

## **The School Around the World project: an attempt to enhance the quality of science teaching**

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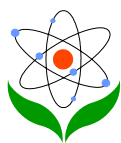
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### **Abstract**

Participating in Schools Around the World Project (SAW) provides local participating primary and secondary teachers a good opportunity to look into their current teaching practices. Science has been taken as the first investigation subject, which is an area that demands more attention in Hong Kong. Joining the SAW project, it may improve and enhance the quality of Hong Kong science education by promoting and encouraging professional development of the participating teachers through local and international sharing and discussion on the collected samples of student work in science with the aid of technology advancement. This paper focuses on how student work and technology can act as a means to achieve this aim.

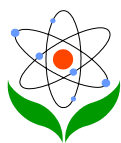


## The Schools Around the World Project (SAW)

Schools Around the World: An International Study of Student Academic Work (SAW) is a five-year multi-national project, which is co-ordinated in the United States by an education research foundation, the Council of Basic Education (CBE) (<http://www.c-b-e.org/>). Other than Hong Kong and the United States, there are 7 other countries involving in this project, including Australia, the Czech Republic, France, Germany, Japan, Portugal, and the United Kingdom. The SAW model invites teachers across national boundaries to teach one another how to create learning environments and challenging teaching relationships that help students to attain high levels of achievement. (<http://www.edc.org/CCT/saw2000/>)

Instead of using curricular documents, textbooks or an one-off tests to find out standards of student achievement, SAW defines standard by engaging teachers in professional discussion about the nature of excellence and the methods of teaching. The excellence at issue is excellent students' work. The SAW project is starting with investigations about science and biology learning, where Mathematics will be taken as the second discipline to be studied. In studying science learning in Hong Kong, the work in science of students aged around 8, 13 and 16 (which means work of some topics in General Studies for P4/P5, Integrated Science for S2 and Biology for S4/S5 students) are to be collected and analysed by teachers. Samples of student work at three different achievement levels: above, at and below standards are to be examined. With the samples of student work, teachers in each country/region discuss among themselves. Some of the selected student works are translated and made available via the SAW web site and the CD-ROMs for all the participating teachers to share, analyze, and evaluate by their international discussions. With the selected samples, teachers from different countries/regions have a solid basis of comparison for better understanding about what can be expected from students and at what levels of achievement they should hold upon their students. It is also envisaged that teachers participating in this project can share their experience in teaching with other teachers in the other parts of the world and achieve professional development.

Through the exchange and discussions, an international professional network of teachers will be built up. Teachers can work together to develop not only the local set of standards but also world-class expectations for students. The teachers' network may also sustain an on-going dialogue about whether the work represents high student achievement and what it takes to support students in pursuit of that achievement.

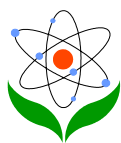


## **The Schools Around the World Project and Hong Kong**

### **Science Education**

The SAW project relates to science education in Hong Kong in three ways. Firstly, the collection of student work may illustrate the variety of assessment and classroom practices among those participating countries/regions. This collection may become references for local science teachers as they are considering shifts in their current practice. Shifts in teachers' practice are likely to occur as the recent reform proposal in education in Hong Kong (Education Commission, 2000) has called for an abolishment of public examinations and emphasized the importance of life-long learning. While teachers and students are long adapted to the examination-oriented approach of teaching and learning methods, this change in the aim of education would mean a revolution in these methods. The long established tradition of preparing students for different levels of examinations have to be replaced by alternative methods of teaching and hence assessment. The focus of assessment is shifted and so is the purpose. The reform proposal and the proposed changes are in line with recent developments in education assessment. Black (1998a) reviewed the evidences that support the effectiveness of formative assessment. Based on at least 20 studies, he concluded that formative assessment helps the "Low attainers" in improving their learning whilst also raising the overall level of achievement. He also found a number of common characteristics among the research reports. These include: the involvement of new modes of pedagogy that calls for significant changes in classroom practices; the active involvement of pupils in the assessment process; the results of the assessment practices have to be used in adjustment of teaching and learning strategies; formative assessment can affect the motivation and self-esteem of pupils with obvious benefits in engaging pupils in self-assessment. The battery of student work generated by the SAW project may provide local science teachers with workable examples of science assessment practices from different countries/regions which may be very different from their current practices.

Secondly, the SAW project provides professional development opportunities for local science teachers. While there is a change in the education policy, the implementation of the policy has to be supported by teacher development opportunities. The direction of teacher development includes changes in more fundamental beliefs about learning among the teachers (Black, 1998a, 1998b). The assumption, that students will automatically learn and fully understand the concepts once they are taught by their teachers, has to be changed. It is because learning does not always happen by hearing but by active involvement and construction of concepts. The teachers participating in SAW may have an opportunity to re-examine their own beliefs and consider the beliefs of other local or international participating teachers through the analysis of the student work. A more detailed discussion about how teacher professional

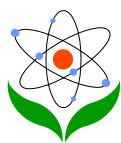


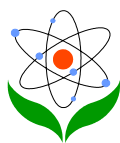
development can be enhanced by participating in the project will be included in a later section of this paper.

Thirdly, the SAW project may raise the awareness of local educators about the importance of science education. In an international comparison on students' achievement in Science and Mathematics, the Third International Mathematics and Science Study (TIMSS) has shown that science achievement was much lower than mathematics achievement among the primary students in Hong Kong. For mathematics, 18% of the students from Hong Kong score among the top 10% of the fourth graders (primary 4-5) among the 26 TIMSS countries. For Science, only 4% of the students score among the top 10% (Law, 1997). The contrast in student achievements in Hong Kong points to a potentially disturbing situation. Science seems to be a neglected area in the primary education arena and that primary teachers may seldom identify themselves as science teachers. With the SAW project, the importance of science as an area of learning is emphasized at both primary and secondary levels. By participating in the project, teachers may be more aware of student work, achievement and assessment in science. With the project and teacher participation, discussions about science teaching, assessment, and education are facilitated and promoted in the education arena.

## **Inducting teachers to the project**

Teachers are first introduced to the project through a teacher development workshop. The workshop includes areas and alternative forms of assessment in science, setting criteria and expectations for student work, and introduction about the protocol for the analysis and collection of student work in the project.



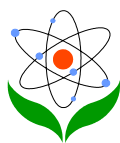


Apart from a face-to-face workshop, the teachers may also participate in an on-line course over a period of 5 weeks. The course is structured to introduce teachers to the workshop through the reading of papers about science assessment, the analysis of student work samples, and the exchange of ideas in the discussion forum with other participants and the facilitators. At present, the on-line course has just completed its pilot run in the United States and is expected to be introduced to teachers in other partner countries/regions.

(<http://www.edc.org/CCT/saw2000/course.htm>)

## **Students' works as a basis for teachers' professional discussion**

The teachers participating in the project may choose one of the science topics that they teach in the current academic year and collect students' work. They are actively involved in providing comments about the collected work and exchanging ideas with other teachers choosing the same topic about standards of achievement. Seminars for local teachers are to be organised initially to facilitate the exchange of ideas. Student work, comments as well as expectations of teachers and associate teachers are digitized and mounted on the web. The innovative approach of utilizing web-based technology in the project enables teachers in different geographical locations to have direct access to one another's work at any point of time. For teachers who have limited or without access to the Internet, they can still view the student work and other related information by using the CD ROMs produced by the project team. The CD ROMs basically contain all the information on the web at a given point of time. The student work samples, which are exclusively for participating teachers, may provide a basis for teachers around the world to share their teaching ideas, thoughts about assessment, expectations on student performance, and even feelings about science teaching.



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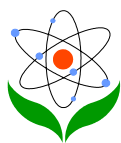
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Visible light and ultraviolet rays pass through them. Furthermore, they will absorb part of the infrared rays reflected by the earth, leading to a slight increase of the temperature. This phenomenon is called "greenhouse effect". Scientists believe that there is about 34% increase of greenhouse

## Enhancing teachers' professional development

While the SAW project is considered to be an attempt to improve the quality of science education in Hong Kong, this aim is expected to be achieved by enhancing local teachers' professional competence. Firstly, the workshops and the online course conducted at the beginning of the project serve to raise the awareness of the teachers in science teaching. The workshops also help the teachers to realize that student work does not only mean homework but also include a range of different types of works for the students in their teaching in general. Teachers may also further develop their competence on how to set objectives and expectations from students. Teachers may realize how their students have performed through an analysis of their work, and hence reflect on their own teaching.

Secondly, the teachers have an opportunity to share samples of their student work, their expectations and comments with teachers from other local schools. This opportunity is rare for most local teachers to develop a collaborative relationship among themselves. This opens up a new possibility for the setting up of support groups of teachers where they may exchange ideas and resources in teaching specific subjects.



Through the local and international sharing of experiences, it is envisaged that the project may encourage teachers to attempt using alternative forms of student work in assessing student science learning and engage in professional discussion with other participating teachers in the project.

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