THE DEVELOPMENT OF PRIMARY SCIENCE EDUCATION IN TRINIDAD & TOBAGO

P. Fraser-Abder

The position of science at the primary level became established in 1956, when the elementary school syllabus contained a section of Nature Study. The aims and objectives of this syllabus were:

(a) *Children should be able to recognize and know by their popular names the common wild flowers, grasses, trees, birds, insects, animals and fishes.*

(b) *They should be concerned with the preservation of natural beauty and abhor wanton destruction and vandalism.*

(c) *They should imbibe ideas of kindness to animals.*

(d) *They should above all be left with feelings of awe and reverence for the wonderful works of nature.* (Syllabus of Study, 1956, p. 12)

The syllabus was rather content-oriented and required a great deal of rote memorization on the part of the student. This syllabus was replaced by a General Science Syllabus in 1975.

The aims of this syllabus were:

(a) *Science should become a way of thinking for the child, a way of reducing fear with facts, of making reasoned guesses, of withholding judgements until adequate information is received and of using knowledge in solving practical problems.*
(b) Science should help children to discover, organize and use information to improve learning. (Syllabus of Study, 1975, p. 65)

The syllabus included the following topics:

(1) Man  
(2) Plants and Animals  
(3) Air, Water and the Weather  
(4) Matter  
(5) Machines, Forces, Work and Energy  
(6) Living Things  
(7) Health Activities  
(8) Earth and Universe

This syllabus was also content-oriented with great emphasis being put on rote memorization. It should be noted that students were being taught by teachers who had a poor science background and who had entered the system via the pupil-teachers' system which was abolished in 1963 or by secondary school graduates some of whom had attended the Teachers' Colleges.

The majority of teachers have not completed any formal science. A small percentage of those trained between 1950 and 1960 would have completed General Science as an optional subject at the Teachers' College. In 1958 when the one year emergency teachers training course was introduced, the syllabus contained General Science as a Basic subject. In 1960 the Teachers College syllabus was revised and General Science became a practical subject. In 1970 a further version of the syllabus resulted in General Science becoming a basic compulsory subject. The aims and objectives of this revised syllabus were to produce teachers who:

(a) have a knowledge of the great variety of plants and animals in Trinidad and Tobago.

(b) can stimulate children into asking and answering questions about the world in which they live.

(c) can promote an experimental enquiry approach into their teaching. (Syllabus of Study for Teachers College, 1970, p.4)

Remarkably absent is the production of teachers who can
teach science, and who can train students to think like scientists. No mention is made of science teaching methods. A syllabus with a reasonable balance of content and methodology would have been far more effective in producing science teachers. By 1981 all primary teachers had attended the Teachers' College; however, many of them left with an inadequate exposure to science and a negative attitude towards teaching science (Fraser-Abder and Shrigley, 1980); consequently very few teachers attempt to teach elementary science.

Another factor which has militated against the teaching of elementary science is the Common Entrance Examination. Up to 1981 Science had not been a part of this examination. Many principals had been known to remark that their school is judged not by whether or not they teach science but by their Common Entrance Examination results; consequently they concentrate on this objective and do not teach science.

Gocking and Edghill (1981) attest to the above situation when they state:

*It is claimed, for example, that the Common Entrance Examination, however necessary as an instrument for allocating scarce secondary school places, has had adverse effects because of the inevitable distortions of good primary school education through over-concentration on training for the Common Entrance tests. This is true. To correct one of the evils, namely, the neglect of certain subjects of the Primary School Curriculum, the Ministry of Education and Culture, in collaboration with the Educational Testing Service of Princeton, New Jersey, is working on the inclusion of Social Studies and General Science in the Common Entrance Examination as a means of inducing teachers and pupils to give these subjects the consequence they deserve in the preparation of children of primary school age. If it is known that these subjects are going to be examined, then there is the certainty that they will be taught. (pp. 1–2)*

It can be safely concluded that in spite of the existing
primary science syllabuses of 1956 and 1975, Science was hardly taught in primary schools. The absence of any significant amount of science teaching at primary level is reflected in:—

(a) The inadequate science background of students entering secondary school and their inability to cope with secondary science subjects;

(b) the increasingly poor G.C.E., O'Level Science results in spite of the sharp increase in the number of students placed in the Common Entrance Examination (This factor may also be attributed to the type of teaching which takes place in the secondary schools).

In 1977, the Ministry of Education and the School of Education launched an elementary science curriculum development program. The curriculum developers Raphael Douglass, Science Supervisor, Ministry of Education and Pamela Fraser-Abder, Research and Development, School of Education were faced with the problem of a complete absence of any basic research in curriculum development. According to Miller (1981):

*In the Caribbean there has been little inclination to do basic research. A positive research climate and environment is only now beginning to emerge in the Caribbean. Part of the colonial legacy in this region is that there is a readiness to accept opinion as fact, to substitute hunches for conclusions from empirical evidence and to make changes without substantial investigation. The colonial experience consisted in rewarding and encouraging imitation rather than innovation. It accepted the thinking that was done elsewhere, the knowledge that was generated in other environments and further accepted that one's responsibility was to adopt and adapt the models and structures developed in the metropolitan countries to the circumstances of the colony. Research was not a part of the responsibility of the colony. The paradigms were worked out elsewhere and force-fitted into the local circumstances. In this setting, research had a very low priority. Although a more favourable climate is emerging in the Caribbean, the stage of evolution at the current time could be described as benign interest. Research is*
recognized as a necessary element and adjunct to development but is not perceived as being absolutely essential. (pp. 4–5)

No local research on elementary science curriculum development or cognitive development could be found in a review of literature. The literature review showed that Adey and Manbodh (1977) did a survey of cognitive development in some lower secondary schools and reported that much of the science curriculum makes demands at the late concrete level which can only be met by some 35% of first-year pupils.

In an attempt to provide a profile of cognitive development as a prelude to the development, innovation and implementation of the new primary science curriculum, Fraser-Abder (1977) investigated the cognitive development attainment levels of primary students in Trinidad and Tobago. Her study showed that at the end of their primary education at 11–12 years old, only 2.8% of the students have attained the late concrete level which Adey and Manbodh (1977) had shown to be required to cope with the secondary level syllabus. It became apparent that a new science curriculum would have to cater to a very wide range in intellectual development in any given class, and attempt to better prepare students for secondary science. The results of her study were used to assist in determining the types of activities that can be engaged in by the different age groups. Further research was undertaken to determine content, placement and sequencing of topics in the science curriculum (Fraser-Abder, 1982, 1983, 1984).

Research in this area continues during the implementation, evaluation and revision stages. Researchers believe that a teacher's attitude toward a subject determines if and how he teaches that subject; it was therefore felt that it was necessary to do some research into the status of the attitude of teachers in Trinidad and Tobago toward science and science teaching.

Fraser-Abder and Shrigley (1980) found that:

(1) Male teachers sampled had a more positive atti-
itude to science and science teaching.

(2) Teachers of eleven year olds had a better attitude than teachers of six year olds.

(3) The type of primary school attended did not affect the teachers science attitude.

(4) Rural and suburban teachers have a significantly higher attitude mean score than urban teachers.

(5) Mathematic course attended did not affect science attitude.

(6) Scores of teachers having science courses at primary and secondary levels were significantly higher than teachers having science in primary schools or those having no science courses, the teachers sampled showed an overall negative attitude to science teaching. These results were obtained at the commencement of the development of the curriculum. The developers were therefore faced with the task of changing the negative attitude of the teachers in an attempt to better facilitate elementary science teaching. Fraser-Abder (1984) developed a model which proved to be successful in developing a positive attitude to science and science teaching. This model was used with approximately 10% of the teacher population. A new model is currently being used with teachers who have not been directly involved in curriculum development but are now involved in the implementation of the curriculum. (p. 643)

**SCIENCE SYLLABUS AND CURRICULUM**

Traditionally teachers have been presented with science curriculum material and have been expected to teach science. However this has resulted in disillusionment with the scope and quality of curriculum implementation and developers are beginning to realize the role teachers can play in the process
of curriculum developers. Teachers are better aware of the classroom situation and if they play an active role in producing classroom material they are more prone to implement the use of this material. Connelly (1972) articulates this belief when he says.

*The strength and major contributions of a developer are that he works with and can translate involved ideas into a form useful for teachers and students. However, the developer cannot assign, let alone account for the full range of teaching situations that arise. It is here that teachers' experience and wisdom enter into the curriculum planning in a way that cannot adequately be replaced.* (p. 79)

Tyler (1975) accuses curriculum developers of creating non-teachable curricula because they do not know the classroom reality; he feels that teachers should play an active role in curriculum development.

Active teacher participation in curriculum development generally takes two forms:

(1) *during implementation, teachers adopt or modify the curricula which were produced by other developers, and they design alternative optional activities if they so desire.* (Connelly, 1972; Silberstein, 1978).

(2) *Teachers act as developers from the initiation of a project.* (Rudd, 1975; Gray, 1974, Presst, 1978).

In Trinidad and Tobago elementary science curriculum development took the second form, i.e. teachers acted as developers from the initiation of the project.


The new curriculum stresses what is considered to be
the main purpose of science education.

(a) to awaken in the child whether or not he will become a professional scientist — a sense of joy, the excitement and the intellectual power of science.

(b) to expose the child to a more accurate recognition of the range and limits of man's control over nature.

(c) to prepare the child for life in a world where new scientific discoveries are being made every day.

The aims of this curriculum are:—

(1) to develop skills in the careful and systematic use of the scientific processes in the elementary school as a necessary preliminary to undertaking more complex science learning in the secondary school.

(2) to facilitate the development of the scientific process which underlie the discovery and continuing development of scientific knowledge.

(3) to help children discover, organize and use information to improve living.

(4) to facilitate the development of children's thinking.

(5) to develop in the child a positive attitude to science. (Fraser-Abder, 1979, p. 26).

The major goals of the curriculum development project are:

(1) the attainment of scientific literacy by all students.

(2) the development of a positive attitude towards science and the teaching of science.

(3) the improvement of the science background and teaching methods of all teachers.
In the development of the curriculum four major factors had to be considered:

(1) Orientation toward external examinations.
(2) Science background and professional training of teachers.
(3) Facilities available at elementary level.
(4) Cognitive developmental level of school population.

SYLLABUS DEVELOPMENT

The content of the syllabus was influenced by the examination done at the end of primary school, the science educational level of the teachers and attitudinal and cognitive developmental research. The syllabus was developed by Fraser-Abder, Faculty of Education and Douglass, Ministry of Education. The syllabus comprised philosophy, aims, content, process and objectives for each primary school year. Figure 1 shows the relationship between content and processes during the seven years at primary level. The gradual increase in content facilitates the final content-oriented examination.

FIGURE — 1 Process/Content Relationship

CURRICULUM DEVELOPMENT

Teachers were involved in the development of the curricu-
lum during the period 1977 — 1983. They attended workshops, the major objectives of which were:

(1) To change the teachers’ negative attitude to science teaching.
(2) To expose teachers to teaching science using the process approach of science teaching.
(3) To involve teachers in developing and writing activities to be done in the schools.
(4) To expose teachers to teaching strategies involving hands-on experiences.

Five basic elements are interwoven into the workshop:

(1) Introduction to the principles of curriculum development.
(2) Designing activities aimed at increasing teachers’ knowledge of science and science teaching.
(3) Deliberations on approaches to science curriculum development.
(4) Development and production of learning materials for use by all elementary students.
(5) Interaction with fellow teachers, trying out the materials and revising and modifying them based on feedback collected via trials in schools.

During the workshops teachers developed activities for use by students. These activities were tested and evaluated in the schools and revised based on this initial evaluation.

The activities which resulted from the work of these teachers were edited and revised by the curriculum developers and published in the form of Teachers Guides and distributed for use to all elementary schools.

700 teachers (approximately 10% of the primary teachers population) were directly involved in writing curriculum activities. These teachers later served as resource persons in their schools and assisted in the implementation of the curriculum.
IMPLEMENTATION

Since the initial phase involved only 10% of the teacher population it was essential that the remaining teachers be exposed to both the content and the necessary techniques for teaching the subject. To achieve this, workshops are now being held at district/country level.

The objectives of these workshops are:

(1) To increase the teachers knowledge of science and science teaching.
(2) To expose teachers to teaching science using the process approach.
(3) To change the teachers negative attitude to science teaching.

The implementation of the curriculum continues, with work being done both with students and teachers.

EVALUATION

The progress of the child is continually being evaluated. The evaluation includes:

(1) Classroom visitation by the curriculum developers.
(2) Teachers verbal reports and questionnaires.
(3) Student questionnaires.
(4) Parent questionnaires.
(5) Competency measure tasks.
(6) End of term tests.
(7) Video tapes.
(8) Views of professional curriculum developers

This phase is, of necessity, tedious and time consuming. It is however hoped that the entire curriculum can be evaluated and revised in the not too distant future.


Fraser-Abder, P. — *Concept Development in Elementary Students in Trinidad and Tobago*. Mimeo, 1977, 1982.


Syllabus of Study for Teachers College. Trinidad and Tobago Ministry of Education and Culture, 1970.


Williams, Eric. — "The Prime Minister's Proposals to Cabinet on Education. Port of Spain, Government Printery, 18th September, 1975, p. 7."