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THE BENJAMIN FRANKLIN INTERNATIONAL SCIENCE TEACHERS' PROGRAMME

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The Benjamin Franklin International Science Teachers' Programme was inaugurated in November 1996 by the Graduate School of Education (GSE), University of Pennsylvania, in the United States of America. The primary goal of the Programme is to improve the quality of Science Education in the urban communities around the world. The programme aims to achieve this goal by familiarizing participants with the latest developments in the methodology and technology of Science Education. Participants attend courses taught by the GSE faculty, visit schools to observe classrooms, and participate in educational field trips to sites such as the Smithsonian Air and Space Museum in Washington D.C., the Kennedy Space Centre in Florida, the American Museum of Natural History in New York and the Franklin Institute in Philadelphia.

In the initial years of the Programme only educators from Singapore were invited to participate but in the November/December 1999 Programme, the nine participating teachers from Singapore were joined by sixteen teachers from Shanghai, China. The highlights of the 1999 Programme were a two-week teaching stint at the University City High School, West Philadelphia, where participants were given opportunities to teach Chemistry to small groups of low-achieving African American students and a visit to the Bronx High School of Science, a top school in New York known for producing Nobel Prize winners. This article documents the experiences the Singapore participants had in encountering the different ends of the spectrum in American Science Education.

TEACHING CHROMATOGRAPHY TO AFRICAN AMERICAN HIGH SCHOOL STUDENTS

The lesson taught was on Chromatography. The Grade 8 class consisted of entirely African American Students of age range between 15 and 17 years. Almost all came from lower income families and were weak academically. Attention span was short and motivational level low. Their Science Teacher was a young male Caucasian American with a clear and loud voice. The students were put into groups of 5 or 6 with at least two participating teachers from Singapore and Shanghai. The topic was taught in three parts over the two week teaching stint. Students were introduced the concept of Chromatography through four activity-based sessions. The next part was for the students to discover the application of chromatography using the concept of the Retardation Factor. In the final part, the students had to put up a presentation for their classmates and teachers on what they had learnt about chromatography. The first and second parts of the topic were taught by the Singapore and Shanghai teachers with only laboratory support from the school staff. These parts covered the first week and half of the last week of the Programme.* The final part was facilitated by the school's Science teachers on the last few days of the Programme.

In the introductory phase, the students were given samples of colouring-coated candies from twobrands (M & M and Skittles). Also provided were different types of solvent (namely water, alcohol, acetone and acetic acid). They were then asked to plan a procedure to find out which solvent would best dissolve the colourings from the sweets. This task was set by their Science teacher. Teachers from Singapore and Shanghai were to facilitate the students' exploration through planning and designing investigative procedures. After the students had done the experiments, they recorded their observation and data. These information were filed in their folios and collected by

* **Note:** In between the two-week teaching stint, participants went on a study trip to schools and other science-related institutions in Washington D.C., Florida and New York.

their Science teacher for grading. The students were generally noisy and inattentive. With only 45 minutes allocated to each session, it took two sessions for the students to decide on their choice of solvent and another two sessions to learn the procedure of running a chromatogram using the given solvents and the coloured dyes removed from the candies.

In the second part of the topic, students were given dyes from various natural sources like red carrots, green vegetables and natural colourings. They were to extract the coloured dyes from these materials and run chromatograms. Efforts were made for them to discover the constant factor involving the ratio of the distance moved by the spot to the distance moved by the solvent front. This part alone took another two 45-minute sessions.

BRONX HIGH SCHOOL OF SCIENCE

Bronx High School of Science resembles any top secondary school in Singapore. The basic framework of the school's Science curriculum has a significant weightage of practical and project work. Participants spent two mornings touring the school's premises and observing science lessons and practical sessions.

All final year students are to submit a research project as part of the requirement to graduate. Each student has a research mentor from a research institution (either industrial or academic) and a teacher mentor from the School. It takes several months to complete a project. A formal presentation is then organised for the students to display their completed work to a diverse audience that include their parents, top research scientists, distinguished alumni, and their fellow school mates and teachers. During the Programme, participants made an additional visit to the School to attend the Intel-sponsored Bronx Students' Research Project Presentation. Students displayed a variety of projects ranging from social science studies to cancer research at the Einstein Medical Research Institute. Technically, the entire event resembled our Science Talent Search organised by the National Science and Technology Board.

REFLECTIONS ON EXPERIENCES ACQUIRED FROM THE BENJAMIN FRANKLIN PROGRAMME

During the Programme, participants also attended lectures on Science Inquiry by Professor Ryda Rose and Constructivism in Science Education by Professor Kenneth Tobin. A weekend workshop by Mrs Judith McGonigal, a First Grade Teacher and Faculty Member of GSE, on Involving Children and Parents in Science Inquiry was also an exciting eye-opener.

The Benjamin Franklin Programme had given participants many insights into the American culture of delivering a Science curriculum that is heavily lined with opportunities for students to embark on independent science inquiry and support from outside the school environment, namely from parents and external organisations. Be it a lesson on chromatography at the University City High School or a research project by a Bronx High School student, the element of inquisitiveness was always there. One obvious observation made was the spontaneous raising of hands to take a teacher's question in practically all classroom lessons observed during the Programme.

Despite the rowdiness in the class during the chromatography lessons and the highly technical research projects undertaken at Bronx, it was amazing to see the students' effort being presented both visually and orally. The deepest impression came from the display of projects by elementary school students during the workshop by Mrs Judith McGonigal. The support from parents and the enthusiasm of the Science Teacher added much to developing budding young scientists right from the start of their education.

CONCLUSION

Being involved in the Benjamin Franklin Programme was an enriching experience. It would be interesting if Science Education in Singapore can take on a similar line of active participation by students and teachers with the support from educational authorities, research institutions and parents. Although many initiatives are already in place to ensure our Science Curriculum supports the Thinking School Learning Nation Vision, the culture of independent inquiry is still in its infancy here.

It would be desirable if students, perhaps in secondary schools, have ample opportunities to be exposed to or be involved in research activities. This may take the form of an Exposure Programme in which students undertaking a Science Inquiry Project may keep in touch with a relevant research authority (local or overseas) via electronic means and make visits to these relevant research establishments to gain some insights into what actual research work is. This will be complementary to an Experience Programme similar to the current NSTB's Talent Search Programme. Perhaps the more able students from the Exposure Programme may eventually be put on the Experience Programme. Put together, these two field-based programmes will benefit students of all academic abilities.

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REFERENCE

<http://www.upenn.edu/gse/IntlProg/segment/sci.htm>

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