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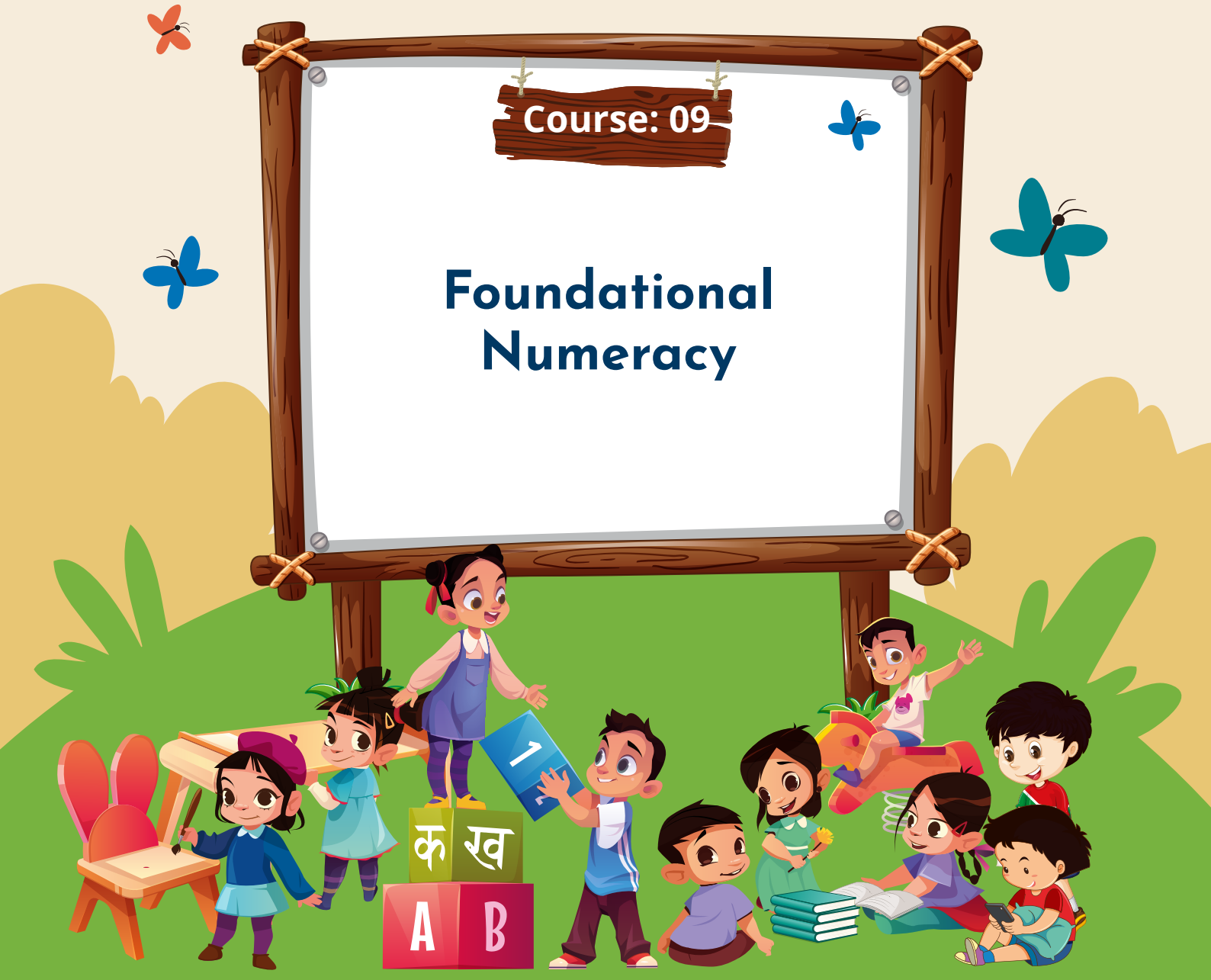
NCERT

NISHTHA FLN

National Initiative for School Heads' and Teachers' Holistic Advancement (Foundational Literacy and Numeracy)

Course: 09

Foundational Numeracy



Preface

Ensuring strong foundations in literacy and numeracy is vital for every child in school and throughout life. These foundation skills are the most reliable predictor of longer-term educational outcomes and personal and economic wellbeing. Thus, Targets 4.1 and 4.2 of Sustainable development goals state: "By 2030, ensure that all girls and boys must have access to quality early childhood development, care, and pre-primary education so that they are ready for primary education and also complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes.

The National Policy on Education (NEP, 2020) highlights that a large proportion of students currently in elementary school - estimated to be over 50 million in number - have not attained foundational literacy and numeracy, i.e., the ability to read and comprehend basic text and the ability to carry out basic addition and subtraction. NEP further recommends that attaining foundational literacy and numeracy (FLN) for all children will thus become an urgent national mission, with immediate measures to be taken on many fronts and with clear goals that will be attained in the short term (including that every student will attain foundational literacy and numeracy by Grade 3).

As per the recommendation of NEP, a National Mission on Foundational Literacy and Numeracy has been set up by the Ministry of Education, known as the National Mission on Foundational Literacy and Numeracy (NIPUN Bharat) for ensuring that every child in the country necessarily attains foundational literacy and numeracy by 2026-27. A comprehensive guideline has been issued for the implementation of the NIPUN Bharat mission by the Ministry of Education. The National Mission lays down priorities and actionable agendas for States/UTs to achieve the goal of proficiency in foundational literacy and numeracy for every child by the end of Grade 3.

Teachers are at the center of all the teaching –learning process therefore it becomes imperative that they are trained in creating learner centred, educationally stimulating, classroom environment using story based, toy based, art and sports based pedagogies which provides more experiential learning to children and makes teaching learning more participative. They also need to use research based pedagogies for teaching numeracy and literacy across curriculum and address multilingual classroom environment. Teachers also need to shift to competency based teaching learning and assessment methods. The Principals / Headmasters as leaders must also be trained to support the teachers. The NISHTHA (Foundational Literacy and Numeracy) focuses on all these important aspects through 12 Courses.

Introduction to FLN Mission - This course provides an introduction to the FLN Mission, NIPUN Bharat and the role of different stake holders.

Shifting towards Competency Based Education (CBE) - This course highlights the need for shifting towards CBE. It discusses the three developmental goals of FLN, the competencies of the three developmental goals and codification of learning outcomes as given in the NIPUN Bharat guidelines.

How Children Learn: Understanding Learner? - This course describes ways children learn, their learning needs, and the strategies to address them as children vary in cognitive abilities and styles that make them think and behave differently, analyse differently and make decisions accordingly.

Involvement of Parents and Communities for FLN - Community engagement is critical for achieving the FLN mission goals. This course describes how the partnerships of schools with parents, families and community can support learning by children. It suggests how to create and nurture these partnerships.

Understanding *Vidya Pravesh* and *Balvatika* - This course is describes the transaction process of '*Vidya Pravesh*' (school preparation course for initial three months Grade-I) and '*Balvatika*' programme (one year programme before Grade-I) which are meant to prepare children with cognitive and linguistic competencies that are pre-requisite for learning to read, write and develop number sense through a play-based approach.

Language and Literacy - The course apprise teachers about how children learn to read and write and develop their language skills in social and academic contexts and how the classroom assessment should be done.

Multilingual Education in Primary Grades - This course elaborates on the importance of including children's home languages in early years of learning, and what are some strategies that can be useful to facilitate that. We hope that this course helps you develop a positive attitude towards the use of children's home languages in teaching learning processes.

Learning Assessment - This course aims to help teachers to develop and enhance their knowledge in 'Assessment for Learning' and improve foundational literacy and numeracy skills of children through different methods of assessment.

Foundational Numeracy - This course helps teachers develop an understanding of the content knowledge, pedagogical processes and assessment in the area of foundational numeracy and mathematical thinking to form a strong foundations of numeracy among children.

School Leadership for Foundational Literacy and Numeracy - This course has been conceptualized for primary school heads and teachers with the prime objective of developing them as school leaders and teacher leaders who can lead their school for achieving foundational literacy and numeracy targets for children in the age-group of 3-9 years.

Integration of ICT in Teaching, Learning and Assessment - The course enables a teacher to understand the purpose of using technology, parameters to be considered for effective integration, and also to explore various possibilities of technology integration.

Toy Based Pedagogy for Foundational Stage - This course provides an overview of Toy Based Pedagogy across the Foundational Stage. This course focuses on helping the learner to explore their immediate environment and the world of toys, and games and practice the use of toys and games in classroom processes.

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COURSE 09

Foundational Numeracy

Course 09: Course Information

Course Overview

Description of the Course

This course is designed to help teachers and workers in early childhood education and care centres like anganwadis, standalone nursery schools and nursery schools attached to primary schools in building their understanding of numeracy. Thus, the course contains the content knowledge and pedagogical processes to form a strong foundation of early mathematical and numeracy skills integrated with literacy among all children up to the age of 8-9 years.

Keywords

NISHTHAFLN, NUMERACY, FOUNDATIONAL, MATHEMATICS, PRE NUMBER SKILLS/ CONCEPTS, CLASSIFICATION, SERIATION, ONE TO ONE CORRESPONDENCE, SUBITIZATION, NUMBERS, NUMERALS, COUNTING, OPERATIONS, ADDITION, SUBTRACTION, SPATIAL SENSE, 3D AND 2D SHAPES CUBE, CUBOID, SPHERE, CYLINDER, RECTANGLE, TRIANGLE, CIRCLE.

Objectives

On completion of this course, the learners will be able to:

- Acquaint yourself with the need for Foundational Mathematics and Numeracy among children
- Explain the terminology and skills associated with Foundational Mathematics and Numeracy
- Provide appropriate intervention within and outside classrooms to help children have a strong Foundation of Mathematics and Numeracy
- Apply assessment tools to continuously understand the learning strengths and gaps (weaknesses) to provide timely help to each child in the class.

Course Outline

- Skills associated with Mathematics and Numeracy: Classification, Seriation, One to One Correspondence, Spatial sense, etc.
- Need of Early Mathematical Skills
- Aspects and Components of Foundational Mathematics and Numeracy
- Pedagogical Processes to enhance Foundational Mathematical (Numeracy) Skills
- Assessment of Foundational Mathematics and Numeracy

Module 1

Introduction to Foundational Numeracy

Module 1:
Introduction to Foundational Numeracy

1.1 Foundational Numeracy: An Introduction

Watch the Video

Scan the QR code to watch the video

Or

Click on the link

https://diksha.gov.in/play/content/do_31345960146318950411 4

Transcript

Dear learners,

Hello friends, so we are going to talk to you on another very important aspect of Foundational Literacy and Numeracy and that is Numeracy. In this course you are going to learn about what numeracy is? How it is defined? Over the years the definition of numeracy has changed and what changes has taken place this all is given in this course. You will be able to learn about why it is important to learn about numeracy to give emphasis on numeracy? Why the National Education of Policy has emphasized on Foundation strong Foundation Literacy and Numeracy? This all is given in this course. You will also learn about the pedagogical processes what are required in order to have a strong foundation of literacy and numeracy. For numeracy, what are the basic skills which are required. Those skills haves been explained in detail along with the activities which can be conducted with the children in order to make them understand about the mathematical learning. Friends, in this course lot of activities are given which you can conduct and our request to you is while you are going through this course you please conduct the activities with the children surrounding you. You may be having some children in your home, 3 to 6 year age or may be in your surrounding wherever you find may

be in a centre, may be in a school where ever you find you please conduct these activities with the children. You will also learn to contextualise these activities according to the child's context. Some children are from better economic status, some are from some lower socioeconomic status and so on as per the child's status, child's culture you will be able to modify these activities should rather do this along with the course. So, while you are studying the context part of this. Kindly make it useful to the learner so that they should enjoy it, they should learn by joyful act not as a pressure where as say for example while learning numbers we ask them to cram number names in an order which is certainly not required so what is required, that is given in this course and then in the end you will find the processes which are required particularly integrating assessment. Why assessment is important that is also given, you probably may have also learnt in this whole course on Foundational Literacy and Numeracy about assessment but as per numeracy the assessment techniques have also been given here. So you will also have an idea how assessment is to be integrated with day to day teacher learning process so that we should be able to understand whether children are learning appropriately, as appropriately as they should or not or If there are certain learning gaps occurring during teaching then how these learning gaps are to be bridged. So, these all ideas have been given in this course and the major part of this course friends is your own creativity. Your own understanding about this because whatever is written may not be applicable to all the children. So, kindly while you are reading, conduct these activities with children and gather your own understanding about this, write your own journal about how children are learning? What type of learning gaps are there? What type of questions normally children are asking? You have to this is very clearly mention here that you have to provide that opportunities to children to interact because mathematical communication has been taken as a very important aspect. So, the skills which are required those has been explained very exhaustively here in this course and I hope that this will help you in making your own understanding and also to teach students in your schools or at the center to make their foundation on numeracy integrating with literacy very very strong so that while children will enter class III or beyond class III they should work with mathematics in a confidence. In that confidence in which they will not have any fear of mathematics.

Module 2

What is the Need of Early Mathematical Skills and Foundational Numeracy?

Module: 2

What is the Need of Early Mathematical Skills and Foundational Numeracy?

2.1 Let's Understand the Concept of Numeracy

Watch the Video

Scan the QR code to watch the video

Or

Click on the link

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Transcript

Well friends, so we are going to have an interaction on what is there in the course for numeracy. This course is part of Foundation Literacy and Numeracy course and I hope you may have already read this course and on reading and conducting activities with children, you may be having certain questions in your mind. I have with me Miss Gunjan, who will, who is also having certain some questions. These question may be similar to those which you are having in your mind or may be some different questions are there. So, it will ask Gunjan to ask questions and then I will try to answer your queries.

Gunjan Khurana: So sir, my first question is we usually talk about counting when we start with early learners but the course talks about pre number concepts so what are they and what is their relevance with the counting?

Prof. Anup Rajput: Good.. Now to understand this let us count the number of objects placed here. These are say one, two now.. observe the process of counting. This is one then two then three and so on. What I'm doing? Every time when I am

counting. I am dividing or classifying these complete groups into two parts. One part is of the objects which have already been counted, another which are to be counted. So one, two, three so every time this is classified into two parts. This classification is considered to be a very very important skill while we count, while we talk about numbers. Now again see when I am saying if say one so I have associated a number with this and this will be associated with all those objects which are having as many number of objects as these number of...these.... cubes are there. Say for example this, this is also one, my finger is also one and so on. So, therefore one is associated with this, then two .. number two is associated with this group and when I am saying about two then i every time this type of group is coming into mind or when I am looking into this number two is coming to my mind. So this one two one correspondence between a number name and the number of objects in a group this one to one correspondence is another important skill which we require before we go for counting and the third one is if we say 1, 2, 5, 7, 3 the counting will never be okay. So you now to have a good counting or exact counting what we need is these numbers in an order. So 1, 2, 3, 4 this seriation is very important seriation of number names in an order and if we do not consider this seriation counting will not be appropriately okay. So therefore, seriation is considered to be another important pre number skill and this seriation normally now these three when we develop classification, seriation, we start them without talking about counting. We do not tell a child that you are going to be count objects thats why these are required. They..they enjoy. So we do conduct activities for classification with large number of objects on the basis of colour, on the basis of shapes, on the basis of size and so on. Similarly, we go for seriation on the basis on of size, on the basis of length and so on. Then we go for one to one correspondence between two groups one group is having certain number of object another group is having another certain number of objects, so there is one to one correspondence we make so for example boys and hats so one to one correspondence, one boy one hat, one boy one hat, one hat one boy. So, these one to one correspondence... such activities we conducted, large numbers of activities we are conduct at a preschool stage. So we make learner ready to count before we start counting or before we start talking about numbers.

Gunjan Khurana: Okay ..so the main pre number concepts are classification, one to one correspondence and seriation. Is it Right sir?

Prof Anup Rajput: Absolutely

Gunjan Khurana: So, Sir, how should these skills be enhanced in preschoolers?

Prof Anup Rajput: As I mentioned children are required to be engaged in such activities where in they are having opportunity to classify objects say for example, we are having these objects are placed here. Now, if they have to classify on the basis of colour so the colour classification yellow and the other colour, not yellow so children may classify like this. This is one attribute on the basis of which the classification has been done by the children. There may be more than one attributes but that increases the complexity of the task. So, we should increase the complexity but gradually, slowly when child is of age three year probably only classification on the basis of one attribute is important and then slowly and slowly when child age is of age four year or when experiences are added. This not much related with the age but related with the experience. When experiences are slightly better then you can say introduce one more attribute than on the basis of three attributes, four attributes and so on. So classification. Similarly for seriation, you can say children normally seriate wherein they for example one bigger object and on which smaller object is placed another smaller object, another smaller object, they cannot, ... they normally have this understanding that a bigger object is not to be placed on a smaller object because that may not be stable enough. So that's children already have, they are doing certain seriation but even then on the basis of length for example, sticks of different lengths are given to them and they have to arrange them. There may be say material of different utility they have to arrange them say for example there are pictures of their daily routine activities. They are say waking up in the morning, then taking bath, then taking breakfast, then readying for school, then doing activities in the school and then coming back for home and there are pictures. These picture are to be arranged in an order, there are pictures related to stories, where children have arranged to them so these are activities which are to be conducted for one to one correspondence. There may be say for example two groups where in one group there are boys and another group there are hats. So children have to arrange one boy, one hat, one hat one boy and so on. So they can then also come to know that which one is more, number of boys is more, number of hat is more or both are equal and so on. So, more or less is also coming when children started one to one correspondence.

Gunjan Khurana: Yes Sir, I understood it. And sir one another question is, sir as we all know numbers is an integral part of a child's life but when we talk about number sense or development of number sense, is learning about number same as development of number sense or there is something more to it?

Prof Anup Rajput: No, see, our understanding about learning numbers is only about counting and reciting numbers in an order. If my child is able to recite

names in an order, I understand or people used to understand that my child has understood counting whereas that is not counting. Number one, for counting one simple test is there, see when a child is able to give me number of objects as per the number say for example if I say, if I ask you take out five blocks from here. So will you be able to do it? Take out five.

Gunjan Khurana: Okay, one, two, three, four, five. These are five blocks.

Prof Anup Rajput: So you are able to do it. Now if I ask you how many are these?

Gunjan Khurana: So, one, two, three, four, five, six, seven. So these are seven blocks.

Prof Anup Rajput: These are seven blocks. So two different types of activities the child is able to do. Number one, when a number is told the child is able to extract or form a group of objects as per the given number and second is when a group of objects is given he is able to tell me the number corresponding to this group. When a child is able to do these two we understand that the child has understood the counting process and is now slowly initiated the idea of having number sense. By number sense the child must be able to now understand what is relationship between six and five. See six is one more than five, five is one less than six. Say if five can be divided into two parts, three and two, six can be divided into two parts three and three and so on. When child has this understanding, we say the child had started having number sense.

Gunjan Khurana: And Sir, apart from numbers, a child also encounters shapes around him. So can we include the concept of shapes with numeracy?

Prof Anup Rajput: Of Course! Yes. When we say numeracy we are not only talking about numbers and counting. It is more about the reasoning, more about a way of thinking. Mathematics is a way of thinking, which is logical, for which child is having reason for everything whatever he/she is saying. If I ask why you said this? Child must be having some idea why? So when child is starting explaining why, communication skill is improving, child is having ideas about thinking and so on. Thinking is also involved whatever the child's experience is and shapes are in much more manner in child's experiences rather than numbers. Because shapes are all around the child. So shapes child normally seeing knows the names of those shapes, size of their shapes and so on or the relationship between two shapes. How say, for example if I have now these two shapes with me, so let's see these two shapes. Child must be seeing these two but there are certain relationships, there are some similarities with these two shapes and there are some differences in these two shapes. Child has started making out these differences. Child knows what is the difference between glass and bottle. If you ask a child aged two year

probably he may not be knowing the name of the shape itself but probably yes he will be able to tell you lot many differences or the similarities between the two shapes. And that is what in child's daily life. So, therefore shapes are all around and when we talk about numeracy skills they includes shapes. In addition to shapes there are certain vocabulary related to shapes and positions and that say for example above, below, in, out, right, left and so on. So child must be able to use these vocabulary in an appropriate manner. Means where this word 'in' should be used appropriately used. And this child can do with exposure and experience when child is provided lot of opportunities to work with this and to use this vocabulary child will understand where this is to be used, what is the right use of words here and so on means in is to be used or out is to be used. When you say in, child will slowly or gradually will also make an understanding the relativity of these words, say for example 'in', with certain references something is in and in other references something is out. So child will also consider may be at later stage when experience is enriched child will make out that there is the relativity when we say in or out, when we say anything, when we say large, when we say long, when we say short, when we say tall, tall may be with reference to something it is tall with reference to something it may be short. So, I think this thing is very important aspects, the shape are very important aspects and this we consider in the name of spatial understanding. So, this spatial understanding includes two number one the shapes, their names, their chartersistices, the similarities between two shapes difference between two shapes and another is the spatial vocabulary, their exact meaning, their exact uses.

Gunjan Khurana: Sir, we talked about development and strengthening of problem solving skills in the children. So are these skills relevant with preschoolers also?

Prof Anup Rajput: Of course! why not? See every person may be a child of aged two months has certain problems for which he or she is finding solutions and solving. So problem solving related with numeracy, related with mathematics obviously is there. So, children have lot of such activities surrounding them for which say for example child is already having some number of toffies with him and now he or she has given to younger or elder brother or sister. And now how many are left? how many are given? So if these many are left can I give to mumma also? can I give to some more to other? So there are many such situations which probably child is interested in finding out solutions to them. These are very small simple problems which are around every child and these require to be the..the attitude of solving problems by using the knowledge which is already there. Attempting a solution then testing the solution and then modifying the methods solving the problem, this all is required with the young child also. Say for example addition

of numbers and subtraction of numbers. So, I have 10 rupees with me. I bought something for 5 rupees, bought something for 3 rupees. If I gave 10 rupees to the shopkeeper, how many rupees will I get back? So obviously, lot of mathematics is required. 5 plus 3 is 8, 10 minus 8 is 2. So, child will be able to do all otherwise, there may be 'n' number of different ways. I have 10 rupees. I bought something for 5 rupees, so 10 minus 5, 5 rupees are left. I bought something for 3 rupees 5 minus 3, 2 rupees are left. So instead of adding 5 and 3 child is only subtracted 5 from 10 and then 3 from 5. So, this probably there are many ways of solving. Children should be provided opportunity of attempting such different ways of solving problems and ultimately reaching to problem solving. So, very important aspect. Later on we see when child is entering into some may be higher classes we do not use our knowledge which is required in order to solve problems. We only use that problem to say get good marks in examinations. So, we have to move beyond that and NEP has very clearly mentioned that problem solving is the skill which is to required to be develop among children.

Gunjan Khurana: So Sir, that means we should use contextual situations before introducing a concept? Is it?

Prof Anup Rajput: Of course! Very important. Whatever material is given in this course, all teachers I will request you please read this, try to do these activities with children but contextualize this. Everywhere the situation will not be same, every child is different, different in context. So you have to have different types of activities. You have to modify activity as per child's context. You have to create examples, you have to create situations as per child's own context. So that child should having a relationship between what is happening in the classroom and what is happening at home. So, this continuous relationship should be developed. So therefore contextualization is very important aspect. Until child relates that whatever is given in the book, whatever my teacher is doing with me, that all is my daily life. Until child is realizing that there is no use of any education.

Gunjan Khurana: Sir, my last question is, we usually talk about literacy and numeracy skills together, so are they interrelated or is there any connection in them?

Prof Anup Rajput: Of course. There is a strong connection. See, I used to say this if I extract if I takeout number names, number names from your daily language, will you be able to express yourself, whatever, whenever you want something. For example, now if you have to tell me see, how many are these objects? And without using any number name. Will you be able to tell? Not at all, it will be very-very difficult. Either I have to use my fingers or a group which has as many objects as these are. Or if the number of groups, this numbers of groups became larger

and larger. I will not be having any group associated with this which I can show or otherwise I have to keep that may be say the numbers of pebbles in my bag and I'll say how many objects are? How many sheeps are there in your herd? I'll say these many sheeps are there in my herd as the numbers of pebbles are. If I do not use the number name. So, therefore number names is very important aspect of say.... my communication. Similarly, thinking, I thinking and I am using words related to vocabulary related to mathematics in my daily life, daily language, I am making out meaning out of that. So, I cannot say child for this is my bifurcation for child that this is numeracy, this is literacy and this is may be mathematical thinking this is social science, this is EVS, this is science and so on. This is our classification. Children are having some problems and they are finding solutions. So, for them, they try to understand the world. And when they try to understand the world, they try to communicate they demand to know what others are saying and they want to tell others what is going in there mind, then a strong language is required for which mathematical language is important aspect. So, without mathematical language no communication can be complete and for any communication, we need language for which mathematical language is also an important aspect. So, we cannot say that number names are mathematical language but say describe its properties of shapes. For example for this object, slowly I will say... Okay. These have these many corners but then later, I'll understand may be at say... class 4, Class 5 somewhere, I understand that these are called vertices. So, I'll say these have these many vertices these many edges, these surfaces have plain surfaces, this surface is rectangular surface. This is a mathematical language. I will be in a better way to express until I use a rectulagar surface I cannot express as appropriately as it is. So, therefore it is essential that I should be able to use this language in order to express this. That's why mathematical language is having another important role in communication. Otherwise we will not be able to communicate appropriately.

Gunjan Khurana: So Sir, can we start by bringing child's own language in maths classroom?

Prof Anup Rajput: Of course! Yes. And this not only in case of mathematical language, this is for any language development. Child's home language/home vocabulary is very important. Child say...for example childs may not having any idea about new words which we are using but child may be saying something else for that. Having the idea of that concepts, having the idea of the object but not the name as such as we are saying in my language. So, probably when I say edge, I may not having the idea of edge. But child say for example which is coming from a Hindi family and he is saying 'Kinara' Toh chalega. There is no problem which

we say child is started saying may be when we are teaching child is started saying this has these many Kinaras. Isme itne Kinare hai, isme itne kone hai toh, when child has started saying, you should accept it. From there gradually we will build up the mathematical language. I hope I am able to answer some of the queries raised by Gunjan Ji. Do you have any other query Gunjan?

Gunjan Khurana: No Sir, you have explained it very well.

Prof Anup Rajput: So friends, I hope you also made out something from this after reading your course. Either if you have already read this course then this interaction will help you. Or if you have not read then now go for reading and try to correlate whatever we have discussed here that with your reading with the material given in the course and you will find that now you are able to develop a better understanding and in case of any other queries you can write to us.

Thank you very much.

2.2 Activity 1: Try Yourself

Most children learn counting early but they may not associate the number with quantity. For example, two-year-old Neha can recite numbers up to 10 easily but cannot make use of her knowledge of the number sequence to count objects. When asked to give six toffees, she gave whatever she could pick at one go.

1. From the above example, think and reflect on these questions.
2. It is evident that the child is not able to count correctly but she is able to count from 1 to 20. Is reciting numbers in order the same as counting?
3. List the possible mistakes that the children in your class make while counting?
4. What are the probable reasons for each of the listed mistakes?

Module 3

What are the Major Aspects and Components of Early Mathematics and Foundational Numeracy?

Module: 3

What are the Major Aspects and Components of Early Mathematics and Foundational Numeracy?

3.1 Aspects and Components of Foundational Numeracy

Aspects of Foundational Numeracy.

During the learning of mathematics in early stages, a child is expected to:

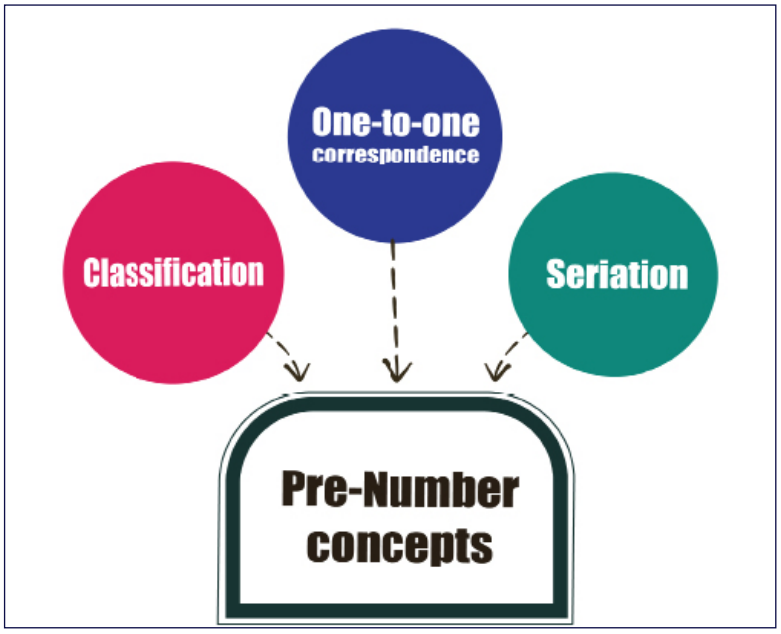
- Count and understand the numeration system.
- Learn conventions needed for the mastery of mathematical techniques such as the use of a base 10 system to represent numbers.
- Perform simple computations up to three-digit numbers and apply these to their day–to-day activities in different contexts.
- Understand and use standard algorithms to perform addition, subtraction, multiplication and division on numbers up to three digits.
- Learn vocabulary of relational words to extend understanding of space and spatial objects.
- Identify and extend simple patterns starting from repeating shapes to patterns in numbers.
- Collect, represent and interpret simple data/information in daily life activities.

Components of Foundational Numeracy

Pre-Number Concepts

Mathematicians and psychologists have often argued that before children start counting objects or develop an understanding of numbers, 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 pre-number concepts. Recall the process of counting. The following are the essential requirements for counting:

- Whenever objects in a group are counted they are classified into two sub groups of objects, counted objects and to be counted objects.
- While counting, it is important to organise or serially arrange the objects so that neither an object counted more than once nor are some objects 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. For example, for every group there is a corresponding number and for every number a group can be formed.



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 also that they are familiar with the objects that a child has to classify.

Seriation involves ordering a set of objects according to some rule. Intrinsically it also involves ordering objects in two directions. For example, a child applies the relation of '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 patterns.

One-to-one correspondence involves matching or pairing of objects. 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 the child's context so that the child relates and uses them in daily life experiences.

3.2 Activity 2: Check Your Understanding

Do the activity by scanning the QR code

Or

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https://diksha.gov.in/play/content/do_31345957712305356815 36

3.3 Numbers and Number Operations

Numbers are the mathematical tool to count and measure. Numbers are used in many forms. Three major types of numbers are: cardinal numbers, ordinal numbers, and nominal numbers. Cardinal numbers are used to measure and communicate the size of a group of objects, for example, 30 students of Class V went for a picnic. Ordinal numbers are used to describe the position of an object when they are arranged in a specific order, for example, the fourth child from the left has brown hair. Nominal numbers are used as nouns/labels to identify the object in a group, for example, train number 2298 has just left.

The objective of foundational numeracy is to develop a number sense in children, which is the ability to think and work with numbers. The key skills that come under this category are number sense, reading of symbols, writing words and symbols, comparison of numbers like bigger than/smaller than, etc., fundamental operations – addition, subtraction, multiplication, division and their applications in daily life.

Problems involving operations such as addition, subtraction, multiplication and division allow the children to move beyond counting concrete objects to more abstract uses of numbers. These operations have wider applications in daily life.

The operations of addition and subtraction are complementary to each other. Addition is a combination/aggregation of distinct sets of like entities while subtraction is the exact opposite that is take away or left over from a set of elements. Similarly, multiplication and division are also complementary to each other. Multiplication is done by repeated addition while division by repeated subtraction. These operations are not just to develop computational abilities in children but to use them as tools for problem solving in daily life context. This would feed into the higher aim of mathematics as a problem-solving tool.

The problems which commonly use addition and subtraction involve an increase or decrease of some quantity, combination of two or more objects and comparison of objects. A common strategy to represent subtraction problems are 'take away'/ 'left over' problems. There are some informal strategies in dealing with addition and subtraction of small numbers as it helps to build a 'number sense'. These operations are useful to interpret, represent and solve simple problems in daily life context.

All children have ample opportunities to develop the ideas of numbers and operations on numbers in their local context within and outside their learning environment.

To achieve skills of handling numbers, the following approaches can be followed:

- While teaching numbers, the concept of groups of tens should be used using a variety of objects like sticks, pencils, etc.
- Involve children in matching and sorting objects using one-to-one correspondence and ordering objects that vary in colour, size or other parameters.
- Encourage children to count different groups of objects and to think about quantity and number.
- Use strategies that help children learn to count accurately and efficiently such as pointing to/touching/moving each object being counted.
- Draw attention to numbers and how they are used such as house addresses, prices of objects marked on packets, etc.
- Use words related to estimation – more than, less than, about, nearly, approximately and in between.
- Ask children to estimate or how many by looking at a group of objects. Encourage them to test for the actual answer.

- Play games that include counting and using numbers like simple board games, card or dice games, etc.
- Give children problem solving situations involving combination, taking away, equal distribution of objects so that they can make the concept of addition, subtraction, multiplication and division.
- Engage students with some fun loving and learning-based activities so that they can develop the concept of different operators.
- Encourage children to use vocabulary, such as together, take away, number of times, equal sharing.

3.4 Shapes and Spatial Understanding

Spatial understanding is the area of mathematics that involves shape, size, space, position, direction and movement. It helps describe and classify the world we live in. Spatial sense gives children an awareness of themselves in relation to people and objects. The key concepts include 3D shapes and solids, flat and curved surfaces of solids, 2D shapes as seen on surfaces of a solid shape, for example straight lines, curved lines, shapes made of straight lines, curved lines etc., for example triangles, quadrilaterals, circles, etc.

Since children are familiar with the shapes of objects around them, it is better to explain differences between shapes by making a connection with other objects, such as this is round like a ball, etc. When children use their own language or common vocabulary, they can communicate what they find through their explorations. It helps them to generalise and to understand the concept better. Later, they can relate this base of understanding to the formal mathematical vocabulary.

The teachers may follow the approaches given below.

- Encourage children to identify different shapes as they draw, look at different objects, work with puzzles, and building blocks.
- Give children many opportunities to handle objects such as blocks, boxes, containers, shape sorters and puzzles.
- Encourage children to climb in and out of boxes or large block structures, on or around outdoor equipment, and over, under, around, though, into, on top of, and out of different things to experience themselves in space.
- Encourage children to make new shapes by putting materials together and taking them apart in different arrangements. They can do this by moulding clay or playing with blocks.

- Introduce spatial vocabulary, including location and position words – on/off, over/under, in/out, above/below, front/behind, top/bottom; movement words – up/down, forward/backward, toward/away from, straight/curving; distance words – near/far, close to/far from, shortest/longest, etc.

3.5 Activity 3: Try Yourself

In a classification activity for identification of a shape, a circle, the teacher gave the children a few round buttons and a few square buttons. The round buttons were red and the square buttons were yellow. Then the teacher held up a round button and asked the children to select the round buttons from the pile of buttons.

1. Do you think it is an appropriate activity to build the concept of a circle? Justify.
2. Can the teacher be sure that the child who has done the activity correctly has understood the concept of circle? Justify.
3. How can you modify this activity for the development of the idea of a circle?

3.6 Measurement

There are innumerable situations that we face in our daily life, which involves dealing with quantities, for example, buying clothes, constructing wooden items and buildings, cooking a meal for guests, etc. Measurement is an inherent part of human life, which dominates successful and smooth functioning either being used in the accomplishment of routine work or in an occupation. This majorly contains the understanding of the following attributes of measurement:

- Length/distance
- Weight/mass
- Volume/capacity
- Time
- Temperature

While comparing and measuring, children should be encouraged to make a guess or do a visual estimate first, and later verify their guess or estimate by carrying out more systematic comparison or measurement (or by using a specific instrument).

Thus, measurement is a topic that is inherently activity-based. There is plenty of opportunity for children to actually measure and to work in groups. We can encourage this. Measurement involves both understanding and skill.

The following approaches may be followed by the teachers:

- Give ample opportunities to use language of comparison – use appropriate attribute words for different situations.
- Let children figure out the units of measurement. Children understand standard units like meters, centimeters, grams, litres, etc. better when they have a lot of experiences working with their own way of measuring and comparing in non-standard units.
- Involve children in activities such as block building, cooking, craftwork and other experiences that involve measurement.
- Look for opportunities to help children make comparisons and measurements of volume, height, weight, length, and temperature in day-to-day conversation.
- Provide simple experiences that help children begin to develop an understanding of the concept of time by comparing how long different activities take. Start with daily time references (after the story, before lunch) and proceed to more abstract concepts (yesterday, tomorrow, months, years, etc.)

3.7 Patterns

Patterns are all around us. Patterns can also be seen in numbers, shapes, sounds, etc. Arrangement, repetition, and order are important in many branches of mathematics. Patterns can be identified on the basis of colour, shape, size, etc.

As patterns are all around us, it is important to develop an understanding of patterns. Identification of the pattern helps in enhancing observation and analytical skills as while identifying the pattern, one should observe the similarities, dissimilarities, repetition, non-repetition, growth/decay, etc. Describing patterns helps in enhancing vocabulary and improving language, which is one of the important aspects in mathematics learning. Patterns can be identified on the basis of a particular rule. For example, counting numbers have a pattern, each number is one more than the preceding number and each number is one less than the succeeding number.

Patterns can be of many types like sound patterns, number patterns, patterns in shapes, patterns in colours, patterns based on symmetry, etc. Working with patterns usually consists of four major steps. Teachers need to conduct appropriate activities within and outside classrooms to develop the conceptual idea of patterns among children. Some suggestions are:

- **Identifying pattern:** Pattern can be identified by observing the rule which the pattern is following. For example, whether it is a repeating pattern, progressing pattern, etc., such as 1, 2, 1, 2 or 2, 5, 8, 11, etc.
- **Describing the rule:** After identification of the pattern, the next step is to describe the rule and identify the unit of repeat (in case of repeating patterns). Let children see patterns around them and form rules to extend similar patterns on sarees, tiles, borders, etc.
- **Extending pattern:** Further extending the pattern by using the unit of repeat. For example, in the pattern 1, 2, 3, 1, 2, 3, 1, 2, 3 the unit of repeat is 1, 2, 3. So by recognising this unit of repetition, the pattern can be extended further as 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3, and so on. Similarly, for any repeating pattern, once the unit of repetition is recognised by the child, the child can easily extend the pattern.
- **Creating new patterns:** Once the child is able to achieve the above three steps, the child can start creating new patterns by identifying, analysing, extending and exploring patterns further and using one's own creativity.

3.8 Data Handling

Data refers to information in a raw form, which is collected from various sources. Having access to data and the capacity to interpret data can be a source of power. The availability of data, which is reliably and systematically collected, makes a system transparent. This is important for a democratic society. It is only when people have confidence in their own capacity to handle and interpret data that they will also seek data.

We collect data when we need to answer a specific question, a problem or when we want to understand a situation in general. This may be because we need to make a decision. It is noteworthy that though data answers some questions, at the same time it raises further questions, which cannot be answered from the data. Data collection and handling are usually thought of as a part of statistical activity and so only of interest to people specialising in statistics. We rarely acknowledge the fact that in everyday situations, we are collecting and using data. A teacher is collecting data even when she takes the attendance of children in her class.

The major components of data handling include collecting, representing and interpreting simple data, recording data using tally marks, collecting data and representing in terms of pictograph, choosing appropriate scale and unit for display through pictographs, and drawing conclusions from the data.

The following approaches should be followed:

- Organise activities and provide opportunities to record information in numbers and to draw inferences or make decisions out of it.
- Involve children in discussion to highlight the importance of recording information.
- Create situations in such a way that the child uses own ways to record and present the information in a meaningful manner.
- Give opportunities to children for exploring ways of recording and presenting data and draw inferences from the data.
- Encourage children to participate in activities and discussion, raising questions, making interpretations, etc.
- Engaging students with group assessment where students work as a group and collect and present data and draw inference based on it.

3.9 Mathematical Communication

Mathematical communication refers to a process by which information is exchanged between individuals through mathematical symbols, signs, diagrams, and graphs. It encompasses both listening and reading (comprehension) and both speaking and writing (expressions).

Language plays a crucial role in the construction of knowledge. Thus, it becomes imperative to think carefully about the role language plays in the learning of mathematics. Every discipline has a specialised language. Mathematics also borrows words from everyday language, but gives them special meanings. When the children begin solving simple problems presented through words in the mathematics class, they begin working with the mathematics language. 'How many?', 'Altogether how many?' 'How many are left?'are all examples of the use of mathematical language. Children mix such mathematical language with their ordinary, everyday language while discussing a mathematical problem.

All children need to understand the mathematical language and its relationship with one's home language. They must communicate meaningfully during the course of developing numeracy and mathematics skills. This will help them in having a strong foundation of numeracy.

3.10 Activity 4: Check Your Understanding

Do the activity by scanning the QR code

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Module 4

What are the Pedagogical Processes to Enhance Foundational Mathematical (Numeracy) Skills?

Module 4

What are the Pedagogical Processes to Enhance Foundational Mathematical (Numeracy) Skills?

4.1 Pedagogical Processes to Enhance Foundational Mathematical (Numeracy) Skills

The teachers and parents have to devise/design appropriate activities and material in context with the child's surroundings and experiences. All activities and interaction with children should focus on experiential learning and use of manipulative and concrete material. Some of the suggested processes are:

- **Learner centric pedagogy:** A change in the role of teachers from information providers to facilitators has to be done. This should also be re-emphasised in the curriculum, textbooks and teacher training curriculum. The curriculum, textbooks and pedagogy should focus on development of skills rather than content. It should enable children to solve other problems too and not just textbook problems.
- **Providing scope for exploration and mathematical thinking:** The classroom environment cultivates the spirit of exploration and visualisation of concepts that lead to mathematical thinking. Different ways of calculations and strategies for problem-solving need to be explored (other than employing standard algorithms) along with many diverse ways of communicating the results of exploration. The teacher should modify her role from an information provider to a facilitator who creates situations/contexts for creating understanding and exploration.
- **Use of manipulative/toys (toy pedagogy):** Providing hands-on experience is an integral part of mathematics especially in the lower classes. It provides an implicit understanding of concepts in children, which a child may not understand when told explicitly. Toys and manipulatives also help children in visualising concepts. Lot of indigenous toys are generally available in every child's surroundings. These should be used as important resources for teaching and learning of mathematical skills.
- **Mathematics in daily life:** Pedagogy should be such that the understanding with real life applications is given more space like including life application projects and assignments. Assessment of these projects and assignments should be part of the all-round year long school-based assessments.

- **Medium of instruction:** The language, which a child brings from home, plays a big role in the mathematics classroom. The instruction should be given in the home language so that the child can easily understand it. Mathematics learning should not seem like learning some foreign language for the child. No doubt a strong linkage of the home language with the language of mathematics will help the child in understanding and communicating mathematical ideas.
- **Integrating mathematics with other subjects:** Mathematics is not just a subject. It is a language, which is used in learning all other subjects like languages, environment, science, etc. Short stories, poems, rhymes, simple riddles, etc. usually involve different aspects of our life and provide opportunities to think holistically and link mathematics with other subjects or vice-versa.
- **Communicating mathematically:** Creating a classroom environment provides confidence among students to raise doubts, ask questions, participate in discussions and share the child's thoughts and imagination. An environment should be created where the child expresses observations, understanding and the teacher moulds that understanding mathematically. The skill of meaningful problem posing needs to be enhanced to think and communicate mathematically.
- **Giving space to alternate strategies supporting problem solving:** Creating facts and formula – not promoting rote learning of facts, formulae and procedures should be encouraged in a mathematics classroom. Instead of emphasising on standard algorithms, the teacher should encourage diverse ways of problem solving with peer learning and collaborative learning. A teacher should provide support and confidence to the students when they struggle with problem-solving so that mathematics anxiety is avoided.
- **Joy in mathematics (recreation with mathematics):** Mathematics curriculum needs to emphasise on experiential learning and provide scope for learning flexibility by integrating the use of poems, rhymes, stories, riddles and puzzles, local art and culture, and games to help students enjoy the learning.
- **Space for errors in the child's room:** In all mathematics classrooms, every response/question of the student needs to be treated with respect. Care needs to be taken about discussing them with the class. Such an environment will encourage students to raise questions and voice their doubts. Moreover, a child's errors provide a window to the teacher and parents to understand how and what the child is thinking and the way the child is progressing in learning mathematics.

- **Collaborative learning:** Collaborative or group learning should be practiced with students that is, learning from each other and helping each other to learn. Such an approach will help the teacher focus on many other aspects of the classroom. Peer learning also helps children in developing conceptual understanding and mathematical communication without any fear and hesitation.
- **Assessment:** There is a need to develop a continuous and comprehensive assessment system, which assesses the student for her understanding, knowledge and problem-solving skills. School-based assessment should be given more prominence to help children to understand the learning strengths and gaps.

4.2 Activity 5: Share Your Thoughts

A child, when asked to subtract 17-9, wrote 12 as an answer. What does this tell you about the child's thinking and how will you help the learner better understand the concept of subtraction? Share your thoughts.

Steps to be followed:

Step 1: Accessing the activity page

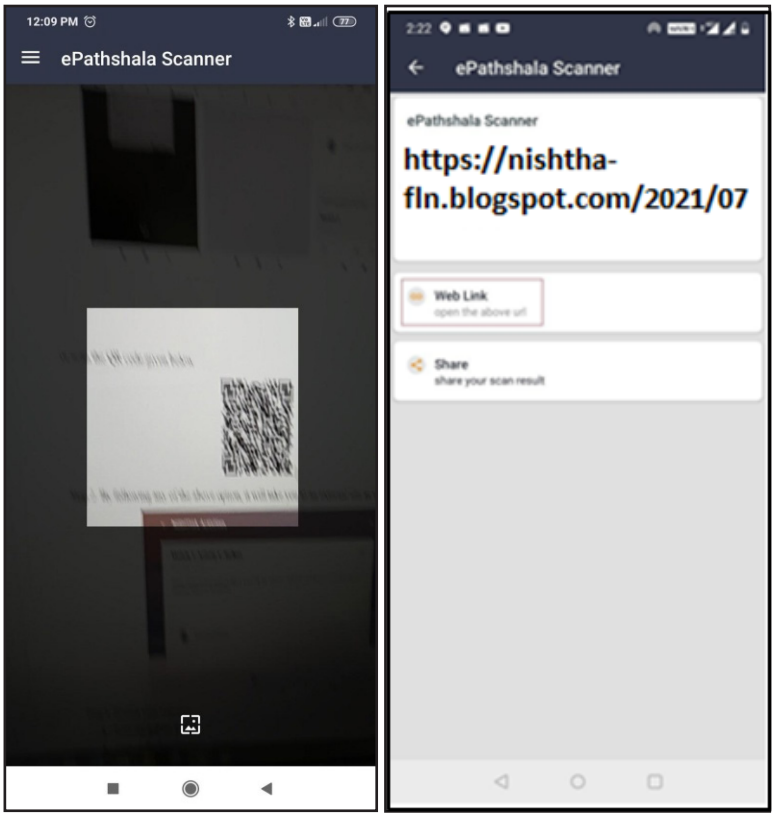
Follow any one of the following option to access the activity page:

Option 1: Type the URL in a browser https://tinyurl.com/course9activity5

Option 2: Download this pdf from DIKSHA and copy this URL.

https://nishtha-fln.blogspot.com/2022/02/course-9-activity-5-share-your-thoughts.html

Option 3: Install mobile app '**ePathshala Scanner**' from play store. Using the app, **scan the QR code** given below.



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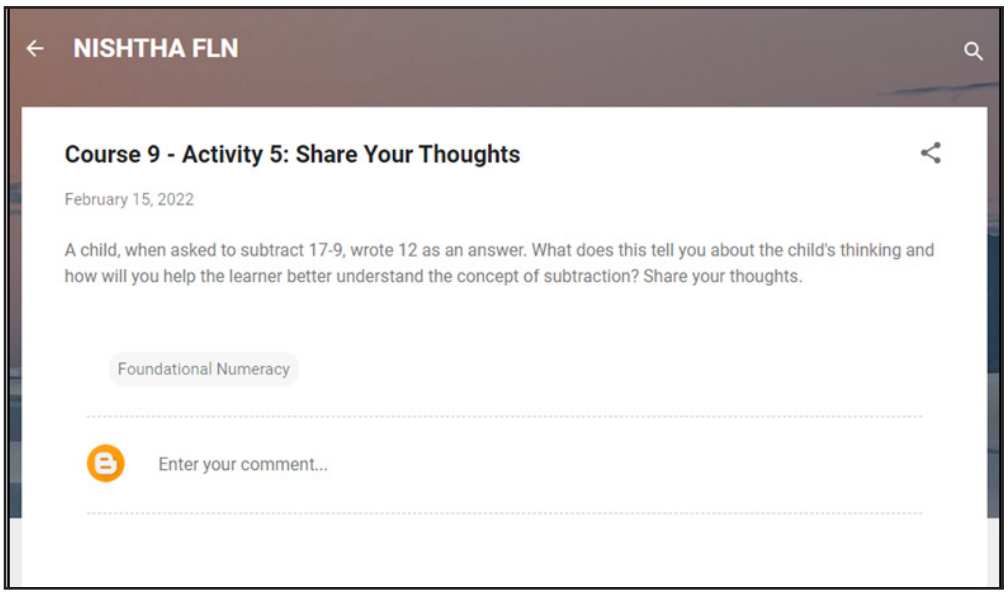
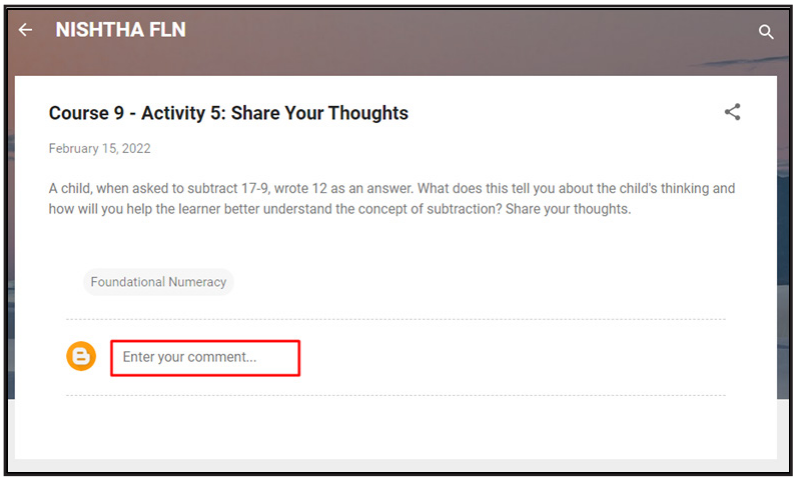
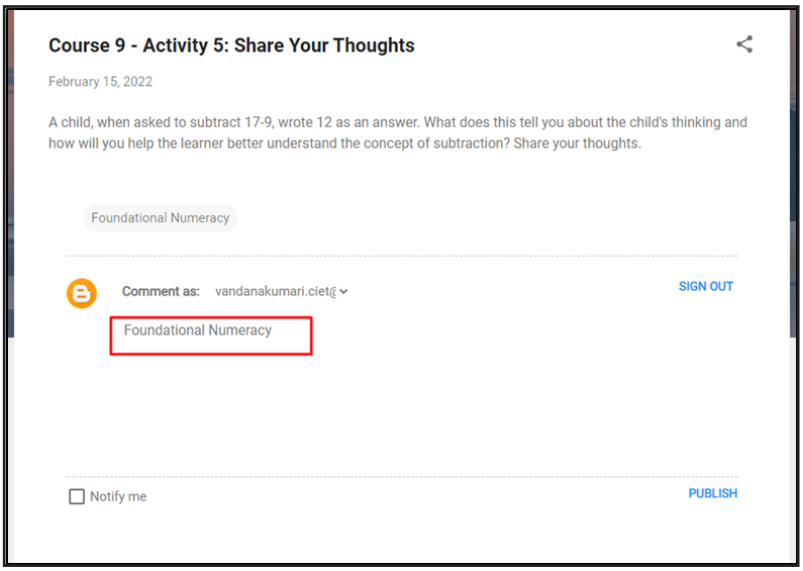


Step 3: Post your response

- Read the given activity
- Click on **Enter your comment**



- Type your response in the comment box.



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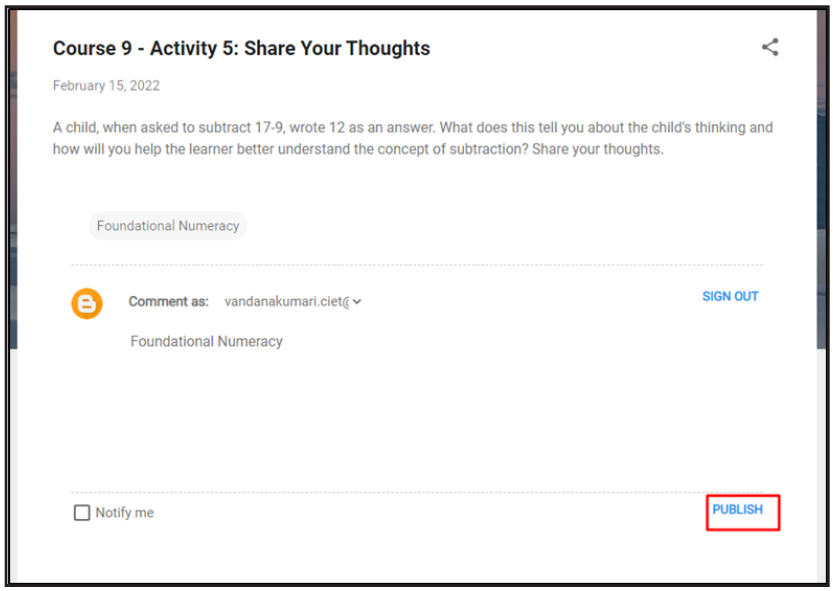

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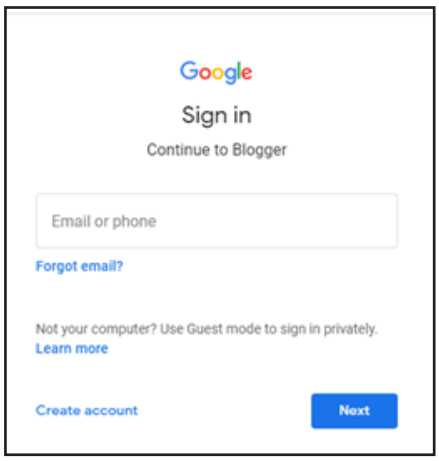

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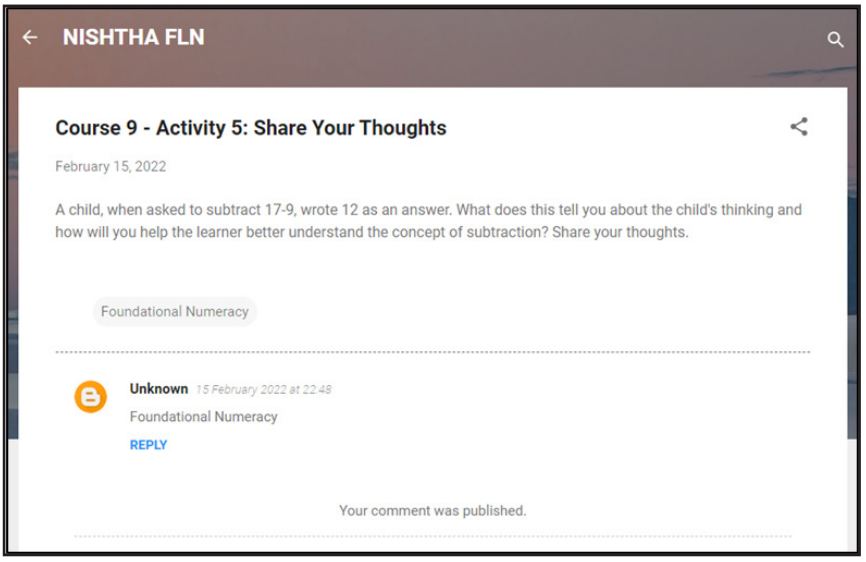

Module 5

How Can We Assess?

Module 5
How Can We Assess?

5.1 Assessment Processes

Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.

Assessment is an integral part of learning. So, it should not focus on testing the memorisation skills of the learner, rather assessment should itself be considered a form of learning. This will help in developing better curriculum, pedagogies and teachers for students. These assessments become very crucial in the context of early grades as some of the skills which are integral in these grades, like listening and speaking, etc. can't be assessed by the standardised paper-pen tests. So, there is a need to bring in some interventions in this field too. Some of the suggestions for the same have been shared below.

- ***Multiplicity of assessment tests and techniques:*** India is a diverse nation, so 'singular' tests can't be used to assess the numeric skills of all the students of a nation. So, multiple assessment tests need to be created according to the socio-cultural, economic, geographical and linguistic demands of the areas.
- ***Development of model assessment test based on learning outcomes:*** The assessment tests should be subjective and according to the learning level of children of the classes. This subjectivity should not malign the ultimate aim of attainment of foundational numeracy among the learners. So, the competencies identified for this stage should be the prime focus while developing these assessment tests, so that parity can be maintained in the tests.
- ***Development of question bank:*** The teachers should develop a pool of questions related to varied aspects of foundational numeracy for the students of different age groups. The learning outcomes/competencies of each class should be considered while developing the question bank.
- ***Creation of audio-visual tools for assessment:*** Some audio-visual tests can also be developed to understand and assess the attainment of numeracy and mathematical skills among the learners. They may be appropriated by the different state governments as per their needs.
- ***Learning levels assessment tests:*** Teachers can also devise their own learning levels assessment test for learners, where they can identify the learning gaps in learners and help them in their better understanding. These tests can also help teachers in reflective understanding of their pedagogy.

A teacher can assess a learner using a range of skills which the teacher identifies as essential for understanding. For example: skills for numeracy can be counting, advanced counting, early additive part-whole thinking and advanced additive part-whole thinking, spatial understanding (shapes, sizes, location/positions), etc.

5.2 Activity 6: Share Your Thoughts

To assess the child on number operations, a teacher frames a question paper at the end of the lesson with multiple choice questions only. Another teacher divides the concept of number operations into smaller sub-units and observes how the child responds to activities designed for each sub-unit. The teacher maintains a file of each child's sample work done in that unit in a portfolio and uses it to write the report looking at their portfolio. Which strategy would you like to adopt in your class and why? Share your thoughts.

Steps to be followed:

Step 1: Accessing the activity page

Follow any one of the following option to access the activity page:

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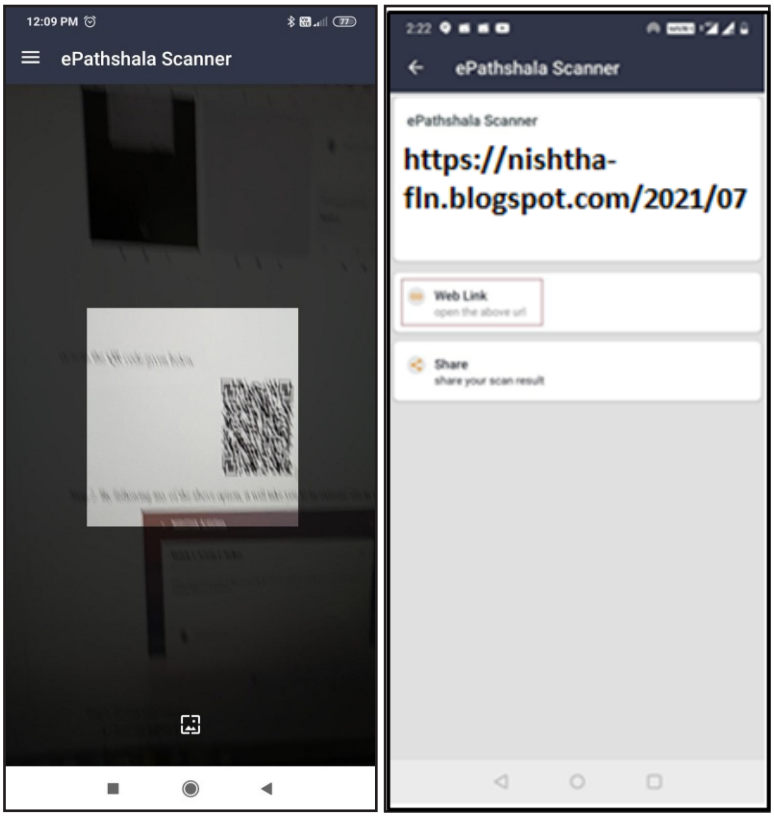

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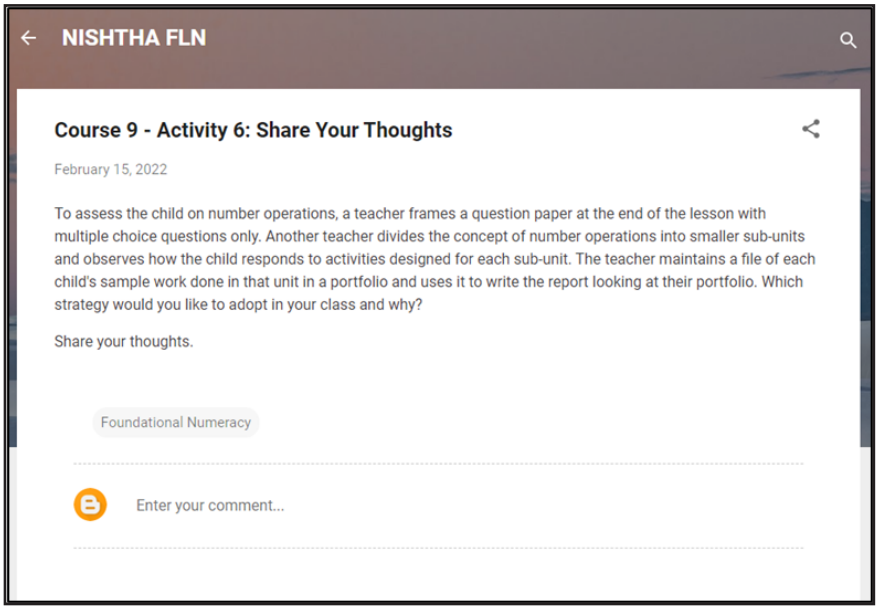

Step 3: Post your response

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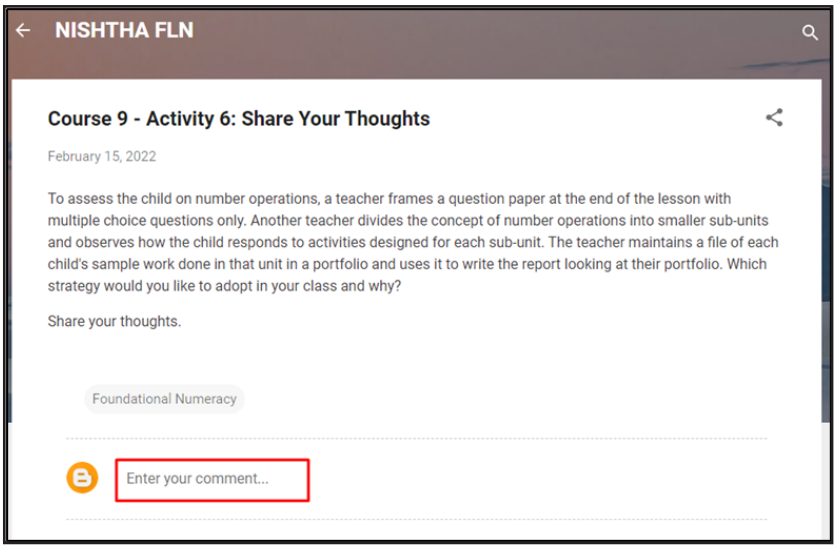

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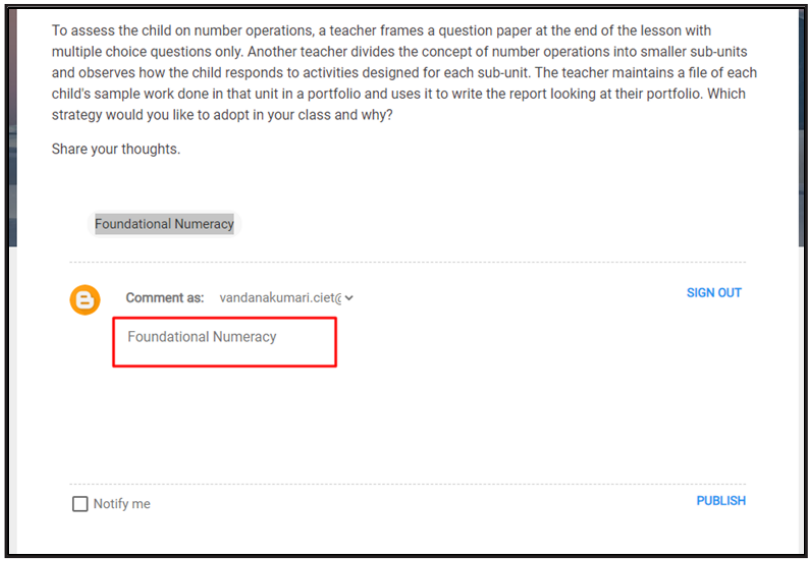

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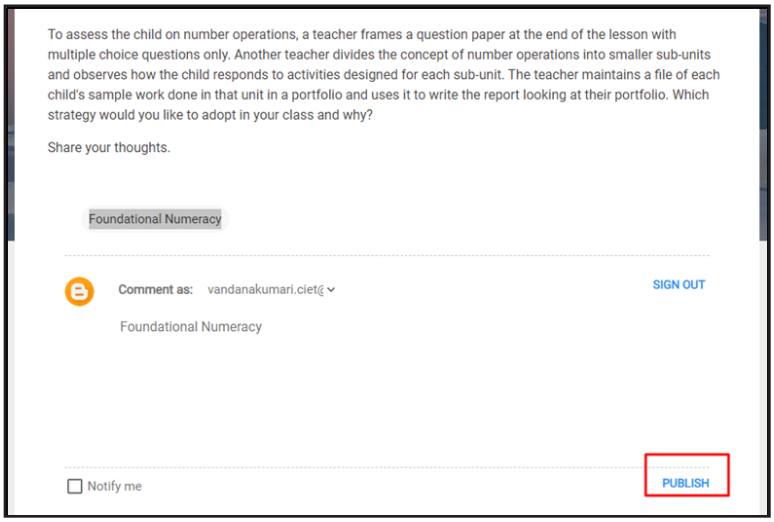

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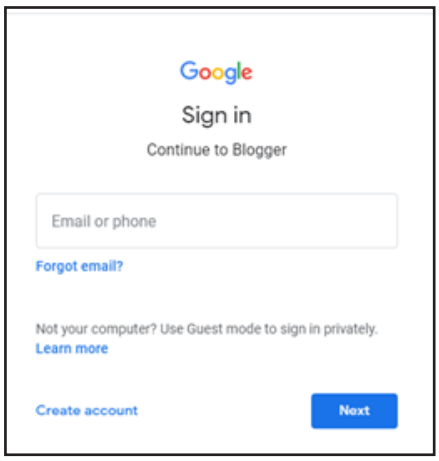

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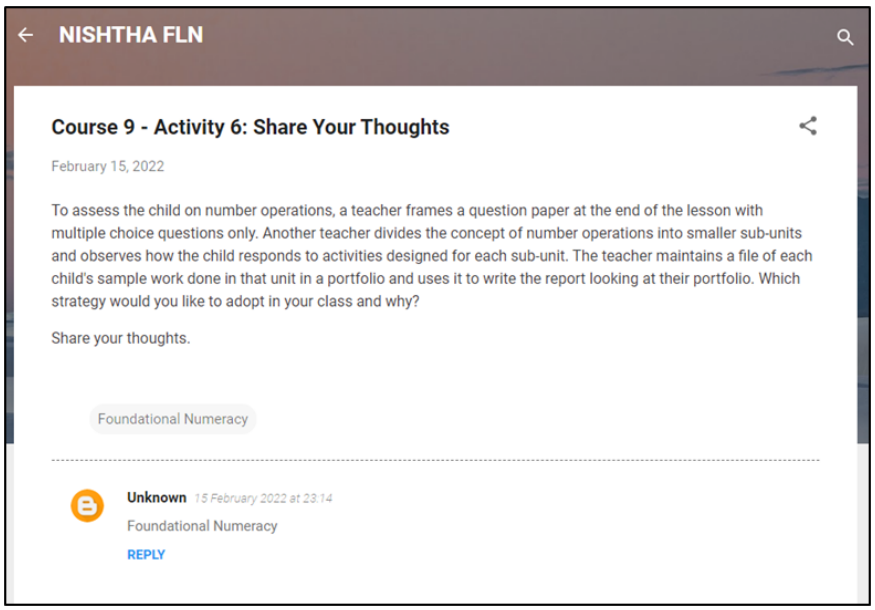

5.3 Assessment Through Rubric

Watch the Video

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Transcript

Hello Friends,

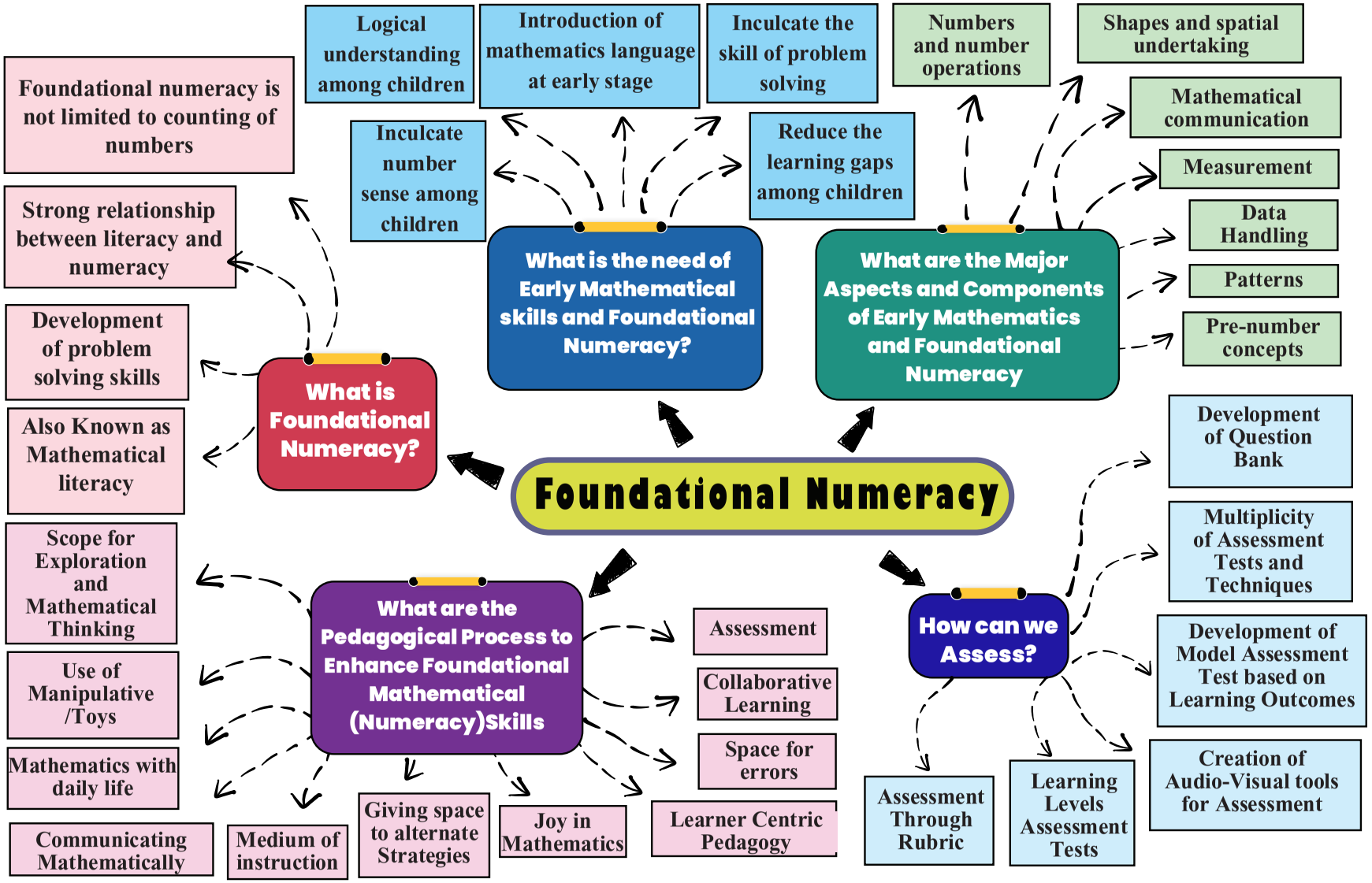
So today we are going to have a discussion on " Assessment of Foundational Numerarcy". How the assessment may be made useful to the learner? useful to the teacher? But before assessment you have to keep a few points in mind, number one is Every Child is unique. When child comes to the classroom, child comes with a different different atmosphere, different context and that context needs to be considered while we are teaching and while we are integrating assessment. When children are coming to the school or the class they are not coming as they know nothing, they come with a lot of knowledge with them and that knowledge may be taken from home, may be from the society, may be from the peer. Thus every child is coming with different different knowledge and that is to be considered while we are assessing the child. Another very important point is that the progress in learning takes step by step. This never having a jump that today learning is at level A and tomorrow learning will be at level B. This is a continuous process and that continuous process is to be considered while we are assessing the child. Then assessment is to be made an integral part of the day-to-day teaching learning process. It is not an activity which is to be conducted in isolation, so therefore friends it is very important that while you are teaching, while you are making your teaching plan, make the plan for assessment along with the teaching. And then the assessment should support the learning of important mathematics to the child and by important mathematics we need, we mean number one is that child should be able to apply whatever has been learnt

in the daily life, may be about numbers, may be about addition, may be about shapes and so on. And second logical learning, they should have thinking which lead them towards the reasoning and that is very important, that is to be assessed. That is important Mathematics. While we have to assess a child we have to use different strategies and those strategies also to be considered which a child is using while learning. So, every child may have different strategies. Say for example, while adding two numbers one child may count all (4+5) so the child has started 1, 2, 3, 4, 5, 6, 7, 8, 9 some child may count ahead...count on and this count on means when 4 and 5 are to be added, child may have an understanding 4 has already been counted, after four I have to count 5 more. So therefore, child may say 5, 6, 7, 8, 9. So both of the children have different strategies, you have to keep these strategies in mind while you are assessing the child. So child is not only to be assessed only for the end product but to the processes also. Then observe the child and talk to the child. While child is interacting with other children, child is doing something, observe the child, when child is engaged in some activities, observe carefully what child is doing, how child is manipulating the objects and so on and then second talk to the child. Very important aspect is talking to the child that will be a window to the brain of the child, to the thinking of the child, how child is thinking? When you will interact, when you will have questions, when you will ask interact with the child, child will tell you what is happening in his brain, child will tell you how he/she is thinking? Then, very important aspect is feedback. Giving feedback to the children that Okay this much you have learnt, lets now learn ahead. Instead of telling this has not been learnt, tell them what has been learnt and how it is to be used and what are the activities which child is able to do, the task the child is able to perform and the task the child is not able to perform in may cases almost all children will come up with their own understanding that okay we have problem in this, we are not able to complete this task. So, feedback and then follow up, after feedback see what child is doing, how child is progressing and so on? Then choose examples or questions carefully which should be from child's daily life. Because every child is having a different context, so you have to use questions which you are going to ask the child or may be say for younger children the assessment should be totally verbal or may be on observation. You have to use multiple tools and tasks for assessments and this is very important because one tool may not fit for the learning level of the child or the learning style of the child. So therefore, it is essential that you should use say for example many tools like observation, you may use assignment given to the child, you may observe when child is talking to other children, you may ask questions and how child is answering those questions and so on. So there may be many ways of assessing a child, use all those assessment tools and tasks which child can perform differently and you can have an assessment on them. Then,

development of model assessments tasks is very important as per the learning outcomes are there. Because ultimately we have to assess whether the child has achieved learning outcome or not and those can be assessed only when a particular type of tasks are designed for the child and those task may be the learning outcome same for every child but the context is different. So therefore learning levels may be different, so that you have to assess. And then question banks are to be prepared and these question banks may be prepared with the help of the children. Children must be involved/engaged in preparing questions not only the answers, when you are asking a question the child is answering. Why is a child cannot have a question and other children are answering those questions. So this is very important activity with this you can make your own question bank, children can have their own question banks. Then audio video tools are very important which can be created in order to assess the children. Then such assessment tasks are to be taken up which should be able to give me an exact idea of the learning level of the child at what level the child is. Say as I mention there are a few tools, one of them is rubric. A rubric is prepared by the teacher on the basis of an assignment, an activity or a task whatever given to a child. Say for example, child is asked to prepare a chart by coloring say for example there are few shapes triangles, rectangle, then square, then may be an oval, then other shapes and the child has colored them differently and child has then counted how many triangles are there, how many quadrilateral are there and so on. So, if this task is given then there may be many aspects, many criteria which you can fix up, may be their coloring may be one of the criteria, how the child has colored. Drawing those shapes is another aspect, then counting is another aspect, there are may be many criteria with this task. So, you have to make your own rubrics and another important part of rubrics is that you can have multiple levels, multiple grades, say level 1 ,level 2, level 3, level 4 and so on. Those levels you have to define as per the children in the classroom. Then rubrics need to be developed by the teacher in consultation with the students, that is very important. Students should be engaged in preparation of their assessment task, how they should be assessed, how much weightage to be given to the color? how much weightage given to drawings? and so on. So, children when they are engaged they can do their own assessment or peer assessment also. The assessment of other may be done by the the children or there own assessment can be done by the child so that is very important that children should be engaged in their own self assessment, that is very important. Then this will not be threatening if the third party or the third person doing assessment then there may be some fear in the mind of the child that I will be labeled and this assessment is say... stressful to me. But when child himself/herself is doing the assessment and the assessment is only to find out the learning levels as in this examples you may see. Then there may not be

any threat to the child and child may enjoy if child is at level 1 child will strive, child will struggle to achieve level 2 and for that everyone in the class should help the child. In addition to teacher the other children in class must also help the child. So there may not be this competition among the children. Competition of the child is with himself/herself only. Today I am at this level tomorrow, i have to go to other level and so on. This competitive spirit is to be brought into the children, but competition with self not with the others. This example will help you and you can make your own rubric as you wish. Another important aspect keeping a record of child's learning is portfolio. When in this portfolio we have designed the task may be a period wise, date wise and so on. When child was entered the classroom at what level on a particular aspect the child is then after few days what happens, after few days what happen and so on. So we are keep on writing keep on writing. So that anybody who can who see may be the parent, may be the other teacher, may be the child he/she can read, may be the elder sibling, anybody can see how child is progressing. On first day where the child was, second day what happen, third day, forth day. You have to write down the days only notable points. Not everyday this record is to be portfolio is to be maintained. But when the child has done something very extraordinarily different done, may be something very bad, something very good, something may be average but you find that this is something different which child has done, note that point and keep a record of that in the child's portfolio. So, this portfolio even can be prepared online. So when the teacher who have facilities of online assessment, online portfolio they can even keep records online also. Then assessment checklist is very important. This gives idea about child's learning, how are they learning and there only we are putting a tick marks and crosses. The level at which child has achieved we will say tick mark is there but the child is yet to be achieved cross mark is there. And this will help us may be after few days crosses will ultimately turn into tick marks. So, all crosses will in the end are removed and then there should be tick mark for every child. That is very important. That every child should learn and ultimately, we should not say that this child has not achieve the learning outcome. There may be slide difference in level of learning outcome, level of achieving learning outcome but every child should achieve and that is very important with the teachers is to keep in mind and this can be done only when the assessment is done continuously. So friends, this video will help you in having a understanding of assessment how is to be done in classrooms with individual child and second is that how record is to be maintained and how this record is to be used by you, by parents, by anybody who is associated with the child. So friends, kindly go through the course and have your own understanding. Thank you very much for listening to me.

Summary


Foundational Numeracy
What is Foundational Numeracy?
Foundational numeracy is not limited to counting of numbers
Strong relationship between literacy and numeracy
Development of problem solving skills
Also Known as Mathematical literacy
What is the need of Early Mathematical skills and Foundational Numeracy?
Logical understanding among children
Introduction of mathematics language at early stage
Inculcate the skill of problem solving
Inculcate number sense among children
Reduce the learning gaps among children
What are the Major Aspects and Components of Early Mathematics and Foundational Numeracy
Numbers and number operations
Shapes and spatial undertaking
Mathematical communication
Measurement
Data Handling
Patterns
Pre-number concepts
What are the Pedagogical Process to Enhance Foundational Mathematical (Numeracy)Skills
Scope for Exploration and Mathematical Thinking
Use of Manipulative /Toys
Mathematics with daily life
Communicating Mathematically
Medium of instruction
Giving space to alternate Strategies
Joy in Mathematics
Learner Centric Pedagogy
Space for errors
Collaborative Learning
Assessment
How can we Assess?
Assessment Through Rubric
Learning Levels Assessment Tests
Creation of Audio-Visual tools for Assessment
Development of Model Assessment Test based on Learning Outcomes
Multiplicity of Assessment Tests and Techniques
Development of Question Bank

Portfolio Activity

Assignment

Imagine that you are working with children 4-5 years old. Create a detailed lesson plan to teach any concept in mathematics discussed above. You can use this format to make your lesson plan:

- **Lesson:**
- **Learning Outcome:**
- **Objectives:**
- **Prior Knowledge:**
- **Concept/topic:**
- **Teaching Learning Material:**
- **Classroom Interactions:**
- **Integration of Assessment:**
- **Summative Assessment:**

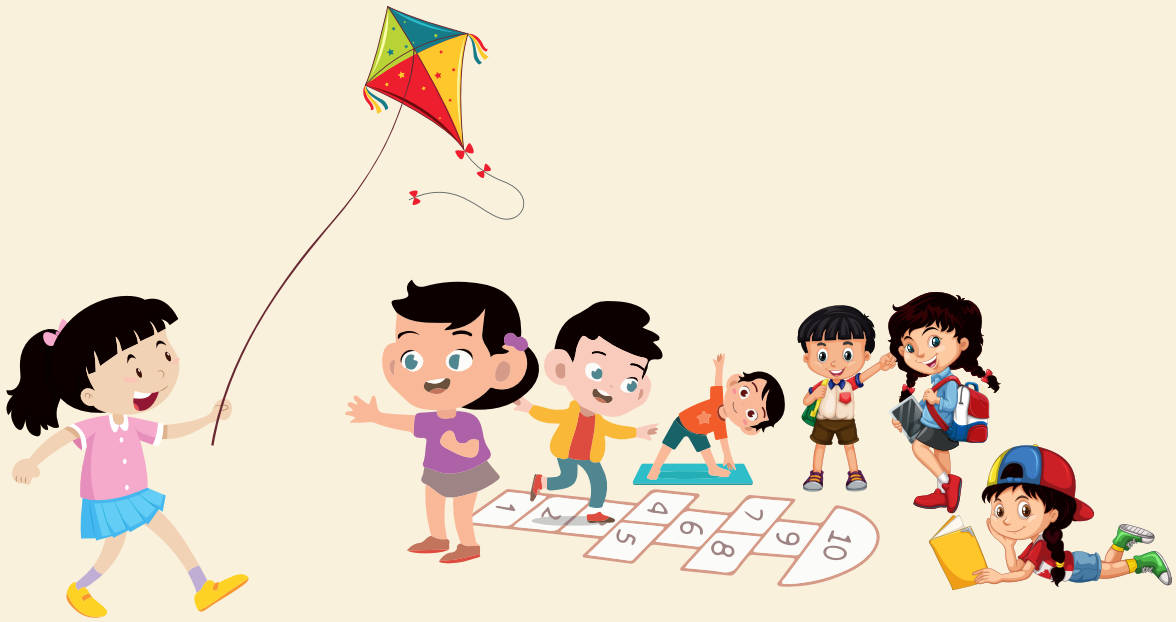
Additional Resources

References

- Mathematics Teachers' Resource Book, 2019, NCERT, New Delhi ISBN- 978-93-5292-132-4
- Mathematics Learning Kit, 2017, NCERT, New Delhi
- Manual of Mathematics Learning Kit, 2017, NCERT, New Delhi ISBN- 978-93-5007-832-7
- Mazedaar Hai Ganit, 2019, NCERT, New Delhi ISBN- 978-93-5292-157-7

Weblinks

- Continuous Comprehensive Evaluation CCE
  https://www.youtube.com/watch?v=X9aS21pYWTY
- Teaching of Maths Activities
  https://www.youtube.com/watch?v=eZHItWWBPCY



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