ENRICHMENT OF SCIENCE TEACHING AT THE PRIMARY SCHOOL LEVEL THROUGH PRACTICAL EXPERIENCE

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ABSTRACT

This paper attempted to suggest that a practical oriented approach should be adopted a way of enriching science teaching at the primary school level in topics related to eve day life. The paper mentioned that existing syllabuses have been criticized for failing encourage pupils particularly at the primary school level to show application of scientif principles in everyday life. Practical approach the paper noted promotes processes o science as a way of enquiring mirrored in the school laboratory.

Priorities for practical work were grouped under four broad headings, stimulating interes and enjoyment; learning experimental skills and techniques, teaching the process o science and supporting theoretical learning.

Problem-solving chain was also treated. Specific examples of topics related to everyda life were mentioned; small animals, science for life, preservation of food, solar energy pendulum, flower and insects were treated. The role expected of classroom teacher principals, inspectors, administrators, ministry of education, curriculum developme agencies, professional association and organized private sectors were also highlighte

The paper concluded that teaching and learning of topics related to everyday life throug practical experience help children to develop ideas, not imposing ideas on them Development of ideas depends on children testing out their ideas against experience b observing, interpreting, hypothesizing, raising questions, communicating. In short usin all the process skills of science.

TRODUCTION

sting science syllabuses have been criticized for failing to encourage pupils particularly he primary school level to show application of scientific principles in everyday life. thin many primary schools science is taught without relating them to everyday life.

is a method which cannot easily provide a systematic or balanced approach to a riculum in science.

the primary school level science topics which are directly related to everyday life and perience of students in their home or local environment should be highlighted. Such pics could possibly introduce decision making and strategy and relate to social areness.

pics related to everyday life include:

- Small animals
- Science for life
- Preservation of food
- Solar energy
- Pendulum
- Flower
- Insects

PRACTICAL WORK IN SCIENCE

HY LABORATORY/PRACTICAL EXPERIENCE?

answering this question one may be tempted to say science is a practical activity. But at least two reasons we should be a little more cautious. According to Allsop (1985), stly, our practice of school laboratory work is changing and developing from a rspective of laboratory experience as confirmation of previously taught theory (prevalent to the 1960's at least) to one where the processes of science as a way of enquiring e to be mirrored in the school laboratory. Secondly, when the research literature is refully studied, it is very difficult to locate studies that provide clear evidence relating hievements in laboratory work to success in science learning generally, except in spect of very specific manipulative skills.

IMS FOR PRACTICAL WORK

lsop (1985) grouped priorities for practical work under four broad headings;

i. Stimulating interest and enjoyment
ii. Learning experimental skill and techniques
iii. Teaching the process of science
iv. Supporting theoretical learning

STIMULATING INTEREST AND ENJOYMENT

This aim is the most frequently quoted by teachers and is manifestly present in early science learning particularly where the practical is orientated towards investigational work, but much less obvious in later years where practical work often becomes linked closely to verification and consolidation of previously presented theory.

LEARNING EXPERIMENTAL SKILLS AND TECHNIQUES

Practical skills are learned, but studies by the Assessment of Performance Unit (APU) in the UK show that by the age of 15, it cannot be guaranteed that students' discrete skills can be harnessed in the service of devising experiments and conducting experimental investigation.

If skills are to be developed, it must be clear to students that a particular experiment is designed with that purpose in mind.

TEACHING THE PROCESS OF SCIENCE

If we are trying to teach an approach to scientific enquiry, we shall have to be quite explicit about the aim, we shall have to provide frequent appropriate experiences for students, and give teachers training and resources support. At present we cannot guarantee these provisions.

SUPPORTING THEORETICAL LEARNING

Practical is frequently ill-suited to learning theoretical concepts. Most teachers can think of experiments in their own subjects where understanding of theory has actually been absurd by inadequate data obtained in student practical work. Familiar examples would be the collection of experimental data relating to the mole concepts and compound formation, and the use of trolleys and ticker timers to 'disorder' Newton's Laws.

APPROACHES TO PRACTICAL WORK

It is important to link particular aims for practical work with particular types of activity otherwise clarity for both teacher and student is lost. In any one experimental sequence

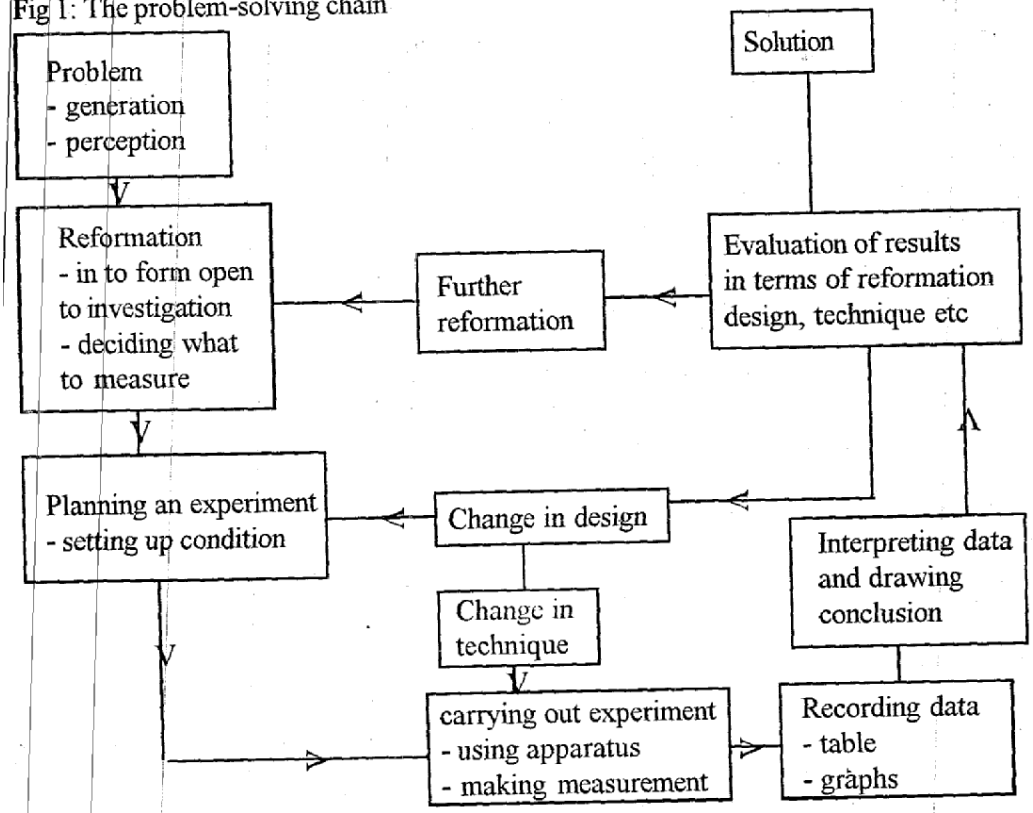
It is hopefully important that one aim is emphasized to avoid over lapping aims from leading to confusion.

A simple classification according to Longman (1988) is

Aim	Type of activity
Developing practical skills and techniques	Exercises
Being a problem-solving scientist	Investigation
Getting a feel for phenomena	Experiences

For most teachers, the most radical aspect is investigation. A valuable framework for the development of investigation has been provided by the work of the Assessment of performance unit (APU) in the United Kingdom (UK) is summarized in the now familiar problem-solving chain (Fig 1)

Fig 1: The problem-solving chain



Source: Assessment of performance unit science in schools age 15 no 2. Department of Education science (London 1984).

The Nutfield co-ordinated science (Longman 1988) describes four different types of investigation.

- Laboratory investigation designed and carried out by the pupils using equipment supplied.
- Laboratory investigations designed and carried out by the pupils using equipment selected by themselves
- The design of a piece of equipment, or other artefact, to perform a particular task
- Investigations outside the laboratory including field work

The practical experience of all students should include among others the followings;' pupils should develop the intellectual and practical skills that allow them to explore the world of science and to develop a further understanding of scientific phenomena and the procedures of scientific exploration and investigation. This work should take place in the context of activities that require a progressively more systematic and quantified approach, which draws upon an increasing knowledge and understanding of science. The activities should encourage the ability to;

i. Plan, hypothesize and predict
ii. Design and carry out investigations
iii. Interpret results and findings
iv. Draw inferences
v. Communicate exploratory tasks and experiments.

TEACHING TOPIC RELATED TO EVERYDAY LIFE

SMALL ANIMALS

Children are familiar with small animals. They observe them and they play with them. There are some animals which children's parents will have warned them about. Pupils frequently play with animals at school to observe their behaviour. Students will bring into the classroom interesting specimens for the science corner or nature table.

Pupils are natural collectors. All they need is a little encouragement from the teacher before they start to look more closely at their surroundings and make this interest in small animals a part of the classroom.

The teacher should be familiar as possible with the places near his school to find small animals, flowering plants and bushes are good places for flying insects. Many insects, snails, and beetles hid underneath big stones and logs, tadpoles, beetles and dragon fly larvae may be found in puddles and pools. Darker corners of the classroom serve as abode for spiders, flies and mosquitoes. It is therefore necessary for the teacher to look round the school compound for small animals so that when the need arises you will know the most likely places for your pupils to look for different animals.

Old match boxes, cigarette boxes, tins, jars and bottles are some of the needed containers for any small animals they may catch. If children wish to keep any animal in the classroom for longer periods of time larger cages will have to be made.

The following activities include questions that pupils might raise at any time. The teacher should encourage children to work on these activities when the children raise each question and not in a specific order. Different children in the class may raise different questions and the teacher may find different groups of children working on different activities at the same time.

"WHAT DO THEY EAT?"

This is an important question, and one that your pupils will surely ask if they wish to keep the animals they have brought to class. Children can discuss this question and if they can remember where each animals was found, they will be better able to answer.

As your pupils are working on the feeding habits of their animals, they will notice many other things. They may notice how different animals move and how they respond to being handled.

Children will observe how the animal eat and may notice the detail of their mouth parts. They will see animal dropping and they also may be lucky enough to see an insect molting or pupating. All of these observations should be used for group discussion and the basis for future experiments and observations.

GROWTH AND REPRODUCTION

Children may collect different stages of life cycle of the same animal. If these are being raised in the classroom, your pupils will see eggs, larvae, pupae, and adults. They will see each stage growing. If they are fortunate they may even see some animals mating.

Children could try to find out if there are any differences between male and femal animals of the same type. All these observations can be used by the children to talk wit each other about growth and reproduction.

DEFENCE AND PROTECTION

As children observe and work with animals, they will notice different animals' reaction to being handled and disturbed, some bite and sting, some fly and run away while other might have patterns or markings that make them look frightening. In some frightenin noise is noticed and nasty smell in others.

USEFULNESS AND HARMFULNESS OF SMALL ANIMALS

This topic naturally arises from the children's work. Some example of kinds of question children might ask and try to answer are: How many things around the school, and a home have been damaged by small animals? Do any small animals ever make peopl and animal sick?.

Can children think of any examples where certain animals might be useful? Are there any small animals that eat other harmful animals? Are there any animals useful to plants in some ways? Are there any animal which are scavengers? How might this be useful? Examples of small animals are caterpillars, Locust and grasshoppers, flies, butterflies and moths, termites and ants.

Animals in puddles and small ponds-frogs, tadpoles, beetles; Animals that live in– the soil-earth worms, other smell animals include leeches, bedbugs, weevils (bean and maize weevils) Palm weevil. Cockroaches and crickets ticks.

SCIENCE FOR LIFE

Some of the topics for student's explorations are;

The water I drink	-	tiny organisms in the water
Drinking safe water	-	killing organisms in drinking water
Water in our world	-	the water cycle
Where do I live	-	my place on the earth
Staying Healthy	-	cleaning the opening in my body
Cleaning Around us	-	keeping my home, yard and school clean
What I eat	-	three basic foods for good health
My House	-	types of shelters

Saving things around	-	conservation
Getting and saving my food	-	producing and preserving food
Handling waste materials	-	sanitation and waste handling
Which way?	-	directions, east, west, north, south
How far?	-	distance, close and far
Warm or cold	-	climate weather
Life in my home	-	family life, health, cleanliness

PRESERVATION OF FOOD

Keeping food being a more understandable term for young children, a choice of question leading to experimental activities should be outlined;

- How do plants store food? (ponds, ears, roots, tuber) for how long?
- What happens to foodstuffs if they are left around the classroom? Do just that and see that there is variety children can bring from home; fruits, bread, rice, milk. Things are bound to happen and outcomes can be observed (seen and smelled), discussed, recorded.
- Can you do something so that these changes do not occur? Let children suggest what they like and try it out (mother's way will turn up and could be discussed and, of course, tried out; boiling, drying, smoking, covering, salting, and others)
- Somewhere one could focus into a specific foodstuff or crop; e.g. maize or beans, rice or other seeds) taken from different stores (names of children) children can ask themselves.

Which are good and which are not?

First observe carefully and see what you can find out.

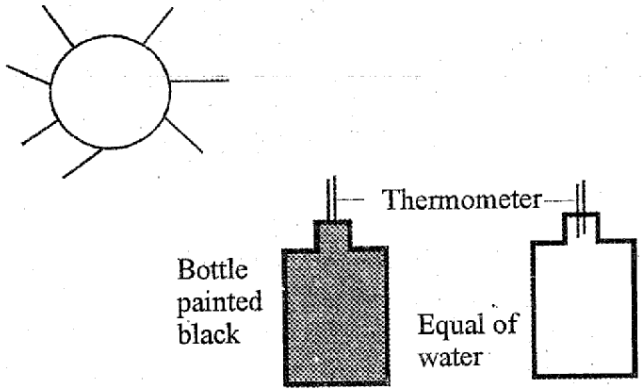
Next test the seeds by germinating a hundred of them between dump newspaper or cloth

A hundred is a nice figure and leads to percentages. Good and bad seeds can be arranged side by side to form natural box chart which of course, can also be produced on paper.

- What makes the bad seeds bad?
- Time can be devoted to observing the work of weevils, flies, fungi etc

SOLAR ENERGY

A Typical Solar Energy Activity



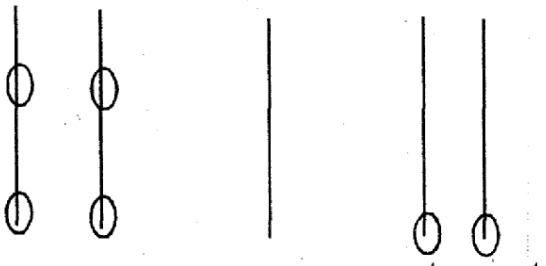
Water in black bottle reaches a higher temperature than the water in the white bottle

What would happen if;...
The bottles were painted on the inside?
The bottles were made of glass without paint but contained water with clack dye and white dye?

The bottles were exposed to non-luminescent heat source?
The bottles were of different shapes? (e.g. two black bottles, same volume of water, but quite different shapes)
Pupils learn to; Predict
Control variables
Record data
Interpret data

PENDULUM

What does a pendulum do?
This question is less simple as it looks
The answer may be given as "It goes to and fro...
But where is 'to'? and where is 'fro'?
What happens at 'to'? and what happens at 'fro'?
What happens in between?
Are 'to' and 'fro' at equal distance?
From what?
How do you measure the movement of a pendulum?
Can you make a measuring device?
Are the times (periods) between 'to'' and 'fro' of equal length?
How can you make a pendulum swing 'faster' and 'slower'
What exactly do you mean by 'faster' and 'slower'
Let us name the movement 'to' 'fro' a swing and 'to' – 'fro' – 'to' a period can you make a pendulum with a period of 1 second?
Can you make the slowest pendulum in town? Who can make the fastest?
What happens when you swing these pendulum?



try one at the time

A Pendulum can make circles or eclipses. How?
How does this affect its 'swing' or period.

FLOWERS

Children can easily spot differences, but find it often difficult to indicate similarities. An exercise like this one may help to overcome this problem. Out of class activities; each one of the pupils collects five different flowers; big and small, known and unknown, wild and cultivated, undress your flowers carefully and arrange the parks on a sheet paper; Make categories and place corresponding parts together. Join the work f

whole group together. Parts which are too small, may be examined through a lens an sketches on the paper.

Mimosa Pudica as a selected example of flower.
Many of this flower grow, small and humble behind the sports building.
What happens when you touch the leaves? can you make half a leaf fold?
How long does it sleep?
What happens when you give it real hard kick?

INSECT
Where can you find an Antlion?
At the bottom of a humble, sandy pit
Can you spot it?
Can you get it out?
Take a good magnified look, sketch and describe it briefly
What does a disturb antlion do?
How does he move?
When does it start moving?
What happens when antlion is in sand?
Can an antlion see?
How can you find out?
Which part of the antlion is the most sensitive?
How does an antlion make new pit?
Would it make a pit in other things than sand?
In Sugar? In flour? In coarse sand?
In wet sound? In sawdust?

Set up an experimental situations. You probably will have to wait till the next day for an answer to the questions.

CONCLUSION
Teaching and learning of topics related to everyday life through practical experienc help children to develop ideas, not imposing ideas on them. But development of idea depends on the children testing out their ideas against experience by observing, interpretin hypothesizing, raising questions, communicating. In short using all the process skills science Harlen (1985).

When children work in this way they learn by doing things, by observing closely, working out relationships, and reflecting on what they find. This can give them power in coming to terms with understanding the world around them, coupled with a growing responsibility for their own learning. It can help grow into autonomous thinking people who will eventually take some responsibility for shaping their society as well as for technological and scientific advances (UNESCO, 1985)

The problems of implementing this approach go beyond the need for the new curriculum material. Teachers require re-education that will enable them to understand from experience the value of this kind of learning, to reflect on it and to become creative in pursuing it in their own classroom. In-service courses should be designed for this. Change in school science teaching at the primary school level requires more than change in teachers, parents, school principals, inspectors, and administrators have their influence on what can be done in schools (UNESCO, 1985).

Way of communicating with these groups include:

- Inviting principals and inspectors to join in with teachers on in-service workshops
- Using the media where feasible and appropriate
- Bringing parents into schools to see children at work and running special sessions for parents.
- Running workshops which extend the way of working to other subjects as appropriate.
- Recognizing the priority which is given to reading and number work in primary schools and displaying children's work which shows how science activities help this learning. Government should contribute toward improving primary science education. This contribution could come in form of:
- Equipment and materials supply
- Organising and attending meetings, courses and conferences to communicate good practice
- Updating materials for teachers and pupils.
- Training key personnel
- Assessment methods which are consistent with good practice in science education
- Coping with syllabus overload and allocation of time for science
- Bringing about the wider changes in teacher/student relationships required as a context for the kind of learning proposed.

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