Learning Resources for Mathematics and Numeracy – Primary Education

By

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Many children today do not like Mathematics and the most common reason for negative attitudes are based upon lack of proper understanding of the subject which in many cases is due to Mechanical Teaching and upon plain boredom – a product of uninteresting teaching. Research finding within the past twenty years into the psychology of learning provide unchallengeable evidence that sound and lasting learning can be achieved only through active participation. Mathematics and numeracy are aspects of our daily lives which children should be encouraged to learn through practical every day experiences.

Mathematics is a discovery of relationships and the expression of relationships in symbolic form – numbers as in Arithmetic, letters as in algebra or diagrams as in geometry. Mathematics relationship can be discovered and communicated in a variety of ways. Mathematics truths always have two sides with realities lying in the same time and space, with the other, they face and have relationships with one another.

Example:

When you add ** to **** you get 6******

$$\left.\begin{array}{l} 2 + 4 = 6 \\ 4 + 2 = 6 \end{array}\right\} \text{ Addition}$$

The relationship between 4, 2 and 6 can also be expressed in

$$\left.\begin{array}{l} 6 - 4 = 2 \\ 6 - 2 = 4 \end{array}\right\} \text{ Substraction}$$

$$2 \times 3 = 6$$

$$6 \div 3 = 2$$

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(d) Realia: Realia are those things – real objects – that relate to the daily life of people. They include costumes, tools, dwellings, carvings, media of exchange (brass rods, cowries, manillas, etc.), coins of other lands, brass work, farming implements, etc. The use of realia are based on the belief that a great deal of learning takes place in essentially non–verbal situations. Non–verbal learning takes place when the child is meaningfully engaged with some concrete object – be it a model, an ancient artifact, a lump of clay, a pair of chopsticks. Both the teacher and the children can collect *realia* from the community. The exercise of collecting is itself rewarding.

(e) Field Trips: The field trip is the time honoured device for taking children to realia and resource people, but the places visited should be chosen with discrimination. For instance, a visit to a real farm may not necessarily be the best way to study agriculture as the farmer may have a limited knowledge of agricultural production, processing, and distribution of food crops. An agricultural experimental farm, or a market garden may staff experts better qualified to discuss plant growth or food production with young children.

The field trip enables children to see spontaneous human interaction in the adult world. For example, to see a local council in session is to see the interaction of members. The excitement when a plane comes into an airport, or a train pulls into a station, or the confusion and activity at a motor park are difficult to get from any source other than direct experience. But excitement alone is not enough. The teacher has to direct their observation before hand by telling them some of the things to look for.

(f) Museums: These are rare in the country but they do exist in some parts of the country, for example at Nri, Oron, Jos, Lagos, Ife etc. For those who are lucky to have one near the school, museums are invaluable sources of historical material, and should be exploited. The school can even start a small museum from its own collection of realia.

(g) Government Documents: Some government publications make good reading material. Publications by different Ministries contain a wealth of material on industries, commerce, activities of governmental agencies, news from different parts of the state, etc. The Ministry of Information could be contacted to supply these materials regularly to schools.

R 3 4 6 are all related in various ways. To gain an appreciation of Mathematics and numeracy, children must have experience and knowledge of these aspects of the subject. In talking about learning resources for mathematics and numeracy, we first of all have to think of what we want children to know about the subject, in other words what are the aims of learning or teaching mathematics. What do we want children to get from Mathematics. These are sevenfolds:

1. To make children think for themselves.
2. To give children a knowledge and appreciation of mathematics as a creative subject making them aware of its order and patterns, of its vital presence in everyday life and in the environment.
3. To give children a facility with numbers and with quality relationships Mathematical concepts can be reduced to seven.

i. Sorting out and classifying objects into sets comparing sizes of sets by matching of one to one correspondence, learning the language and later the symbols of inequality i.e. greater than and less than.

ii. Counting objects in set i.e. cardinal numbers. This involves putting each object into one to one correspondence with one in a series.

iii. Conservation of numbers and the composition of numbers. The number line i.e. numbers in sequence and the development of one an awareness of the place value in the number notations 1, 2, 3, 4, 5,

4. Measurement and money. Conservation of measured knowledge of the relationships between one and another

Unit	Tens	Hundred
1	11	111

5. Simple fractions i.e. halves, quarters, three quarters.
6. Various aspects of the addition, substraction, multiplication and division as these arise in the real situations of the classroom or the life around the child.
7. Size and shape (proportion the learning resources for acquiring these concepts and skills) are many and varied.

Many of these resources are infact unconsciously provided by the children in the environment and through their own play outside the classroom. The learning resources for Mathematics and numeracy can be discussed under three headings.

A. Real Life Situations: By real life situations, I mean providing opportunities for children to learn either in the library, classroom, and the environment. Librarians, teachers, and parents can stimulate children. For example, a visit to the Amusement park or the Zoo can provide children with ample opportunity for learning numbers. Here is an example.

Mummy and Tayo went to the Zoo, Mummy paid 10k for herself and 5k for Tayo at the entrance, how much did Mummy pay altogether? This is simple addition learning real life situation. Tayo had five bananas, he gave two to the elephant, how many did he have left? Simple substraction. Mummy had four sweets and ate 2, and gave Tayo two. Simple division into four will give 2.

We can take a classroom situation where the teacher wants the class cupboard tidied. The children took the objects out and arranged them in sets. Infact children's first Mathematical experience is with sets and many children will be able to compare one set with another — 2 pens, six pencils, 3 erasers, 5 rulers. We can add up the total number of objects in the cupboard. We can compare by way of substraction, there are six pencils and 3 erasers which is greater and by how many. There are other ways in which mathematics can be learned in the classroom. Many classrooms have a shop corner in which buying and selling is actually practised so that when you buy a packet of biscuits for 3k and you give the teacher 10k you get 7k change. In order words 10—3 = 7.

B. Concrete Objects: These are common objects which children play with like seeds of fruits, pebbles, marbles, palmkernels etc. Children use these for certain counting or guessing game which have mathematical implications. When I was a child, a popular game was done with little stones or palm kernels. You throw a nut up and pick two up at the same time catching the one up in the air. This kind of game, besides teaching addition and substraction, also teach Mathematics precision i.e. time the moment to catch the nut in the air.

Another common object is water. Many children like to play with water. In learning about volume and fluids, water comes very useful. The children can actually pour water from one utensil or the other. Playing with models such as building blocks not only help children to estimate match or measure but also help them to get familiar with Mathematical shapes such as squares, triangles, circles etc. There are many toys both local and imported which teach Mathematics concepts

in the shops. These can be purchased as part of library resources in schools. Infact, toys are essential learning resources for mathematics and numeracy. Because of their attractive forms, children find them appealing.

Beside toys and local concrete objects, films, slides pictures, posters and other resources carry mathematical information. For example, there is a fill in our Media resources centre entitled "Mathematics in the Primary School". Other Mathematical films are Area, Shape and size.

Space Exploration: Without mathematics, precision space exploration would not have been possible. Other non–book materials for learning mathematics are flash and picture puzzles.

C. Books: Books are the librarians stock in trade. They are and will continue to be the most important learning resources any library can have. Books for learning mathematics can be divided into three classes: text books which are normally recommended by the school and which every child is expected to possess. Most text books come in series to enable children to learn the subject in a systematic way thus graduating from one level to the other. An example of a text book is *Evans Primary Mathematics Books 1–6* intended for primary school children. The librarian's function is to enable children to broaden their outlook and learn beyond what is required in the classroom. Some shall not spend much time with recommended text books which teachers and children already know about. We are going to concentrate on a few non–text book resources.

i. Reference Books: These are books as their names suggest which children refer to for quick information on certain topics. They can be encyclopedias, dictionaries, directories etc. There are no specific encyclopedias offering quick information on mathematics and numeracy for children but most science encyclopedias deal with mathematical problems. Some of the reference books which children will find useful in learning mathematics and numeracy are:

1. *Baker, Susan ed Answer Book of London, Henlyn 1975 – 3v*
2. *National College of Education, Evanton: Your People's Science Encyclopedia Chicago children's press 1970 20v.*
3. *Pitt Valorie, John Danitih and Alan Isaac eds Sciences Encyclopedia London, Hanylin 1976.*
4. *Wolf, Donald ed. The Science Library: New York, Crosset and Dumlap 1969 6v.*

Reference books are usually used in the library. They cannot be taken from the library on loan. Many reference books contain a brief information on the subject. But many articles do contain further readings which interested children can pursue further.

ii. Supportive Books: Finally, there is a third type of books which I will like to name supportive books. These are the books that supplement classroom learning teaching.

For very young children, there are simple counting books mostly picture books. Sugita, Yutaka *One to Eleven* London, Evans, 1971. Wildsmith Brian, *1, 2, 3,* London Bodley Head, 1966.

There are also picture story books with mathematical implication. For example, many of the books in the Mac Donald First Library. Size, Shape, Number, to mention a few. Srivastor, Jane Jonas. Area Illustrated by Shelly Freshman, London, Adam and Charles Black 1976 – *Weighing and Balancing* by the same author.

Charosh, Mannis, *Straigth lines, Parallel lines, Perpendicular lines,* illustrated by Enrico Arno London, Adam and Charles Black 1971.

For older children there is Littlewood, Miscellany, Sawyerr, W. W.

a. *Vision in Elementary Mathematics* Hooper, Algred. *Makers of Mathematics.* London Faber, 1967. In reviewing this book in 1968 the *Formal Further Education* remarked "From a book of this kind certain types of student will learn more mathematics in a month than in a year of normal study not because the drill is here but because the stimulusis."

b. Littlewood, J.E. Mathematician's *miscellamy,* London Methuen 1969.

c. Sawyerr, W.A. *Introducing Mathematics* four volumes consist of the following:

i. Prelude to Mathematics
ii. Vision in Elemantary Mathematics
iii. The Search for Pattern
iv. A Path to Modern Mathematics

In these four volumes the author takes the reader from the rudiments of mathematics like simple numbers and counting to more sophisticated ideas like the theorem or quadratic equations. Those who are not specialists will gain from these books enough Mathematical knowledge for normal everyday living.

d. Taylor, L F *Numbers* Lander Faber, 1970. There are also Mathematical games and puzzles for stimulating the mind.

i. Barnard, D St P *Fifty Observer brain–twisters*

ii. Scriptive, Nicholas E *Fifty Wit–Sharpeness*

CONCLUSION

In the search for materials, very few books by Nigerians which were not designed as textbooks are available. Text book materials are not of interest in this study.