

# Integration of Environmental Experiences with Literacy and Numeracy

Mohammad Umar

Children come to school having learnt many things from their surroundings. Their learning naturally involves interconnecting and integrating various subjects. Teaching and learning in the early grades become more purposeful when this integration and interconnectedness of subjects is kept in mind. Possibilities for foundational literacy and numeracy can be found in all teaching materials; what is needed is a shift in perspective.



Figure 1. Integration of subjects creates joyful learning.

Currently, Foundational Literacy and Numeracy (FLN) in primary education is a priority for central and several state governments. Therefore, education departments and organisations are doing considerable work on this. Many people in government and non-profit organisations understand the issues of FLN from the perspective of integration and holism, but this thinking has not yet reached the classrooms. This article includes the experiences of integration and holism gained through teaching-learning engagements with teachers and children. It also attempts to consider the following questions:

- What challenges do children face in FLN?

- What are the possibilities and approaches for working on the integration of language, mathematics, and environmental experiences?
- Which principles of education could be more beneficial for working on FLN?

## Integration and interrelationship of subjects

I read a sentence aloud in Hindi to some teachers, 'These days inflation has increased; wheat flour used to be 40 rupees per kilo, but now it is 45 rupees per kilo.' Then I asked, 'What skills and competencies do we need to understand this statement?'

One teacher replied, 'Reading and writing in Hindi, and being able to construct meaning while reading. For example, we should know the meaning of words like inflation, flour, increase, 40 rupees, 45 rupees, etc., and then understand the meaning of the sentence as a whole.'

The teacher was right. In daily life, we use maths and language together in various contexts. Even with young children, while telling stories, assigning tasks, or discussing their experiences with games, we use both maths and language. For example:

- *Two* monkeys lived on *a* tree.
- There was *a* very big mango tree in the garden.
- Bring *three* glasses from the kitchen.
- These *two* rotis are for you.

Children also integrate language and maths with their experiences while talking among themselves. For example:

- I scored *15* runs today.
- Dad gave me *10* rupees. I ate ice cream at the fair.
- I am *taller* than you.
- I can run *faster* than you.

Here, we see the intertwining of not only language and maths but also everyday experiences from the environment. Clearly, without a foundational understanding of language, maths cannot be understood. Yet in schools, language and mathematics are taught separately. From the beginning, children's textbooks, notebooks, classes, exams, teaching aids, and teachers are different for these subjects. This separation becomes a major challenge in children's learning of language and maths at a beginner's level.

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A good curriculum, syllabus, and policy documents – all recommend creating and continuously highlighting interconnections between subjects. Still, very little attention is paid to the organic interrelations present between the subjects. Even in training programmes, these subjects are separated. The language expert focuses primarily on language issues, and the mathematics

expert on maths. Modules created for teacher training are also divided between foundational language and mathematics. So, among the teachers too, these subjects remain compartmentalised. In such a situation, we need to consider when, where, and how integrated, holistic and interconnected work can actually be done with the children.

## Integration and interrelationship: Some experiences

I shared some of my experiences with teachers while showing a few pictures. These experiences of discussions on the pictures came from my interactions with very young children, classroom teaching across grades, and discussions during teacher training. Most questions and activities were taken from primary textbooks, workbooks, posters of poems/stories, or books from the library bag.

## Observation, conversation & understanding of spatial and form comprehension

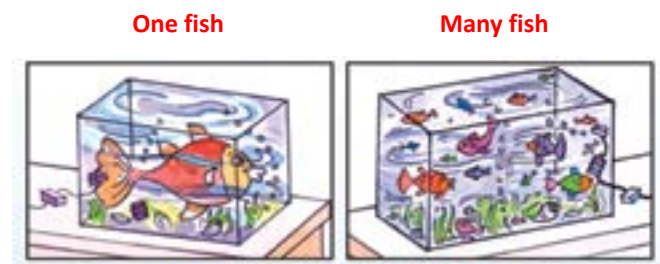


Figure 2. Conversations reveal children's knowledge.

A father was having a conversation with his 3-year-old son, who had not yet started school, showing him the picture of a fish in an aquarium. Looking at the fish confined in the aquarium, the child said, 'This fish will die!'

'Why?' the father asked.

'She will not be able to turn around,' the child replied.

Why would a 3-year-old child talk about the fish dying? Upon analysis, we found that the child had developed an early understanding of 'space and objects occupying space' based on observations and experiences of his surroundings. He knew that for a fish to stay alive, it must move freely in the aquarium. Looking at the picture, the child understood that there was no possibility for the fish to move around. In this situation, the child's remark that 'The fish will not be able to turn around' gives us a glimpse of his deep mathematical understanding. The child, in his own words, is not only expressing an 'understanding of space and shape' but is also applying it. Adults use similar mathematical skills, for example, when they check whether all their household items will fit in a new house or not.

## Drawing, understanding of proportion and its application

In class I, children were given a worksheet to solve. The children did not know how to read yet, so the teacher read it aloud: 'A rabbit and an elephant are drinking *sherbet*. Draw and colour the glasses of *sherbet* in their hands.'

All the children drew pictures. Some could draw straight lines, some could not. Many children coloured outside the lines of the glass. But surprisingly, all the children had drawn a big glass for the elephant and a small glass for the rabbit.

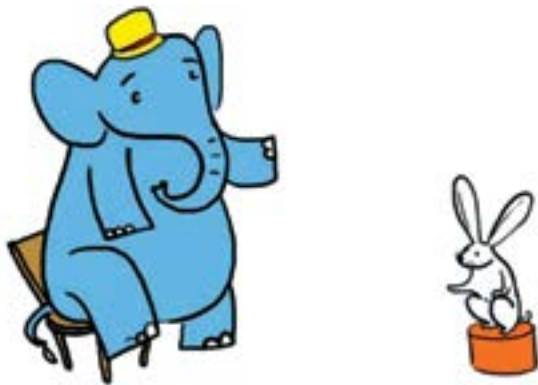


Figure 3. Using reasoning skills to understand size and proportion.

The teacher asked, 'Why is the elephant's glass bigger?'

'The elephant will drink more *sherbet* because he is very big,' a child replied.

We can see that experiences of everyday life and observations of surroundings had taught the children to see the 'proportional relations between things.'

We also asked class VII and VIII children similar questions about the understanding and application of proportion. For example, Kamala contributed Rs 2000, and Fatima contributed Rs 4000. Together, they started a cottage enterprise with a total of Rs 6000. After a month, they made a profit of 3000 rupees. Tell us how this profit will be divided between them. The class I children in drawing a bigger glass for the elephant and a smaller one for the rabbit are demonstrating the same sense and skill of proportionality at a foundational level.

## Matching, one-to-one correspondence, and logical thinking

A father showed his 3-year-old daughter a picture of rabbits and carrots and said, 'These rabbits are eating carrots.' The daughter looked at the picture for a while. Then, placing her finger on one rabbit, she said, 'This one won't get a carrot!'

'Why?' the father asked.

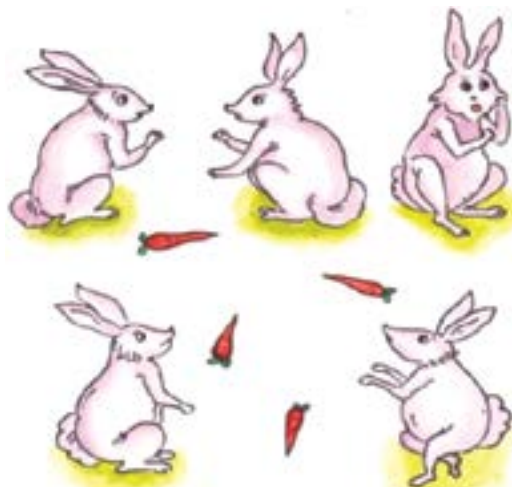


Figure 4. Logical thinking helps in one-to-one correspondence.

The child, matching each carrot with a nearby rabbit with her finger, said, 'This carrot will go to this rabbit, this carrot to this one, this to this, and this to this but this rabbit is looking away, it won't get anything.'

From a mathematics teacher's perspective, this child does not yet know how to count. She did not count the rabbits or the carrots. But by using the principle of 'one-to-one correspondence,' she could tell that there was one carrot available for all rabbits, except one. This understanding will be very useful later for her in understanding other mathematical concepts, along with learning to count and quantify.

## Listening comprehension, artistic expression and factors

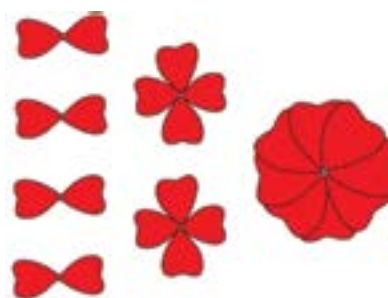


Figure 5. Articles from the surroundings can be used in teaching.

The teacher explained a question to class III children, who did not yet know how to read Hindi properly: 'A flower has eight petals. Rashmi first made flowers by joining two petals each, then she made flowers by joining four petals each, then she made a flower by joining eight petals.'

The teacher asked, 'If you are given 12 petals, how many flowers can be made?'

One girl replied, 'Joining two petals each will make six flowers, joining three petals each will make four flowers, and joining four petals each will make three flowers.'

The children had not yet learned multiplication tables or factorisation of numbers, but they are making flowers by joining 2, 3 and 4 petals to get 6, 4 and 3 flowers, respectively. In this way, the children are actually, indirectly, creating ‘factors of 12.’ Later, with this kind of activity and the teacher’s help, they will also find ‘common factors’ for any two or more numbers.

### Concept of before and after, making estimations, and social concerns

*Image 6* is from a class I textbook. The purpose of the lesson is to work on the ‘concept of before-and-after.’ I showed this picture, and I asked the teachers, ‘Who is the boy in school clothes, and what is he doing here?’

I received many answers from the teachers, such as:

- The boy has come to fetch water before going to school.
- He has come to help his mother.
- He will work the handle of the hand pump, and his mother will fill the water.
- He will help his mother lift the pot.
- There may be many utensils. Mother and son will carry them together.

‘Why is there such a crowd at the tap?’ I asked.

A female teacher answered: In Sirohi, water comes once every three days for half an hour. There is only one tap in the village. The upper caste people fill water there; they do not let anyone else use it.

### Close observation, recognising similarity (or patterns), and independent expression

In the same picture, looking at a boy, the children had said that he came with his mother. I asked, ‘Who is his mother? The woman behind or the one in front?’

Many children said, ‘The woman behind! Because she has placed her hand on the boy’s back.’

All the children agreed. Their argument was that a mother is more likely to put her hand on her child’s back.

Meanwhile, one boy changed his answer. He said, ‘No, the woman in front is his mother.’

‘Why so?’

‘Look at his face, look at both their faces!’ the boy said.



Figure 6. Leading students towards observation and reasoning through pictures.

I looked at the faces of the boy and the woman in the picture, and I was amazed. Both faces were similar. What a minute ‘observation’ this was! None of us had noticed this, but that child had ‘matched’ the faces. At home, children hear that they look like their father or resemble their mother. This child had recognised the ‘similarity’ by matching the faces. This conversation created a great opportunity to work on children’s abilities and skills in observation, independent expression and finding and presenting arguments to support their answers.

Is it not worth pondering over why we work with these same children in higher classes on ‘matching, common properties, mathematical discovery, similarity and symmetry, logical thinking, communication’ etc., while teaching mathematics, language and other subjects in an unconnected artificial manner? We teach them these concepts and skills as if they have no experience after coming into the world. Our vocabulary, contexts, and examples seem unfamiliar to them and, therefore, create challenges in their learning.

### Generalisation and social-human values

I told the teachers, ‘I had asked the children another question: Who is at the back in the picture?’

Looking at the picture, the children gave several answers:

- He is a grandfather.
- He can’t see.
- His turn will come last.

To understand why the children were calling him old, I asked for reasons.

A girl said, ‘He wears glasses and walks hunched over.’

A boy added, ‘He does not have hair either.’

Children make ‘generalisations’ by observing people in their surroundings. They themselves decide whom to call *brother*, whom to call *uncle*, and whom it

would be appropriate to call *grandfather*. These children, too, had made a 'generalisation' based on age, dress, and demeanour. In their arguments, they were presenting this very generalisation.

'What would you do if you were in this boy's place?' I asked.

The children's answers were:

- We would help our mother. We would have worked the handle of the hand pump.
- We would help mother lift the pot.
- We would also carry a bucket of water.

One boy said, 'When my turn came, I would fill my pot, then also fill grandfather's pot.'

'Why?'

'Because he is very old.'

This is exactly what a teacher wants in their class – that young children in class I are aware of their environment and sensitive to people around them. This is real education. Many more learning outcomes are being achieved than the specified mathematical objectives of this lesson. Mathematics, language, environment and surroundings, discussion of values, sense of responsibility—all this understanding and sensitivity are being integrated. With such a teaching-learning process, much more can be achieved than the objectives set for the class.

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All teachers listened very attentively to this conversation. Many teachers started taking photos of the pictures. Perhaps they wanted to try out the possibilities created by the observation, analysis, and dialogue on these pictures in their classrooms. I told them that such possibilities exist in every lesson, subject, and picture. And if they do not, then, as teachers, we should create as many opportunities as possible. For this, we need to develop a perspective to identify available possibilities within the classroom.

During the final consolidation, one teacher said, 'Sir, you have made a delicious *khichdi* that is a wholesome integration of language and mathematics.' 'Yes,' I replied, 'but it also includes environmental and contextual experiences. We will have to work with young children in our primary classes by spreading the fragrance of such a delicious *khichdi*, only then will we truly be able to achieve better results for the objectives of basic language and mathematics.' Hearing this, everyone started smiling.

*Translated from Hindi. Translator: Sandeep Dubey Vetter: Anjali Noronha*



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