

NEP-2020

Foundational Numeracy

Foundational Numeracy means the ability to reason and to apply simple numerical concepts in daily life problem solving. When children acquire the following skills, it is said that they have developed number sense and spatial understanding. It includes the ability to:

- i. Make an understanding of quantities.
- ii. Develop concepts like more and less, and larger and smaller.
- iii. Establish relationships between single items and groups of items (seven means one group of seven items which is one more than a group of six items).
- iv. Use symbols that represent quantities (7 means the same thing as seven).
- v. Compare numbers (10 is greater than 8, and three is half of six).
- vi. Arrange numbers in a list in order: 1st, 2nd, 3rd, etc.
- vii. Visualise shapes and space around them.

THE NUMERACY SKILL INCLUDES

- i. Solving daily life problems using four fundamental operations – addition, subtraction, multiplication, and division.
- ii. Relating Mathematical knowledge with the surroundings; applying logic to daily life, thereby developing ability to think mathematically, and taking logical decisions with reasoning.

NEED OF EARLY MATHEMATICAL SKILLS

a. Numeracy is important for developing logical thinking and reasoning in daily life. We need numeracy to solve problems and make sense of numbers, time, patterns, and shapes etc. for simple daily life activities like cooking, traveling, playing, shopping, communication etc. These are not just skills, but life skills which every child should acquire and develop. Focusing on the basic numeracy skills in the

foundational or early years will eventually improve the achievement of learning outcomes at later stages.

b. Dealing with numbers and spatial understanding are integral part of any communication and daily life discourse. Without being able to do basic calculations, a child cannot progress in the education system and eventually in life. No doubt some skills develop naturally with the daily life experiences and the context in which child grows, but a systematic intervention helps in building a strong understanding of mathematical ideas that lays a foundation for having better life skills like criticality, creativity, communication, and problem solving.

c. It is noteworthy that during early years the mathematical foundations are laid and can be effectively complemented with the provision of relevant and meaningful learning experiences to the children. The major determining factors for effective foundational Mathematics learning are awareness and understanding of concept of early Mathematics skills among stakeholders, teacher's and teacher educator's competence, curricular flexibility, and availability of resource material for teachers and children through pedagogy that keeps child's contextual experiences at the center.

d. From a future perspective, research has also linked foundational numeracy to increased employability and higher GDP. It is directly correlated to increased workforce participation and opens opportunities for social and economic advancement. These basic skills make an individual well-equipped for facing life situations and have better life outcomes.

MAJOR ASPECTS AND COMPONENTS OF EARLY MATHEMATICS

During the learning of Mathematics at early stages, a child is expected to:

- i. Count and understand the numeration system.
- ii. Learn conventions needed for mastery of Mathematical techniques such as the use of a base ten system to represent numbers.
- ii. Perform simple computations in her/his own way up to three-digit numbers and apply these to their day to life activities in different contexts.

iv. Understand and use standard algorithms to perform operations of addition, subtraction, multiplication, and division on numbers up to three digits.

v. Learn vocabulary of relational words to extend his/her understanding of space and spatial objects. vi. Identify and extend simple patterns starting from repeating shapes to patterns in numbers.

vii. Collect, represent, and interpret simple data/information in his/her daily life activities.

These have been put into 7 major themes:

i. Pre-Number concepts

ii. Numbers and operations on numbers

iii. Shapes and Spatial Understanding

iv. Measurement

iv. Patterns

v. Data Handling vii. Mathematical Communication The early Mathematics skills associated with each topic are elaborated further along with opportunities for enhancing these skills.

Pre-Number Concepts.

Mathematicians and psychologists have often argued that before children start counting objects or develop an understanding of number, they need to be able to classify, order and set up one-to-one correspondences to some extent. Since these skills are preliminary to the understanding of numbers, they are called as pre-number concept.

The following are the essential requirements for counting:

- Every time when objects in a group are counted the objects are classified into two subgroups of objects counted and to be counted.

- While counting is done it is important to organise or serially arrange the objects so that neither an object is counted more than once, nor some objects are left.

- uncounted. • Number names in an order or serial need to be known before attempting to count.

- A one-to-one correspondence is established in the groups of objects and the numbers like for every group there is a corresponding number and for every number a group can be formed.

Children grow up counting their toys, toffees, people at home or other small sets of objects. They are often asked who has more/less or are there enough objects in their regular conversations. So, when schools begin to develop the understanding of pre-number concept, they should build upon the child's experience from his/her familiar context.

a. Classification involves putting together things that have some characteristics in common. So, when organising tasks on classification, we must make sure that the activities are meaningful to them and, they are familiar with the objects which she/he must classify. Initially children should be encouraged to classify on one property/characteristic only. Gradually, complexity of the task should be increased where they can classify on more than one property such as colour, size, shape etc. This will later help them in understanding number sense.

b. Seriation involves ordering a set of objects according to some rule. Intrinsically, it also involves ordering objects in two directions. For example, the child applies the relations 'bigger than' and 'smaller than' at the same time. It also means understanding the logic of transitivity which means that if A is more than B and B is more than C, then A is also more than C. Seriation also forms the base for understanding of patterns. Thus, it should be build using the objects from the familiar contexts of children and initially using 3 objects only. Gradually, children should be presented with more objects to seriate.

C. One-to-one correspondence involves matching or pairing of objects. For building upon the understanding of one-to-one correspondence, children need to understand the meaning of 'many and few', 'more than/ less than' and 'as many as'. Teachers need to design tasks contextual to child's context so that the child relates and uses them in daily life experiences.

Thus, while introducing a concept, we should devise as many different activities as possible with variety of materials, so that children can correctly glean and generalise it. At every point they should be encouraged to talk about what they are doing and how they are doing it giving them ample

space to express. Teachers need to use concrete material and toys available around the child in providing opportunities to develop above pre number skills.