PRACTICAL LABORATORY SESSIONS

The Laboratory sessions were prominent in the workshop - a total of 22½ hours (47%) out of 48 hours being devoted to practical laboratory sessions. These laboratory sessions were organized in four phases; exploration, demonstration and practice, working in groups, and plenary sessions.

Phase One: Exploration session

A number of printed curricular materials and some low-cost science equipment were displayed. The printed materials included those from the Curriculum Unit, Ministry of Education, Papua New Guinea; the Department of Education, Wellington, New Zealand, the Curriculum Development Centre, Canberra Australia; and selected from the United Kingdom and Nigeria. The low-cost science equipment included physics, chemistry and biology kits from the School Equipment Production Unit (SEPU), Kenya; a water-drop microscope, a spring balance made from bamboo, thermal expansion apparatus, and a ball-point pen thermometer developed at the Appropriate Technology Development Unit based at the PNG University of Technology, Lae; and a double beam balance, a ray optics set, and metre rules developed at the Materials Development Unit, Education Department, Port Moresby.

The main focus of this session was to make the participants aware of the rich potential for local production of simple items of equipment. While examining the apparatus on display, participants were asked to consider, amongst others, the following basic questions:

(a) Is the apparatus suitable for children's use, considering the age range as being up to early secondary-level education, particularly in relation to the accompanying printed material?

(b) What advantages/disadvantages are there when comparing the larger composite kits of SEPU to the smaller topic kits (e.g. optics kit) included in the Papua New Guinea apparatus?

(c) What advantages/disadvantages are there when considering kits of apparatus as distinct from equipping a laboratory with individual items?

The participants showed a lot of interest in the material on display.

Phase Two: Demonstration and Practice Session

Several different demonstrations were carried out by the consultants and resource persons.

Allen Inverssin showed such techniques as cutting glass bottles, making dyes from local plants and electrolysis of sodium chloride solution using simple, locally made electrolytic cells.

Norman Lowe showed such techniques as glass cutting, making pipettes, scaling glass tubes, cutting by polystyrene hot wire and hot-wire technique for cutting glass tubing (fluorescent light tubes).

Mike Davis showed the technique of drilling glass plates and bottles using a copper bit and carborundum powder.

The demonstrations were followed by sessions during which participants had a chance to practise the special techniques to which they had been exposed.

Phase Three: Working in Groups

Participants were assigned to groups (three or four in each group). Each group was asked to examine the PNG curriculum materials and pick out two units (one from primary and another from secondary) and design suitable low-cost equipment for them. The detailed guide-lines for the group work was as follows:

(a) Indentify two topics - one primary and one secondary
(b) Decide on equipment
(c) Prepare and design specification
(d) Construct prototype
(e) Prepare a teachers' guide to include the method of construction and the use of the prototype equipment.
(f) Evaluate the equipment and teachers' guide produced.

The list below shows the specific tasks undertaken by each group.

Group	Primary Level Task	Secondary Level Task
A	Light: Circular disc	Electricity: hydro-electricity
B	Electricity: Lighting more than one bulb at the same time	Comparative expansion of liquids (using solar energy)
C	Electromagnetism: model to demonstrate electromagnetism	Energy: transformation of energy (model hydro-electric generator)
D	i) Light: various types of pin-hole cameras using different types of local materials	i) Insect cages for students
	ii) Wooden box for storage of spirit burners	ii) Wooden box for storage of spirit burners
		iii) A potometer to measure transpiration in leafy plants.
E	The Electric Buzzer	Device in creating electric current

The detailed construction exercises are as shown in pages 88 to 122.