Exploring Science Locally and Sharing Insights Globally

by Marianne Cutler

Young people everywhere are growing up in an increasingly global society. Issues such as diet and health, energy and climate change affect everyone everywhere. It is increasingly important that young people have an appreciation of the science behind these issues, from their own local perspective as well as a global one if they are to participate fully in this global society. The Science Across the World (SAW) program can help young people cultivate a global perspective on contemporary science issues by increasing their knowledge and allowing them to communicate with other young people across the world. This article explores aspects of the SAW program that both teachers and students find motivating and rewarding in developing a global dimension to their understanding of sciences issues.

It is well recognized that science and technological developments are essential for prosperous, sustainable global societies. Many governments clearly acknowledge the value of developing global science perspectives so that young people have an understanding of the world and their role within it. The United Nations Educational, Scientific and Cultural Organisation decade of education for sustainable development, which commenced in 2005, is an illustration of this recognition and commitment. However, it is sometimes difficult to translate government ideologies into outcomes for the everyday science classroom. Global science perspectives cannot and should not be seen as peripheral, but as natural extensions to the teaching and learning that takes place daily. It is perhaps easier to persuade teachers to take a step in this direction if they can clearly develop their students' key skills at the same time.

*SAW is an international education program developed and managed by the Association for Science Education (ASE) in the UK, in partnership with GlaxoSmithKline. A longer version of this article first appeared in *School Science Review*, Sep. 2004, 86(314), pp. 33-41. SSR is the flagship journal of ASE.

Format and Topics

Science Across the World topics and their Exchange Forms constitute the heart of the program. Box 1 (p. 9) outlines how it works. Each topic is primarily designed to cover a subject that is interesting and relevant to young people whatever their cultures and wherever they are living in the world. Of course, any topic must also relate to the science curriculum in a broad range of countries; it cannot be too specific, but concentrates instead on the broader issues, such as diet, health, and genetics that all young people will be covering to some degree in their science lessons.

Most important, the topics must give scope for exploring science issues that might differ from one region or culture to another, or from one country to another. So, SAW goes beyond finding facts: It explicitly explores science in its social context and that makes for interesting exchanges of information, ideas, and opinions among students from different countries. Topics involving exchanging views on the use of energy and methods for conserving it in different parts of the world, or comparing findings on sources of acid rain and how this problem is dealt with in different countries and regions, are motivating and provide a context for understanding physical laws of energy conservation or the periodic table. The topics are structured flexibly to suit adaptation for a wide range of curricula, ages, and abilities, stretching the more able and encouraging those with difficulties in attainment or lacking in motivation.

Ensuring that all these criteria are met is not easy. It can take many months to develop a new topic, pilot it in a broad range of schools around the world, and finalize it in the light of the pilot feedback. An enthu-

South African students working on the What Do You Eat? topic in a Durban, South Africa, fruit and vegetable market.

siastic and dedicated team of educators from around the world facilitates the development process.

Key Skills and Thinking Skills

In many countries the emphasis of the science curriculum is moving towards teaching knowledge and understanding of how science works through developing key skills and thinking skills. These skills, including communication, working with others, reasoning, inquiry, creative thinking, and evaluation are natural components of classroom teaching and learning when working on SAW topics. They also link to a global trend of developing and assessing "scientific literacy."

Students generally work through the students' pages of their topic in small groups. This can be done as part of classroom work or as an extra-curricular activity. Through a broad variety of activities students gather the ideas and information they need to share with other schools through the Exchange Form.

Topic activities involve some active research into questions such as "Are there any renewable energy resources in your country which people use but which do not get counted in the official statistics?" and "How is renewable energy used on a small scale in your neighborhood?" Both of these involve surveys of energy use and sources in homes, farms, and small businesses, etc. In the Biodiversity topic, students interview older people in the local community to explore changes in land use and natural habitats during their lifetimes. In the Genetics topic, students investigate genetically modified (GM) crops and foods by researching regulations on their use and how the media reports GM issues in their country. Younger pupils, working on the Eating and Drinking topic, survey the food they eat during a typical school day, investigate the role of labeling from foods in their kitchen cupboards, and analyze different advertisements for food.

For many students, conducting their own research is not a regular part of their science lessons but they often find it challenging and rewarding. Topic activities can involve "traditional" practical work, but it is always designed to require minimal specialist equipment so that schools in a wide range of situations can take part. For instance, in the Chemistry in Our Lives topic, students prepare their own chemical product and share their methods with others. For many of the students involved, opportunities for practical work are scarce and they enjoy sharing their recipes for prod-

How Does SAW Work?

1 **Join Science Across the World through <www.scienceacross.org>**
Lifetime membership for schools enables the students to communicate with other schools worldwide on a variety of science topics.

2 **Go to "MyZone"**
Schools use their email address and password to enter MyZone, a personalized area that enables them to:
- set up exchanges with schools across the world
- send Exchange Forms via the website in different formats
- keep up to date with our latest news and features
- access and edit their school membership information.

3 **Choose and sign up for your topic**
The school chooses a topic from the list on the website. Each topic includes teachers' notes, student pages and an Exchange Form.

4 **Study the topic**
Students work through the student pages, gathering ideas and information they need to share with other schools. This can be part of classroom work or an extra-curricular activity. Research takes approximately 3–6 hours, which may include a homework assignment.

5 **Complete the Exchange Form**
Students complete a single version of the Exchange Form that can be downloaded as a Word document, to share with other schools. Students need to compare notes and agree on the entries they make on the form.

6 **Select schools to exchange with**
Schools select schools from the online database that are working on the same topic, at the same time, and with similar-aged students. Students may communicate in one or more languages.

7 **Carry out the exchange**
Schools send their Exchange Form to their selected schools and to schools wanting to exchange with them.

8 **Discuss and report findings**
Once a number of Exchange Forms have been received students explore the different responses to the topic issues around the world and display and report their findings. The student pages for each topic suggest discussion points.

ucts, such as bright pink nail polish made from gumamela flowers in the Philippines and laundry soap from vegetable oil and banana stalks in Singapore.

After the background research, activities always involve discussion and debate. For example, in the Renewable Energy topic students discuss and debate the questions:

- What are the arguments for giving people a choice about "green electricity"?
- Is this an issue in your country?
- Would you be prepared to pay more for it?

In the Climate Change topic their arguments are steered by the following questions:

- What actions have already been taken by the government in your country to tackle global warming?
- What actions would you be prepared to take as individuals?

Teachers tell us that such contemporary issues are generally of interest to young people; some feel quite passionate about them and welcome the opportunity to develop and air their views in a well-managed atmosphere. In fact, it has been shown that discussions provide students with the opportunity to learn from someone other than their teacher and, healthily, to disagree with teachers and develop their own ideas.

Topic activities give plenty of opportunities for creativity and positive action. For example, in the Biodiversity topic, students design their own local Biodiversity Action Plan, which identifies a local problem and its consequences, their objectives in addressing the problem, their proposed actions, and the likely impact or effect of their actions. In the Domestic Waste topic, students plan and carry out actions to combat waste in their homes and school. Such decisions and consequent actions give a clear indication of active citizenship and are to be encouraged.

Science, Literacy, and Languages

The Science Across the World website and topics are in seven languages: Dutch, English, French, German, Italian, Portuguese, and Spanish. Many of the topics are also in additional languages such as Bulgarian, Catalan, Chinese, Farsi, Japanese, and Russian—with all translations provided by our team of enthusiastic teachers around the world who understand the language and literacy levels required for their students.

These resources make an ideal basis for Content and Language Integrated Learning and are used increasingly as curricular content by science teachers working in a bilingual context, and foreign language teachers perhaps working with colleagues in their science department.

The Exchange Form

Having completed the main activities, student groups then compare notes and agree on the entries they want to make on the Exchange Form. Small groups often make presentations to the whole class before the class comes to a consensus on the information and ideas that best represent the views of the class. This requires deliberation and constructive debate, which, when well managed, many students enjoy. The Exchange Form is a distinctive approach to encouraging international communications among students. Using a common Exchange Form for the whole class ensures that everyone focuses on the same issues for their activities and reporting. Communications between schools are constructive and related to the topic issues.

Having completed their Exchange Form, students then have the enjoyable task of selecting up to 20 schools to exchange with, usually through the SAW website. These will be schools where similar-aged students are working on the same topic at the same time, with the same language(s). Exchange Forms are sent to these selected schools and to those wanting an exchange with their own school. With sometimes hundreds of schools to select from and over 4000 teachers from over 120 countries currently participating in the program, the SAW online database of schools is an invaluable resource for teachers and students looking to develop constructive links beyond their country and culture.

ICT and Beyond

Although many schools still transfer their Exchange Forms by mail or fax, the vast majority now use our website. This creates a real purpose in using the Internet to communicate with schools in different countries. It also presents numerous opportunities for developing skills in information and communication technology (ICT). These include research using topic data and hotlinks, creating and using spreadsheets and graphs, setting up exchanges with schools across the world, completing and sending Exchange Forms

through the website in many different formats, and creating school websites related to the Exchange Form. All of this is supported by new personalized functionality under MyZone, MySchool, and MyExchanges for teachers, with restricted personalized functionality for students.

Amanda Ruiz Wilches, Chief of the Education Research Department, Education Secretariat Colombia, Latin America, commented that "The innovative methodology, and especially the possibility of sharing our culture with the rest of the world via the Internet, are aspects that make Science Across the World an excellent tool."

Developing Global Perspectives

For many participants, the most exciting part, and the main point of the exercise, comes next—receipt of Exchange Forms from across the world. These are then analyzed for similarities and differences, and patterns in response to the topic issues. Each topic suggests discussion points to help students develop global perspectives and better understand the issues in their own locality. For instance, younger pupils may compare their eating habits with others or discuss the science behind folklore and sayings from different parts of the world. Older students might explore the effect of the Convention on Biological Diversity at local and national levels in different countries. They may incorporate good ideas from different Biodiversity Action Plans into their own and perhaps explain whether or not the targets set by governments for using renewable energy are achievable or high enough. Such discussions may form a sound basis for interpreting these issues as they arise in the media.

Exchanges and Collaborations

Feedback from teachers and students indicates that SAW can be a motivating and valuable experience. Many students personalize their topic work by sending colorful artifacts along with their Exchange Forms. Others use the topics as the basis for extensive projects and developing longer-term relationships between small groups of schools around the world, some with support from European Union Comenius funding for teacher travel and training. Others may benefit from attending SAW teacher workshops, which are based around the Genetics topic. Students might enter our regular online competitions, vote on different issues online, or perhaps get involved in our new **Young Ambassadors for Chemistry** (see box below) scheme in partnership with IUPAC. With some planning and commitment to communication with other schools, Science Across the World can be a rewarding experience for all.

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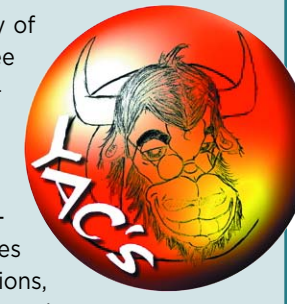
www.scienceacross.org

Young Ambassadors for Chemistry



The YAC project—a joint activity of SAW and the IUPAC Committee on Chemistry Education (CCE)—aims to train teachers and provide resources to develop the communication skills of young people and teach them to be young ambassadors for chemistry. Project activities have focused on two SAW publications, *Chemistry in our Lives* and *Talking about Genetics*, and involve the following steps:

- translation of the materials into the languages to be used in the specific regions (e.g., Mandarin, Russian)
- local workshop for training teachers, followed by local workshops in which trained teachers train more teachers and Young Ambassadors for Chemistry
- local public awareness events run by Young Ambassadors for Chemistry
- presentations by the Young Ambassadors for Chemistry of their work and research to their peers

In recent months, YAC herds have stopped in Argentina, Russia, and Taiwan.

For more information, contact the head of the YAC herd, Lida Schoen <amschoen@xs4all.nl>. For reports on previous YAC adventures, see the link below.

www.iupac.org/projects/2003/2003-055-1-050.html