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Science Across the World in Teacher Training

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ABSTRACT Science Across the World is an exchange programme between schools world wide. It has two main components: existing resources for students (age 10-16) and a database with all participating schools. The programme exists since 1990. It is carried out in partnership with the British Association of Science Education (ASE) and international pharmaceutical industry GlaxoSmithKline and is growing rapidly. This paper deals with the Science Across the World programme in Teacher Training in three countries: the Netherlands, Ireland and Germany. It shows how international collaboration can be fostered by participation in the programme.

Amsterdam Teacher Training College in the Netherlands offers Science Across the World as an elective course to Dutch and European Erasmus students, who work in international interdisciplinary groups. They study the Science Across the World website and choose a topic to study in more detail. Later they write an implementation plan for their teaching practice school. At University College Cork in Ireland Science Across the World is part of a (Higher Diploma in Education) course on Science teaching methodology. Participating students implement the programme in their teaching practice schools. An elaborate research was carried out to investigate the success of this implementation. Teachers are enthusiastic about possibilities the programme offers and suggest an in-service training course on the programme and methodology. The government of the State of Hessen, Germany has just started a new concept in Biology methodology. The government decided to base Teacher Training in Biology on 'Competencies and Standards'.

With increasing globalisation in the next decades the largest, easy to use, global exchange programme Science Across the World can help to achieve aims of modern education in all countries. Teacher Training can help with training student teachers in international collaboration on school level. The triangle Teacher Training– Science Across the World – Research should be pronoted.

Key-words: *Global education, science across the world, teacher training.*

Introduction

Science Across the World is an exchange programme between schools throughout the world and has two main components: A variety of resources in various scientific topics for students (age 10-16) and a large database of all participating schools. The Science Across the World programme started in 1990 as Science Across Europe, supported by the Association for Science Education (United Kingdom) and facilitated by British Petroleum (until 2000). Since 2001, the programme is carried out in partnership with GlaxoSmithKline. At present, there are approximately 4,400 registered teachers in 126 countries. Science Across the World

is essentially a global internet-based exchange programme for students. It provides a forum for students to exchange facts and opinions with young people in other countries through a unique series of compact resource topics on science, environmental issues and social science in up to eighteen languages.

Simplicity of communication is the key to the success of this award-winning programme. Each topic has clearly defined aims and includes clearly laid out student and teacher pages included in the form of a teaching package. The students work by collecting information and data of various varieties and forming opinions about the different topics and exchange their findings with other schools worldwide, through a common Exchange Form available on the website.

Most topics offer extensive help for language teachers and for science teachers to use English as a working language. Students are asked to bring into class various information, data and opinions about the topic under study, based on their own personal experience and research in their own town, neighbourhood and families. Information is collated and summarised on the Exchange Form. This form is then sent to the schools, which have been selected from the database of registered schools. The communication may be performed in the mother tongue or foreign language. Follow up sessions take place after Exchange Forms from other countries have arrived. Discussions usually reveal many cultural differences.

Examples of topics include:

1. Acid rain.
2. Biodiversity around us.
3. Chemistry in our Lives.
4. Climate Change
5. Domestic Waste
6. Drinking water
7. Eating and Drinking (for primary students)
8. Global Warming
9. Keeping Healthy (picture from topic)
10. Plants and me (for primary students)
11. Renewable Energy
12. Talking about Genetics
13. What did you eat?

All Science Across the World topics can be used in cross-curricular education. This has obvious applications for language learning. The language teacher can use authentic texts, authentic messages between students in a foreign language, and can be helpful with translating data on the Exchange Form.

Science Across the World in the Netherlands

Amsterdam Teacher Training College in the Netherlands offers Science Across the World as an elective course to Dutch and European Erasmus students. These students work in international interdisciplinary groups with the support of an electronic learning environment. They undertake an introductory study of the Science Across the World programme using the website and then choose a particular topic,

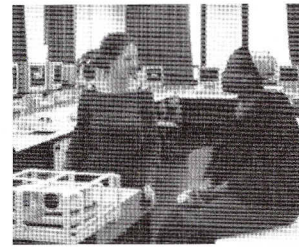
which they study in more detail. The entire course and the work of the students are presented in English. In the second part of the project, the students write an implementation plan for their teaching practice school.

Apart from the weekly meetings with the whole group, an electronic learning environment is used, and this provides opportunities for a mutual agenda, chatting, e-mailing, organising a group archive and collaborating on a document.

A report of the course with the 2003 / 2004 cohort of students may be found on the Science Across the World website. This group consisted of Erasmus students from Belgium and Spain, a native student from the Dutch Antilles (Curaçao) and students of Biology, Chemistry, Information Technology and English (full time and part time). Two of the Erasmus students were future primary teachers, so a wide variety of subjects was covered.

A group of students choose a topic, carry out all activities (from either the student pages in English, or from the translation in Spanish or Dutch), and fill in the Exchange Form.

For example, Ellen (Gent, Belgium) collaborated with Jaskara from Curaçao (Dutch Antilles) and compared the diets of people in both countries.



Ellen (Belgium) and Jaskara (Dutch Antilles) discuss their presentation

This phase of the course concludes with a (PowerPoint or web) presentation about products and the process with the students of other groups as a critical audience.

During the second part of the course, the students write an implementation plan for their own school with the following strategies included:

- how to convince the school management to take part in the programme (subjects, costs, history);
- collaboration with colleague(s);
- benefits for the school, teachers, students;
- what to do with the results, apart from discussing the Exchange Forms from other countries (exhibition, open/parents days, regional media coverage);

Following approval from the management, a concrete scenario for the lessons submitted. This covers areas like:

- substitution or enrichment of parts of the curriculum;
- class management;
- evaluation (related to aims).

Lida Schoen helps Julie (Belgium) with the projector

Julie's reflections on the course (Brugge, Belgium: primary education): *At the start we got a lot of information. I had to get used to this way of teaching. The teacher students in the Netherlands get more independent tasks and less classroom teaching than Belgian students. In Belgium, the teacher explains everything in 30 teaching periods a week. I felt very*

insecure and 'stupid'. This was a real concern, but in the end, I got answers on all my questions!

I learned to produce a PowerPoint presentation and other computer skills, e.g. to collaborate on one Word document. I could even introduce illustrations and links to Internet sites, related to 'Eating and Drinking' for Belgian primary schools, in our final presentation. I was so proud.... During the presentations, we learned about the other topics studied by the students. Afterwards we had to ask questions about the content and had to offer ways that the project could be improved and suggest ways that the presentation could be improved. The good thing about Science Across the World are the ready-made materials for both the students and the teachers. The students carry out their own investigations and exchange information with other students in countries all over the world. A wonderful idea!

Additional Departments Taking Part: Cross-Curricular

In the 2005 course, students from the math and history departments joined the project. The history students wrote additional exchange materials for the 'What did you eat?' topic: The history of food since the Middle Ages until now. Teachers and students exchanging on this topic can decide together to use this extra subject, e.g., to learn how to consult historical sources. For math, we explored possibilities to handle data received from exchange forms from other schools statistically, so the math teacher can join the cross- curricular Science Across the World team in the end phase of a project. We also explored possibilities to use the Science Across the World programme for subjects related to citizenship, which is an issue in many countries. Too many subjects to study them in depth, we just made a start and will go on!

An extra during this course, there were exchanges on teacher training level between the Dutch teacher students and students from the University of Teheran (Iran) and University College Cork (Ireland). Especially the exchange form from Iran about Renewable Energy leads to many discussions and new questions for the students in Teheran.

Science Across the World in Ireland

University College Cork

At University College Cork in Ireland Science Across the World is embedded as part of the one-year course, Postgraduate Diploma in Education, on Science teaching methodology for student science teachers. The student teachers implement the programme in their teaching practice schools. Dr Declan Kennedy (Irish coordinator of Science Across the World) offers an introductory lecture/workshop on Science Across the World to all the student teachers taking the course. This session covers areas like the origins, aims, procedures, student/teacher materials, website, and his own experiences of working with the programme.

Each student teacher is supplied with the Science Across the World information leaflet showing 'Eight simple steps to success.' All students choose one topic and carry out a project with one of their class groups. Each week some time is spent

discussing the progress of the project, i.e., partners found, topics chosen or any problems encountered by the student teachers. At the end of the year, all student teachers present a written report of about 10 pages showing their experience of participation in Science Across the World.

Student teachers attending a Science Across the World workshop on 'Chemistry in our Lives' in University College Cork.

Research

Fíona Crowley, a local science teacher, carried out a detailed research project to investigate the effectiveness of the inclusion of Science Across the World in the Higher Diploma in Education course. Fíona was interested in finding out how successfully the Science Across the World programme was being integrated into the Irish Science Curriculum by the Higher Diploma in Education students. Fíona, having received the brochure on the programme, was immediately taken by the phrase: *Science Across the World aims to stimulate interest and confidence in science among young people and promote awareness and discussion of the scientific issues that affect people's lives around the world.*

In the Irish education system, one of the aims of the Junior Cycle Science Curriculum is that students develop an appreciation of the role of science in the everyday world and a scientific interest in the local community and environment.

It was found that the student teachers were enthusiastic about what the SAW programme offers and they suggest further in-service training courses for full-time practising science teachers on the programme itself and on the methodology of integrating the programme in one's own teaching.

The results of this survey also found that the student teachers were very positive in their praise of the programme and stated many benefits to their teaching and to their pupils. In her report, Fíona lists benefits and pitfalls of the programme. Student teachers working with Science Across the World, quoted that:

- *It helped teamwork, it was a new educational tool and a great way to teach science.*
- *Even the very weak pupils returned with a great deal of information and made them feel as involved and important as the other pupils.*
- *It gave pupils a chance to benefit from some social implications and enhance their knowledge of the wider world.*
- *It helped bring home to students how important science is in their lives.*

Fíona concluded that Science Across the World is a new and exciting dimension that can be used as an extra activity in Irish science classrooms. The findings of Fiona's study contained minimum criticism of the SAW programme and many positive aspects to the project. As Science Across the World was 'new' to the sample of teachers, it is evident that the teachers need time to sort the programme out for themselves. It is also evident from the analysis of data that teachers need some form of training in the programme before they present it to their classes. For the exchange process to work effectively, it is recommended that at least twenty exchange partners be selected, so that the level of responses can be high.

Science Across the World in Germany

Although many schools in the 16 States of Germany are involved in the Science Across the World programme, at present Science Across the World is not part of the formal teacher training in Biology, Physics, or Chemistry in the State of Hessen. All states in Germany design their own curricula, Hessen just started a new initiative. As a response to the PISA surveys and the Bologna process, the government decided to organise Teacher Training in Biology in modules over two years, based on 'Competencies and Standards': 'Lessons based on research strategies,' Introducing students to self-determined learning,' 'Cross-curricular projects,' and 'Teaching as a profession with life-long learning'. Science Across the World fits in very well in these modules. The topics can serve as a guideline for health and environmental education.

Mrs. Gerti Schneider from Friedrichsgymnasium and Egbert Weisheit discussing the projects outcome.

German teachers have to pass two-year training at a 'Studienseminar,' the institution for teacher training after a university degree. Student teachers follow courses in two subjects and didactics at university. At the same time, they are trained in a school. 'Studienseminar für Gymnasien' in Kassel (Hessen) offers an optional course 'the European Dimension of Teaching.' The Science Across the World site provides helpful resources for students and didactical facilities for teachers. Science Across the World can offer resources for cross-curricular teaching and learning. The results of the activities in the topics on the exchange forms provide an insight in the relevance of science topics in foreign countries. Our students read authentic data from students within the EU and worldwide, so the cultural context of science can be the subject of a lesson. Exchanging information and opinions will usually happen in another language than the mother tongue. Therefore, these exchange forms can also provide authentic texts for language teaching and learning. This can initiate cross-curricular teaching and learning in a school.

Content and **L**anguage **I**ntegrated **L**earning (CLIL) is getting more and more popular in many countries, including Germany. Language teachers find specific material to enhance their skills to deal with the Science Across the World resources. Many topics offer language teachers' notes (apart from the Science teachers' notes), the site also offers general help for language teachers 'Language for thinking' and 'Ten ways to link languages and science,' written by specialists in the field. Science Across the World can be a great help for student teachers to deal with CLIL that includes more than teaching Science in e.g. English!

State of Thüringen: Centent and Language Integrated Learning

Recently, Hessen's neighbour Thüringen introduced a project on 'Content and Language Integrated Learning in schools. Ideas from three Science Across the World team members were published in the report (Thillm). Hopefully German Teacher Training can make use of the successful Science Across the World programme to an even greater extent.

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Biographies

Dr Lida Schoen graduated from Amsterdam University. After teaching science at teacher training level for 20 years, she is now an educational consultant and freelance teacher trainer. She is a member of IUPAC's Committee on Chemistry Education and chairs the Young Ambassadors for Chemistry (YAC) project. She is a member of the Science Across the World team.

Egbert Weisheit, Dipl. Biol., is Senior teacher trainer (Studiendirektor) at Studienseminar Gymnasien, Kassel, Germany. He also teaches seven lessons a week Biology and Chemistry at Friedrichsgymnasium, Kassel, Germany. He is a member of the Science Across the World team.

Dr Declan Kennedy graduated with a BSc, HDipEd and and MSc from University College Cork (UCC) and MEd and PhD from York University. He taught science at secondary school level for 23 years. He is member of the Science Across the World team.