MAKING AND USING LOW-COST EDUCATIONAL MATERIALS

THE EXPERIENCE OF THE ASIAN PROGRAMME OF EDUCATIONAL INNOVATION FOR DEVELOPMENT (APEID)

by ALEXANDER DYANKOV

The Asian Programme of Educational Innovation for Development (APEID) aims at stimulating and encouraging educational innovations linked to various problems of national development in the Asian region. One of the problems in many countries has been the lack of adequate resources, resulting in a strong need for the design, development and utilization of low-cost, simple educational materials, using various locally available resources. Such an approach, apart from being economical, proved to be effective, and had the additional advantage of relating education to real-life situations of the learners.

At that time, the prevailing method of teaching was the so called ‘chalk and talk’ method, which could not activate students to participate in the teaching-learning process, and frequently resulted in mechanical memorization of facts and theories, difficult to apply in everyday life. The outdated teaching methods failed to motivate learners, or to help them to comprehend the subject matter by demonstrating or illustrating various phenomena. At the same time, scarcity of resources was an obstacle to the supply of ready-made, commercially available teaching aids, which were expensive and difficult to obtain. On the other hand, many imported teaching aids and models, produced in industrialized countries were also inappropriate for local use, being designed for pupils with different background, culture and environment; sometimes they were unusable, due to lack of electricity, or voltage fluctuations, or they quickly deteriorated, exposed to tropical climate, lack of air-conditioning, etc. In addition, many teachers were reluctant to use imported equipment, and sometimes it ended up locked in storerooms, collecting rust and dust.

At the same time, there were teachers who invented simple, easy to use teaching aids, models, charts, etc. which were also easy to make from locally available materials and resources, and naturally such self-made devices tended to be used extensively. In some cases students were also involved in the design and production of aids like charts and models, practising “learning by doing” and “discovering science”, while experimenting with their self-made devices, which contributed to enhancing their knowledge and skills.

The efforts of APEID participating countries to promote the development and use of such low-cost educational materials resulted in a series of activities being organized at the national and regional level, starting with a Regional Workshop in Educational Technology, with special emphasis on the development of low-cost teaching aids in Malaysia in December 1977, with the participation of 13 Member States.

This was followed by a series of National Workshops on the same subject organized during 1978 in Afghanistan, India, Japan, Malaysia, Nepal and the Philippines. Various indigenous materials being developed and used in these countries were identified prior to the workshops, then were demonstrated, evaluated and improved by the participants, and finally described in case studies.

These six countries, joined by Pakistan, participated in the First Sub-regional Workshop on Educational Technology on the topic of low-cost educational materials, held in Nepal in November 1978.
A second series of national workshops on the same subject were held during 1980 in the following six countries: Bangladesh, Papua New Guinea, Republic of Korea, Sri Lanka, Thailand and Vietnam.

These six countries, joined by Laos, participated in the Second Sub-regional Workshop on Educational Technology and Low-cost Materials, held in Dacca, Bangladesh, in October - November 1980.

Prior to each workshop, the experiences in design, production and use of low-cost educational materials were observed and studied, exemplar models were selected to be demonstrated to the participants. During demonstration, their design and use were discussed and participants collectively developed work sheets describing each device, usually working in small groups, which later reported to the rest of the participants on their achievements. Sometimes these work sheets were collectively improved and guidelines developed for the design, development and use of educational materials, along with instruments for evaluation of their effectiveness.

Usually each APEID regional or sub-regional workshop was attended by many local participants from the host country, and the immediate effect of this was a popularization of the experiences of many other educators. Sometimes the APEID activity was covered by the local media, popularizing it at a large national scale. The agenda of each workshop normally included visits to local schools, teacher training institutions and educational materials production enterprises, exposing the guest-participants to the experiences of the host country. At the end of each workshop, reports describing the countries' experiences in the design, production and utilization of low-cost materials, along with the description of some selected teaching/learning aids, were produced and disseminated throughout the region.

Perhaps the most valuable product of these activities was the initiative of the APEID Secretariat at the Regional Office for Education in Bangkok to select the most original self-made teaching aids and their instruction sheets on "how to make, how to use, how to adapt" these aids, and to publish four volumes of *Inventories of Low-cost Educational Materials*. Each instruction sheet in these inventories provided information regarding the name of the teaching/learning aid, the applicable level of education, the subject area, with instructions containing a brief description of the device, the materials used for its production and how to make it, how to use it, and how to modify it for different situations and conditions.

Gradually these *Inventories of Low-cost Educational Materials* became the most popular APEID publications and were widely distributed within the Asia-Pacific region, and served as a model for other geographical regions, following the successful experience of APEID, as well as for UNESCO Headquarters, where similar inventories have been compiled and published for wide distribution throughout the world.

The following pages contain a few examples from the APEID Inventories of Low-cost Educational Materials.
TRIANGLE

1. BRIEF DESCRIPTION

This is a device to demonstrate to the students that the sum of the internal angles of a triangle is equal to 180°.

2. OBJECTIVE

To develop the idea of one of the properties of the triangle.

3. MATERIALS NEEDED

1. A piece of paper (size about 250 X 200 mm).
2. A pencil, a ruler and a pair of scissors.

4. HOW TO MAKE

1. Draw a triangle on a piece of paper and cut it out. The size of its sides could be, say, 250 mm, 200 mm and 150 mm.
2. Mark the angles A, B and C as shown in the diagram.

5. HOW TO USE

Fold the triangle along the lines mn, sm and nt so as to bring the three tips of the angles together to meet at point D. When the three angles A, B and C are thus brought together meeting at one point, their sum is equal to 180° (a straight angle). This method illustrates that the sum of the three angles of a triangle is equal to 180°.

4.

**METRIC WHEEL**

1. **BRIEF DESCRIPTION**

This device is called a metric wheel because one complete rotation of the wheel from the marked point on its circumference is one meter.

2. **OBJECTIVE**

To measure around curves, crooked paths as well as straight distances.

3. **MATERIALS USED**

A circular piece of wood, bamboo and a ruler.

4. **HOW TO MAKE**

1. From a piece of wood, make a circular disk with a radius of 16 cm.

2. Attach the centre of the disk to one end of the bamboo handle about 80 cm long.

3. Draw a marker on the outer side of the disk to indicate the starting point on the circumference of the wheel.

4. Attach a piece of flexible bamboo strip that will touch the handle and produce a ‘click’ after one meter has been traveled.

5. **HOW TO USE**

1. Make the marker of the wheel coincide with the beginning of the distance to be measured.

2. Count the number of rotations made by taking note of the clicking sound made.

6. **POSSIBLE MODIFICATIONS**

1. Covers of cans may be used instead of a circular piece of wood.

2. The wheels may be marked with decimeters so that distances less than 1 meter can be measured accurately with this device.

1. BRIEF DESCRIPTION

The educational kit consists of fine ferrous particles sealed between two sheets of acetate and one or more magnets to be used with an overhead projector.

2. OBJECTIVES

1. To help learners understand the basic concepts of a magnetic field.
2. To illustrate the properties of magnets.
3. To illustrate magnetic fields created by magnets.

3. MATERIALS NEEDED

1. Two sheets of clear acetate (size 160 X 260 mm each).
2. Masking tape.
3. Third grade ferrous particles (approximately 30 grams).

4. HOW TO MAKE

1. Place two sheets of acetate together and seal three of their sides with masking tape so as to form an envelope.
2. Pour the ferrous particles into the opening of the acetate envelope.
3. Seal the remaining side.

5. HOW TO USE

1. Shake the acetate envelope so that the particles are evenly spread.
2. Place the acetate envelope on an overhead projector to show the initial position of the particles to the students.
3. Place the magnet(s) over the acetate envelope.
4. Let the students observe the various shapes formed by the magnetic field.

6. POSSIBLE MODIFICATIONS

When an overhead projector is not available, place a white sheet of paper under the acetate envelope and proceed as described above.

1. BRIEF DESCRIPTION
This inexpensive simple bamboo lettering pen is a handy teaching aid that can be easily made.

2. OBJECTIVES
1. To prepare a simple learning instrument for drawing letters.
2. To develop a useful teaching aid by using locally available materials.

3. MATERIALS NEEDED
1. A 120 mm long stick of bamboo cane for each lettering pen (see Fig. 1).
2. Sharp knife or razor blade.

4. HOW TO MAKE
Cut the end of the lettering pen at an angle as shown in Fig. 2. Make sure that the end is flat and even in thickness as this will affect the lettering (Fig. 3).

5. HOW TO USE
Dip the pen in ink and begin lettering.


* This particular instruction sheet was developed by the participants from Lao People's Democratic Republic.
STOCKING DOLL AND SPOOL DOLL

BRIEF DESCRIPTION

This is an improvised toy made of empty discarded thread spools, wire, cork and crepe paper.

MATERIALS NEEDED

1. Old stocking
2. Bottle
3. Various sizes empty thread spools
4. Wire
5. Crepe paper
6. Scissors
7. Crayons
8. Cork
9. Corn hair and
10. Glue

HOW TO MAKE

1. Stocking dolls are made of stuffed cotton stockings with painted or embroidered faces. They can be made to stand by slipping them over empty tall bottles. The face features may be painted on; the hair of yarn or abaca or corn hair may be topped with a small hat; and the clothes may be fashioned from cloth scraps or crepe paper.

2. Spool dolls are made by stringing various sizes of empty wooden spools, with cord, soft wire, or pipe cleaners. When the wire is bent it makes the dolls stand or sit as desired.

A few large spools should be used to form the body and regular size spools for the legs. The arms can be made of smaller spools. The head can be made of rounded cork with hair of yarn or corn hair. The eyes, nose and mouth can be painted with water colour or crayon, as desired.

Source: An Inventory of Low-cost/Simple Educational Materials, Games, and Toys in the Philippines.
WORD/BUILDING MATCHBOX TRAIN

Level: Pre-school and primary
Subject area: Learning alphabet and spelling

BRIEF DESCRIPTION

This simple toy requires a number of empty discarded matchboxes marked with a large size letter each. When attached to one another, they may form various words.

MATERIALS NEEDED

1. A few empty matchboxes
2. Paper
3. Felt pen or Crayon
4. Scissors, and
5. Glue

HOW TO MAKE

1. Cut plain paper into rectangular pieces the size of the top side of a matchbox.
2. Draw one letter on each piece of paper and glue it onto a matchbox.

HOW TO PLAY

Let the pupils arrange the matchboxes so as to build the desired word and make a "train" by attaching the matchboxes together.

**SOLAR SPECTRUM**

**BRIEF DESCRIPTION**

The solar spectrum can be demonstrated with a simple experiment in which a plain mirror is dipped at an angle in a glass with clean water and turned around in the sunshine.

**MATERIALS NEEDED**

1. Water glass
2. Plane mirror

**HOW TO MAKE**

1. Place a plane mirror in the water glass at an angle with the bottom of the glass.
2. Add water in the glass and place it in the sun.

**HOW TO USE**

Rotate the glass towards the direction of the sun and observe the spectrum produced.

BIOGRAPHY OF THE AUTHOR

ALEXANDER DYANKOV

(Bulgaria)

From 1969 to 1989, Alexander Dyankov occupied several posts in UNESCO, in the field and at Headquarters, as programme specialist in educational technology.

From 1989, he has been a consultant to UNESCO.