO has been introducing the methodology for microscience into the education systems of both developed and developing countries. One of UNESCO's key partners in this endeavour is the RADMASTE Centre at Witwatersrand University in South Africa. To date, training workshops in microscience have been organized in some 84 countries (see map overleaf).



Photo: Magdi Hadid  
Children in Ramallah  
on their way home from school

Over the past year, UNESCO has turned its attention to the Middle East. In collaboration with the Islamic Organization for Education, Science and Culture (ISESCO), it has introduced the microscience project into Jordan, Lebanon, the Palestinian Territories and Syria. As project coordinator at UNESCO, I took part in the first training workshops in Beirut and Ramallah, in November 2006 and February this year.

The microscience methodology gives primary and secondary school pupils and university students alike an opportunity to conduct practical scientific experiments in physics, chemistry and biology using kits that come with a text-book. These kits are veritable mini-laboratories. They are perfectly safe, insofar 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 material<sup>13</sup>. Each kit is compact, can be reused and is unbreakable because made of plastic. In addition, the small quantities of chemicals used make it environment-friendly. The microscience approach not only helps to develop scientific thinking among pupils and students but also provides developed and developing countries with new teaching tools.

## Step one: getting acquainted with the kits

The initiation to the microscience approach begins with a two-day training workshop in a given country. This workshop is attended by teachers from secondary schools



Teachers learning how to use the micro-scale material during the workshop in Beirut. As they tried the different experiments, they were delighted to discover that the results were comparable to those obtained in conventional laboratories



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and technical colleges, university teaching staff from the country and staff from the Ministry of Education.

For the two workshops in the Middle East, UNESCO's basic sciences team in Paris expedited the microscience kits, drafted and supplied practical instructions and text-books, and dispatched international experts to Beirut and Ramallah to explain the methodology to the participants and liaise with both Ministries of Education. For their part, the UNESCO offices in Beirut and Ramallah were in charge of organizing the workshops; this entailed choosing the venue, issuing invitations and liaising with the Ministries and local authorities. The participants were enthusiastic about the workshops and, in both cases, the teachers were of a high standard.

## A deceptive serenity on my arrival in Lebanon

When I arrived in Beirut in November 2006, just months after the signing of UN Resolution 1701<sup>14</sup> and the end of hostilities with Israel, life seemed to have returned to normal. There was no sign of the difficult situation in which the Lebanese had found themselves the previous summer. Beirut was reborn. The streets were filled with young people. Nonetheless, the Lebanese army maintained a strong presence in these same streets and the security measures in place belied the apparent serenity. People and vehicles wishing to enter the UNESCO office in Beirut were subjected to strict inspections. This could have been construed as normal procedure for administrative and international buildings but these inspections were repeated in the streets, hotel entrances, taxis and all other types of vehicle.

This said, the microscience workshop proceeded without a hitch. The participants were mainly teachers of various scientific disciplines from Beirut's lower and upper secondary schools, both public and private. They first discovered the theory behind the new approach during an introductory lecture. They were then able to test its practical application when they began using the micro-scale kits themselves for the first time to conduct various experiments.



The workshop is held in a hotel in Ramallah

It is true that the approach can be adapted to the education system of any country. It suffices for a country to include some of the experiments from the microscience kits in the curriculum and/or use the kits to create new experiments. What seduced the participants in the Beirut workshop were the kits' cost-effectiveness and safety, the fact that they were environment-friendly and the possibility of adapting the methodology to the Lebanese education system.

### From scepticism to enthusiasm

The teachers were somewhat sceptical to begin with. They found themselves confronted with material much smaller than in a conventional laboratory; nor were they used to manipulating such tiny quantities of chemicals. However, as they moved from one experiment to the next, they were delighted to discover that the results were comparable to those obtained in a conventional laboratory.

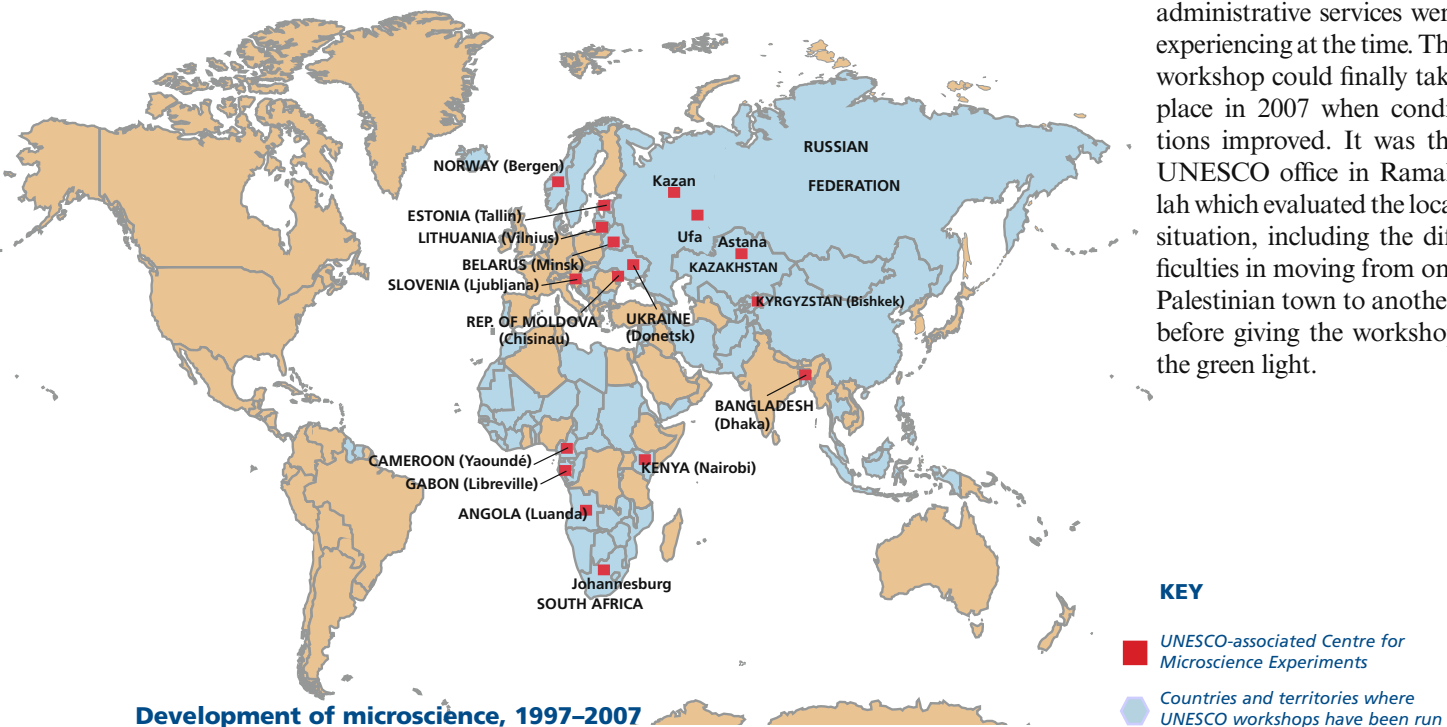
Although several schools in Beirut are equipped with conventional laboratories where pupils can conduct experiments as part of their classwork within the curriculum, the participants in the workshop felt the approach of experimenting on a micro-scale could be easily taken up and adapted in their schools.

The low cost of the kits also means that each pupil can conduct his or her own experiments rather than being a passive spectator. He or she can observe the reactions, analyse the results and draw conclusions from these: the basic tryptic of science.

As they prepared to leave the training workshop, the take-home kits under their arm, the participants all vowed to speak to their school principal about adopting the methodology in their own establishment.

### The workshop in the Territories can finally take place

A few months later, in February 2007, it was the turn of Ramallah to host a training workshop. This workshop had already been postponed once, a year earlier, owing to the difficulties the Palestinians and administrative services were experiencing at the time. The workshop could finally take place in 2007 when conditions improved. It was the UNESCO office in Ramallah which evaluated the local situation, including the difficulties in moving from one Palestinian town to another, before giving the workshop the green light.



Development of microscience, 1997-2007

#### KEY

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

## Self-service in microscience

Within its Global Project on Microscience Experiments, UNESCO makes teaching and learning packages available to teachers and students free of charge online. These packages may be easily downloaded and adapted to suit the needs of national curricula. The complete set of teaching and learning packages exists in English only for the time being but new language versions, including Arabic, Russian and Spanish, are under preparation and will be added to UNESCO's website once finalized.

The materials currently available online are:

### Primary level

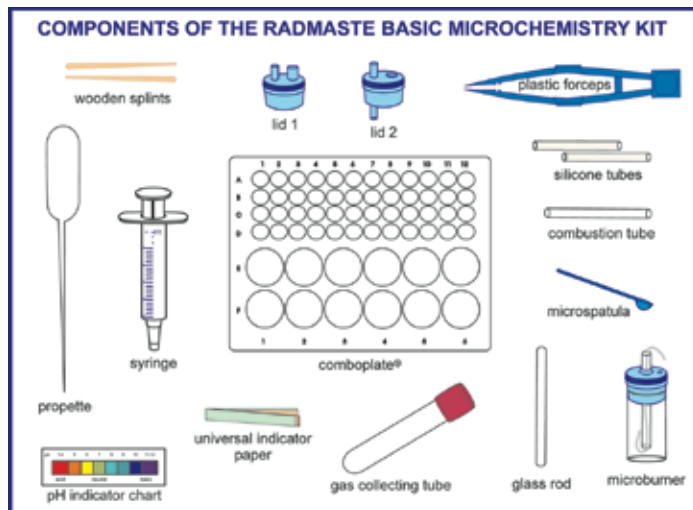
A variety of experiments covering, among other subjects: air, soil, water, acids, plants, living things, electricity, magnetism and heat.

### Secondary cum tertiary level

Chemistry; microelectricity; biology; microelectrochemistry experiments (a separate manual for learners and teachers); microscience environmental experiments, water quality and water treatment (a separate manual for learners and teachers).

The microscience kits needed to conduct the experiments in the educational packages listed above have been designed and prepared by the RADMASTE Centre at the University of Witwatersrand in Johannesburg. Funding is provided by UNESCO's Division of Basic Sciences and partners that include the International Union for Pure and Applied Chemistry, the International Organisation for Chemical Sciences in Development and the International Foundation for Science Education. Manufactured by Somerset Educational Ltd in South Africa, the kits are purchased by UNESCO for use in introductory workshops.

To download materials: [www.unesco.org/science/bes](http://www.unesco.org/science/bes); RADMASTE Centre: [beverly.bell@wits.ac.za](mailto:beverly.bell@wits.ac.za); [www.radmaste.org.za](http://www.radmaste.org.za); UNESCO co-ordination (in Paris): [j.hasler@unesco.org](mailto:j.hasler@unesco.org); [m.liouliou@unesco.org](mailto:m.liouliou@unesco.org)



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At the time of the training workshop, a curfew had been declared in the Naplouse region because of Israeli raids in search of Palestinian activists. On account of this, the workshop started earlier than planned on the second day to ensure that the participants could make it home before the curfew.

## The teachers enthuse about microscience

University professors from the different cities in the West Bank figured among the participants in the second two-day workshop, which took place in the presence of international experts. All the teachers were delighted to discover the methodology and to conduct practical experiments.

In the course of their training, the teachers came to realize that the microscience approach, and particularly the kits, could be of great use in Palestinian schools, most of which were not equipped with a laboratory. The teachers admitted that their schools were cruelly lacking in the basics, be it methodology or materials. They found the microscience approach user-friendly, safe and cost-effective. This vote of confidence did not escape the notice of the representative of the Ministry of Education who was also present.

## A workshop under curfew

The workshop was run from a hotel in Ramallah and proceeded smoothly. The experts had to drive to Ramallah from Jerusalem each day, accompanied by UNESCO staff from the Ramallah office, a 15-km journey which took 45 minutes. The numerous checkpoints we ran into every time we had to pass the wall of separation brought home to us just how impeded movement is in the Territories. Multiple identity checks punctuated each day.



A policeman directs traffic in central Ramallah

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At the end of the workshop, we met with the deans and professors of the Universities of Birzeit and Al Quds. They described the difficulties students and professors endured daily in moving from one part of the Palestinian territory to another or beyond. The Palestinian professors explained that, when one of them wished to travel abroad for an international meeting, he or she had first to obtain authorization from the Israeli authorities, no easy task.

To conclude, the project seems to have great potential for broader development in Palestinian universities. UNESCO has proposed creating a Centre for Microscience Experiments in the West Bank. This centre would serve as a pilot project for ensuring that the microscience approach spreads throughout the West Bank.

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An article will follow in *A World of Science* in 2008 on the role of the RADMASTE Centre in the Global Project in Microscience.

For a profile of an existing Centre for Microscience Experiments, read about the one in Cameroon, in the January 2003 issue of *A World of Science*: [www.unesco.org/en/world-of-science](http://www.unesco.org/en/world-of-science)

13. A microscience kits costs US\$15–20 on average

14. Resolution 1701 was adopted unanimously by all 15 members of the UN Security Council on 11 August 2006; it established the basis for a durable solution to the conflict that had begun a month earlier. The Resolution called upon the Hezbollah, the Lebanese Shia militia, to cease all attacks on Israel immediately and upon Israel to cease all its military attacks in Lebanon forthwith