SCIENCE EDUCATION IN THE PACIFIC ARE WE PROGRESSING?

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Why Teach Science?

The Junior Secondary curriculum document on the general goals of science education in Western Samoa states that **"A science education should encourage students to think, to do and to develop attitudes and values within a scientific perspective of the physical and biological world".**

Science teachers who can make connections between the science text and the environment can really make science learning come alive for their students. Science teaching should enable students to better understand our environment and also stimulate their curiosity as well as their imagination, initiative and involvement. The ultimate aim of science education should be the development of sensitive human beings, informed and competent in the subject matter and methods of science and possessing a sense of social responsibility. Science education should create in all students a set of behaviour patterns that can be useful to them throughout their lives, regardless of their occupation.

What problems exist which might prevent these aims from being achieved?

Thinking about the questions below should indicate the status of science education and enable us to identify deficiencies in our education systems.

- Are the existing programmes at primary and secondary levels relevant?
- Do the students know what is expected of them and why?
- Do teachers set goals that are relevant to the students and significant to science?
- Is there on-going evaluation of the programmes that examines the aims and effectiveness of the activities provided?
- Is there any data available about the effectiveness or shortcomings of the existing programmes?
- Do we have an adequate supply of teachers?
- Do science teachers have adequate qualifications and training?
- Do schools provide the materials and environment necessary for effective science teaching and learning?

Most of the above issues can be classified as being related to either human or material resources.

Resource problems involve laboratories and equipment. Many schools lack a science room or laboratory. Without such an environment it is difficult for students to be motivated to learn science. Many schools also lack the most basic science equipment.

Human resource problems refer mainly to teachers. They are the agents of change. How well do we prepare them for this? New courses, new curriculum materials and the introduction of new teaching methods have not made science teaching any easier, nor diminished the number of teachers needed. The shift away from teaching facts to teaching skills poses a challenge to all who are engaged in this effort. Teaching is essentially a process of developing, clarifying, enlarging and presenting information, ideas and meanings to others. Its ultimate aim is that of preparing pupils for life in the real world. The achievement of this aim will depend mainly on the teachers' abilities to manage the classroom situation, which in turn depends on how well they know their subject and how well we train them.

If asked to describe an ideal modern science teacher, my list would go something like this:

A good modern science teacher is one who

- is sensitive to the individual needs of the students, not authoritarian, allows class discussion and is proud of his/her task, which is not simply to dispense the facts of science, but to create an environment in which learning can take place;

- is not overloaded and has a salary that is attractive enough to make it unnecessary to take a second job in order to make a living, with the opportunity for continued self-improvement through in-service training, which consists at least in part of developing new teaching aids and materials;

- is flexible, takes into account individual differences among students and provides work that is challenging;

- has adequate mastery of content and methodology and is able to admit that he/she does not have answers to all of the questions that may be raised by students, followed by suggestions on how both teacher and students may proceed to find the answers;

- is a stimulator, motivator, guide, helper and a rewarder of student activity;

- stimulates students' curiosity to find out for themselves;

- knows the final outcome expected of the students;

- makes sure that students know the objectives set for any unit of work;

- conducts diagnostic checks designed to inform students of their degree of understanding of the objectives while a unit of work is in progress, and follows these up with remedial measures (when appropriate);

- uses an end of unit test to assess the degree to which students have achieved the objectives;

- is able to recognise different learning needs and behaviour patterns and uses appropriate teaching methods to meet the needs;

- is capable of, and interested in teaching new content and methodology;

- takes into account psychological and social factors in learning;

- is willing to improvise and use low cost materials to replace equipment that is unavailable and uses 'hands-on' experimentation in place of the traditional 'chalk-and-talk' approach.

It is unlikely that many of our teachers would meet all the above criteria.

It is easy to identify problems but solutions are not so easy to find. Is there anything we can do to improve the efficiency of our science teachers? One practical step would be networking; networking within the schools, forming cell groups within districts, nationally, regionally and globally. It would be a relief for practising teachers in Western Samoa, for example, to know that the problems they face are no different from those faced by teachers in Fiji, Tonga, or other countries in the region.

Journals such as *the Pacific Curriculum Network* can be an effective means of sharing ideas and seeking solutions to problems faced by science teachers in the classrooms.

There should be regular, on-going in-service activities in local centres, nationally and internationally. These in-service activities give teachers the opportunity to participate in problem-solving situations. These activities could also help teachers overcome the problem of lack of equipment.

Recently, for example, I attended a writing workshop on non-communicable diseases. The group had written an activity on cardiovascular diseases. It was merely a reading activity and would most probably end up being delivered through 'chalk-and-talk'. It examined heart attacks due to blocked arteries resulting from fat deposition on the arterial walls. I asked the group if they could think of an activity which could give an experience to the students on the effects of a blocked artery. The result was a simple, inexpensive model to demonstrate how hard the heart has to work when an artery is blocked. The equipment consisted of a soft plastic shampoo bottle which represented the heart. The bottle was fitted with a small plastic hose and was half filled with water. As the student squeezed the water out of the bottle, s/he was able to feel how much pressure was required. The bottle

was again filled with water and this time the hose was half closed by pressing it with the fingers of one hand at the same time trying to squeeze the water out with the other hand. The force required was much greater. Then the volume of water squeezed out through the open hose and the half closed hose was compared. After doing this, the teacher would have no difficulty in explaining how hard a heart has to work to pump blood through a half-blocked artery. At the end of the day the group went home with great satisfaction.

Science teachers can solve some of their own problems. However, we have to provide the opportunity and challenge for the teachers to do so through science workshops, teacher associations and international conferences. Exchange of information, improving ways of teaching science, mutual encouragement and intellectual stimulation can be achieved through these forums. I believe that if we all combine our knowledge and skills, science learning throughout the Pacific region could be greatly enhanced.

References

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