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LearNing CuRve

Reinforcing Learning

Learning Curve is a publication on education from the Azim Premji University for teachers, teacher educators, school heads, educational functionaries, parents and NGOs on contextual and thematic issues that have enduring relevance and value for them. It provides a platform for the expression of varied opinions, perspectives and stories of innovation; and encourages new, informed positions and thought-provoking points of view. The approach is a balance between an academic and a practitioner-oriented magazine.

FROM THE EDITOR

What exactly is reinforcing learning?

This was a question we asked ourselves before we went ahead with the theme. The vision that immediately springs to the mind when we talk about reinforcing learning is piles of homework, mostly in maths and language, which as students, we used to do without thinking very much, heads bent and intent only upon finishing, not learning or applying the mind. The textbook was central to this approach - in maths, for example, we looked at the sums that had been 'worked out' at the back of the chapter and followed the prescription to a T.

Subjects like civics fared no better - the ideal of democratic behaviour in practice was not emphasised. The priority was answering the end-of-the-chapter questions which, again, were unimaginative and theoretical. I can even recall a book prescribed for Hindi - 100 proverbs (Muhaverein aur Kahavatein) - to be learned by heart and used only to fill in the blanks in sentences for homework. The list can go on as everyone has their favourite stories to tell.

But now all that has changed. The NEP 2020 has mandated that there is to be no homework up to class II and has raised the permissible homework hours from two hours a week for classes III-V to about 10-12 hours a week for Secondary and Higher Secondary classes.

This has meant a new look at Reinforcement, which is nothing other than a reflection of teaching on the one hand and learning on the other. Reinforcement should ideally be an aid to learning the principles that constitute a concept since the basis of learning is to grasp the fundamental propositions of a topic. Thus, in maths, the four operations are the first actual use to which numbers are put, one can add or subtract, multiply or divide. A child learns the symbols of the operations and goes on to understand that a number can be negative or positive. This sets the stage for using this idea later in graphs in maths, as well as in geography, for instance, for temperatures falling below zero. In civics, being introduced to the Preamble of the Constitution, the right reinforcement in the form of projects and discussions stress upon the ideas of social justice. Children also understand how regional history and culture are influenced by its geography and of course, the ways in which language can be reinforced are infinite, because all of the above reinforcements need language for expression. Acquiring a language is much more than learning the rules of grammar - situational exercises and experiences, which use language imaginatively and in conjunction with the home language are so much more effective.

With this in mind, when we asked for articles, the responses were swift and imaginative. We have a focus article which recounts how teachers, too, need reinforcement and looks at corrections in a different light for better learning. Another article outlines how reinforcing maths learning with understanding is the basis of logical thinking and grasping abstractions which can set children off on a lifelong journey of applying those very skills to life situations. We have tried to include reinforcement in the most important primary school subjects - so there are experiential articles in maths, language, EVS and science as well as an overview of what reinforcement could mean, if undertaken with some imagination. There is also an article on assessing reinforcement which illustrates that assessment, if done holistically, is in itself a reinforcement tool.

We look forward to your feedback.

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CONTENTS

CONTENTS

Effective Assessment for Reinforcing Student Learning

Aanchal Chomal

Teaching, at all stages of education, is a very purposive and deliberate exercise. There are various strategies that educators adopt to make their teaching purposive. One of the key ones is to integrate various formal and informal ways of assessment while teaching, to check if students can follow them and what they should do differently if students are not learning. This sort of integration of assessment during the teaching-learning process is called the focus of assessment in the National Education Policy (NEP) 2020 and the National Curriculum Framework (NCF) 2023. One of the phrases used in the NCF-School Education is that *'Assessments should be constructive, developmental, and learning-focussed'*.

This article will try to unpack the meaning of these ideas - *constructive, developmental*, and *learning-focused* in the context of assessment and how these can be used in reinforcing student learning.

Overview

Assessments have often been associated with various kinds of negative connotations, such as stress, fear, and anxiety. However, in the last few decades, research has revealed convincing evidence that assessments, when used meaningfully during the teaching-learning process, can play a significant role in improving student learning as well as teaching practices. We commonly refer to this as formative assessment or assessment for learning. The NCF-SE 2023 suggests that assessment needs to be visualised as an ongoing process which teachers integrate within the teaching-learning process using various formal and informal ways to elicit reliable evidence about student learning. Collecting such evidence helps teachers understand the effectiveness of their pedagogy in terms of what the students have understood, what needs to be worked on further, which methods of teaching work, what kinds of resources help, and so on.

In such a context, it becomes important to deliberate on what the reliable evidence of student learning is and how a teacher could gather such evidence. Equally important is to discuss what

they do with such evidence to reinforce student learning.

How do we know if students are learning?

Within the school context, there are several ways in which students demonstrate their knowledge, capacities, values, and dispositions. These tangible/explicit (and sometimes intangible/implicit) 'markers' are denoted as evidence. This could be in the form of artefacts, such as worksheets or drawings produced independently or collaboratively by the students; work done in notebooks during classwork or homework, project or survey reports, exam sheets; or these could be in the form of children's behaviours reflected during their participation in the class, group work, school activities, and so on.

Spaces for eliciting such evidence could be both formal and informal; structured and unstructured. These could be inside or outside the classroom; during school processes, such as sports and games period/ assembly/ mid-day meals/ lunch/ snack breaks, etc.

Observation plays a big role in collecting such evidence about student learning. One must be mindful of what to observe and how to use that observation for teaching. For example, while observing students in a geography class, the teacher may give them a worksheet on identifying and plotting the location of towns and cities on a map. There are various approaches that students may take while solving this type of worksheet. For instance, some students may be looking at the latitudes and longitudes to be more precise with their locations; some may be using nearby locations as the reference; some may be using other kinds of estimation for locating.

While observing the students, a teacher needs to be aware of what the various strategies students could possibly adopt and make a mental note of these details. The teacher may also take natural

pauses during the activity and ask students to clarify doubts – the nature of questions the students ask will help them understand what kind of problems or confusions students may be encountering during map work and help them reinforce learning during the activity itself.
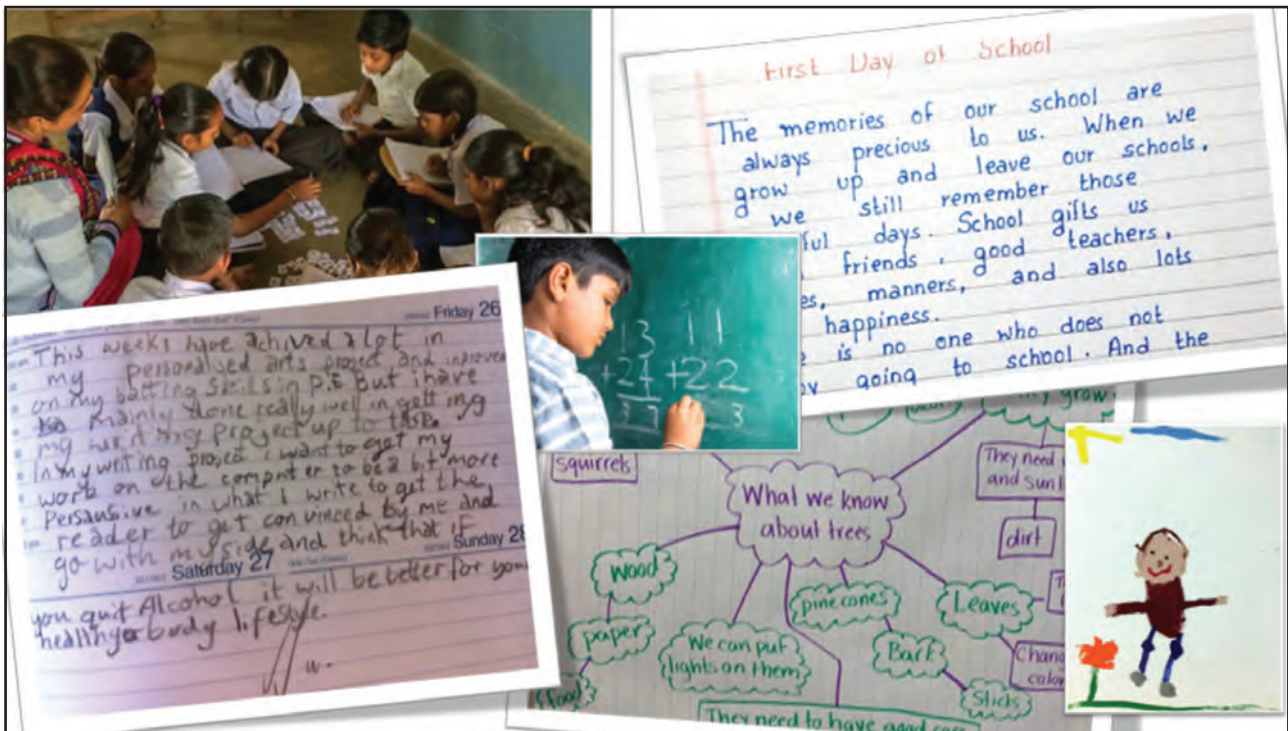
Figure 1. A teacher must look at various types of evidence of student learning to design reinforcement.
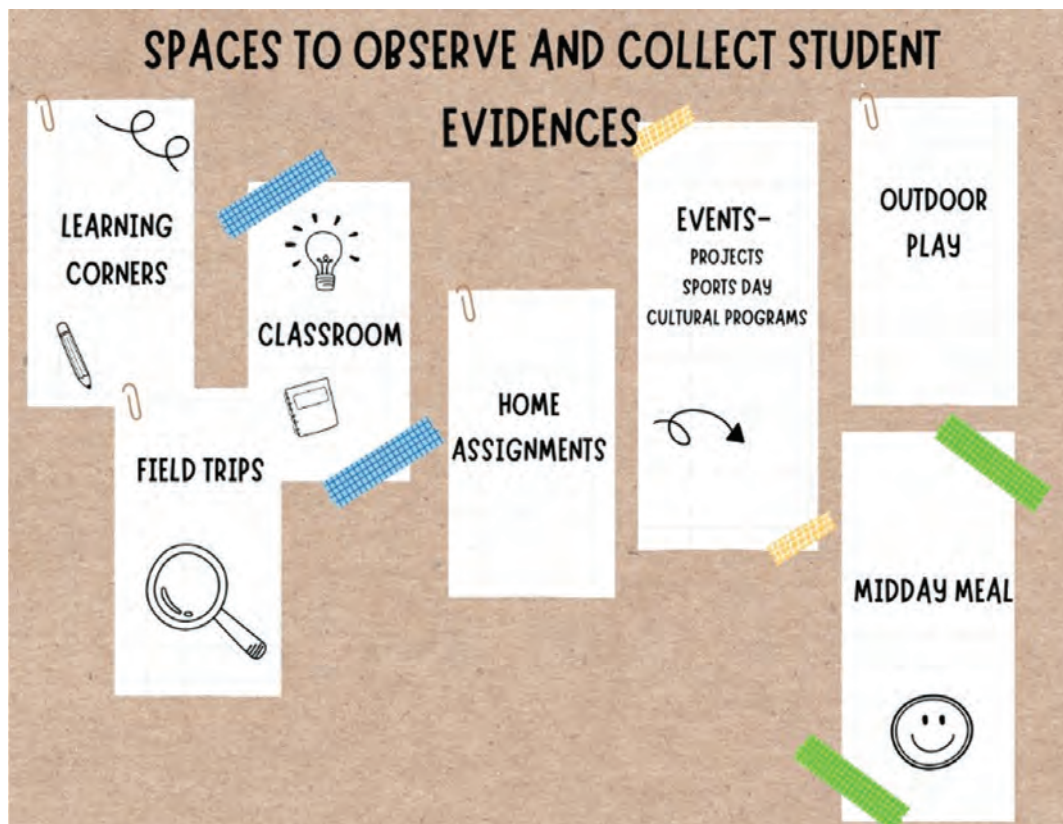
Figure 2. Spaces to observe and collect evidence of student learning.

Features of reliable assessment

Assessment should be constructive

When students do written work in the classroom, they typically demonstrate their learning of concepts, their capacities and sometimes even their interests. For assessment to be constructive, it should help the teacher scaffold the learning of the student.

Let us take an example to understand this better.

Figure 3. A student draws a picture and describes it.

In this task, the student has been instructed to draw any picture and then describe it in sentences. One of the foremost things to do is to analyse the student's work against prescribed outcomes and goals. This task has been analysed against the following outcomes:

LO1: Composes and writes simple, short sentences.

LO2: Uses pronouns related to gender like his/ her/, he/she, it and other pronouns like this/that, here/ there, these/those etc.

What does this evidence tell us about the student?

From this example, it is evident that the child has been able to write coherent, meaningful, and expressive sentences, although there are some mistakes. The sentences have appropriate gaps between words, begin with a capital letter, and end with a full stop. The child has used *I* and *this* appropriately in the sentence but used the preposition *from* incorrectly in the third sentence. The child has used an invented spelling for season and is unable to distinguish the use of articles *a* and *an*. There can be many more inferences that one can draw from this evidence.

The next logical step will be to work with the child on the basis of this evidence. The teacher can chalk out some simple next steps, such as:

- Look at the student's notebook to evaluate whether the student has a consistent understanding of proper and common nouns and if the student understands the rules of capitalisation of proper and common nouns.

- Use some picture books to encourage the student to express their thoughts in oral form. The teacher can then prompt the student to write it in the notebooks and provide the necessary support wherever needed.

- Discuss specific examples that use articles, *a*, *an* and *the*, to help the student understand the rules of appropriate usage.

- Give some simple feedback to the student about their work based on what the student has done well and what can be improved further.

The above two steps are referred to as *Analysis and Interpretation and Acting Upon Evidence*. Quite understandably, the teacher may not be able to do this for every single activity or task done by each

Figure 3. A student draws a picture and describes it.

student. However, if the teacher can do this sort of analysis periodically, she will be able to get a very good sense of individual student's capacities and can then scaffold them better in the teaching-learning process, leading to reinforcing the 'correct' usage of grammar.

A simple checklist for analysis and interpretation and acting upon evidence could be:

- What does this evidence tell me about the extent of learning?
- What does the student know? Are there any misconceptions?
- Is multiple evidence pointing to a similar conclusion?
- What are my next steps of reinforcement going to be?

Assessment should be developmental

While the teacher may try her best to scaffold student learning, we also know that the one-size-fits-all approach may not work. There will be students who are at different levels of learning. There may be some who are unable to write anything at all, and a few who will write incomplete sentences. And then there may be a few who can write more complex sentences, using more sophisticated vocabulary. It becomes important for the teacher to recognise that for the same competency, students may be demonstrating their capacities at different levels. In such cases, assessments should be differentiated to help students demonstrate their abilities on the basis of their respective levels of proficiency.

While this may sound overwhelming to the teacher, for all practical purposes, the two most fundamental competencies that any language teacher aims to develop among her students are reading and writing at age- and stage-appropriate levels. If the teacher is able to design or curate multiple worksheets or tasks that cater to the diverse learners in her classroom, she is well-equipped to do such differentiated assessments, because then, she will be able to gather more reliable evidence of students' learning levels and provide reinforcements more effectively. This also helps the teacher address the diversity of learning in her classroom without leaving any child behind in the process of learning. This perspective of assessments also makes them fairer and more accessible to all learners. Once the teacher is confident that all students in the class are able to write at least a few sentences independently, the teacher can raise the complexity of the writing tasks for the entire class.

Assessment should be learning-focussed

While all the above approaches make assessment learning-focused, in the last decade or so, the approach of *Assessment As Learning* has gained popularity. In this approach, the fundamental point is that the student self-evaluates against their past performance or achievement. There is no comparison with other students – each sets their own milestones and tracks their progress against it. This makes students more self-reliant, as they can judge and reflect on their strengths and weaknesses. Here, assessment becomes synonymous with learning, resulting in self-reflection and self-development.

Assessment As Learning is equally important and relevant for teachers. It helps them evaluate to what extent their strategies have led to student learning. This ongoing diagnosis of student learning and teaching practices helps teachers understand where reinforcements are needed and to what extent.

Conclusion

In all of the above practices, it is important for the teacher to have a comprehensive understanding of learning standards. Any kind of assessment for reinforcing student learning must be rooted in the curricular goals, competencies and learning outcomes of the subject. It is important that the content of the textbooks is used to develop knowledge, capacities, values and dispositions. It is also important to pitch the content as per the level and context of the learners. The teacher needs to introduce and build a concept using examples and anecdotes that are relatable for the students in her class. Very often a teacher may not be fully aware of this at the start of the year, but regular conversations and discussions help the teacher in knowing students better and pitching the content at the level of their abilities and interests.

Reinforcement of student learning is not only dependent on the strategy that the teacher adopts but also on the classroom environment that is built over time. A classroom culture that empowers students to clarify their doubts, ask questions, imbibe confidence and share their thoughts in a stress-free and non-judgmental environment, goes a long way in removing the stress of assessment and nurturing life-long learning.

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Music has the power to stir our emotions. We often observe children singing or humming songs, rhymes, and sometimes just humming some familiar sounds…Music has rhythm and melody, which helps students to develop fluency in the language and when rhymes are sung with actions and gestures, children are also able to comprehend the meanings of English words and expressions.

Deepika Jhala, Music as a Reinforcer in English Language Learning, page 53

Eklavya's Social Science Programme | A Reflection on Practice

Arvind Sardana

In this thought-provoking piece, the author muses on an experiment that was carried out, resulting in not only reinforcing the knowledge of the learners but that of the teachers as well.

The social science programme of *Eklavya* (1985-2002)[i] was an alternative tried out in eight government schools of MP across three districts. This experiment was not just with alternative textbook design but also teacher training and assessment as part of a holistic effort.

Setting the tone

My colleague Rashmi in her article for *Learning Curve* (August 2010) mentions that the project '… raised questions about what one should expect in terms of understanding and achievement from the children who had studied the new texts. Quite naturally, this led to a discussion on how to evaluate these students and gauge whether they had achieved the required level of conceptual clarity and skill development demanded of the new content and teaching methodology'.

Hence, learning from experience and evolving practice for all, not just children, was embedded in the programme. One of the constant reminders for this was the open-book examination pattern that we opted for, following in the footsteps of the Hoshangabad Science Teaching Programme,[ii] as the best counter-position to the rote learning, then prevalent. This structural reminder kept our sights on the curricular objectives that we had set, but which had presented many challenges, and were difficult to predict.

Open-book exams

An incident of the first year, 1989, when this was introduced, brought to the fore the central cultural challenge of the open book system. At a rural school in the Dewas district, just a few days before the examination, one of the boys came up to the social science teacher with a request:

'Sir, can you lend me your textbook?'

'What! The whole year has gone by, and you have not purchased the book?'

'*Sir, kiraya le lejiye* (take a rental from me),' said the boy, without blinking.

'This is ridiculous, just take it!'

This was the central challenge that we faced for the first few years. The usual practice for social sciences was to mark portions of the textbook passage that were meant to be learned by heart and reproduced in the examination. The questions asked were always from the textbook. Anything different was considered 'out-of-course'; not appropriate. In such an atmosphere, the open-book exam/test was interpreted as licence to copy from the textbook.

After a year or so, students began realising that it was not that easy. If they had not read the text properly, they would keep turning the pages or copy down irrelevant passages. Even with teachers, it took a few rounds of the Board Examination for them to internalise the broader objectives of assessment. As a follow-up during training sessions, there was practice for distinguishing between comprehension questions whose answers could be located in a certain passage of the text and those of reasoning, in which the component elements could be spread out across the sections of the chapter. Questions requiring reasoning could be of various kinds, such as those that needed locating and summarising the scattered elements in the text, comparing situations, applying an idea, extrapolating, expressing an opinion, etc.

The open book system was really helpful in addressing questions related to visuals, whether they referred to pictures, maps, tables or illustrations. Comparing visuals across chapters, searching for new elements in the pictures, comparing them to contemporary life – the possibilities of creating new questions around visuals were tremendous. This was, and is, the central point for open-book examinations – increasing the capacity to design new questions and not using the questions in the textbook.

An example: Farm owners in the USA cultivate a single crop on their farms that stretch over hundreds of acres.

a. How is this fact illustrated in the picture on page 24?

b. What is the advantage of growing a single crop on such large farms?

This also had an effect that went beyond examination and started influencing classroom practice and students' relationship with textbooks. Children pored over pages, looked at details, asked questions and marked land and ocean on the maps. For us, these experiences pedagogically strengthened the idea that illustrations were not just fillers but an integral part of text. This also allowed much more creativity in designing chapters with storyboards and visuals spread out across pages. Content and pedagogical experiments could be merged in creative ways.

Some memories from a rural school remain etched in my mind. The teacher at this school would do a mundane exercise and I was always puzzled by it. Before beginning a chapter, he would ask students to count the pictures, the illustrations, the tables, graphs, flow diagrams and anything visual in the chapter. Later, I realised that by getting them to count, he was actually helping them to concentrate on these. It is the visuals in the chapters that always fascinated children and they would look over maps and illustrations with great awe. One must remember that these were the few printed material available in their surroundings and the novelty of the visuals was appealing. At times, the teacher would also point to the sub-headings of the chapter and follow this up with an introduction of his own.

Open-ended questions

Another component of the open-book assessment was the open-ended questions. Children's opinions were sought on a given situation such as, 'If you were the minister of finance and desired to increase revenues what would you increase: the tax on salt or the tax on cars?' The idea was to elicit their answers and the reasoning behind them rather than match them with the text or the view of the teacher. It took some practice to internalise this aspect.

Challenges

There were two central challenges to the open-book examination. One was designing new questions pertaining to the text, but different from the existing questions in the textbook. This required a lot of practice that was usually part of the paper-setting workshops for board exams. The initial hesitation - that it was feasible for the physical sciences but not for social sciences - was overcome. The other challenge was encouraging children to write in their own words and the teachers becoming confident about this process.

The 'Dhar Workshop' was born out of a suggestion from a colleague, who proposed that we should do a workshop using a sample of the answer scripts of children much after the board examinations were over and hence, with no reference to checking and allotting marks. This was to collectively examine what children were writing and their thought processes behind these answers. This was a rich experience for all. Once you ignored the grammar and sentence construction errors and difficulties and with no pressure to mark, the children's thought processes started emerging in a rich manner that impressed everyone. Besides, when we saw a pattern in the answers and asked ourselves how this was emerging, we could see both, the strengths and weaknesses in our own text. This was as much a mirror for us and helped us considerably in revising the re-formulation of the text.

Insights

Some important insights emerged clearly from the analysis of children's scripts. We saw that children writing in their own words and learning how to argue their views would not necessarily cover all the expected 'points' that a model answer might demand. We have to look at and encourage their ability to put forward their arguments in writing rather than just mentioning all the expected points. That there would be a fair amount of variation in expression is to be expected and this had to be appreciated over the reproduction of the 'model answer'. It takes years to build the ability and confidence to write in one's own words on any subject.

The objectives of the open-book examination system served a transformative role. It clearly indicated and sent appropriate signals to all – teachers, students and the Eklavya team. Looking back and comparing this experience with the curricular reforms by NCERT (or SCERTs), one can see this missing element in the latter's efforts. If there is an opportunity for curricular reform, it should be to change the sequence and begin with changes in assessment and come to textbooks later.

Importance of orality for practice

The good thing about writing in their own words was learning to argue orally. Practice is not just for the written form. In fact, this was the natural strength of the society around that had been predominantly oral. Hence, arguments were rich, questions

sharp and opinions were expressed fearlessly. We encountered this organic strength in many ways.

At the end of every section of a chapter, there was a text box with some comprehension and reasoning questions. Teachers were very supportive of this design since it helped to check comprehension and also keep to the central ideas that were being highlighted. However, one teacher, pointing to the questions, said, 'The speed breakers that you have introduced are at times too many. Keep a balance between stopping to check and the flow of the chapter.' This emerged from teachers' practice and became a guiding principle for our chapter design.

Classroom observations showed that most of the comprehension and reasoning questions were taken up orally and they increased children's participation and engagement with the text and links with the social world around them. Some questions would baffle teachers. For example, with reference to the text that explains how a voter's list is drawn up, one child asked, 'My family's names are registered both at the village and in the city. We have two homes. What is wrong with that?' The teacher was stumped but promised to get back on that. If you read one of our teacher's books on his classroom experience of teaching this course over a decade, he cites many questions that children asked in the classroom (See Prakash Kant). A memorable account in his book is the volley of questions that came pouring forth when he introduced the globe. While he was grappling with the explanations one child asked, 'How do you know all this? Who told you?' In another school, while a teacher was introducing the forms of Hindu religion, a child commented, 'But I don't believe in God' and another child remarked, 'Sir, how will he be redeemed? (*Iska kya hoga?*).'

Exploring orality was further strengthened around the mid-90s when many younger scholars joined our team. During this period, we revised our textbook and had begun to look for evidence to the question of whether the conceptual development embedded in the textbook was actually taking place (See Rashmi Paliwal). We designed questions with written answers and oral discussions with children that would give us a rich background and cues for exploration.

Oral discussions also helped to chart the children's train of thought. Our texts used stories and case studies extensively. Children would easily get immersed in the story details, but could they go beyond a specific story and relate to the abstraction that the text was trying to draw upon? Such explorations provided us with feedback for the chapters. Another question that was explored orally was whether children could handle more complex texts at the class VIII level. It was surprising that they could handle the abstract power dynamics of society, but structures of governance appeared out of their frame of comprehension. This latter realisation led us to formalise a study now published (See Alex M George). The oral component of the textbook engagement was extensive and became an organic part of classroom discourse but unfortunately, we could not make this a part of formal assessment.

Question bank for teachers

The younger scholars who had joined the team suggested that we needed to provide teachers with practice questions. They felt that the questions at the end of the chapters were not sufficient to lead the children into writing naturally with some confidence. Moreover, the culture of teachers correcting and guiding the written work of students was absent. One way of overcoming this gap was to provide the teachers with a set of printed questions for practice. The team also helped in providing feedback to the teachers. A question bank started evolving.

Revising textbooks

We were fortunate to follow the principle set by the science programme - from the lab to the field. The initial textbooks that were prepared were considered as 'lab' prototypes and within a few years of the experience at schools, revising them was considered essential protocol. The first level of feedback was from teachers, especially during training sessions where the dialogue between teachers and the textbook writing team was crucial to understanding issues of social sensitivity and other requirements as perceived by teachers. The other feedback was from the team's classroom observations and field visits. The third level was from the analysis of answer scripts of the children, where, as mentioned earlier, patterns could be observed that indicated weaknesses in the text itself. With feedback from these different sources, issues of revision were tackled with confidence.

In summary

Practice is not just for children. Textbooks, teacher preparedness, assessment format, and school context are all variables and given the experience of children, we should be able to ask with an open mind how these variables could be tweaked so that learning is more conducive for all children. We have discussed this in detail in the section, *Writing and*

Revising the Books as part of the essay, *The Insider's Narrative* (See Poonam Batra).

The need for practice was constantly reiterated in the social science programme during its long history (1985-2002). These reminders reaffirmed curricular objectives, the practice of which built the appropriate cultural atmosphere required for the programme. What however is important is not what we did for practice, but the idea that open and multiple reviews of curricular objectives would point to the pathways of practice to be undertaken in a particular social context.

Endnotes

i   https://www.eklavya.in/past-work-top/programmes-past-top/social-science-programme

ii   https://www.eklavya.in/past-work-top/programmes-past-top/hstp

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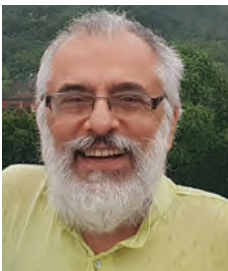
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Practice in Different Phases of Learning

Chandra Viswanathan

How do we learn new things? Many of us think that learning begins at school. We say that 'children come to school to learn'. The truth is that children have been learning from the time they were born. Over the past several decades, neuroscience research has established that the brain learns by constantly rewiring itself – giving up redundant connections that are not used frequently, while strengthening the connections that we access often. This happens to a very large extent in childhood, when our brains are most receptive to learning.

The study and research of the human brain tells us that to learn and master any new concept, we need to repeatedly encounter and apply it in many different formats. This is the reason that different formats of practice, as well as the right frequency of practice, are critical to learning and mastering a skill. In this article, we discuss some examples of how we can design our classroom activities to provide the right practice for wholesome learning.

Practice in the three phases of learning

Learning a new skill involves three main phases – concept understanding, skill development, and application. In each of these phases, a different kind of practice is needed. Our job as teachers is to ensure that at every phase, children are engaged, focused, and overcome specific gaps, while retaining the excitement and momentum to move forward to the next phase.

Let us take the example of a simple skill related to English comprehension – learning to comprehend and answer questions on a passage. (In this example, we are assuming that many children in our schools learn English as a second language, without much exposure to the language at home.) What are the kinds of practice formats that we can offer children at each learning phase so that they understand the concept and master this skill?

Phase 1: Concept understanding

Usually, we introduce children to reading comprehension by giving them a whole story to read and then asking them to answer questions at the end of it. For children who are just getting used to a new language, it is very difficult to decode, understand and remember a whole story and then answer questions from it. In this approach, the child has no way of comparing or recognising patterns in different types of questions.

Instead, we could break down the problem to first introduce the concept of 'sentence comprehension'. This helps children understand the meaning of question words, compare them, and categorise the response to each question word.

Example Sentence 1: In the evening, Ajay went to the park to play.

First, write down questions with a different question word in each, and underline the response word or set of words in each answer.

Question	Response	Response in a sentence
Who went to the park?	Ajay	**Ajay** went to the park.
Where did Ajay go?	the park	Ajay went to **the park.**
When did Ajay go to the park?	in the evening	Ajay went to the park **in the evening**.
Why did Ajay go to the park?	to play	Ajay went to the park **to play**.

Example Sentence 2: Kamala goes to the market in the morning to buy vegetables.

Then, give the children another similar sentence and ask them to make the table again.

Question	Response	Response in a sentence
Who goes to the market?	Kamala	**Kamala** goes to the market.
Where does Kamala go?	the market	Kamala goes to **the market**.
When does Kamala go to the market?	in the morning	Kamala goes to the market **in the morning**.
Why does Kamala go to the market?	to buy vegetables	Kamal goes to the market **to buy vegetables**.

Ask the children to compare the responses in the two tables and come up with a category of response for each question word. Help them make a Question Word Table:

Question Word	Response Category
Who	person
Where	place
When	time
Why	reason

The concept understanding phase of learning involves analysis, pattern recognition and comparison. In this example, the practice activities prompt children to compare different question words and responses, figure out the pattern, and come up with the category of response on their own. When they do this repeatedly, with many simple sentences, they understand the meaning and difference between question words.

Phase 2: Skill building

The skill-building phase involves mastery of specific techniques through practice in a variety of formats. In this example of building comprehension skills, specifically to answer questions accurately, we can introduce practice through a combination of different activities. A few examples are given here:

Flip it: Write the question word for the response

- Give children different answers with the response word(s) underlined. For each response, ask them to fill in the correct question word in the blank.

Q: _____ plays in the playground?

A: The children play in the playground at lunchtime.

Q: _____ do the children play at lunchtime?

A: The children play in the playground at lunchtime.

Make your own questions

In this activity, children only *make* questions – they need not worry about *answering* them. It is important to keep the focus on the question and not on the answer. This allows children to practise using question words in different contexts. It is best to do this activity in groups to build children's confidence.

- Show children a picture. Ask them to make at least three questions of their own by looking at it. Allowing them to make mistakes in constructing the question is very important. It is NOT important for the question to be grammatically correct at this stage. We are only trying to help children understand and formulate questions with different question words.

- Give children a single sentence (without the picture). Once again, children must make three questions of their own from the same sentence.

- Give children a 3-line passage. Ask them to make five questions of their own from the passage.

Talk time: Dialogue practice

Once children have done a lot of practice making their own questions, we can try a dialogue activity to move them up a level. Divide the children into pairs for this activity. Give each pair a dialogue, with one of the questions missing. We can either give them options to make it easier or allow them to form their own question. Once they fill in the correct question, they can practice saying the lines to each other.

The practice for skill building does not mean doing the same thing over and over again. It means doing different things that lead to the same learning goal. In the process, we discover multiple routes

that lead to the same destination. Teaching each other, group discussions, role plays, and artistic expression – these are just some of the many ways of practising skill building.

> **Vineet:** When is our English test?
>
> **Usha:** It is on Friday.
>
> **Vineet:** _____
>
> **Usha:** Yes, I started studying for it last week.

> Choose the correct option:
>
> (A) Shall I start studying for it?
>
> (B) Have you started preparing for it?
>
> (C) Can you help me prepare for it?

Phase 3: Application

To complete the phases of learning, children need to use the skills they have built in the classroom in different contexts and in real-world situations. This is an important step because it helps learners discover the relevance of the skill they are learning. In the context of our example of building comprehension skills to answer questions on a passage, we can get children to apply the skills that they have learnt by interviewing people around them. At school, they can interview teachers and each other, and record their responses.

To take English beyond the classroom, we introduce a *Walk 'n' Talk* activity that children engage in once they go home in the evening. They walk around their neighbourhood in small groups, interviewing adults by asking simple questions in English. In many of these communities, the adults would not know English. So, the children translate each question into their local language and teach their parents and other elders how to respond in English. This makes every child a 'teacher' and a proud one! Going beyond just application and practice, this activity also builds confidence in children.

Practice at the right time

When should we introduce a practice session in each class? In the concept understanding phase, we need to interweave teaching and practice in short intervals. Let us say a teacher allocates the first 40 minutes of a one-hour class to introduce the topic, and the next 20 minutes for the children to practice what they have learnt. There is so much packed in

the 'teaching time' that it becomes impossible for children to recall or apply what they have learned during 'practice time'.

Instead, breaking down a one-hour class into short segments, and ensuring that every segment has, say, five minutes of teaching followed by five minutes of practice, makes each concept more tangible and relatable for the child.

In the skill-building phase, each practice activity must have a 'Do-and-Discuss' approach. Once children do the activity, the teacher leads a discussion around it. The discussion time is not just for explaining the correct answers. It is a key element of the class that allows the teacher to get feedback on the effectiveness of the practice activity, and to modify it if needed. It is the opportunity for us to discover which children in the class need more support at the same skill level, and which learners are ready to advance to the next.

It is not just the *right kind* of practice, but it is practice and feedback at the *right time*, that can enhance learning and ensure outcomes for all children.

Back to basics: Practice of foundational skills

Several studies have established that a child's competence and confidence in the middle and high school years depends on the strength of foundational skills laid down in primary school. So, practising basic language and maths skills just for a designated time in a year is not enough. Foundational skills need continual practice for several years. Even as the syllabus introduces newer and more complex skills in each class, every school must have continuous back-to-basics practice sessions stitched into its timetable.

Many schools prioritise 'completion of portions' as children go to upper primary and middle school. However, if there are gaps in children's basic reading and arithmetic skills, the efforts made to achieve higher outcomes become redundant. Every school needs to plan how to allot the time available effectively, so that foundational skill practice goes on in parallel with grade-specific skill building.

Building skills, building confidence

The goal of effective practice is to build the learner's confidence as they strive to achieve a skill. To do this, practice has to be at the right level. It must provide reassurance and challenge in the right proportion. It is our responsibility to search for enriching practice activities that lead to robust

learning for our children, while enhancing their curiosity and positive self-image.

A teacher's job is a hard one. Many of our ideas may fall flat, and only a few may succeed. Nevertheless, it is important that we continue to search for the right methods that resonate best with the students; that keep alive in them the quest for real and deep learning.

Figure 1. Skill-building (phase 2), in which students are asked to form three questions after seeing a picture like this one.

Figure 2. Application (phase 3) in which children practise speaking English in the community.

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Reinforcement and Practice in Mathematics

Hriday Kant Dewan

There is a general agreement that learning maths requires practice essential to reinforce ideas that are to be absorbed. Though we know that learning needs to be understood as the ability to use what has been learnt in situations that require them, many people report that much of the maths that they learnt is no longer accessible to them when they need to use it. For example, unlike the shopkeeper who does the sale and purchase calculations quickly and efficiently, many of us are not confident of our ability to do so, or even write down and calculate as we did in school and prefer to use a calculator.

Our problem is that as teachers in classrooms, and more generally in interactions with children who are to learn these ideas, we find it difficult and perhaps unimportant to find ways to create situations that are comfortable and natural for the learner. We not only find it difficult to think of how to help a child learn but often do not know what and how this can be done.

The element of practice in formal mathematics teaching focusses on teaching specific methods to solve specific types of problems or even a particular problem, rather than on enabling students to find their own strategies to solve those.

> Learning maths has to be based on ensuring that basic concepts develop and evolve in the minds of the learners. As more complex ideas get introduced, the conceptual structure needs to be modified, requiring the readjustment of ideas that have been formed in the early stages.

The practice must force the learner to think about this constantly and be aware of the differences. It must enable the learner to automatically notice the mathematical objectives that have to be worked upon and interpret the task, choose the steps and arrive at the answer accordingly. The tasks given, whether in the classroom or as homework, should require the learner to think and engage with the mathematical objects along with the underlying concepts and not merely follow procedures mechanically.

Existing methods of teaching

The nature and form of practice in maths classrooms are generally very different from what has been described as essential here. Walking past a primary classroom, one is used to and still can in many schools, hear the class resounding with chorused voices, led by either the teacher or a student. The participation in these choruses is energetic and everyone seems to be actively involved in whatever is being recited repeatedly. Reciting number names in sequence or repeating them are considered useful and important elements of practice. Repetition chants for remembering the sequence of steps in an algorithm (set of rules in a process) are also composed. Schools use different devices aimed towards the same goal, some using gadgets and some, TLMs. All formulas for calculation of simple interest, addition, subtraction, division and multiplication of whole or fractional numbers or using decimal numbers have reinforcement items created that help in repeatedly doing the same steps or repeatedly recalling the same facts. The questions are: Is this the kind of practice that is relevant for the learning of maths? Does this help in the 'real' learning of maths?

Concepts and reinforcement

There are many ways to look at what is central to maths learning and how reinforcements can be planned – an aspect particularly important to maths. One evidence of maths learning is in the fact that the learner is able to solve problems, but the difficulty is that the range and kinds of problems expected to be attempted are limited to the exercises, which need to follow solved examples in the chapters. The chapter is taught by the teacher explaining the method by which the solutions have to be arrived at, detailing out the problems a little more. The teacher may solve some of the exercises from the book and students copy those solutions in their notebooks. The prescribed textbooks are also such that they give elaborate solved examples and provide techniques that are to be remembered and followed. A few textbooks that are written slightly differently are not

used even if prescribed. The expectation is clearly that the kind of detailed examples and problems that are given in the books would be the kind of problems that would be asked in the assessment or even in competitions where the only expectation is 'cracking the test'.

Current methods of reinforcement

If we examine the ways in which reinforcements generally happen, we come across two frequently used directions; the key principle of both being arriving at the solution of the problems as the main object of the reinforcement. This is achieved by providing simple steps to solve problems that are likely to be included in assessments either by remembering the solution or having a simple, mechanically-followed procedure. This could mean either repeating the same questions or doing them repeatedly till they are mastered (in this case, remembered), again for testing.

For example, as mentioned, in many schools, pre-primary to class V have loud chanting and copying sessions in which children are given rhyming ways of reciting number names or multiplication tables and even addition tables. These tasks often appear engrossing and particularly interesting to children as these are routine and simple, and children develop their strategies to complete the copying tasks in ways that they have to do minimum work. There are classroom observations that suggest that while copying numbers, say from 1 to 100, children complete the task by writing single digits without even thinking about the two-digit numbers they are writing!

The second kind is the practising of a method, thereby reinforcing it. It is essentially an opportunity to repeat the task till the steps are memorised. When learners in the early stage of learning are given numerical sums of operations to solve, the practice focuses on making them work on numbers by writing these in columns place-value-wise and doing the operations column-wise by mechanically carrying over and borrowing. They are not looking at what the numbers that they are adding are or the results they are getting. This extends to multiplication and division as well, when they rigorously follow particular algorithms without any sense of the numbers that they are starting or ending with and goes even further to operations on fractional numbers and, later, to solve equations. The reinforcement tasks are so constituted that the learner can only follow the method being taught and explained through the examples. Very often, the mixed exercises even recommend the particular method that would be the most suitable for the problem. The objective of this type of reinforcement is to learn the steps to be followed in each of the specified methods.

Clearly, in the second kind of reinforcement, learners get problems that are identical in nature to the solved examples and, while these may have different numbers, there is no change in the method to be adopted. The method could be a standard procedure of solving or a shortcut created, as in the case of fractions. Each operation has different steps as a part of the solving procedure. However, these methods are not taught in the classrooms as concepts that lay the foundation for newer ideas that will come later but as standalone procedures or finished techniques that have to be followed like a manual. This means that the reinforcement does not help conceptually for further learning and interest in maths. Instead, it sets the expectation that all subsequent tasks, including that of assessment, would be similar. The learners would not have to think and/or use a mixture of methods or try to find a suitable method for the problem given. The expectation is that the question would clearly indicate what has to be done and the procedure and steps to be followed are made obvious.

Developing conceptual ability

In conversations with learners who are given a set of random but level-appropriate problems from the type of exercises that they should be familiar with, what emerges is their anxiety about not knowing which operation is required and on which numbers. They have 'learned' how to do all operations in specific known situations, but do not know what each of these operations really mean. They have been given practice on using the procedures of operating on fractions but may not even know that the term 'fraction' denotes the denominator and numerator together. Or that the digits in decimal numbers (after the decimal point) are part of a number and are no longer independent numbers. This seems obvious but, in our hurry to make learners proceed with the operations, we do not allow them to engage with the underlying concepts and give them rules to follow mechanically and produce results of operations without having a sense of the numbers they are operating with or the result they are arriving at. This is made worse by an overload of a battery of methods, tips, shortcuts and procedures to follow,

resulting in confusing procedures, with no idea of the range in which the result should lie. Thus, the learners are unable to review their results or think about the procedures followed.

What we need to remember is that practice and reinforcement are important, but only when they are not mechanical and repetitive. Tasks given to children must stretch their minds and give them the opportunity to develop the capability to read and understand texts related to maths and then devise processes for the solution of newer problems, making them feel confident when facing them. As the Position Paper on Mathematics (NCERT 2006) says, 'Children should be able to construct non-trivial problems to develop conceptual ability and confidence'.

The point is that if we think of school maths as an activity that provides links between what is learned and life experiences, we have to adopt a different mode of teaching in which the ideas of spatial transformation, mathematical patterns, symmetry, ratio and proportion etc, do not remain confined to notebooks and classrooms but interact with the way learners organise things and their thoughts, communicate ideas, and the designs they make. These ideas need to become a part of the intuitive way in which a learner looks at and absorbs the world around them. This means that the learner becomes comfortable in dealing with mathematics and using it to look at the world. In order to be able to do this, it is essential that we underline the fact that learning involves understanding, otherwise it is not learning.

What practice in maths means

Practice must mean opportunities to struggle with problems that are new so that they are able to separate what is given from what has to be found. Practice and reinforcement must include tasks of reading related to mathematics, such as excerpts from textbooks and other sources. Texts chosen could be those that aim to build conceptual understanding, new types of problems to engage with, texts about mathematicians and the development of mathematical ideas among other things. The ability to visualise and find methods to explore and do mathematics retains interest and curiosity in and about mathematics. What is to be ensured is that just one way of solving does not get specified and

the children who lag behind have the time to engage at their own pace even as the class tasks move at the pace of those who appear to be brighter. The purpose of learning to read excerpts from textbooks and other materials is to ensure that children become capable of reading and comprehending mathematical texts with competence, confidence and interest.

Another significant aid to retaining an interest in mathematics is to have practice and discussions among small groups on mathematical content. The effort spent to solve a problem or unpack a text as a team serves many purposes. It has, however, to be complemented with time for individual practice, then discussing the work with the teacher or presenting it to the whole class for its participation in improving the task done.

The other crucial issue that we must think about all the time is the nature of exploration tasks and the kind of problems assigned. From what we have discussed, some points are clear. For example, these tasks must not only help develop the ability to solve problems (not just the set given and pre-done but any new problem of appropriate level) but to also find steps to unpack any problem to some extent. Practice, therefore, must mean opportunities to struggle with problems that are new so that they are able to separate what is given from what has to be found.

Reflection, re-articulation and reformulation

As children explore maths, they can be encouraged to think of the numerous ways in which they can obtain any particular number. For example, the number 10 can be obtained from: 5x2, 10x1, 6+4, 15-5, etc. Or comprehend that all squares are rectangles and that they are also parallelograms and quadrilaterals as they have all the properties of a general quadrilateral and some special properties that all quadrilaterals do not have. Or that even though rectangles and squares have equal opposite sides and equal angles since all the sides of a rectangle are not necessarily equal, all rectangles are not squares.

This ability to visualise, generalise and particularise properties of sets helps in making such connections. If there is comfort and confidence with mathematical ideas more and more connections will continue to emerge for the learner thinking about them. For example, the idea of concrete fractional numbers from life experience (half a sweet, three-quarters of the class, etc) to fractions as division, needs modifications of previous understanding, which

develops a sense of the properties of concepts. Practice and reinforcement must take cognisance of these and provide opportunities for reflection, re-articulation and reformulation. Such opportunities cannot come merely from solving problems based on a set of rules.

Understanding as reinforcement

One fascinating aspect of mathematics (like with words in a language) is that one can play with mathematical objects and create generalisations and formulations which are new for the learner who has just discovered them. Allowing a learner to articulate the manner in which they arrive at the knowledge gives them both confidence and clarity, leading to a more complex understanding of the basics. The logical reasons that they formulate for the connections made, help develop the notion of and ability to comprehend and develop mathematical proofs for themselves. Rather than having to remember proofs as tasks, understanding

what proving something means and the logical, necessary formulae necessary for such proof is greater reinforcement than being given proofs of standard theorems, identities or statements.

This sort of reinforcement and practice must lead to finding exceptions to a mathematical statement or formulating mathematical statements for others to disprove. This practice can also help in the understanding of how a mathematical statement is made and why it needs to be specific.

Conclusion

To put it briefly, practice must be engaging, and it must require thinking. It must generate curiosity and exploration. Practice is not about remembering formulas, rules and definitions, but about a student being able to develop their own definitions, generalisations and methods of solving problems when looking at a problem, trying to understand, uncovering what has to be found and developing a way to move forward.

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Reinforcement Strategies for Deeper Learning

Jwairia Saleem

Reinforcing learning to make it meaningful and long-lasting has always been integral to high-quality teaching. From drills to mnemonics, from manipulatives to Computer Assisted Learning (CAL), teachers have used a range of strategies and techniques for better student learning. But what does 'better learning' signify? Does it refer to the student's ability to remember details and recall them when needed? Or does it mean the ability to make sense of what they know and make this knowledge usable? Before delving into why and how to reinforce learning, the word 'learning' itself merits some discussion and unfolding.

How does learning happen?

Extensive research in Learning Sciences points to learning as being much more than committing information to memory and recalling it when needed. A more comprehensive way to define learning is to see it as 'a process that leads to a *change*, which occurs as a result of *experience* and increases the potential for improved performance and future learning' (Ambrose et al, 2010, p.3). The process involves collecting information using our senses, processing that information to make sense of it, and responding to it in some way. The change, however, may not always be visible; it could be a change in how we perceive things, which may alter our world view or attitude towards people, situations, or the environment.

Learning can also be construed to occur at different levels. Learning of facts, concepts, and procedures without knowing how to apply them is superficial learning. It is marked by disconnectedness and therefore, remains in surface memory. When students make connections between prior and new knowledge, actively construct meaning, and use this learning in new and unfamiliar situations (Constructivist theory), learning is deep and committed to long-term memory. This 'transferable' knowledge, characterised by 'usability', occurs as a result of engaging over time with key ideas and concepts through active mental processes involving higher order thinking (McTighe, Silver and Perini, 2020). Reinforcing learning would, therefore, imply that teachers use strategies that enhance students' engagement, leading to deeper understanding and provide opportunities for applying this learning to real-world tasks that are meaningful and rewarding.

Learning theories and reinforcing learning

Different theorists have posited their views on how learning occurs, with adequate research to back their exposition. Although each theory has contributed to building our understanding of learning, each one has a distinctive view of learning and how it can be facilitated. While individual teachers may have personal leaning to one or
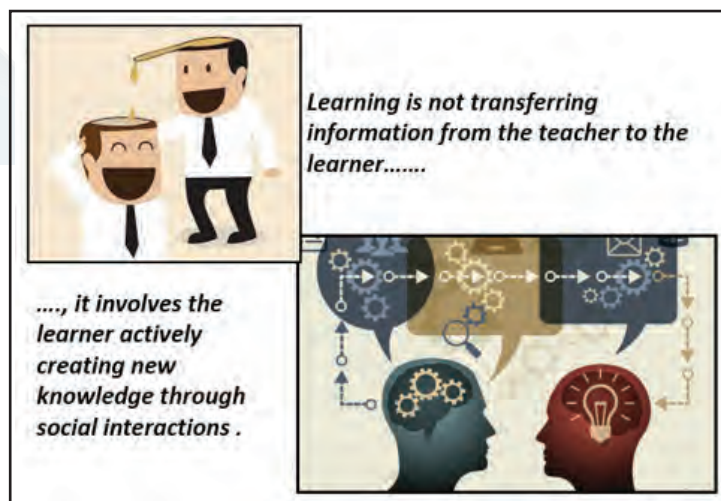

Learning is not transferring information from the teacher to the learner…….

….., it involves the learner actively creating new knowledge through social interactions .

Figure 1. What learning means

more of these theories as they develop their own teaching philosophies and craft their teaching practices, having a thorough understanding of different theories can help teachers develop a holistic view of learning enabling them to use appropriate strategies for reinforcing learning.

Table 1. Learning theories and how learning can be reinforced according to each

Learning theory	How learning occurs	How learning can be reinforced
Behaviourist	Through interaction with the environment e.g., observation of others.	By modelling, demonstration, use of positive and negative reinforcers.
Cognitivist -constructivist	Through active mental processing of information gathered by the senses, making connections to prior learning and create their own knowledge.	By using tools for metacognition, strategies for active engagement, connections to prior learning.
Social-constructivist	Through social interactions - when learners engage with others who are more proficient, they learn from others who are more proficient and can do tasks they could not have done independently.	By providing opportunities for collaborative and cooperative learning through heterogeneous group and pair work, scaffolding material, students lead their own learning and have choices.
Humanist	Through the inherent need for achieving their potential, achievement provides intrinsic motivation for further learning.	By supporting the development of self-awareness, socio-emotional resilience, and coping mechanisms, providing choice, autonomy and agency, and designing realistic tasks that allow for success
Experiential Learning	Through experience and reflection cycles.	By creating activities that need application of learning, by providing time and processes for reflection on learning
Connectivism	When students make connections with themselves, others, and their environment through the networks: especially online and virtual	By creating opportunities for exercising self-awareness, choice, peer learning and community engagement, using the internet as a source of information, with adequate guiding learners on media and information literacy issues for safe online behaviour.

In his Experiential Learning Theory, David Kolb stresses the importance of learning experiences and reflection as a means for achieving deeper learning, while connectivists maintain that learning is greatly enhanced and enriched when students are connected to umpteen opportunities across the internet, to find their own interest, connect with others and engage in networked communities to learn from each other.

All of these theories suggest unique ways of optimising and reinforcing learning. Seasoned teachers capitalise on the strengths of each theory to meet the needs of all learners while attaining time-bound learning outcomes.

How can we reinforce learning?

A prerequisite for facilitating and reinforcing learning is to know the learners well. Teachers can then select strategies as per the context of their classrooms: the age group, nature of learners, content that they wish to teach, etc. Most teachers use a judicious mix of reinforcement strategies for managing behaviour, keeping learners motivated and engaged and promoting deep learning.

Given that learning is something that students do themselves, reinforcing learning would require students to develop skills in using strategies and tools that make learning deep and long-lasting. Research on deep learning points at three key competencies that teachers can nurture to reinforce learning: cognitive, intrapersonal, and interpersonal skills.
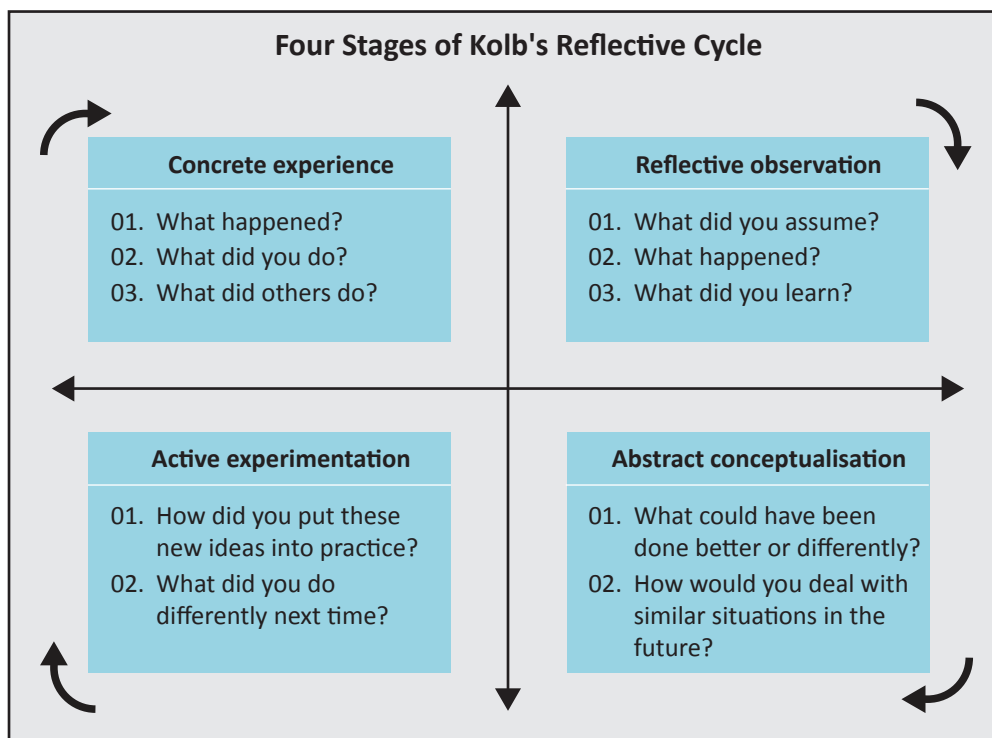
Four Stages of Kolb's Reflective Cycle

Concrete experience	Reflective observation
01. What happened?	01. What did you assume?
02. What did you do?	02. What happened?
03. What did others do?	03. What did you learn?

Active experimentation	Abstract conceptualisation
01. How did you put these new ideas into practice?	01. What could have been done better or differently?
02. What did you do differently next time?	02. How would you deal with similar situations in the future?

Figure 2. Kolb's Cycle

Activating cognitive capacities may sound like a daunting task, but in practice, it is amazingly simple and can be practised with all learners, in schools of all contexts. So is developing the two closely-related domains of intra- and interpersonal skills. A prerequisite for developing these competencies is to make the classroom a safe, warm, and nurturing place where learners can work cooperatively and collaboratively. Such classrooms afford learners the opportunity to develop self-awareness- to know what they are good at and what they need help with, where seeking and giving help is a virtue. Below are some select practices that teachers have found extremely rewarding in terms of both their effectiveness in engaging learners in the learning process as well as reinforce deep learning that is transferable.

Sharing learning goals

Many successful practitioners engage learners and drive learning by starting their lessons by stating what they will learn, why it is important and how they can use it. Teachers use a very learner-friendly language to state this. Some commonly used starter phrases are *We are learning to…* (WALT), *We are looking for…* (WALF), *By the end of this lesson, I will…* (BTL-IW). Explicitly sharing learning objectives builds interest and creates a need for learning. At the end of the lesson, teachers can involve learners in assessing their progress against the stated objectives. When teachers share the success criteria for the task - either through checklists or rubrics, students learn to take more responsibility and develop independent learning skills as well.

Questioning for reinforcing learning

Perhaps the most powerful tool a teacher possesses is the art of questioning. Asking questions that stimulate thinking, asking for opinions and views, probing assumptions, calling for justification of views expressed and raising questions about questions can be potent ways to develop higher order thinking skills. Asking learners to frame questions as they go through the content is a compelling way to keep them hooked and dig deeper into the concepts they are learning. Discussions around these questions with their peers lead to cogent explorations that go far beyond the textbook. For older learners, the SQ3R technique, which is a five-step process in which learners 'Survey, Question, Read, Recite and Review' content on their own or with a peer, is a great tool for both independent self and group study. It helps in both comprehension and retention of content learnt.

What is a good question & what does it look like?	
Stimulates thinking	What if the story did not end this way?
Probes assumptions	How can you say the dragon was evil?
Asks for opinions	Do you think Birbal was disrespectful to the king?
Calls for justification	Why do you say the cap seller was clever in throwing stones at the monkeys?
Raises more questions	What made you ask this question?

Figure 3. Good questions and how they reinforce learning

Identifying 'Big Ideas'

Most teachers struggle to teach the textbook from cover to cover, and in trying to do so, end up teaching large amounts of information that is disconnected, often irrelevant and dealt with at a superficial level. Identifying the 'Big ideas' in the content, that is, what they wish their learners *to know and do* - helps them to reinforce learning that is both meaningful and long-lasting. Teachers then ask questions, organise activities, and set tasks that

stimulate learners to think about what they are learning and why, and how they can use it in real life. Some tools and strategies that help teachers focus on big ideas and generate deep learning are described below.

Graphic Organisers (GOs)

These actively engage learners in thinking deeply about the concept in a structured way by organising information, identifying relationships (how different things are related to each other)
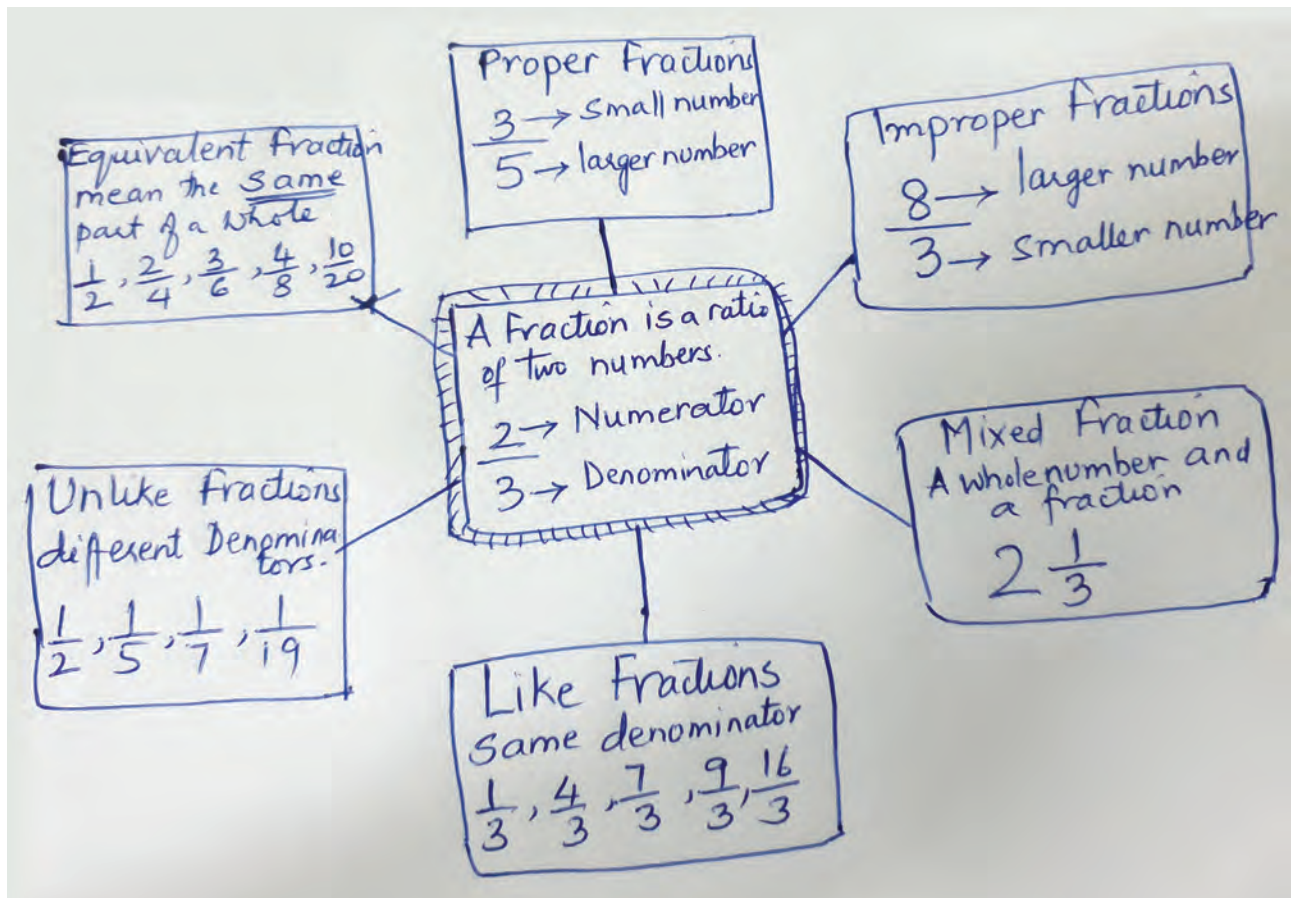

Figure 4. Types of fractions

and making connections visually. Working with GOs not only deepens understanding of complex concepts but also aids retention, while developing critical thinking and metacognition. It is particularly useful in multilingual classrooms where visual representation helps learners understand concepts even when their language skills are not optimal.

Think-pair-share (T-P-S) or Small Group Discussion (SGD)

In 'think -pair- share' the teacher pairs students, each student thinks through the concept being learnt, then pairs up with their partner to discuss their learning. The pair then shares their learning with the entire class. In 'Small Group Discussions', the teacher creates small groups (either same- or mixed-ability grouping) and gives them a task to discuss. The teacher may need to support group discussion through question prompts till learners become comfortable using the technique independently. These provide opportunities for students to articulate their thinking, build active listening and learn from each other. Other peer learning techniques, like Jigsaw Learning[1] or Peer editing[2] not only reinforce learning but also help in building skills of communication, cooperation and collaboration.

Reflection

Getting learners to think about their learning and what they could do to make it better, takes time and effort. Teachers can begin with group reflection and as learners get accustomed to it, introduce individual reflective practices, like journaling. Reflection helps students develop a deeper understanding of their own learning styles reinforcing independent learning skills.

Teachers need to start small - with one or two strategies - and consistently use them till they get embedded in practice before adopting new ones. The ensuing engagement of learners and the depth of learning they will then witness is truly gratifying.

Endnotes

1   Teacher divides class into groups and distributes content among the groups. Each group studies their part together. Groups are then rearranged to ensure each group has one member of all content groups, to share what they have learnt with each other. The content is learnt by all learners through group interactions.

2   Working in pairs, learners provide feedback to each other on how to improve their work.

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The practice must force the learner to think about this constantly and be aware of the differences. It must enable the learner to automatically notice the mathematical objectives that have to be worked upon and interpret the task, choose the steps and arrive at the answer accordingly. The tasks given, whether in the classroom or as homework, should require the learner to think and engage with the mathematical objects along with the underlying concepts and not merely follow procedures mechanically.

Hriday Kant Dewan, Reinforcement and Practice in Mathematics, page 16

Helping Children Engage with Science

Anish Mokashi

Science gives us a way of observing, wondering about and understanding natural and physical phenomena. Science is an important achievement of human civilisation that needs to be shared with the future generations. Most of us who have worked with children have witnessed their capacity for keen observations and insightful questions about the world around them. Such qualities are crucial for engaging in processes of science. Given this, how can we introduce ideas from science to children while also drawing on these innate abilities that they possess? Here I wish to share a framework suggested by the educationist Eleanor Duckworth (Duckworth 2006) that can be useful and can help us reinforce children's learning in science as well as support the pedagogical practice of teachers and educators.

Direct contact with subject matter and sense-making

First, we aim to put the learners in direct contact with the subject matter – earthworms, pendulums, ice cubes, balance beams, and seeds, etc. This brings the teaching and learning to life and catches the interest and imagination of the children.

The second aspect of our approach '...as teachers in classrooms, we find again that when we are interested in the learners' thoughts, the learners take a deepening interest in their own thoughts, too. We find that we focus on the learners' thoughts rather than on our own, as the engine for what generates the intellectual life of the classroom.' (Duckworth, 2009)

Duckworth has described her approach of engaging students in subject matter through 'critical exploration in the classroom'.[i] After identifying an appropriate concrete phenomenon or context to experience it, progressively get involved in it, think and wonder about it and express what they notice and think about the same. The emphasis is on listening to children's ideas about physical and natural phenomena (which they experience directly) in a dignified manner. Care is taken to avoid overwhelming them with big words or scientific jargon. This is a key aspect of Duckworth's approach and interestingly, it resonates with Richard Feynman's famous words asking us to realise 'the difference between knowing the name of something and knowing something'.[ii]

Example: Exploration of leaves

To think about pedagogies that might suggest ways of reinforcing children's learning and supporting their sense-making, let us look at an example of engaging children in a sequence of explorations with leaves of trees and plants. These instructions are only indicative and should be given one after the other, as and when the children complete the previous task. It is good to have more than one facilitator as one needs to make sure that children understand the instructions and also keep track of and make a note of the work done in different groups. It would also be useful to do this over a block class and across multiple sessions.

The activity

Each group of four to five children goes around the neighbourhood and collects twenty fresh leaves from various plants and trees. They are instructed to carefully pluck only one leaf from each plant and after coming back, keep the leaves together. Every child gets a blank A4 sheet and a pencil.

Facilitator's instructions:

1. Now each of you should select one leaf. Sit separately from your group. Place your leaf on the paper. Make a sketch of the leaf while looking at it carefully. Draw slowly and try to notice as many things as you can.

2. Now hold the leaf, look at it from different angles, touch it, feel its texture, scratch it, crush a small part of the leaf, smell it, nibble at it to taste a small bit, make a smudge on the paper with it and explore various aspects of the leaf (without destroying it).

3. What are the thoughts, ideas, observations or questions that came to your mind while observing and sketching the leaf? Write down

three of these just the way they came to you. These points could start with 'I wonder why/how/what etc. (The facilitators must go around and could take a photo of each student's sketch, questions and their leaf.)

4. Read all the points that you have noted down and select the one which you find most interesting.

5. Now return to your group and sit down together. While showing your leaf and sketch to your group, share your most interesting idea/observation/question. Make sure each person in your group gets to share their work. Others can ask questions if they do not understand something or want to add something.

6. Now take all 20 leaves that you have collected earlier. Keep them in front of you and arrange them according to their size - from the smallest to the largest leaf. (The facilitators can note down or take photos of each group's arrangement.)

7. Now arrange or group the leaves according to something else that you have noticed, for example, the texture of the leaf, the edges, veins, smell, or the shades of green, etc. (The facilitators can note down or take photos of each group's arrangement.)

In the next class, the work of individual students and the groups can be shared with the entire class. Before that, teachers/facilitators need to carefully go through all the children's sketches, the points that they have written down individually and those that they noted after sharing within the groups and the ways in which they arranged or classified the leaves. This process will help us to identify their thought patterns and observations of different aspects of leaves. We could then take printouts for an exhibition or create a slideshow to help the children learn about each other's work.

According to the scientist Niels Bohr, 'The task of science is both to extend our experience and reduce it to order.' In the context of this exploration with leaves, we need to make conscious efforts to connect these new experiences that children had with helping them start seeing the patterns or the ways of ordering the same.

We could follow this up further with other interesting ways of engaging students in thinking about leaves (and other aspects of plants) as suggested in books, such as *Small Science* (HBCSE),[iii] *Joy of Learning* (CEE),[iv] Environmental Studies textbooks by NCERT and other state boards, such as SCERT Sikkim which is a wonderful example of the contextualised approach.

Role of mixed media documentation

Such a process that blends the experience of 'direct contact with subject matter' and scaffolding sense-making can be woven into broader themes and topics through further sequences. In the preschools of Reggio Emilia in Italy, a multimodal documentation of children's work and ideas emerging through such processes is used for the continuous professional development of teachers, collective reflection on pedagogy and for building a community of teachers at school (Edwards 2012). They also exhibit children's work to 'make learning visible'[v] for initiating and sustaining a dialogue among children, teachers and parents (the community) that is anchored in the work of children and the sense that children make of their work. For example, the visual documentation of sketches, questions, arrangements of leaves and observations made by teachers on children's work and sense-making could all be material to be put up as exhibits.

Reinforcement in science

In higher classes, students and teachers have to grapple with nuances of the *nature* of science as well as challenges, such as the often counterintuitive nature of scientific ideas and developing a scientific temper. However, it is crucial for children in primary school to get opportunities to engage in the practice of observing scientific phenomena and articulating what they understand of these experiments. This familiarity with phenomena and expressing one's tentative ideas would also help students as a context to engage in abstract theory-building required later on. We can thus think of reinforcement in science as creating opportunities for students to 'map multiple paths into the subject matter'.

I find it apt to conclude with these words of the philosopher David Hawkins:[vi] '… a recognition that the subject matter of science is not, except in a derivative sense, to be found in books. The subject matter of "the liquid state of matter" is the liquid state of matter, and we had better sometimes have some of it in the classroom. Along with aprons and mops as needed!' (Hawkins, 1965)

Endnotes

i   It is interesting here to consider the origins of this approach. Duckworth says that the first part of this approach comes from her experience of working with Elementary Science Study (ESS), a science education reform effort in the US from the 1960s. While the second part comes from her work with the psychologists, Jean Piaget and Bärbel Inhelder on interviewing children to understand their thoughts and ideas.

ii   https://www.youtube.com/watch?v=px_4TxC2mXU

iii https://smallscience.hbcse.tifr.res.in/

iv   https://scienceshop.vascsc.org/product/joy-of-learning-teachers-manual-1/

v   https://pz.harvard.edu/projects/making-learning-visible

vi   https://en.wikipedia.org/wiki/David_Hawkins_(philosopher)

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Reinforcing Learning | What We Can Do Better

Archana R

In the book *The Homework Myth* by Alfie Kohn, there is a structured exploration of the myths about homework, how it is constantly defended by teachers and parents, and ways that data can be misread to continue the practice. The most interesting, convincing, and altogether horrifying defence of the arguments made in the book that I have come across is in a documentary by Irani filmmaker, Abbas Kiarostami. In his documentary titled *Homework*, the renowned director asks Iranian children from different age groups simple questions about homework. He asks them about how much homework they get, how much time it takes them to complete it, whether they get support to complete it and about their favourite activities. It is clear that the children get too much homework, and completing it takes up most of their time after school. But what the documentary also does is that it explores in a subtle, nuanced way the effect homework has on children. When children were asked if they preferred homework or watching cartoons, each of them instinctively said, 'homework'. A lot of children stick to the same answer even when probed. Only one or two of them admit (quite shyly), after several attempts, that they prefer to watch cartoons. We understand that this shyness, hesitation, and need to respond promptly is the overarching effect of children doing something that is clearly uninteresting and unhelpful to their learning experience but has been established as a marker of a *good* student.

The issue, as we know, is that too many people argue that homework is reinforcement; homework needs to be given every day; and that children who do homework regularly achieve the best learning levels. That this has been contested is also not new, but there are two interesting points the documentary brings out. The first one is, what happens when children have to do homework every day? The second, is the idea of 'a good student' used interchangeably for children with good learning levels. This article explores learning reinforcement as a response to these two questions.

What is homework?

In every school I have visited in Yadgir in the last 4 years, teachers share that children's learning is suffering because they do not do homework. Based on the socio-economic-cultural background of the children here, it is certainly untrue to say that children do not work at home, because all children, especially those above class II, are busy individuals with their own set of responsibilities. So unlike students coming from relatively better socio-economic conditions, the accusation is that children do not prioritise doing 'schoolwork at home' while having no qualms about doing work expected of their families. Meanwhile, we can categorise the homework assigned by teachers in the following manner:

Homework → To complete what has not been finished within the class hour

Homework → To continue exercises whose examples have already been discussed in the class

Homework → In preparation for the next day's content

Of the three, we see that the third option has some scope to engage children well. The first one is done for the sake of maintaining records, while the second option is often too challenging for most children to do without support. Hence, we see the first two types of homework being converted into a copy work activity. Even if we admit that this is only true for about 60 percent of the classrooms, it would still mean that what we are predominantly prescribing to is:

Reinforcement → Homework → Copy work → Improvement in learning

The result of this can be roughly summarised as:

Reinforcement (which is actually more than practice) → Homework (usually in the form of writing) → Copy work (tedious, uninteresting, and does not appropriately engage children's cognitive or critical capacities) → Improvement in learning (rare, minimal, and not to the expected extent).

We generally try to understand what learning reinforcement is, but perhaps we would have a better chance of understanding it if we asked the question: what can learning reinforcement constitute? Because this would mean that while written exercises as homework (some of which can be copy work) would be included in the definition, they will occupy a very small part of the reinforcement. This would lead us to respond to all of the other constituents:

Types of reinforcement

To strengthen concept understanding, reinforcement can include contextualising what children have learnt from their environment; finding examples; applying a definition; verifying if a definition works for processes around them; and extending it to find their own questions to broaden their understanding.

In terms of practice, it can include repeating what they have just learnt; trying out different types of problems or questions for a particular topic/concept; and representing what they have learnt in multiple ways. For example, children conducting a simple survey of animals around them to tabulate it as data in maths. Children can either write the names of animals or draw the animals in the table to present their findings.

For developing 'study culture', reinforcement can be trying out exercises of varying difficulty; engaging in activities, like simple investigations; interviews; research; engaging in pair-work and group-work for long and short-term projects; creating simple art and crafts; material collection for a class; working with a study partner on a regular basis; and engaging in activities related to community support/care through simple interviews to create write-ups on certain topics (festivals, trade, or migration). In doing this, the children would not only be engaging with content at home but would also use it to understand their community and develop a concern for its well-being.

As we know, students are rarely given exposure to these kinds of reinforcement. The other reason for this is that we do not plan for reinforcement to happen *in the classroom, outside the classroom during school hours, starting in the classroom and extending after school, starting as homework and extending into class, and after school hours*.

This brings us to the question of planning a variety of activities and administering them at different times. During my work with schools, I have attempted and worked out a selection of activities:

Language

During assessments, we see children struggling to write about a given picture. Some of the ways in which they try to respond (for example, Figure 1) are:

- Writing random letters that they know
- Writing something unrelated, mostly copied from somewhere else
- Writing words or phrases that lack continuity and coherence
- Repeating sentence structures to cover everything in the picture

What was understood from these responses is that children feel an overwhelming pressure to fill up the given space and that knowledge of letters does not guarantee good written responses. Thus, the plan was to have activities that would address both these issues:

- Writing needs to make sense, where children write about what they have experienced because it expresses what they see or think (Figure 2)
- Writing well needs to be an aim, where children understand the need for aspects, such as using punctuation, variety in sentence structures, wider vocabulary, names of objects, etc.

The activities planned were:

- Word jars, flashcards, sequence cards, and other TLMs prepared for a lesson.

This is usually done for new words that students are introduced to in the lesson, but their usage is limited to memorising the spelling. This was expanded to use as daily activities for sentence construction and combining a set of words to write about an event in the lesson. Thus, two sets of homework could be given to groups of students: one, as a group activity to be done in the classroom, which can, secondly, extend to an individual task.

Learning: Children who write a few words or some sentences during the classroom are more likely to use the words to write complete sentences. They are more likely to write if the content of what they are expected to write is discussed orally and they are given clear instructions to write it down in three to five sentences.
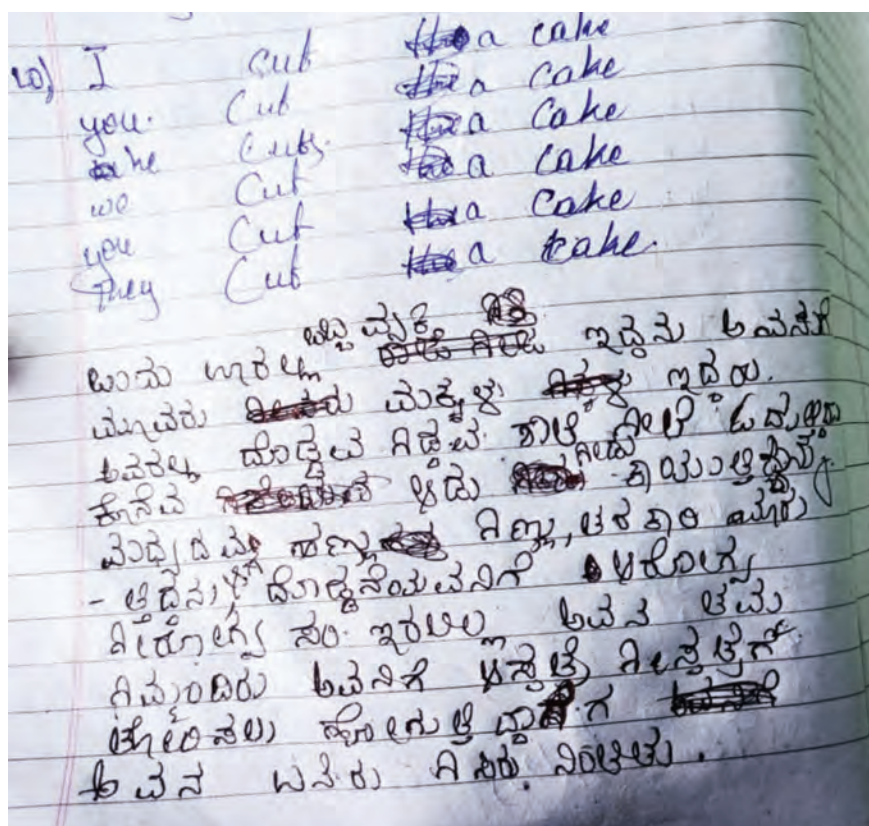
Figure 1. A student repeats a sentence structure and uses unrelated words in an attempt to describe a picture.
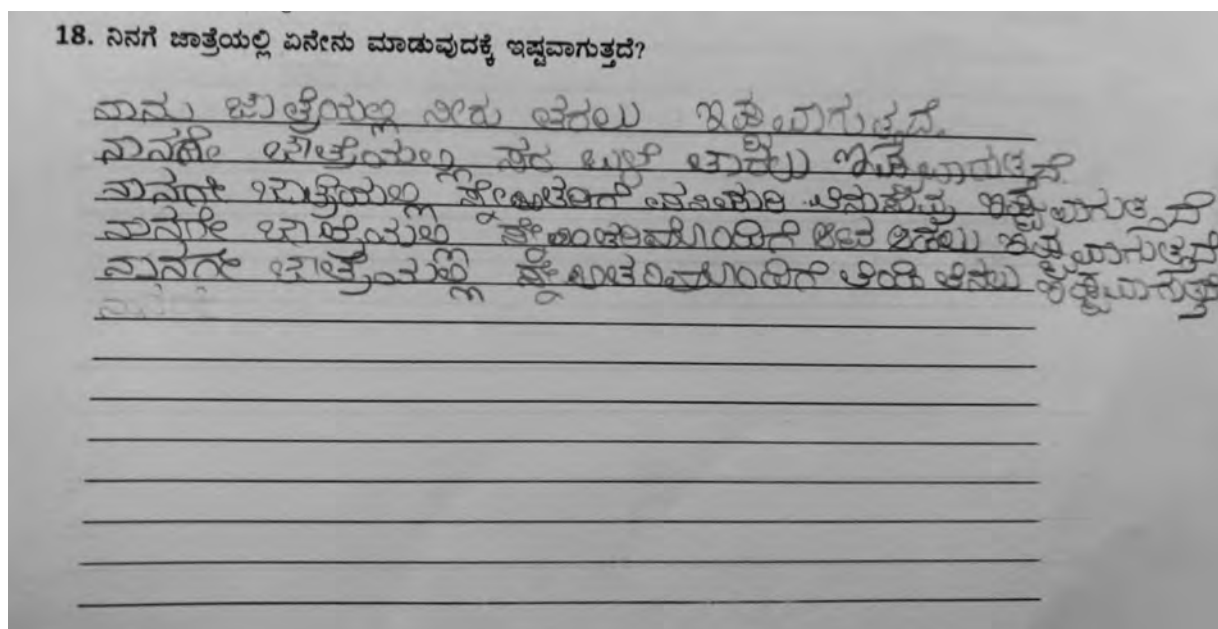

Figure 2. A good written response: Student describes going to a fair.

- Using a series of writing prompts

Teachers give topics to children to write about, but prompts to help them write, and clear instructions on what the focus should be, are often ignored. A sample of how this can be improved is shown in Table 1.

Table 1. Writing prompts

Topic	Day 1	Day 2	Days 3 and 4
Making a list of daily routine activities	Draw a clock and divide it into 5-6 activities. Shade the different parts using different colours (it should look like a pie chart).	Write down the activities with Time. Also, add other activities that were not shown on the clock.	Use the list to write about your day – each item on the list can become a sentence. Also add a few extra things, such as: - A line about your favourite dish for dinner. - A line about what other people in the house do while you are watching TV or playing with their friends.
Writing about your village/library	Make a list of everything you see.	Make a note of the activities in terms of: What – Who – When – How	Write sentences from the details in the table.

Learning: Writing prompts are necessary, but they need to be decided and assigned while factoring in different aspects. For example, a teacher had asked students to create a story using *jodu padagalu* (words like *alli-illi*, *poori-geeri*, and *hocus-pocus*) in Kannada but had not illustrated it sufficiently. Thus, students created stories by turning almost every word into a *jodu pada*, and the stories they wrote were almost unreadable!
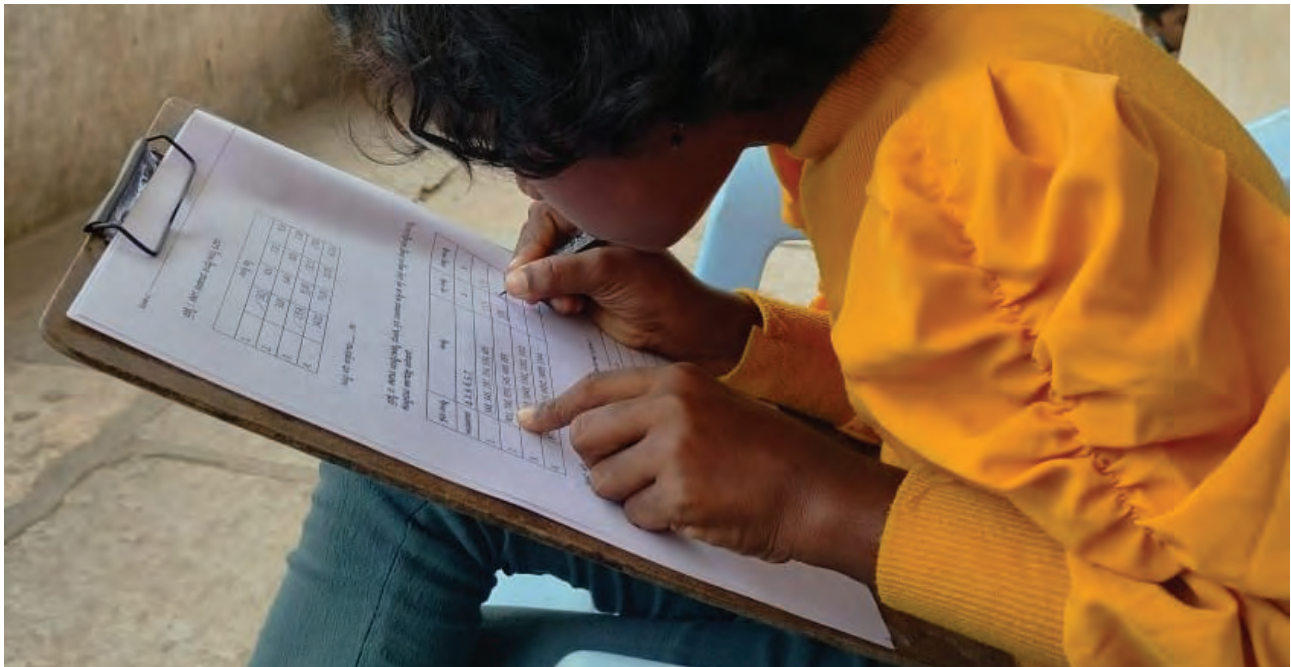

Figure 3. Writing prompts with clear instructions help reinforce language learning.

Maths

While conducting maths assessments, it was seen that a common challenge is that children are most comfortable with repeating 'procedures' that they know. For example:

- They assume that any two numbers given vertically need to be added. Or, even if they understand that they are expected to multiply the numbers, if they do not know multiplication, they add the numbers because it is what they can do.

- They are only exposed to a few strategies for basic operations, such as drawing sticks to add or subtract. It is time-consuming, and likely that if there are four to five sums given, they complete only a few of them and leave the others.

This led to the conclusion that children are not being taught poorly, but that the exposure that should be given as reinforcement is very limited. A few examples of activities seen as reinforcement are shown in Table 2.

Table 2. Reinforcement activities for maths

| Topic	In the class	Outside the class	At home
Sorting and counting	Counting activities as per the *Nali-Kali* cards	Giving children cut-outs of different kinds of flowers and asking them to arrange stones to represent the number of petals	Collecting leaves, flowers, grass, etc. while coming to school and sorting them by colour/shape/number/texture, etc. Counting at least 5 objects they see in their home or around and showing these in their drawings.
Patterns	As a group, they practice continuing a given sequence		Creating and drawing their own patterns
Number sense	Using arrow cards to create and read numbers, showing their expanded forms, and writing them in words.		Creating their own arrow cards: Children can be assigned to create specific arrow cards based on whether they are still at the two-, three-, or four-digit number level. Writing the expansion form and the number in words.
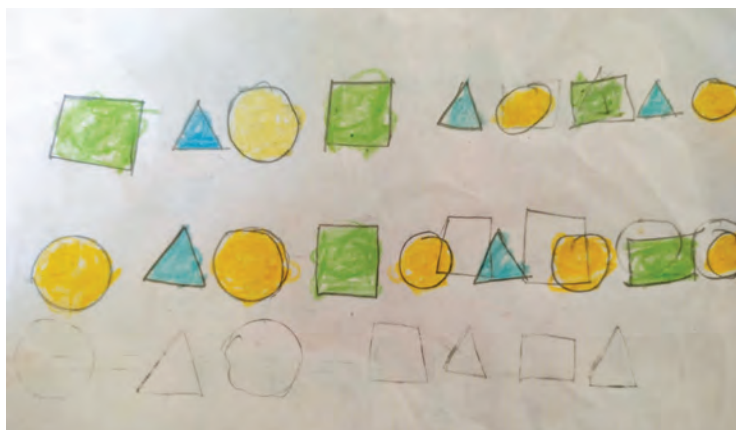
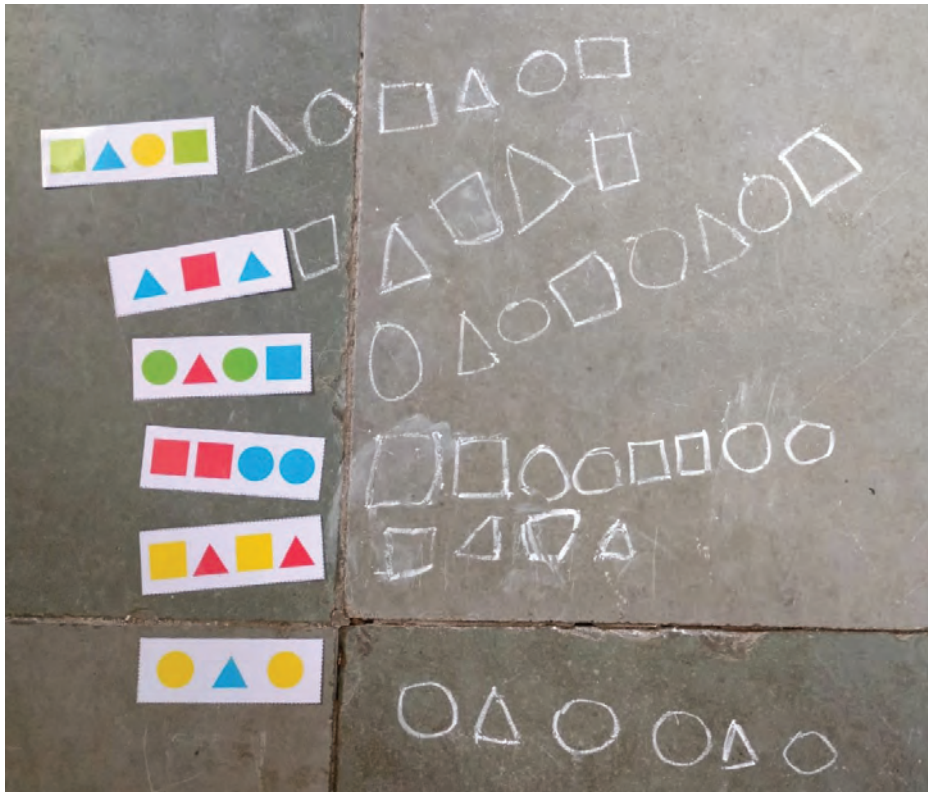*Figure 4. A student's work on creating a correct sequence.*

Figure 5. Another student's work on creating a correct sequence.

Concluding remarks

I have drawn a lot from my work on reinforcement with teachers and children. Some of these learnings are:

- Activities can be constructive in reinforcing learning based on how they have been planned, and how clear the given instructions are.

- On any day or week, good reinforcement activities can be planned by reflecting on a few basic aspects, such as how much time children have spent on writing activities and inside the classroom. As a practitioner, if we are able to set a limit on this, we would be able to map that we are largely focusing on one to two areas (such as memorising spellings of words, solving sums) and are not maintaining diversity in reinforcement activities.

- A lot of TLMs developed for the classroom are not used to their full potential because they are not connected to reinforcing learning. Spending some time giving instructions to children for using TLMs on their own is a reinforcement in itself, and also gives children the space to explore a topic on their own.

- Alternate pedagogies can start with simple activities and evolve slowly, such as sitting outdoors to narrate a story or dividing a high-strength classroom into indoor and outdoor groups with different activities. Children who are assigned outdoor activities can do simple surveys and data collection, shared reading of texts, solving exercises whose instructions have been given by the teachers, etc., as they can carry out these activities even without the direct supervision of the teacher. This need not have an immediate impact, but some steps can also be taken with the objective of making the class fun. Especially in schools where student strength is very high, such steps would bring qualitative engagement of all the children, whereas otherwise, only a small group of students would be able to follow the teachers' plan.

I believe adding significance to reinforcing learning adequately and appropriately would improve learning and also have a much larger impact, such as the children finding the school a happier place; feeling free to give spontaneous answers, completing their home assignments enthusiastically because they are more engaging, and having teachers who do not read assessments as students' effort to 'reproduce' what has been practised, but as an opportunity to reinforce what may not have been adequately internalised.
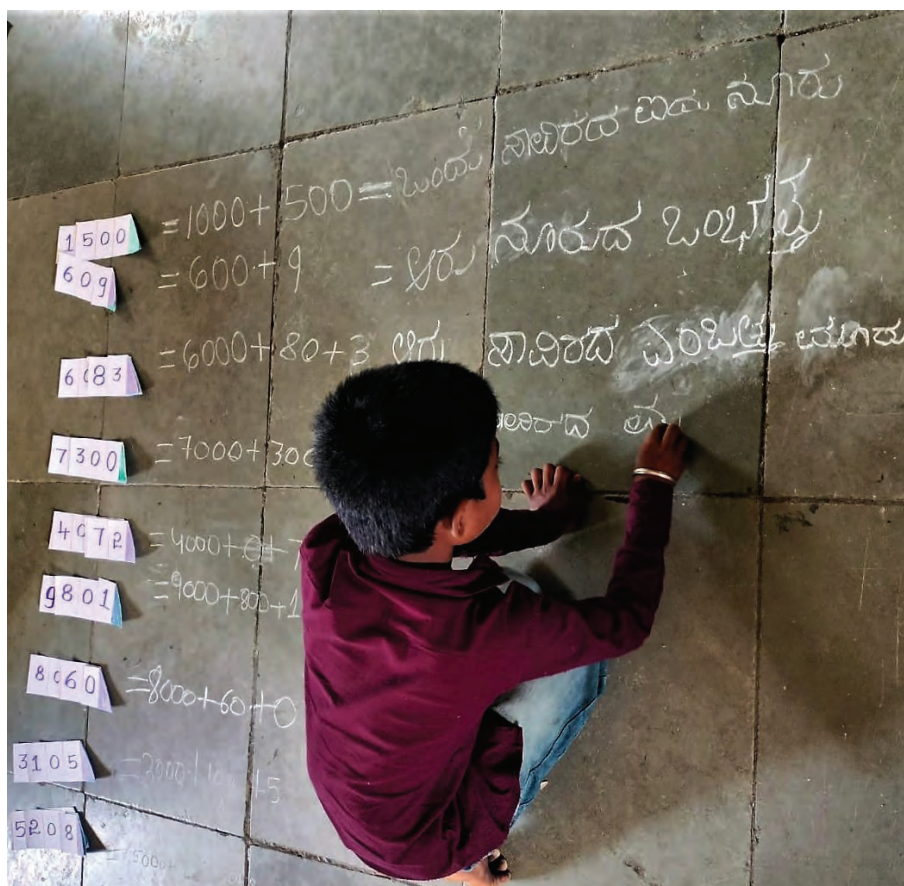
Figure 6. A maths reinforcement activity that children enjoy.

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Reinforcing Learning Through Local Knowledge

Akshatha J A and Sumangala

We routinely say that 'Students are active learners, not passive listeners'. Since most of the students in public schools in rural areas face socio-economic challenges, teachers need to try out multiple pedagogies to ensure their involvement and reinforce learning.

As part of the Associate Programme,[i] we have been visiting two schools in the Yadgir district – Government Higher Primary School, Ashnal, and Government Higher Primary School, Kanchagarahalli. These two schools have classes I-VIII, with the strengths of 228 and 202 students, respectively. Each class consists of 30-40 students, most of whom are first-generation school-goers. Children come to school with a huge knowledge base and a very intimate understanding of their surroundings but learning processes are usually limited to the classroom and do not extend into their daily activities. The impact of this is seen on the expected learning outcomes, both in terms of how many children attain it and to what level.

Keeping these factors in mind while preparing lesson plans, we prioritise the engagement and involvement of children, comprising aspects like creating space for oral expression, comprehensive reading of posters and picture stories, writing for expression, and connecting day-to-day events to mathematical operations. The activities also keep a balance between time and space within and outside the classroom.

At the beginning of the 2023-24 academic year, we organised a five-day Children's Creativity Workshop for all the children in the school with a variety of activities to enhance children's enthusiasm and interest in schooling. The objectives of the workshop were:

- Bringing children back to school (in this context, children take up to several weeks to return to school after school holidays) by engaging them in activities requiring creative and critical engagement
- Improving community interaction with school through student and parent involvement in activities
- Conducting activities that integrate aspects of foundational literacy and numeracy
- Encouraging teachers to participate in the activities and extending these into their teaching practices

A few examples of activities that were conducted in the community space before school hours to encourage student and community participation were – simple games, art shows (*Yakshagana*, drama, puppet show), bird-watching, creating simple arts and crafts using local materials. Parents and youth were invited by us and the children to join or contribute to the activities.

We realised that while the community did not show immediate support or participation, they were observant and encouraging in their own way. Although we had visited the community with children before this workshop, these five days helped build an entirely different understanding and relationship. The visits helped us understand the setting of the houses of different communities, places of worship, places for leisure and gatherings, etc.

As we were there to conduct activities each morning, we also became aware of certain social complexities, such as children refusing to go to certain parts of the village and those who did, experienced conflict with members of the village. These moments required a degree of sensitivity that could only be managed with the support of parents and teachers. Most importantly, this experience helped us realise how much children observe, learn from, and engage with their surroundings; how wonderfully acquainted they are with their knowledge systems; and how little of this is part of their learning at school.

To bridge this gap, we supported children to conduct simple interviews of people in the village and develop a village map and village newspaper. Everything children created or developed was displayed on the last day as an exhibition hosted by children for their village.

Village newspaper

To begin with, we tried to ensure that the students understand the usefulness of a newspaper and the various types of its contents. We probed them to think about how a newsletter of their village could be created. Then, the content (list of news and other items) to be included in the newspapers was listed by the students. The list of news collected was diverse and interesting. For every news item listed, the students had so many things to tell us about that we encouraged them to create short write-ups by assigning them different news stories.

Village newspapers have been brought out. Designed by students, these include information about events that have occurred in and around their school and village. Students of classes VI and VII carried out this activity in both the schools. Each edition also includes students' art, puzzles, quotes, photographs, and riddles.

Figure 1. Students explaining their work to community members

Enhancing literacy and numeracy skills

Bringing out the newspaper helped in reinforcing several aspects of literacy, like a probing thought process; development of skills around listing, prioritising, and filtering information; collecting and consolidating data; writing about their experiences; describing a series of incidents; reading and writing to develop questions; representing information in multiple modes, like art and craft; and explaining it to a varied audience.

Figure 2. The Village Newspaper created by students at GHPS Kanchagarahalli

Commonly, the content delivered to the students is limited and they are expected to read and write in formal Kannada. So, when they were given the chance to access content from local resources involving incidents in the village and school etc., and writing in the local dialect, it created a platform for independent writing. This allowed them to prioritise news, such as 'New Teachers getting appointed to school', 'Declaration of holiday due to rain' etc. These news items are of their interest because of which their write-ups were more detailed and informative. Similarly, one of the students wrote about an indigenous food *hundi*, its method of preparation and the reason why it is prepared only once a year during a festival.

Evolving different methods of collecting data

We observed a few instances where students developed the skill of collecting data in a unique way. For example, a student had chosen the news of 'Ongoing temple construction in the village', for which the student sought the help of trusted sources (elders, teachers, and Temple Trust members) to collect authentic details, like the type of stone being used for construction, source of funds, expenditure till date, etc. In another case, a student was seen briefing the news of 'Cabinet formation' by clubbing a series of incidents that took place during the process. From the teacher explaining the cabinet formation process, nomination, campaigning, exercising vote, result announcement up to the oath-taking ceremony – the entire process was perfectly put in writing by the student which indicated improvement in the student's skill in independent writing. Above all, we noticed students' critical thinking on contemporary problems, like potholes on roads creating havoc during rains and ceiling seepage in classrooms etc.

Representing findings in multiple ways

In addition to the write-ups, the newspaper also provided students with opportunities to represent contents in different forms, like artworks, pictorial riddles, quotes, word puzzles and food recipes. This ensured the participation of students from different learning levels. For instance, a girl faced difficulty in writing but expressed her thoughts on water conservation well through a drawing.

When comparing the two editions of the village newspaper, we could see the improvements, for example, the number of news items collected increased, and the write-ups were more descriptive in the second edition. Sentences were not well-formed in the first edition, whereas, in the second, there was a clear focus on sequencing and maintaining coherence in sentence structure along with descriptions of incidents in an illustrative and expressive manner.

Village map

Generally, when maps are introduced in the EVS classes, outlines of a particular country or state are given and the process of locating places is mechanical, in which students are required to memorise and mark major cities and landmarks. Creating a village map was a way of making this process more relevant to their context and focusing on important aspects, such as geographical representation and usage of directions and signs.

Figure 3. The Village Map created by the students of GHPS Ashnal

Representing what they see

To begin with, a map of their school was designed in which students were able to identify landmarks, like flagpole, stage, volleyball court, drinking water taps etc., and drew these precisely in their correct locations. Extending this outside the school, they identified the landmarks, like waterbodies, places of worship (church, mosque, temple), bank, shops and *anganwadi* centres that they see on their way home from school. When told to look down at their village by imagining themselves as a flying bird, they visualised the aerial view of the village and designed the final map.

This activity reinforced learning skills like visualising a geographical area, knowledge of direction and signs, mind mapping of distances from landmarks and marking the spots, also, reducing the whole village to fit into a chart, etc. Estimation, a major goal of mathematics teaching was also addressed here. Overall, the graphical representation of the village was neatly done by the students with minimal support from us.

Aesthetic features of representation

A unique thing we observed was the colours students chose to represent a building and other structures and the special signs they used for shops, places of worship and fields. Normally, people visualise places by looking at a map, but here students constructed a map by visualising, thus making their learning inductive.

When we planned for an exhibition of students' artworks from the workshop, students took a leading role in mobilising the community by inviting people from every house. Approximately a hundred community members participated in the exhibition at both the schools. In GHPS Kanchagarahalli, along with the community, support from the educational functionaries was significant. Whereas, in GHPS Ashnal, where the exhibition was held in the community space, the community participation was greater. Students were seen explaining the village newspaper and map to different audiences, like educational functionaries, college students, parents, and village elders while being mindful of those who can and cannot read. We noticed that students were consciously choosing the areas to focus on while explaining, such as pointing out the roads or houses of the villagers who were visiting, telling them the process they had followed, and sharing anecdotes. A fascinating feature was the community and educational functionaries encouraging the students to work on the second edition of the village newspaper.

We understand that there can be a learning shift through any mode of teaching. As we see frequently with the teachers in the schools where we practise, it is believed that children learn through rote memorisation, and this is used as the only form of learning reinforcement. Activities conducted in the classroom are mostly for concept introduction, but activity-based learning is rare, and multiple forms of reinforcement are not seen at all. This comes

Figure 4. Visitors spotting places on the village map.

from a belief that the end product where children write answers or solve sums is the only place where reinforcement is required.

With this initiative, we have noticed the significance of working on each aspect of learning that would bring an overall improvement. For example, language learning is improved when we simultaneously work on asking good questions, giving creative assignments, scaffolding students' writing with prompts, helping them plan and revise their writing, and finally, presenting their work. If we had only given students a homework assignment to write about their village festival, the write-ups would have been very different, and the number of students engaging in this process, limited. The advantage of the approach we have used here is the scope for multiple opportunities and exposure, reinforcing wider participation, better engagement in the activities, and community involvement in the teaching-learning process. Retrospection throughout this process leads us to an understanding that when a suitable platform is created through multiple pedagogies, it brings the learning shift more effectively in a limited time span.

Figure 5. Students showing the Village Map to Education Department functionaries at GHPS Kanchagarahalli

Endnotes

i   As part of this programme, Associates of the Azim Premji Foundation spend one year in a government school observing and learning to engage with classes. They try and understand the school processes, contribute to children's learning, and the environment to develop a holistic understanding of public schools and the public education system.

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Reinforcing Democratic Systems in Class

Alice Austin Barwa

School is a place where besides scholastic learning, children also learn how to socialise with others. While it may reinforce existing social inequalities, it is also a space where these can be discussed and deliberated upon so that children may learn to challenge these in the real world. The school also plays a vital role in helping a child locate themselves within society, it becomes imperative that beyond dialogue, through our actions and praxis, we help children redirect their energies for personal and social transformation, laying the foundation for a democratic future.

Classroom dynamics

Aap hume maarte kyun nahi ho? (Why don't you hit us?) was an oddly specific question I was asked by the students as I started teaching in the Government School of rural Kharsia, in Chhattisgarh, as a part of my Associateship Programme. During the initial days of my school visits, I was met with silence and curiosity. Often, the silence would override their curiosity in the presence of a teacher, the authority figure. But in the absence of the teacher, it was utter chaos, with students fighting among themselves.

While discipline was equated to pin-drop silence, it was achieved by the teacher having to shout over a crowd of 20-25 students. This seemed effective in the short-term, but the result was students using the same methods of shouting and beating each other to reach a solution when their classmates did not heed their 'orders'. Students had internalised what the adults around them practised. To run my class, not only did I need a better alternative to how students' behaviour could be managed but also provide them space to unlearn old patterns of behaviour.

Discussions toh, miss, bade logon se hote hain, humare sath thodi! (Discussions take place with big people, Miss, not with us!) This was a remark from a girl in my class as I sat with the students to deliberate on classroom practices that they thought should be in place to ensure learning. Her statement made me realise how children's perceptions of power stem from the way they see it practised. Often, they are expected to act in a certain way in a certain environment without an appropriate conversation with them.

In the common perception of viewing children as blank slates, adults in authority believe these conversations to be beyond their age. In my understanding, this is also a form of power, privilege, and exclusion in the larger society. In classrooms, people in authority, who are equated to power, freely make undemocratic decisions. This position of dominance is often accepted as, and equated to, expertise in certain areas. These traditional classrooms reinforce the *status quo* and limit critical thinking and self-reflection.

Reinforcing democratic processes

Given the chance to talk about classroom norms not only allowed students to discuss what classroom practices they would follow, but also why. This allowed the students to:

- Understand the importance of dialogue and the process of democratic decision-making, acceptable practices in the classroom, the importance of talking and listening in discussions, and learning that to listen we must also pay attention and stay silent occasionally.
- Critique and question classroom practices, for example, the use of corporal punishment, which led to a discussion on their belief of whether students can really learn when they get beaten.
- Co-create norms unique to their classroom, -based on the challenges we faced during classroom interactions.

The discussion was part of the proactive behaviour management practices, where clear behavioural expectations were stated. As an educator, it gave me the opportunity to set reminders and pre-correct undesirable behaviour.

Teachers' role

Every classroom is different, with its unique set of students. While understanding the needs of

my students was part of a continuous and longer process, we established certain enablers to proactively manage their behaviour during our regular classroom transactions.

Instead of shouting at the highly energetic students, we developed a mutual understanding to use call-and-response strategies, such as 'Marco-Polo' or '1, 2, 3 eyes on me' to grab the attention of students in the classroom regularly. This was especially helpful in the primary classes as the students did not have the same attention span as their older counterparts. The students practised it even in my absence to get all their classmates settled for classroom transactions.

To further build self-management and self-awareness, we regularised meditation in the classroom. Initially, it was just on Saturdays, where sitting calmly without giggling for even four minutes was a huge task. But slowly, students eased into it, resting, sometimes taking support of the wall, as soft instrumental music played in the background. This helped in cultivating emotional resilience and awareness among the students.

Ma'am ka tabiyat kharab hai, aaj pareshan nahi karna. (Ma'am is unwell, don't disturb her today). One of my students went around whispering this in everyone's ears, on one of my sick days, for them to remain calm and focused during their class. Gestures like these of kindness and compassion become a reflection of democratic dialogues and praxis we hold in a classroom space. It shows not only their awareness of their surroundings but also self-awareness, self-management, and responsible decision-making skills.

Buddy system

As an educator, in this attempt to create student-centred and democratic classroom experiences both to reinforce acceptable conduct as well as establish an equal partnership among the students, my role was to identify what the students struggled with. Understanding my students holistically consisted of home and community visits, which helped me connect the varying cultural and behavioural responses that I was receiving in a classroom.

A case in point was that of Anu, who would be regularly absent from school despite living right next to it. He was loud and responsive but struggled to write or focus on class. Irrespective of his loud responses, he was often ignored and silenced in the classroom. He ended up getting into fights very often and beating up other students in his class, who were a year younger than him. During a classroom discussion, I learned that his mother had left them, and his father was working outside the state. After planning with his classmates, we made a visit to his home. We shared some classroom experiences and encouraged him to come to class. We assured him help and implemented a 'buddy' system.

In the buddy system, students are paired based on their academic and behavioural needs and skills. Anu could easily do mental math and, when encouraged, made the effort to read in Hindi, (our second language) as well as English (our third language). This buddy system encouraged him to actively participate in class, build friendships and take ownership of the learning process of his partner. His classroom learning was influenced drastically and though he struggled to write more than a paragraph independently, he was able to read fluently both Hindi and English by the end of the school year. From being a child who engaged in fighting, he became the one stopping fights among younger students.

In conclusion

Expectations of complete obedience as a form of discipline in traditional classrooms are autocratic and authoritarian, which dehumanise both the students and the teachers in the classroom. Resorting to violence, that is, corporal punishment and verbal abuse reflects the absence of proactive classroom management, collaborative action and socio-emotional learning among the adults and children.

There is a need to perceive students from a humanising lens, where any practice we use within the classroom reflects our understanding of and interaction with the larger society. Being able to view students as active learners, who hold the capacity to participate in democratic decision-making processes is an important step. While school systems have established processes, such as *Bal Sansad* and being part of the School Management Committee (as student representative), children's voices remain largely unheard and invalidated.

It is up to us, as educators, to create processes within our daily routines and classroom transactions which

reinforce democratic practices through dialogue and praxis, further enabling them to participate in school systems and the larger society. After all, democracy is not a mechanical process, but a live, ongoing social necessity.

Names have been changed to protect children's identities.

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Importance of Reinforcement Activities in Primary Maths

Chithra P

Some teachers believe that it is impossible to teach every concept in maths to each student in the class, in other words, every child in class does not understand every basic concept of maths. However, there is rarely an assessment of our teaching methods before and after the teaching or mathematical conversations with students, especially students with special needs.

As we all know, it is very important to develop foundational learning abilities in children at the primary level. Along with that, we have a responsibility to teach them all the subjects comprehensively. We should be able to develop the confidence in children that they can learn all the concepts meaningfully.

We were observing a maths teacher's class (*Nali-Kali*). The teacher had a great concern for and a good rapport with the children but after the class, she shared with us the challenges she faced. According to her 'only 80 percent of students in a class can learn any given mathematical concept'. She said that it was a challenge to make all the children learn what was being taught. She had many reasons in support of this observation. She also asked us how to teach the remaining 20 percent of the class. Her concern about those children was evident.

We listed some concepts in maths with her. The most important concept in that list seemed to be the ascending and descending order of numbers. Children get very confused by this concept and some struggle to understand it at all. So, we listed out the abilities a child should have before this concept is taught to them. It was clear that a child should know numbers before understanding ascending and descending order, so we need to teach them numbers first. We decided that to make the activity attractive for them, we could let them write on the classroom floor in a relaxed way. Since it was a *Nali-Kali* classroom (classes I-III) we executed this project in phases so that the students of all three classes benefitted from it.

Phase 1

The instruction we gave was: 'Write the visualised quantity of numbers in ascending and descending order'.

1. We wrote a problem on the blackboard and also, on the floor. We placed some stones nearby. We made the children sit in a circle so that everyone was visible to everyone else.
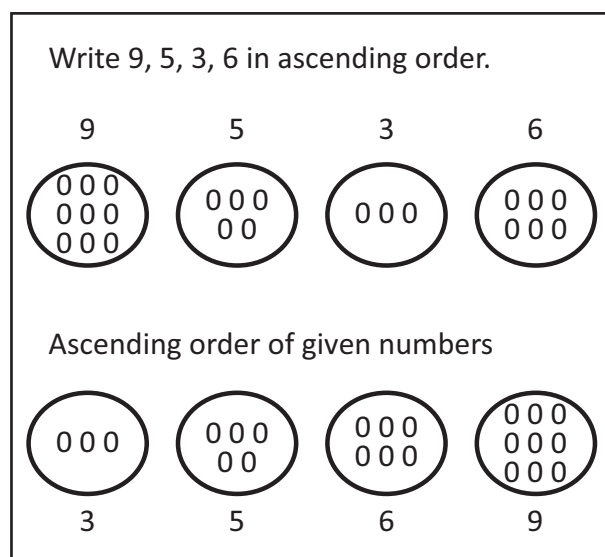

Figure 1. Using the 'quantity visualisation' approach to understand ascending order.

We arranged the stones as shown in Figure 1. Then we asked which is the smallest number in the arrangement. The students answered that it was 3, and then we went on to arrange them in increasing order: 3, 5, 6 and 9. The children were answering by looking at the number of stones (more or less) in the circle. This also helped them understand how a number is bigger than another. After arranging the numbers as the children said, we reinforced this understanding by telling them that this series is called ascending order – arranging numbers from small to big.

2. Then, we gave some problems to all the children and instructed them to solve them in their notebooks. We told them to count using dots instead of stones.

3. After observing that all the children in the class were able to do this, we told them to make their own problems and solve them.

4. Then we asked them to arrange the numbers in ascending order without the help of dots. But all the children could not complete this.

What we found was that even though the children were given tangible objects at first, followed by images and then directed towards intangible numbers, all the children were not able to write the ascending order using intangible numbers.

We realised that this activity could be difficult to do with two-digit numbers. For example, when it comes to numbers like 25,30 and 42, it is difficult to put so many stones or dots. So, we changed the project accordingly and executed a different activity in the next phase.

Phase 2

1. A problem was written on the floor, for example: 8,2,3,5. The task was: the numbers should be written in ascending order.

The children were told to write from 1 to 9 on another part of the floor. We told them to take as many stones as the number, for example, 4 stones for the number 4. They had to place the stones in the number sequence 1 to 9.

Now, we asked them to remove the stones that are placed on the 1 to 9 numbers sequentially one by one and write those numbers. When all the stones were removed one by one the numbers were arranged as: 2,3,5,8. So, we introduced the

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Write 8, 2, 3, 5 in ascending order.

Steps:

1. Write the numbers 1-9 on the floor.

2. Take four stones and place them on the numbers 8, 2, 3, 5 on the number sequence 1-9.

3. Beginning from number 1, start removing the stones and write the number it in the answer space. Example, remove the first stone from number 2, and write number 2 in your answer. Then, remove the second stone and do the same.

Now, you will have the numbers arranged in ascending order – 2, 3, 5, 8.

1
2 O
3 O
4
5 O
6
7
8 O
9

Figure 2. Steps for writing numbers in ascending order.

Figure 3. A student noting the answer in the notebook.

concept of ascending order in this way. We taught two to three problems in the same way. All the children seemed to understand this. Then, we gave chalk to all the children and asked them to solve the problems in the same way on the floor. All the children were solving the problems.

Since it was a *Nali-Kali* class, we grouped the children according to their classes. In the first group, we encouraged the children of class I to solve similar problems, that is, involving single-digit numbers. We went on to do the same with the children of classes II and III and found that they had grasped the concept of ascending order and were able to solve the problems easily.

Then we told the children to write the problems in their notebooks, using dots in the place of stones. All the children were able to solve the new ascending-order problems. This is how we went through this reinforcement activity in phases.

It was a moment of happiness for the teacher when a student of class III asked if they could arrange two-digit numbers in ascending order. After some reflection, the teacher said that with the right planning, the right order with appropriate activities children could very easily learn not only mathematics but any other subject.

Before going on to the concept of descending order, we made sure that the children of classes II and III had understood how to write two-digit numbers in ascending order. For example: 45,21,36,18. We asked the children to write numbers from 1 to 9 again and to place stones as before sequentially; then, remove the stones from these numbers mentioned and write the numbers (write 18 against 1, 21 against 2, 36 against 3 and 45 against 4. So, they had 18, 21, 36 and 45 and these were in ascending order).

Write 45, 21, 36, 18 in ascending order.

Steps:

1. Write the numbers 1-9 on the floor.

2. Take four stones and considering the tens place keep them on the numbers 4, 2, 3, 6 on the number sequence 1-9.

3. Beginning from number 1, start removing the stones and write the number in the answer space. Example, remove the stone from 1 and write 18, then remove the stones from number 2 and write 21. Continue like this.

Now you will have the numbers arranged in ascending order – 18, 21, 36, 45

1 O
2 O
3 O
4 O
5
6
7
8
9

Figure 4. Steps for writing two-digit numbers in ascending order.

Figure 5. A teacher helping students in the activity.

If two numbers have the same digits in the tens place, for example: 21, 56, 32, 51, follow the phases described above. Take the two numbers which have the same digits in the ten's places. Write down the number which has the smaller digit in its one's place first.

When the children were taken through these phases, they started to understand the concept better.

After confirming that all the children were able to arrange the numbers in ascending order, we taught them to arrange single digits in descending order. Then the children learned ascending and descending orders of one-digit, two-digit and three-digit numbers easily. These activities were taught to children in phases as mentioned.

Write 45, 56, 32, 51 in ascending order.

Steps:

1. Write the numbers 1-9 on the floor.

2. Take four stones and considering the tens place keep them on the numbers 4, 5, 3, 5 on the number sequence 1-9. There will be 2 stones on number 5.

3. Beginning from number 1, start removing the stones and write the number in your answer. Example, remove the first stone from number 3, and write number 3 in your answer. Then, remove the second stone and do the same.

4. Now, there are 2 stones on the number 5. Look at the unit place and write the smaller number first (51, then, 56)

Now, you will have the numbers arranged in ascending order – 32, 45, 51, 56.

1
2
3 O
4 O
5 O O
6
7
8
9

Figure 6. Steps for writing two numbers with the same digit in the ten's place in ascending order.

Figure 7. Students working out the problem with the help of stones.

We have instances of children from other schools learning the concept of ascending and descending order very easily when taught in this way. Also, since we work with a lot of teachers, we are able to share this method with all of them. Teachers have used this method and shared their experiences with us.

As you may have observed, in all the above stages, when a child understands the concept in each stage, more and more reinforcing activities are given to the child. Thus, if a child has to understand any concept and apply it in real life, reinforcement activities play a very important role.

Our learnings

1. Children are able to understand concepts well with the help of reinforcement activities.

2. To introduce a new concept, it is very important to plan activities according to the age of the children in the class.

3. When the children are allowed to write on the floor, they love to solve the problems in their own way and learn the concepts.

Figure 8. Students engrossed in the activity.

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Learning Corners and Follow-up Activities

Dasanna Mareddy and V Koteswara Rao

Young children learn through active exploration, play, and social interaction. The learning process includes awareness, exploration, inquiry, and utilisation of new knowledge.

The stages of children's learning are:

- Simple to complex: Children begin with fundamentals and move toward mastery of the more complex techniques
- Known to unknown/familiar to unfamiliar: Children come with prior knowledge of language and their familiar world; they build on their previous knowledge
- Concrete to abstract: Children learn best with concrete material which they can touch, feel, manipulate and later relate this to the abstract, which requires them to use their imagination

Learning Corners

In the early childhood classroom, children construct knowledge, learn new concepts, and sharpen skills through various pedagogical activities. To facilitate learning to happen best for young children, it is important for teachers to plan and provide opportunities for children to strengthen their learning. Playing in Learning Corners is one such reinforcement activity where children get opportunities to explore, evaluate and reinforce the concepts that they learn through teacher-led activities.

Learning Corners, also called Learning Centres, is a system that allows the purposeful arrangement and organisation of play materials in the classroom. Children get opportunities to explore, make things, experiment and pursue their own interests. Each Learning Corner has a different focus and allows children to participate in it in a different way. In the *anganwadi* centres of Telangana, teachers are encouraged to organise four learning corners.

Dramatic Play Corner

Scene: Children playing with a doctor set that is kept in the Dramatic Play Corner in an *anganwadi*.

Child 1: I want to be the doctor now. (This child who was playing as an assistant/nurse wants to take the doctor's role.)

Child 2: You can be the doctor later, now let me be the doctor. (This child who was playing the doctor, wants to continue.)

Child 1: I want to be the doctor. (The first child insists.)

Child 2: Let me be the doctor for two times. (The child holds up two fingers.)

This child continued to play doctor for the second time and then gave a chance to the other child to be the doctor.

In the above vignette, a clear negotiation took place between two children regarding the exchange of roles. The second child applied the 'two' number concept during the negotiation.

The idea of dramatic play among children is triggered by their understanding of social roles and real-world events. Children recreate real-life experiences beginning from their homes. Therefore, equipment and materials for pretending to be 'mommy' and 'daddy' are among the first things to be included. Teachers make different props to facilitate pretend play, such as those used by a doctor, grocery seller and firefighter, that can be rotated among the children according to their interests. While assuming a role in a play, teachers let children put themselves in the shoes of the character they are playing and bring out the emotions that the character might feel. Imitating these various roles gives room to the children to strengthen their understanding of relationships, different social roles of people and the work they do. It also provides opportunities for children to practise and acquire their social skills by playing with other children.

Figure 1. Dramatic Play Corner in an anganwadi.

Blocks corner

Playing with blocks provides children with opportunities for creative and imaginative play and to solve problems. By playing with blocks, children learn about shapes, sizes, and colours. They may compare the blocks, arrange them, or create elaborate structures and models. Blocks motivate children to think in creative ways as they build different kinds of structures. Moreover, sometimes, children build a structure cooperatively, which requires them to communicate with each other and work as a team. Puzzles (such as wooden pegs and jigsaw puzzles for preschoolers) make children explore, think, recall and experiment with various ways to solve them. This corner also provides opportunities for activities, such as matching, sorting, comparing, ordering and patterning objects.

Language and Literacy Corner

This Corner, also known as the Library Corner, is meant to promote pre-reading skills and expose children to the printed word. So, the materials in this corner are printed material: picture cards, conversation charts and books. It allows children to explore a variety of print material, expanding their imagination and sharpening their skills of prediction to form stories. Exploring books with fantasy and animal stories gives them immense pleasure at this stage. To extend the opportunity, after narrating a story or having a guided conversation with children, the teacher can keep the story or picture books/flashcards in the Language Corner and encourage children to use them. This could help the children to explore the same book and attempt to narrate the story in their own words. Some children try to

Figure 2. Children explore books on their own in a Language and Literacy Corner.

Figure 3. Children engaged in activities in a Creative Corner.

recollect a story by looking at the book. It is also a good way to teach children how to 'handle' books: the front and back of a book, the direction of turning the pages while reading, etc. It is valuable also because it shows how what we speak can be represented in writing, which is a skill that children will learn later.

Creative Corner

In this corner, children get opportunities to nurture their creativity using materials, like colours, paper, brushes, crayons etc. While engaging in this activity, children get the opportunity to work with multiple appealing colours that could build their interest in creative activities. Children also gain control over their fine motor skills and by using different materials available in this corner, they can express their thoughts, feelings and imaginations. This corner strengthens creative thinking, self-expression, representation and fine motor abilities.

Teacher's role

The teacher has a very active part to play in how these Learning Corners are used effectively. They must arrange the Learning Corners based on their teaching plans by keeping the materials that are relevant to the content and activities planned. After the initial engagement by the teacher, children continue and reinforce their learning through different Learning Corners when they are asked to 'play' there. Teachers can also:

- Encourage children to share ideas and experiences with their peers as well as with the teacher

- Engage children in conversation by asking open-ended questions (that require more than just *yes* or *no* answers) and scaffolding children's experiences
- Extend children's learning by introducing new ideas and materials
- Model pro-social behaviour by playing cooperatively with other children
- Support children's problem-solving efforts
- Observe children's skills, development, and interests
- Record observations to use in planning and documentation
- Make informed decisions while planning for the next day or week based on their observations

Follow-up activities

Follow-up activities are important for reinforcing the learning that the children gain through the activities. For instance, after a conversation, story or nature walk, the teacher can provide opportunities for children to extend, re-present and apply the concepts they have learnt.

After a conversation

Once teachers complete a conversation with the children, they can create opportunities `for the children to explore picture cards, books, charts, and other real objects which they have used, thereby allowing the children to bring their understanding to the discussion and share their experiences. This is useful in reinforcing their understanding.

After a rhyme session

Along with singing rhymes with action, teachers can read the rhyme poster with expression and intonation. This helps children learn to relate oral language to the written text and connect it to the pictures in the poster. This strengthens comprehension as well.

After a storytelling session

After a storytelling session, teachers can ask the children to draw the characters of the story on the running blackboard. Children can try to represent the characters in drawings and recall the story and also narrate the story in their own words, which is another way of reinforcing learning.

After a nature walk

After a nature walk, children can be asked to draw what they have seen. They can also make different patterns and designs with the materials they have collected during the walk.

As mentioned in the beginning, children's learning processes involve awareness, exploration, inquiry, and utilisation (of newly-learned knowledge/concepts). Children need to get ample time and opportunities to analyse, evaluate, apply and strengthen the learning they get through the structured activities led by the teacher.

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Music as a Reinforcer in English Language Learning

Deepika Jhala

Music has the power to stir our emotions. We often observe children singing or humming songs, rhymes, and sometimes just humming some familiar sounds. Here in Sirohi, firstly, children do not have much exposure to the English language and, secondly, it is their third language. Students often find it difficult to comprehend or even articulate certain words, phrases and sentences. Hence, doing rhymes with them every day becomes essential to reinforce their learning. Music has rhythm and melody, which helps students to develop fluency in the language and when rhymes are sung with actions and gestures, children are also able to comprehend the meanings of English words and expressions.

Any language has four skills, and these are listening, speaking, reading, and writing (referred to as LSRW). Students are required to practise these skills regularly to comprehend the language and gain fluency. In the classroom, when we teach rhymes, children use all these skills, and it helps them to recognise many words. This eases the process of learning, in this case, English, because when we use these words later on in stories and articles, students do not find them difficult. They even understand parts of the text on their own.

Classroom experiences

We were discussing the topic 'bird' with students of class III, as we have a poem *Bird Talk* in the NCERT textbook. We invited our music teacher to the class to familiarise the children with the rhyme. We created a song with this poem. The students enjoyed this rhyme; they danced to it and hummed the tune the whole day. They learned the actions and gestures of the song and the learning outcome of singing the rhymes with actions and gestures was carried out with the complete participation of all the students. All of them were able to sing the rhyme and they identified the birds *Robin* and *Jay* in the picture in their textbooks without us having to tell them. The vocabulary developed with this rhyme has helped us in the chapter *Nina and the Baby Sparrow* in which the students were able to understand the text with only a little help.

When this rhyme was sung with actions in the assembly, students from all classes started singing along and they sang it in the corridors, on the playground, in their classrooms and even in their homes. We also pasted a chart of the rhyme in the classroom so that students could look at it and read it independently whenever they had the time.

Figure 1. Children of class V singing and dancing

Later, we started getting clubbed periods of one-and-a-half hours for English for the primary and upper primary classes and we noticed that students would get bored and often lose attention. So, we introduced an action rhyme to bring their focus back to the classroom. The rhyme 'I am alive, awake alert, enthusiastic' was enjoyed by the students. They made different poses with the word 'enthusiastic.' In the beginning, students found it difficult to repeat these words, but slowly learned to do so. Whenever we noticed a drop in the energy level of the students, we asked them to stand up and recite this rhyme with action. Through this rhyme, we were able to get their attention back in the class for the task at hand. This rhyme was then transformed by students into various forms, and they enjoyed interacting with each other with these words. This has also helped students to build a vocabulary and speak fluently.

Creating higher-order skills

According to Bloom's Taxonomy, creating something is a higher-order skill. Students love creating poems both in groups and individually. When we ask them to add lines to a poem, we get many different types of rhymes with some amusing words. They enjoy reciting these rhymes and they also love to create different patterns with these rhymes and sing along with the whole class. It gives them confidence in the language, and they become less hesitant to speak in it. This helps us teachers in the classroom to give them different kinds of texts to read and share with each other.

One of the activities that we conduct in classrooms is 'listen and write'. Students listen to a poem four to five times. Then, we ask them to write as many words from the poem as they can remember. Through this exercise, we have noticed that students write twice or thrice as many words when they listen to and enjoy the poem. The lines help them to both, remember and develop their phonological awareness.

Positive results

Music and poetry can trigger ideas and stimulate the imagination of children. We feel elated when children write poems or create art, taking inspiration from poems and songs learned in class. Inspired by a poem taught in class, two students of class VII wrote their own poem (Figure 2). Thus, it is rightly claimed that music and rhymes have magical powers which transport children to different and higher mental spaces, something may not happen otherwise.
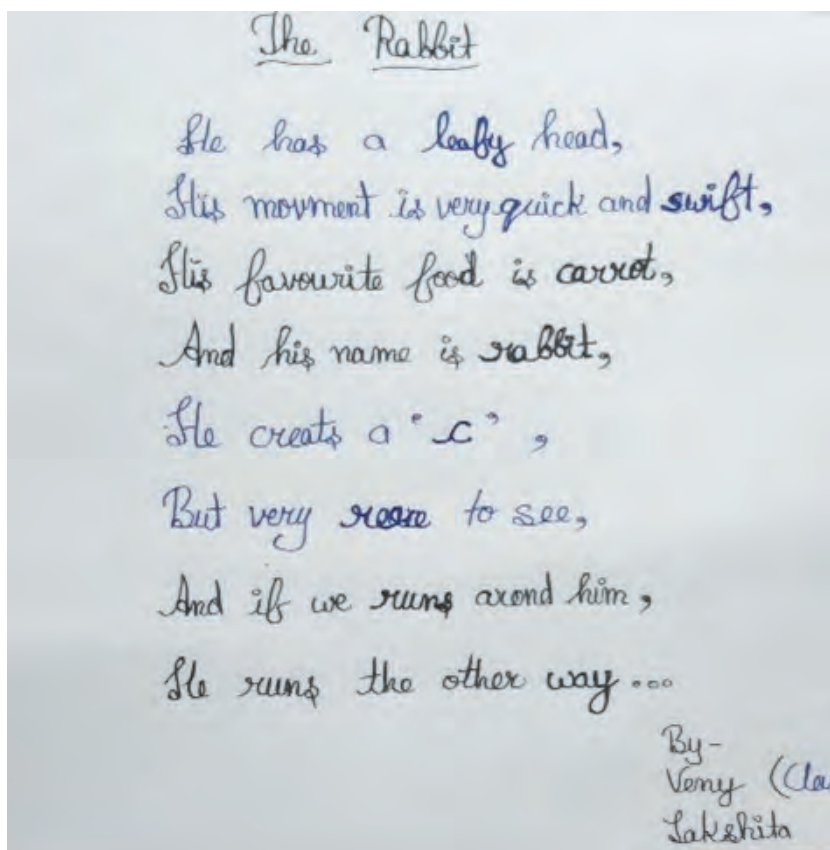

Figure 2. The poem written by two students of class VII

Music ignites the imagination of young minds and provides a scaffolding for creative writing. Our young children write their own short poems. Thus, incorporating music into creative writing is an effective and joyful way to fuel students' imagination and introduce them to creative writing. For instance, getting inspired by the poem *It's a Beautiful Day…* one of our students in class III wrote her own poem (Figure 3).

We have found music to be an integral part of the language classroom. Children learn a language better when they gain confidence in it. Music helps us to build that confidence in our children.

As Rosenblatt has said, language has both aesthetic and efferent aspects to it. Music highlights that aesthetic stance and helps children build a connection with the language of the words of the song. Music makes certain words a part of their active vocabulary: for instance, our students have now started using different words from poetry in their day-to-day lives. It is clear to us that if we want students to learn any language effectively, we need to help them build their vocabulary and gain fluency for comprehension. In the case of English as a third language, this necessary goal is achieved through introducing rhymes as an everyday activity in the classroom.
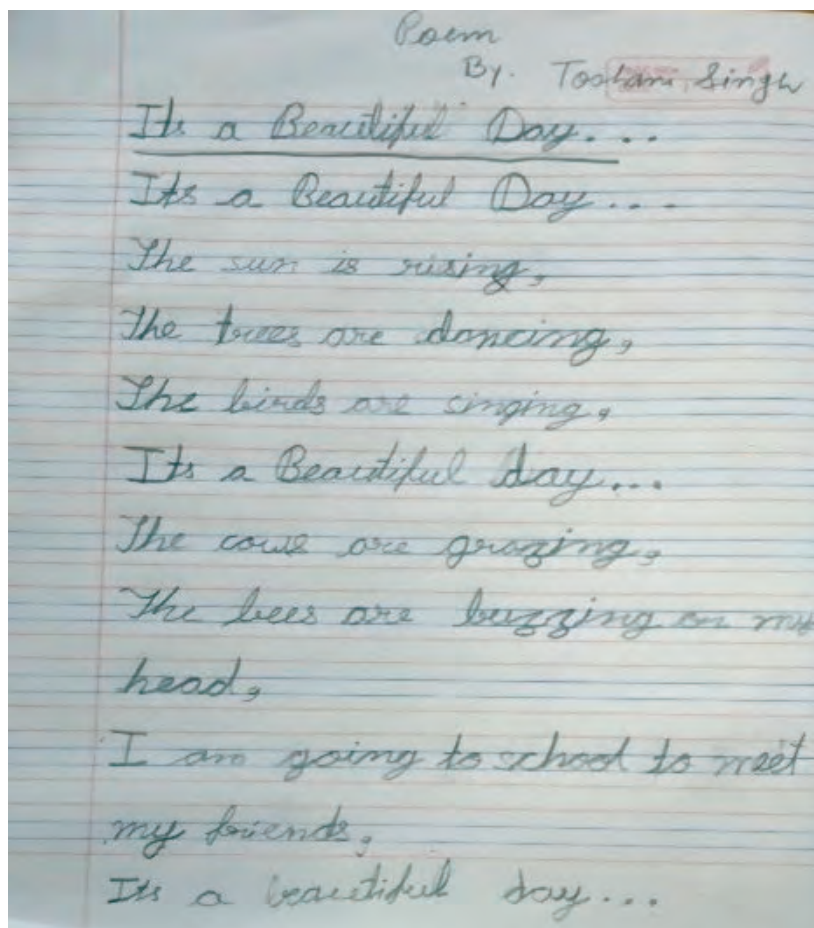

Figure 3. Poem composed by a student of class III

Deepika Jhala is a teacher at the Azim Premji School, Sirohi. She has teaching and research experience of 10 years and has previously worked with various colleges and schools across Rajasthan. Her hobbies include listening to music, cooking and teaching. She may be contacted at deepika.jhala@azimprejifoundation.org

Reinforcing Independent Creative Writing

Kalandar S

No learning is stagnant; it is a dynamic, evolving process. New ideas and thoughts keep emerging, modifying the old ones. This kind of change depends upon continuous practice, experience and the pursuit of new ideas. Because a child's interest has an important role in this process, how we can motivate a child's interest in a creative pursuit is an important consideration. How to help a child progress from standard writing (simple sentences, phrases, description etc.) to independent and creative expression (presenting any subject in their own unique style, adding logical reasoning to justify their thoughts, etc.) is a challenge for any teacher. This article tries to find an answer to that.

If creative thinking or imagination is clubbed with independent writing, then the writing shines. Using one's own unique style and word structures and conveying thoughts with logical reasoning builds independent writing. Are there enough opportunities in our classrooms to build such independent and creative writing skills in students? We need to analyse the learning outcomes, pedagogical models and opportunities provided for such a process in our classrooms.

A language teacher continuously uses different pedagogies to introduce various skills based on learning outcomes. The learning of the skills by students is reinforced by assessing them through homework, reading, term tests, etc.

However, when it comes to creative writing, we must ask ourselves, *will there be enough time for the students to master these skills and to produce new and original writing?* The answer is *no*. Isn't it then natural for the teacher to question if it is important to cultivate the skills of independent and creative writing in children? What is the advantage of creative writing? What will a child achieve by writing stories and poems? It is not a basic necessity like food, water, air or a job for a good life. But if we look deeply into it, learning to solve everyday problems, and social and communication skills are important for life and cannot be acquired overnight. These develop only through constant practice and use. All these are part of an individual's independent thinking and creativity.

If we want to develop independent and creative writing in children, allowing them to express their feelings, experiences, ideas, imagination, speculations, and logic in various ways is the first step. Only when we open these doors for them, can children make progress towards independent and creative writing. Let us see what we can do to make this a continuous process.

Some learning activities that are being used in Karnataka currently to facilitate independent and creative writing.

1	Drawing a picture and writing what it is under it in their home language. Example: Draw a picture of a hand fan and write its name (*beesanige* in Kannada).
2	Writing about life experiences and the things they see around them.
3	Writing short stories or poems about their favourite subjects and presenting these in class.
4	Using language more creatively in writing stories, poems or descriptions.
5	Writing stories in their own words from their imagination.
6	Writing about other people's experiences, or what they gather from hearing other people talking. Example: Conversations at public places, like water taps, bus stands or city junctions.
7	Poster-making - both writing and collecting materials.
8	Using nuances and the system of language in practice. Example: Changing (altering) the words in poems by understanding its meaning and rhythm.
9	Writing effectively by keeping in mind the readers and the purpose of their writing.

Organising recitations

We give our students opportunities to write stories and poems in our classrooms. These are based on the expected learning outcomes. We motivate them to write stories and poems through which their imagination can fly to boundless horizons. With constant effort, a child will write one or two poems within a period of fifteen days or a month but if we move away from this to other learning outcomes, then the work on this skill development halts. Due to the lack of practice, the child may gradually forget the skill. That is the reason why teachers organise recitations of poems or stories in schools, so that these skills can be reinforced and kept alive, and the child can develop an interest in different subjects and styles of writing.

School magazine

Another way of encouraging and promoting creativity among students is the school magazine. We collect stories, poems, articles, plays, book reviews, experiences, ideas, opinions and other forms of writing from children and publish these in the magazine. Students write about their surroundings, people, festivals, fairs and programmes. They are encouraged to explore and include various aspects, such as the importance of such events, their history, and how they are celebrated. Expressing their own thoughts along with the information they have gathered, and learning to reason logically and consistently in presenting are skills that are necessary not only in higher classes but throughout life.

Giving guidance

Children need guidance in these writing activities. Teachers can arrange workshops and invite experienced writers to guide and encourage children to write their stories and poems. In this way, they can be motivated to actively engage in creative writing. During special day celebrations and festivals, students can be given the opportunity to express their thoughts on these.

These activities should be extended outside school, for example, by creating reading clubs for students in their village or community. Children can be encouraged to work in pairs or groups so that they can motivate each other; the mutual exchange of
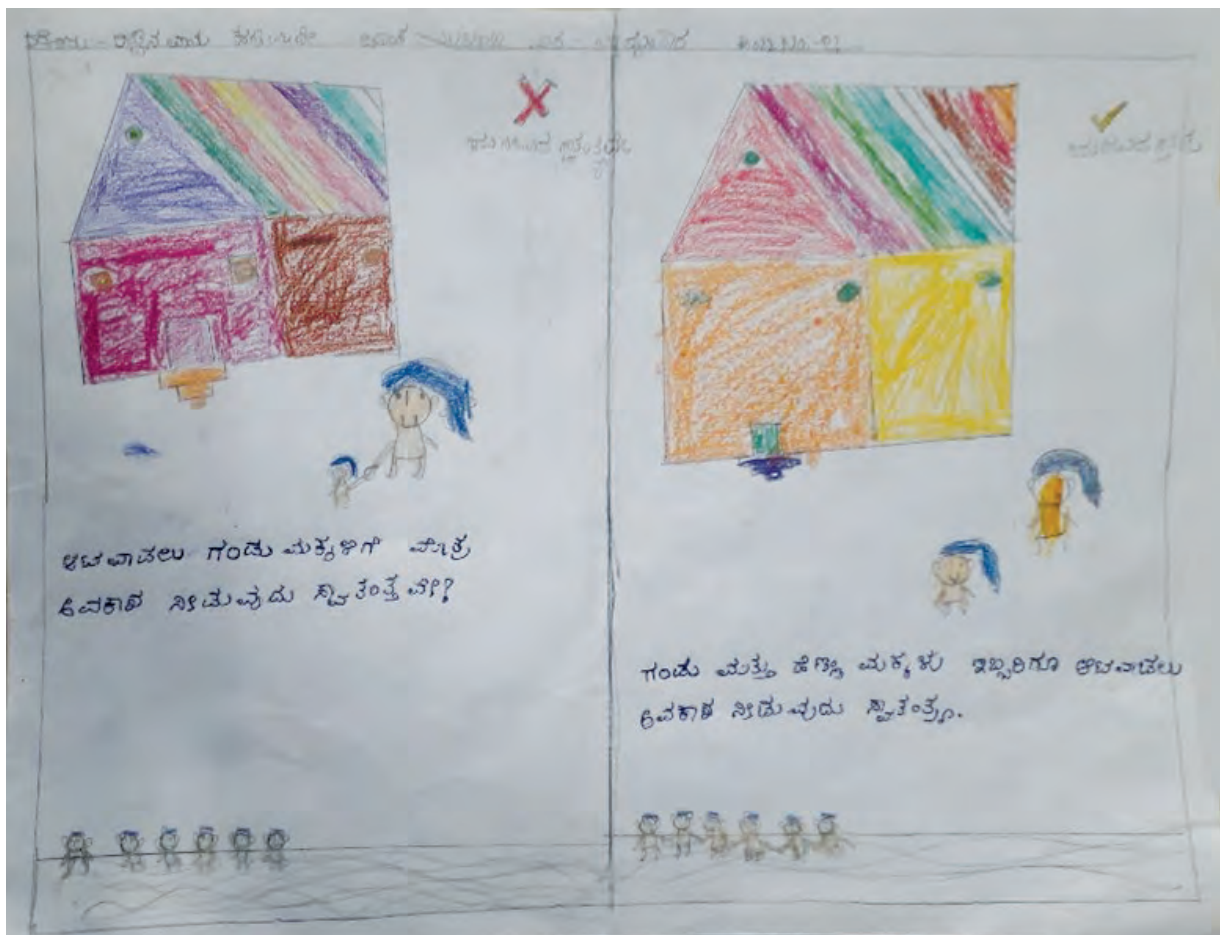

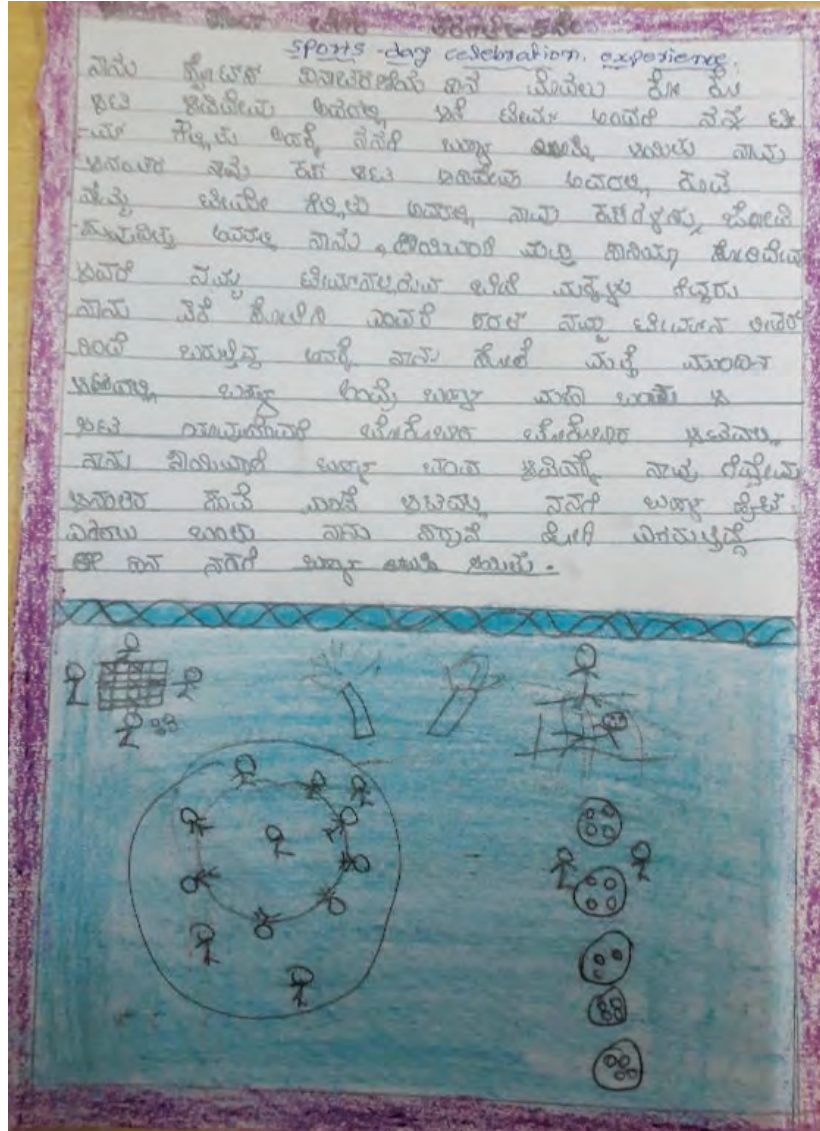*Figure 1. A student's art and writing expressing her view on gender discrimination.*

Figure 2. A student depicts the Sports Day celebration in school.

ideas will also help in honing their creativity and writing skills. The important thing is for teachers to realise that independent writing is an important skill and needs reinforcement and practice; Teachers need to create opportunities to reinforce these skills.

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Similarities and Differences |
Reinforcement Activities for Class I

Krithika

The purpose of school education, especially at the Foundational Stage, is to provide learning opportunities that are suitable for enhancing students' physical, emotional and cognitive development. In order to provide learning opportunities, we must try to understand how children learn. How do they make meaning? Do they learn at the same pace and in the same ways? When children learn at different paces and in different ways, how should the teaching or the learning environment be? Having understood the need and the goal, it is essential to provide diverse strategies so that the learning environment is conducive to making connections and consequently, meaningful learning.

Any activity that we do, involves the regulation of thought or the cognitive process. For example, if a pre-schooler wants to make a string of beads, they will take the thread in one hand, hold the bead in the other and put the thread through the hole in the bead. When successful in this, they will confidently insert the next bead in a similar way. If the hole in the bead is small and does not let the thread pass through, they will eliminate that bead. Gradually, they will acquire selection and elimination skills. This understanding of a child's cognitive process helps us connect it to maths too.

Finding similarities and differences in maths plays a major role in building reasoning skills. Spotting similarities and differences is a core learning skill but is not given much importance in our teaching/textbooks. It is the basis of a lot of learning – in how we connect concepts.

In traditional textbooks, similarities and differences are taught with comparisons, such as tall/short, big/small, light/heavy etc. In supplementary books or children's magazines, these are in the form of 'spot the difference' games, which children enjoy doing. But there is a greater scope of learning this concept better that is missing in a non-interactive medium, like a textbook. In this article, I will focus on reinforcing this skill through activities that use several senses, like working with tactile materials, looking at colourful beads, selecting/eliminating based on colours and arrangements, and so on.

In maths, we teach patterns using numbers, shapes etc., in primary class children. In Tamil Nadu, as part of *Ennum Ezhuththum* (numeracy and literacy) programme, the resource team (this writer is part of the team) created activities using materials that are available in the school/home environment.

Stringing beads activity

In the Tamil Nadu maths textbook (2017) of class I, there is an activity named, 'Making a string of beads'. The same activity is proposed here with a crucial difference to reinforce number sense, thereby strengthening the understanding of similarities and differences. Through this, we have tried to bring different strategies, through different aspects, in the same activity.

I conducted the following activity with class I children of Government Primary School, Sompura Gate, Bengaluru.

Objective

To strengthen the understanding of similarities and differences along with the following:

- To build eye-hand coordination
- To build fine motor skills
- To perceive differences in arrangements
- To communicate with peers
- To observe one's own work and compare it with others'

Materials required

Thread; beads/straws cut into small pieces; clay; notebook for rough work and colour pencils

Duration: 45 minutes

Activity phase 1 (individual)

Give a length of thread and a bowl of beads/straw pieces to each student.

Each student makes a string of beads/straw pieces. Each one's arrangement is different. Each one talks about their arrangements. They look at their peers' arrangements and talk about how theirs is similar or different from their own.

Activity phase 2 (in pairs)

Seat children in pairs.

Each child in the pair makes their own bead string, and it should be identical to their partner's.

Activity phase 3 (in pairs)

Assign roles (by turns) of Instructor and Follower.

A (Instructor) instructs B (Follower) to arrange the beads; A chooses the beads and their sequence; B has to follow as A says.

Then, B (Instructor) instructs A (Follower) in the same way but keeps in mind that the arrangement of beads is different. They talk about similarities and differences in the arrangement.

Activity phase 4

The children are given notebooks and coloured pencils.

They are asked to draw the bead mala that they have made. (This is representing their work non-verbally.)

Next, the teacher makes a string of beads and tilts it slightly and asks the children what will happen if she does not hold the lower end of the string. *What should I do to make sure that the beads don't fall out? Can you help me to stop the beads from falling?* She asks.

(If the children are not coming up with answers, the teacher can show a small lump of clay/dough and ask: *Will this help?*)

Relationship between number sense and this activity

This activity provides many learning strategies related to pre-number sense. We can see that the activity enables children to:

- Compare their own arrangement with others' arrangements and express similarities and differences
- Keenly observe each bead/piece of straw in the arrangement:
  - To figure out: Are the given number of objects enough to generate the pattern? Do we need more? How many more do we need?
  - To check and verify if the arrangement made by oneself is correct. Does anything need to be changed? If so, what?
- To think and discuss with others, to make others understand: What should be inserted first? What should be inserted next?

When we get children to pause and think about what they are doing, what others are doing or how they can do things differently, the activity gains pedagogic depth. Further, similarities and differences are central to mathematical thinking and carry greater value in developing pre-number sense than mere counting. Colour attracts children and provides them with sensory nourishment, the activity uses this for a mathematical purpose by encouraging colour combinations.

The more we engage children's senses and their attention in activity, and at the same time, provide opportunities for them to observe, notice, compare, express and act accordingly, the better is learning.

Krithika is a member of Azim Premji Foundation based in Bengaluru. She is deeply interested in primary maths education. She was part of the team that revamped the syllabus and textbooks for primary maths by the Tamil Nadu SCERT. She is currently supporting the *Ennum Ezhuththum* (numeracy and literacy) programme in Tamil Nadu. She may be contacted at krithika@apu.edu.in

Reinforcing Learning Through Poems

Priya Jaiswal

Among the teachers I work with is Anjali Gupta, Head Teacher, Government Primary School, Dhoran (Raipur), who believes that children can learn any subject quickly and easily through stories, games, and poetry in a stress-free environment in which they do not feel the burden of studies. In doing this, they develop interpersonal communication skills and a sense of teamwork.

With over two decades of experience in teaching, Anjali Gupta composes poems and connects them with the contents of the textbooks, such as action words, tables, and counting. She uses poems to teach traffic rules, body parts and their functions, national symbols, names of days and months, nouns, pronouns, verbs, adjectives, antonyms, synonyms, sounds of animals and birds, and their English names.

In the morning assembly, she has the children recite short, interesting rhymes with gestures. When the children master a poem, she writes it on the blackboard and with her assistance, the students practice finger reading independently. Using this method repetitively, children start reading and writing simple words, paragraphs, stories, and poems.

Understanding Hindi matras through play

Anjali Gupta realised that the students were having trouble pronouncing words correctly and reading fluently because of their lack of understanding of the Hindi *matras*. So, to help them grasp *matras* well, she developed a teaching-learning material (TLM) and devised a variety of activities. For instance, she has made a *'matra khidki'* (window of *matras*) in which children can place any letter from the flashcards and then, read the letter in conjunction with a *matra*. She has also prepared flashcards of different words, alphabets, and *matras*. To help the children recognise *matras*, she gives them word flashcards and asks them to find flashcards of the *matras* that appear in the words. Additionally, children also read and write words with various *matras* in the school's print-rich environment, such as walls.

In another activity, she uses chalk to draw a letter, say, 'क' on the ground, which is subsequently encircled by different *matras*. She then calls out a sound (the letter with a *matra*), like 'को', and asks which matra is required to construct the sound 'को'. The students have to jump on it. She engages the children in several other such activities to

Figure 1. The matra khidki

deepen their understanding of the *matras*. This has resulted in a good understanding of matras by 75 percent of the students from classes II to V. Children are now able to speak, write, and create their own sentences. They also read short stories in their library.

Every day, the teacher makes the students write the names of five different items to help them strengthen their writing and thinking skills – names of food items, vegetables, domestic and wild animals, modes of transportation, items found in a school bag, ornaments, clothing, games, flowers, and places etc. The children are very excited to participate, and each one wants to be the first to write. As an additional exercise, the teacher has made paper slips of different items with the help of the children. She mixes them all up and the children have to segregate slips of similar items, such as names of fruits or modes of transportation. This makes children eager to read and also develops their ability to classify.
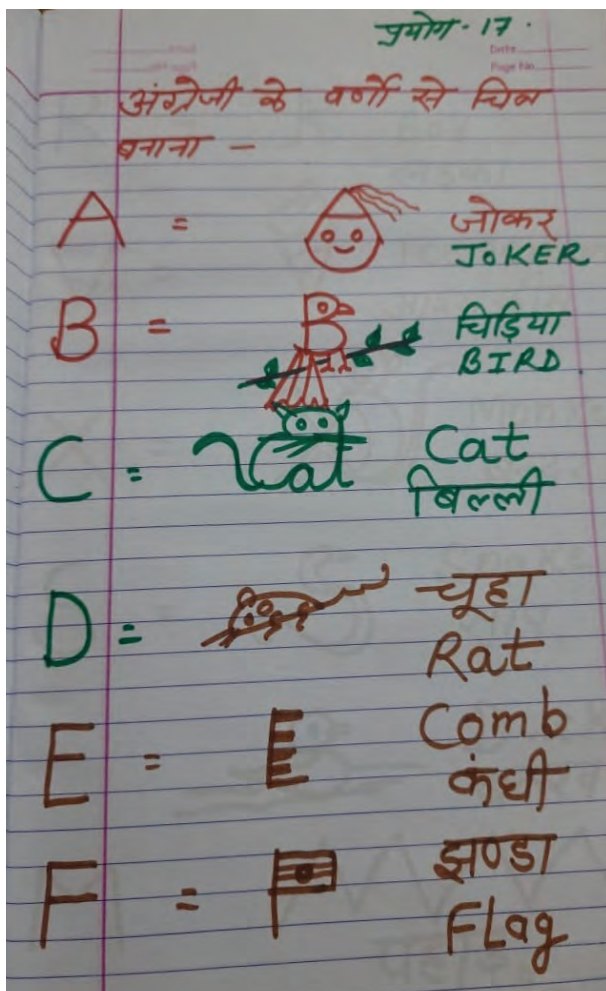
Drawings for English alphabets

Figure 2. Students enjoy making 'alphabet figures'.

Much to the joy of her students, the teacher draws a variety of objects using English letters. She also writes the names of the objects in Hindi and English, so that the children can identify words by looking at pictures. This method helps children learn the English alphabet and new words.

Teaching through self-composed poems

According to Anita Gupta, children forget what they learn in class unless it is repeated. She has, therefore, composed short poems which she makes the children practise regularly. In the morning assembly, she makes the children perform these poems. The children recite and sing the poems with actions. For instance, she composed one explaining traffic rules for the EVS class:

Stop right now, warns the red light.
And immediately we stop.
The yellow light warns us to proceed slowly while we prepare to leave.
What does the green light say?
It says to go right away.

Counting:

Birds keep flying. Birds happily sing.
Five little birds were driving the car.
One bird flew away; now there are only four.
Four little birds were playing the flute.
One bird flew away; now there are only three.
Three little birds were sowing barley.
One bird flew away; now there are only two.
Two little birds were eating cake.
One bird flew away, and now only one remains.
One little bird rose to fame.
That too flew away; now there is only zero left.

Noun, Pronoun, Verb, and Adjective:

Let me introduce Hindi grammar to you.
And explain a noun, pronoun, verb, or adjective to you.
Naming words are called nouns.
Name of a person, place, or thing...just like Radha or Mohan
Pronouns take the place of nouns...just like 'this, that, his, or hers'.
Like a mother and teacher, Verb gets all the work done
Explains the rules of reading, writing, playing and jumping
An adjective describes a noun...tells you the difference between new and old, or good and bad.

Hindi grammar...

Synonyms:

Ishwar, Prabhu, Parameshwar, and Bhagvan
Beta, Vats, Tanay, Sut, and Nandan
The meanings are the same, and the names are many.
Badal, Megh, Payod, Payodhar, Parvat, Shail, Pahad, and Bhudhar
Bhanwara, Ali, Madhukar, and Bhring
Vishdhar, Nag, Ahi, Sarp, and Bhujang
Ratri, Rain, Nisha, Nishi, and Yamini

Chapla, Chanchala, Bijli, and Damini
Mata, Lalna, and Ma
Dharini, Lalana, Nari, Ramani, and Kamini

In this way, adopting a fun approach that helps students understand the contents of the textbook, the teacher, Anita Gupta, incorporates a number of activities into the teaching-learning process, including her own poems. This helps children understand the contents of the textbook better. Children become interested in reading, and their learning improves.

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Reinforcing the Learning of Integers
A Process

Rahul Singh Rathore

I decided to review the work we had done earlier before we began working on numbers with class VII students. The procedure for creating number groups of natural and whole numbers and integers, as well as the need for doing so, were discussed in class when the definitions of number groups were being explained to the students. Integers are used in situations of loss, debt, and deficit, so practice was done using integer addition and remainder operations.

Problems faced during work:

- Students were asked about their knowledge of natural, whole, and integer number groups. According to them, whatever is discovered in nature is natural; if one adds 0 to it, it becomes a whole number. Integers, including negative numbers, are examples of those that are not natural. Students did not include natural numbers in this. They were connecting number groups to both naturally occurring and man-made concepts. In reality, the existence of numbers is seen only on the number line. Whether they are natural numbers or any other kind, all numbers are abstract.

- Some students had a problem with just thinking of 0 (zero) as a whole number, not thinking of 0 (zero) as an integer, and only thinking of 2 as a natural number. Integers were being perceived by them more as negative numbers. Therefore, there was a need to clarify the number-group hierarchy.

- Students could use previously-learnt integer operation concepts to do basic addition and subtraction. A majority of the students erred by thinking in terms of borrowing to answer the straightforward statement with brackets on both sides, such as 18-4, 18-(-4), -18-4, -18-(-4): In each of these four issues, the borrowing context needs to be altered.

Given the aforementioned issues, it seemed that in not allowing students to learn the operation rules on their own, they had ended up memorising them and using them incorrectly. I felt the need to engage in additional activities with the students after considering the following:

- Everyone knows the rule that (-) and (-) become (+) when multiplied. There was a need to practice generating rules by manipulating the number line, spotting patterns, and paying close attention to the subtraction sign and the negative sign.

- Students were having trouble because they were solving the problem by comprehending it in terms of profit and loss rather than using the skill of looking at the number line and using the number line to solve the problem.

- The students were in a hurry to respond and there were certain instances where if they had taken some time to think, deliberate and engage in a dialogue, they would have been able to move ahead correctly.

- The questions were created by the students. But these were similar to the problems that had already been answered, such as 9-4, -9-4, 9-(-4), -9-(-4)

- Considerable thought should go into the context that will be taught to upper primary students. It must be ensured that their future learning is not hindered by this context. We must also take into account whether it will speed up or slow down the abstraction process.

- By demonstrating patterns, one should proceed from generalisation to rules. It is acceptable for students to formulate their own queries, but it is important that they comprehend the reasoning that went into their coming up with the question.

- Students frequently play the game of hopscotch. Could this game serve as practice for integer operations by building a house on the number line?

Game worksheet

Not every student was able to play the number-line game at home. However, it was evident that those who could, were able to see that the numbers were on either side of 0. Secondly, it was also clear that students could understand decreasing and increasing sequences, but more work was needed to help them understand what was happening mathematically as they moved from one point to the next.

Integer Game

-5	-4	-3	-2	-1	0	1	2	3	4	5
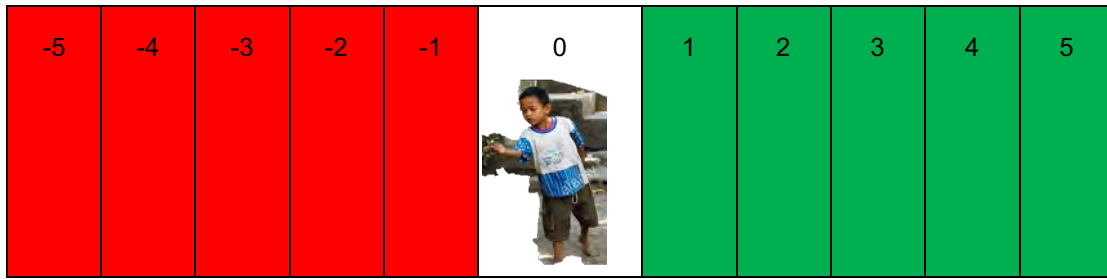
Rules of the game:

1. We must begin at zero, so we must stand at zero.
2. The player must toss the marker from zero but start with the negative numbers.
3. The marker must first be thrown at -1, returned to zero, and then recorded. The player of the team will be eliminated if the marker does not reach zero.
4. Players must record everything they do mathematically.
5. The + sign should be placed when moving from 0 to the right, and the - sign should be placed when moving from 0 to the left.

Example: Raju is playing while also filling out the table below.

Step 1: Raju is positioned at zero. He throws the marker at -4. His current position is 0-4=-4.

-5	-4	-3	-2	-1		1	2	3	4	5

Names of students	Position 1		Position
	Situation on throwing stone	Attempt to bring the stone	Out or another turn
Raju	0-4 = -4	-4+2= -2	Out since did not come back to 0
Rashmi	0-2 = -2	-2-3=-5	Out since did not come back to 0
Anwar	0-2 = -2	-2-(-3)=1	Out since did not come back to 0

Step 2: Raju now moves to position -4 and strikes the marker with his foot, causing it to advance two positions to position -2. The mathematical representation of this will be: -4 + 2 = -2
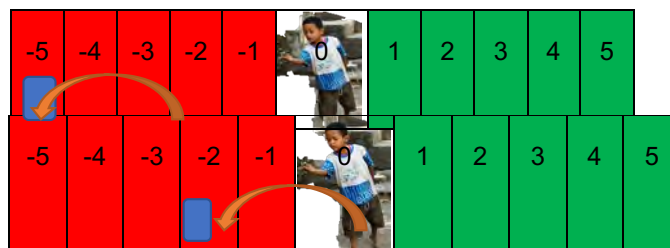

Rashmi took the stage next and performed the following moves:

Step 1: Rashmi is standing at zero. She throws the marker at -2, therefore 0-2=-2.

Step 2: The stone now advances three positions back, or to the left-5 position, after Rashmi strikes the marker by moving to position -2. This will be written mathematically in this way:

-2 -3 = -5

When Anwar got his chance, he played as follows:

Step 1: Anwar tosses the marker at -2 while standing at zero, so 0-2=-2.

Step 2: Now, when Anwar reaches -2 and strikes the marker, it advances three places, or to 1stplace. It will be expressed mathematically as follows.


Anwar writes it as: -2-(-3) =1

He wrote this because when Rashmi went to the left when she got -3, its opposite could be -(-3).

Similar to this, you can set up a table, play the game, and involve others.

Figure 1 . The integer game as it was played in the classroom.

This game was played in pairs in the classroom. One student was asked to write the mathematical representation while the other (their partner) was given the task of playing it.
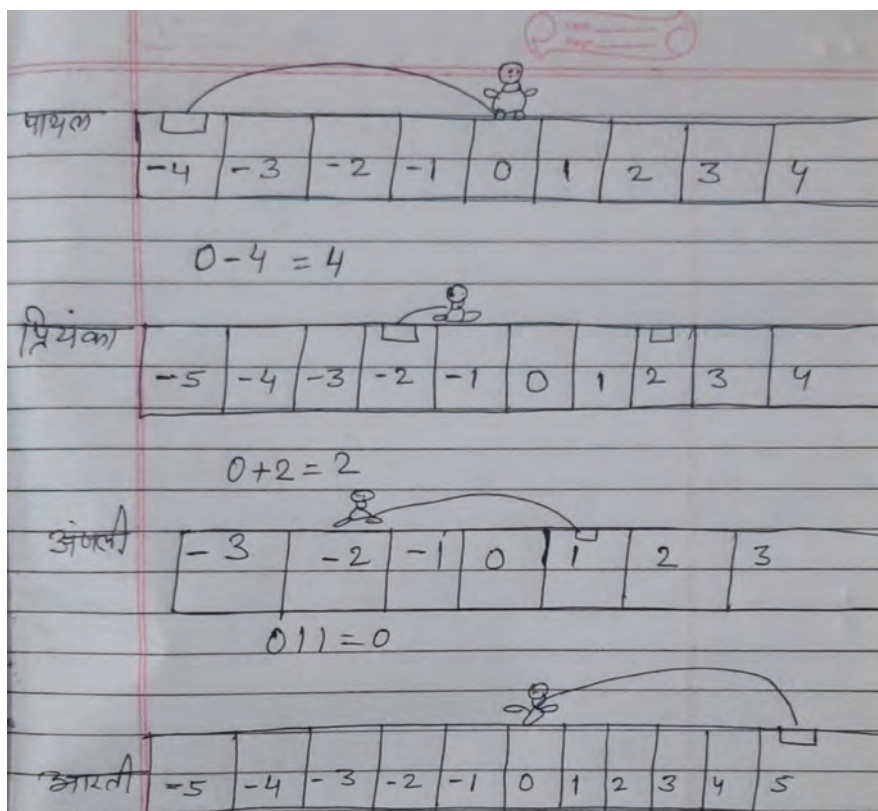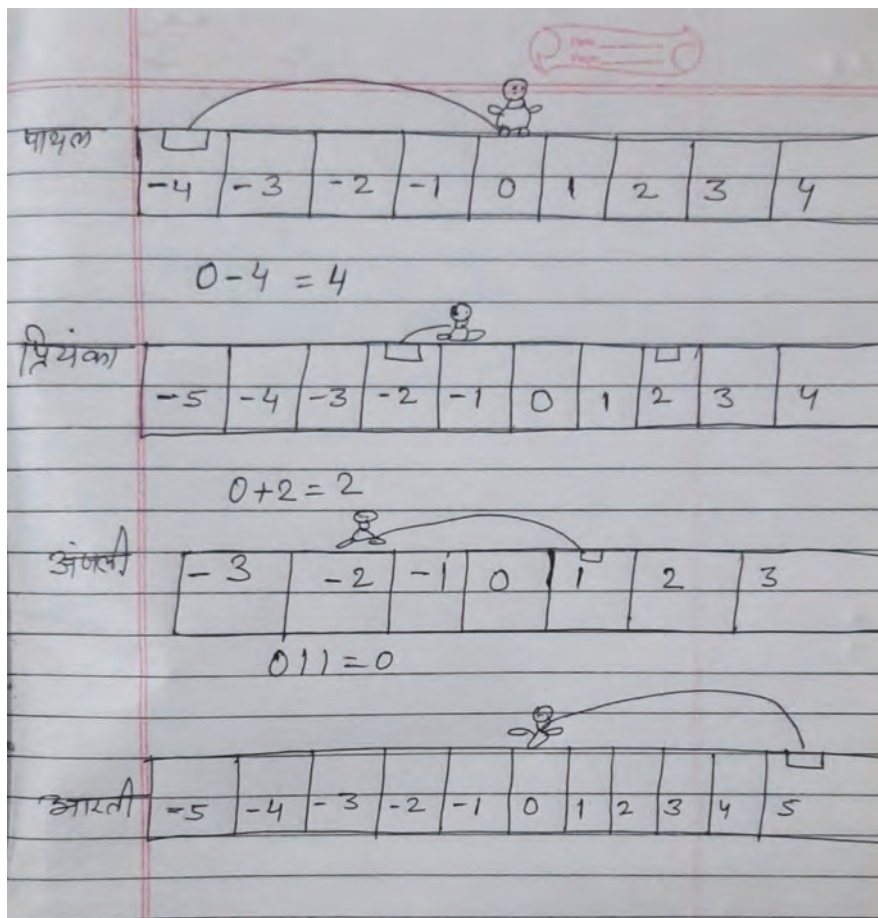
Figures 2 - 3. This is how the students were representing on paper the game that their partners were playing.

All the other students were instructed to watch both of these procedures and get ready for their turn. The students' confusion and mistakes were primarily because of the following:

1. The location of where they were standing had to be written first using symbols. (For this, they were given chances to begin at 0 the first time and at a different house the second time.)

2. It is necessary to use the appropriate symbol to indicate whether to move the token in the direction of ascending order or the direction of descending order. (For ascending order use + sign, for descending order use - sign.)

3. They had to understand: What is the absolute value of how many houses we move? For this, whichever direction they went, they had to count the number of houses.

4. Finally, telling their position on the number line, would be the correct answer.

In fact, it was the students who came up with these four stages. Initially, if the solution to the problems they were doing was identified, they were given a chance to try again. So, after about 45 minutes of practice, keeping this understanding of the game in mind, several addition and subtraction drills were done using the number line on the blackboard.

During the process, we noticed that some students' focus shifted from calculating -3 +5 on the number line to solving the integers on the number line by looking at both numbers separately. Instead, the focus should have been on how -3 to 5 are occurring in one process. Therefore, I removed the integers on the number line and made the students do exercises on the number line classified only with 0.

A majority of the students in the class were able to understand these simple equations using the number line. After that, the worksheet on integers was explained, and the students were asked to solve it on their own.

Here is an example of students' completed work.

The worksheet shows that students were able to compare whole numbers accurately, but when they saw negative numbers, they were confused. I realised that the students were only focusing on the numbers. So, their attention was drawn again to the number line and more practice was done for how the value of a number increases when it moves to the right from its original place, while it decreases when it moves to the left.

Figure 4. When children were given problems of comparison, they were able to solve some problems correctly but were not able to visualise these on the number line.

Following this, the students checked their own work and attempted to fix it. They discussed a lot among themselves; gathered around the board, and decided which number would be bigger and which number smaller. They came to the conclusion that if a number is on the right side of the number line, it will be bigger and if it is on the left, it will be smaller.

Two students began to discuss that they would not be drawing the number line every time they had to make such mathematical calculations. So, they requested some additional work that could be done without the use of the number line. Everyone agreed.

Figure 5. Students doing problems by drawing the number line on the board.

Figure 6. Students attempted these problems without using the number line.

In the same way, the students also tried to solve the question from their textbooks, which they did correctly to a great extent; along with this, they also tried to solve the magic square.

There were some conversations as the children solved the problems, sharing how they were approaching the rules, for example:

- Numbers with identical signs should be added to indicate the direction because they either increase to the right or decrease to the left.

- When a question was given as - 43 - (- 46) then the children got confused - there were two signs here. In response, one child answered, 'one - (minus) means going backwards, another - (minus) means 'reverse', so considering the fact that the reverse of backwards is forward, therefore, we will go forward.

Multiplication with integers

After this, we proceeded with problems involving jumping numbers.

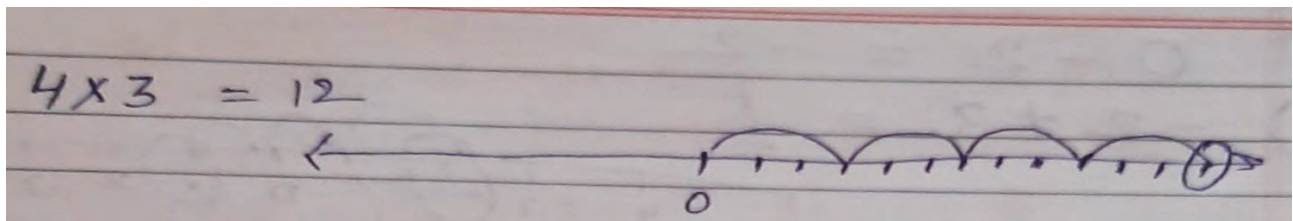In working with children on multiplication of integers, I thought of the following types of questions:

4×3

Figure 7. Here, it was clear on the number line that one has to jump 3 houses 4 times in the positive direction.
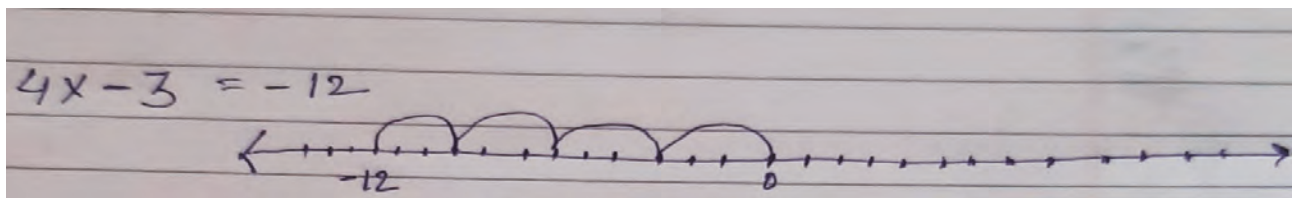
4×-3

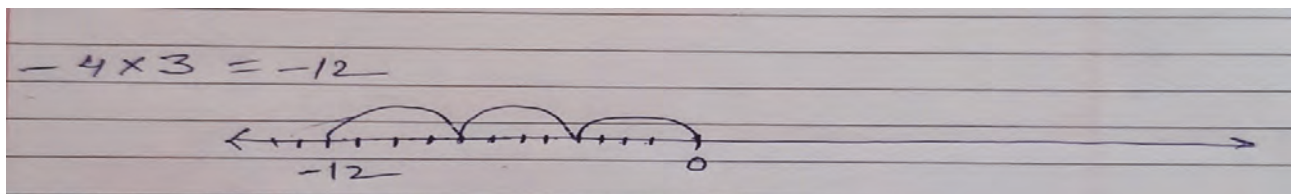*Figure 8. Here, one has to jump 4 times in the negative direction.*

-4×3

Figure 9. In this, one has to jump 4 houses, three times in the negative direction.
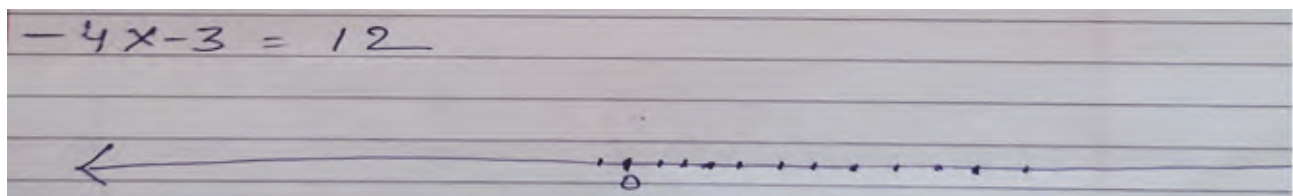
-4×-3

Figure 10. Here, I explained that 4 jumps have to be made in which 3 houses each have to be jumped in the negative direction. But because there is a negative sign in front of 4, it means that it is the opposite of what is being indicated. Instead of jumping towards the negative, we have to jump towards the positive, thus, the answer would be: -4×-3 = 12.

Jumping numbers

While we were discussing this, I realised that similar to jumps, students had already mastered the idea of repeated addition in previous classes. Could we use the concept of repeated addition to help students understand this better?

To do this, I planned an activity with dice. I am sharing it here. It would be great to know the views of other teachers – which is better explaining with dice or using the number line?

When the multiplier is negative, it is not possible to 'say it that many times', so we interpret it in our activity as follows:

When the multiplier is negative, multiply a counter equal to the multiplier by the value of the multiplier a given number of times, then invert all resulting counters because of the negative sign of the multiplier.

For example, 4 (-3) = -12

So, if 4 green (positive) dice are taken 3 times and 3 has a negative sign, all the dice are flipped over, turning them all red, and the result is -12.

Likewise, -4 x (-3) = 12

Our learnings

If the following considerations are made while teaching integers in the classroom, then students advance with understanding and their conceptual knowledge is also better.

- Considerable thought should go into the references used in upper primary classes to ensure that the context set at this level does not interfere with students' learning in the future. We should also consider if the examples used and the understanding they impart will speed up or slow down the abstraction process. For example, when whole numbers, natural numbers and integers were first introduced to the students on the number line, they were only considering 0 as a whole number and all negative numbers as integers. Later, I used different contexts, and these numbers were identified in different ways to clarify this. More such questions should be discussed at the beginning so that the children can develop their understanding.

- By demonstrating patterns, teachers should proceed from generalisation to rules. Students should develop their own inquiries and comprehend the reasoning behind them. For example, when the children were solving integer-related problems, they themselves grasped the pattern of what steps to take in each situation. For example, one student said that they could add all the negative numbers and positive numbers separately and then subtract these two. For the same sign, another student observed that 'it is again going in a positive direction', that is, the multiplication of negative numbers is positive. This is how the children began to arrive at inferences on their own.

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Finger Puppets and Running Blackboard as Reinforcement

Sai Praveen Maddirala

In *anganwadis*, teachers provide learning opportunities to children through different activities, like conversations, stories, rhymes, play, and creative and cognitive activities. Children learn various important concepts through these activities. Learning is a continuous process, so it is essential to strengthen learning in interesting ways. To reinforce children's learning, teachers develop and follow different methods. In this article, I describe how I use finger puppets and the running blackboard to reinforce children's learning of concepts and themes.

Teaching Learning Materials (TLMs) are effective resources that help teachers to explain new concepts easily, and at the same time, reinforce learning. Besides this, TLMs encourage children to remain involved in an activity for a length of time.

Oral storytelling, with adequate facial expressions and voice modulation, helps children acquaint themselves with the characters and plot of the story. After oral storytelling, a teacher can use finger puppets to strengthen learnings from the story. Here is the process I follow.

Using finger puppets

The children and I sit in a circle so that we can all see each other. I place the finger puppets that can be used for the story in a bag and tell the children to close their eyes and open them when I have counted to three. After counting to three, the children open their eyes, and I bring out a finger puppet by making an interesting sound like 'TATTATTOOOOY!'

Looking at the tiny colourful puppet on my finger, the children are excited and shout out the name of the puppet. Then, I ask the children relevant questions, such as if the finger puppet is a fox, the questions could be: *What is the name of this character in the story? What did the character say? What happened after the fox said that?*

I acknowledge the responses with a smile or a nod or ask another question to help them expand their communication. Then I pass on the finger puppet to the children, making sure that all children get an opportunity to put the puppet on their finger. Children giggle with joy when they place puppets on their fingers for the first time. It encourages them and sustains their excitement for the next puppet and question. This process, with finger puppets and questioning, is followed until the end of the story. This kind of reinforcing of learning also helps teachers to understand the extent to which the children have understood the story, and based on this information, they can retell the story, or go on to the next one.

Figure 1. Children with their finger puppets.

Benefits for children

In their early years, children are usually unable to spend much time engaging in any one activity. Using TLMs, like finger puppets, help children to engage in activities for longer periods. Reinforcing learning with finger puppets and asking thought-provoking questions when children are in a joyous state of mind helps children to recall the story that they have heard (and learned) and feel eager to answer. Besides, the teacher's acknowledgement of the children's responses makes them feel happy and they show more interest in the activity. This method of reinforcement also provides opportunities for them to think back about details. There is also oral language development: of speaking sentences in sequence, which improves their cognitive abilities.

Dramatic Play Corner

After the puppet exercise in the classroom, the finger puppets are placed in the Dramatic Play Corner for children to use during Free Play. Finger puppets, being small, colourful, and easy for children to hold, are attractive for them to put on their fingers and narrate a story in their own way by connecting one puppet character with another puppet. Thus, with the help of the finger puppets, children reinforce their perceptions of the story in their free time and space.

A teacher can use finger puppets for stories that have many characters or a particular theme. For example, after having a structured conversation on vegetables (with real vegetables), a teacher can use finger puppets of vegetables and reinforce children's learning on the concept of vegetables by asking questions like: *What is the name of this vegetable? What colour is it? How is it eaten/ cooked? What is its texture?* (Smooth, hard, juicy, etc)

Using a running blackboard

A running blackboard (RBB) is a physical setup in a preschool learning space where the wall is painted black to a height of one meter, starting from the floor. Usually, after completing structured conversations or after story narration, children freely draw their thoughts/experiences on RBB with chalk. Along with free drawing, the RBB also helps teachers reinforce children's learning of particular themes/concepts.

Example 1

After completing a structured conversation on 'My Family', I provided the opportunity for the children to use and draw what they had just discussed. Children sitting near the RBB came up and began drawing. I went up to each child and asked what they had drawn.

One child drew a circle-like shape (Figure 2), and the following conversation ensued:

I (pointing to shape): What is this?

Child: It is our house.

I: Who lives in your house?

Child: Me, my mom, father, *akka* (elder sister).

I: Oh good! What is this (pointing at some scribblings)?

Child: These are the buffaloes and goats at home. My grandfather gets milk from buffalo daily. I like milk.

I: That is really good. What about the goats? Do they give milk?

Child: Yes, but we do not drink goat milk. Their babies drink it.

Figure 2. A child drawing on the running blackboard.

I (pointing at a dot next to the house): What is this?

Child: This is our new bike.

I: Who uses it?

Child: My dad uses this to go to his company (work). Yesterday, my sister and dad went to a *daawat* (feast) on that bike.

I: Good, you have drawn very well about your family.

Then, I moved on to the next child and started having a similar conversation with them.

Example 2

Here is another reinforcing conversation between a child and me on another occasion. After the story narration, the RBB was used.

I (pointing at a child's scribbles: What is this?

Child: This is a Ball; he forgot his name, so he went to the Door and asked the Door to tell him his name.

I: Okay. Then, what happened? Did the Door tell him his name?

Child: No, it did not tell the name, so the Ball came here, to the Broomstick (pointing at another doodle).

I: Good! What happened next?

Child: The Broomstick also said that it did not know the (Ball's) name.

I: So sad! What did the Ball do then?

Child: The Ball went to the Bat (pointing at a line that she had drawn) and asked the Bat to tell him his name.

I: Okay, did the Bat tell the Ball his name?

Child (happily): Yes! The Bat said, 'Your name is Ball, and my name is Bat. We both are friends.'

I: Good! You drew the ball story and narrated it really well.

Benefits for children

Children use the RBB to express their ideas and experiences freely in their own ways. Some children scribble and others use the picture form. Discussing what they have drawn encourages children to connect their art form with earlier conversations (story/ discussion themes) and speak out. In this process, children think and respond to what they have learnt in a creative way. The RBB is one of the most effective methods that a teacher can follow to reinforce a child's learning. Some children do not feel comfortable speaking out, expressing their thoughts or responding to the teacher in a large group. But in one-on-one conversations, while using RBB, they feel comfortable and speak happily about what they have drawn in answer to the teacher's questions.

The teacher's acknowledgement of the child's responses makes children feel valued and develops their self-esteem along with their drawing skills. It also deepens their trust in the teacher, allowing the teacher to use that bonding to gradually involve such children in a large group and encourage them to speak – an essential social skill.

Using the RBB is also a reinforcement activity for children to develop their fine motor skills of holding a writing tool and scribbling or drawing. It helps the children later to hold and use the writing tool with a firm grip.

Conclusion

It is essential to understand children's learning levels individually and strengthen their existing learning through reinforcement. To reinforce children's learning, methods such as finger puppet play and RBB are two methods that teachers can try and regularly use with children. Finger puppets, besides helping children to think and recall what they have learnt relevant to puppets, create excitement, while using the RBB helps children to talk freely because they draw their thoughts enabling free hand movement under no pressure. It is, therefore, easy for teachers to engage children in these activities and reinforce their learning.

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Map Reading Through Activities

Shobha Rani H

We claim that learning is a continuous process. Parallel to this is the conviction that positive reinforcement of any kind is indispensable for learning to be continuous. Real learning becomes possible through reinforcement. When we start applying the knowledge thus acquired in our day-to-day life, then the learning is said to be complete. The National Curriculum Framework (NCF) 2005 has a special focus on Early Childhood Education (ECE), which asserts that learning is a constant process that results in knowledge production by consolidating the experiences outside the classroom. Similarly, teachers are not machines that force knowledge into students' minds. Children possess the ability to build knowledge on their own. Although every child is capable of self-learning, a teacher, acting as a facilitator, gives appropriate reinforcements to support the child towards independent learning.

Map reading is one such area of learning. Many efforts have been made to boost the skill of map reading. In today's digital age, the art of map reading may seem like a skill of the past. Yet, its importance cannot be underestimated. Teaching map reading in schools holds a crucial place in education. In the age of GPS and navigation apps, basic map reading skills are vital. Teaching students to navigate with maps is like giving them a timeless tool for exploration. In this article, we examine the objectives of teaching map reading and how learning this skill at the elementary level leads to a better understanding of the world around us, while also promoting spatial awareness, critical thinking, cognitive development and geographical knowledge.

Activities around map reading

Children from mainly three villages come to our school. At the outset, we divided these children into three groups and instructed them to represent the way to school from their respective houses using directions and symbols. Accordingly, the children enthusiastically created a map of their village using symbols and directions. Later, they discussed among themselves the location of their friends' houses, temples, lakes, churches, mosques, dargahs, wells, fields, roads, etc. on the map.

To take this further, all three groups decided to create models of their village. We enlisted the help of the maths and art teachers in the project. A small model of the village was created using cardboard and drawing sheets along with the maps and toposheets (map showing the topography of the area) designed by the children who made sure that the measurements, colours, and symbols appeared accurately in this structure. Excited by the activity, the children expressed their desire to build their village model using concrete and bricks.

This project helped children learn the basics of mapping. Some children were then able to identify their houses and fields and even the survey and check dam in the maps created by their gram panchayat. Since this activity was related to their daily lives, they found it interesting.

For another project, to understand the importance of measurement in map-making, the children first converted small copies of the maps of different states into bigger ones with the help of measurements and displayed them on the school notice board. This helped them learn about their neighbouring states, their capitals, and coastal regions. They also understood the importance of scale in map-making. Although these activities were done during their higher primary classes, they were successful in creating maps and identifying places even when they reached classes IX and X.

Ways to reinforce map reading

Becoming skilled in map reading has long-term benefits. It ensures the application of this knowledge and more effective learning when children engage in activities such as the following:

Field trips: Field trips can include map reading activities, such as identifying or exploring historical places using maps. These hands-on experiences reinforce classroom learning.

Integration with technology: Combining traditional map reading with modern technology, such as using Geographic Information Systems (GIS), can make the content more engaging and relevant for present-day students.

Cultural appreciation: Exploring maps of different countries while learning about different civilisations can develop an appreciation for diverse cultures and enhance their understanding of the interconnected world.

Problem-solving skills: Map reading teaches students how to analyse and solve spatial problems. It encourages them to think critically while navigating and understanding geographic information, which is a valuable skill in a variety of fields, including urban planning, logistics, and environmental science. These factors are learned not only in geography but also in other subjects.

Historical understanding: Maps provide historical insights, and also allow students to explore how geographic boundaries, landscapes, and names of places have changed over a while. This historical context enriches their understanding of history and geography.

Environmental stewardship: Map reading increases environmental awareness. It enables students to understand ecosystems, natural resources, and land use, promoting responsible environmental stewardship and sustainability.

A final word

Teaching map reading serves as a journey towards spatial awareness, critical thinking, and developing deep connections with the world around us. Strengthening this skill throughout a student's educational journey ensures that they not only learn but also apply and appreciate this skill. Let us guide our young learners on this cartographic adventure, helping them navigate the world with confidence and curiosity.

Figures 1 & 2. Classroom activities

Figures 3 & 4. Outdoor activities

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Reinforcing Science Learning | An Experiential Programme

Saurav Shome

In this article, I am going to outline a programme we initiated to reinforce science learning and make it not only more accessible to our students but also make them aware of the process of science and scientific methodologies. The content of this article is primarily derived from my learning while working at the Azim Premji School, Uttarkashi.

A typical teaching unit

Students' questions

For a few days before beginning a topic, we would invite questions from the students and display them inside the classroom. The teacher would start by asking a leading question(s) chosen from either the students' questions and/or curated by the teacher. The teacher could demonstrate the principle being taught and ask questions related to the demonstration. The first day of the class was usually inside the classroom, though several units, such as *Waste Management, Plants and Animals Around Us, Weather and Climate, Soil,* and *Agriculture* were introduced outside the classroom.

In the first class, students were provided with a worksheet with both short and long answer-type questions, or a set of questions to respond to. The questions were designed for the teachers to understand the students' existing understanding of a concept and content. We developed these questions from our learning from research literature as well as our previous teaching experience on the topic.

Worksheets

Students were then introduced to a problem context and provided with a problem task in the form of a worksheet, which had two parts. In the first part, the students were required to write about their plan for solving the problem – ways of data collection and tabulation, making models and predicting the results or outcomes with their rationale.

In the second part of the worksheets, students were asked to carry out their plan and record their observation in a given format, note down their findings and a reflective note on their learning, and file a self- and peer-assessment sheet. These worksheets were primarily developed and adapted from Homi Bhabha Centre for Science Education (HBCSE) Small Science Curriculum,[i] NCERT Textbooks, Nuffield curriculum, Eklavya's science materials, handbooks prepared by Centre for Environment Education (CEE) and Centre for Science and Environment (CSE) and pullouts of iWonder… (Azim Premji Foundation's science magazine) etc.

Activities

While responding to the worksheets, students were required to carry out diverse activities, such as sharing their understanding, views or thoughts in multiple forms, like essays, short answers, multiple choice answers, posters, drawings, flowcharts, mind maps, planning and carrying out investigations, experimentation and measurements, surveys, literature review, interview, planning, designing and making models, etc. The worksheets included both individual and group work and had to be completed within school hours. The teacher summarised the responses of all the groups and presented them to the class.

In the teaching plan, we would keep multiple worksheets separated on the basis of teacher-led discussion and demonstration, reading, and students' group and individual presentations. Teacher-led discussions were planned to address the students' responses in the worksheet and activities conducted while responding to the worksheets. These discussions helped teachers to assess and meet students' learning needs.

Reading material

Students were provided with a diverse range of readings from publications such as Eklavya, NBT, CBT, NCERT, HBCSE, Pratham, Tulika, Katha, Vigyan Prasar, CEE, CSE, Muskan, Bharat Gyan Vigyan and Takshila etc. Sometimes, students are also provided with selected articles from Chakmak, Science Reporter, and pullouts from iWonder…. Students are given questionnaires to fill out, based on the books they read. The learning from the readings was also discussed in open sessions. Several times, students got their answers while reading the resources.

Sometimes, teachers also prepared handouts for students to supplement their reading.

More student questions

As the teaching progressed, students wrote more questions and displayed them in the classroom and at the same time, they ticked off those that had been answered. We also displayed students' work as resources for other topics and for teaching in other classes. These were presented in the assembly, PTMs, bi-monthly *Baal Shodh Mela*, and other celebrations at school.

Project work

At the end of each of the teaching units, students filled in a questionnaire, took part in a quiz they prepared themselves, or wrote an essay based on set questions. For some topics, a worksheet was designed to carry out a full-fledged project. These projects were completed under teachers' supervision at school. In the classroom, the teacher would introduce the context and the expectations from students; help in planning the work and develop assessment schemes through consultation with students. Teachers would provide cognitive as well as material support while students carried out the project. Some of the projects included community work, like cleaning or planting trees at a selected common community area, running an awareness programme on a communicable disease, etc. Some of these works are submitted for the Children Science Congress and INSPIRE awards-MANAK.[ii]

Learning outcomes

Overall, the teaching units are structured in a way that students could progress in the learning outcomes specified by NCERT and 21st Century Skills.[iii] We used our judgment to decide which concepts students could learn in their context and how these concepts could be built from their everyday experiences. For this, along with using students' everyday context, we designed activities that could simulate experiences that can be expected in other contexts. The teaching units are planned in a way so that the topics would integrate more than one chapter of the textbook of one or more than one subject. In other words, subjects and concepts are integrated while teaching the unit. This integration of subjects and multiple concepts is easier when we ask students to solve real-world problems, expect diverse work student productions, and present their work to real-world audiences for real purposes.

Making science learning joyful

Science learning becomes joyful when students comprehend the content and concepts, feel valued, their questions are addressed, and they are able to actively participate in the learning of science. Conducting projects by integrating multiple subjects and concepts makes content and concepts relatable to students. Completing these projects in a resource-rich environment helps students engage meaningfully, provides their work a sense of value and gives them a sense of accomplishment. Organising teaching around a real-world purpose in an environment where students and teachers work collaboratively, gives students a sense of social endeavour.

We thought that students would learn science with joy if they were immersed in an environment where they felt as if they were working as scientists. The classroom was made to resemble a science lab by doing the following:

- Pasting charts, posters, samples (bones of dead animals, teeth, stones, old equipment) and work produced by students, etc. on the classroom walls
- Maintaining a classroom library of science books and reading materials
- Placing materials required for conducting experiments related to science in the classroom
- Displaying small ongoing experiments, working models, and maintaining living species in the classroom

Summary and the way forward

We realised early that the Learning Outcomes specified by NCERT would not be met unless the pedagogy is not diversified. At the same time, the resources had to be made handy and amenable to manipulation by students and teachers. Therefore, the classroom was designed as a laboratory and library. Many topics were related to plants, animals, and agriculture, so a lot of greenery was added to the school environment.

- Science and Eco clubs were established, and students took on the responsibility of making the school eco-friendly and contributing to community work. These engagements were integrated directly with topics taught as per the syllabus and in alignment with the curriculum.

- Science classrooms were made more exploratory, focusing on designing and conducting activities based on worksheets, group work, self and peer assessment, and reading diverse resources related to the topic.

- Open-book exams were introduced along with worksheet-based assessments.

- Teachers did not force students to learn definitions or list examples of different types or categories in isolation.

- In most of the activities, students were required to first predict and then carry out the task to test their prediction. So, the task of assessment was a learning experience for both teachers and students.

- We did our best to scaffold students engaged in learning science.

Endnotes

i   https://smallscience.hbcse.tifr.res.in/

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A Cooperative Approach Towards Reinforcing Learning

Vinay Nadgir

Reinforcing learning is usually, and rightly, construed as a process in which positive or negative reinforcement is deployed in the class to shape behaviours through rewards and punishments. But there are other ways in which learning can be reinforced. Reinforcement can also happen by designing a learning experience that is not predicated on the product but rather on the process. This article is about cooperative learning that helps in reinforcing learning.

Learning can be conceived in many ways. One way is to construe it as an individualistic enterprise. This conception is based on the principle that every individual can learn independently. But at the other end of the learning spectrum, we can also say that learning is a social process. The word social entails that learning is about cooperation. In this article, I would like to unpack the idea of cooperative learning. I would like to go one step further and say what makes cooperative learning a superior activity is not just its ability to help a learner gain knowledge in the epistemic sense but also the normative and social value that lies behind it. In the second part of the article, I will give general tips and pointers a teacher can keep in mind while designing a cooperative learning experience for students. Finally, I will briefly touch upon what I feel is the value inherent in a cooperative learning activity.

What is cooperative learning?

A proverb which best epitomises reinforcement of learning is 'Whoever teaches, learns twice'. Nowhere can this be seen better than in cooperative learning where students unknowingly teach each other yet reinforce their own learning.

Cooperative learning contributes to the reinforcement of learning by doing the following:

• Actively engaging the learner
• Promoting peer learning and teaching
• Giving scope for reviewing, repeating and recalling
• Providing opportunities for discussion and clarification

• Giving space for autonomy to the learner

When we say that children should learn to cooperate, the one word that usually comes to mind is 'grouping'. Through this grouping of students, we assume that children learn from each other. The second idea that we usually associate with cooperative learning is the process of peer learning. While both of these are necessary for cooperative learning, we need to broaden our understanding of what actually makes cooperative learning what it is. Johnson and Johnson (1999) state that cooperative learning has five basic components.

1. Positive interdependence: This is nothing but the idea that 'I cannot succeed unless everybody else succeeds' or 'All for one and one for all'. So not just individual learning goals, but also mutual learning goals for the group as a whole need to be specified. To increase positive interdependence, a teacher might assign parts of a large project to members of a group. We can think of it as a part of a jigsaw puzzle given to different members of the group who need to work together to complete the puzzle.

2. Individual accountability: When students work as discrete individuals, decoupled from the larger picture, accountability is much more difficult to assess. But in a cooperative learning structure, it is difficult to escape accountability. Students are held individually accountable while achieving group goals.

3. Face-to-face interaction: Students support and assist one another to reach a collective goal when they are told to work cooperatively, as for a class project. In this, certain attitudes, thought processes, and cognitive activities are sparked through each other, such as when they question each other or transfer the knowledge they have to others.

4. Social skills: One of the basic elements of cooperative work is that it nourishes social skills in students. For learning to happen in a group, a student must exhibit the ability to communicate,

defuse conflicts, build trust and be a team player.

5. Group processing: This is a meta-level element of cooperative learning. Here the students in the group reflect on the process involved and articulate the effectiveness and drawbacks they encountered. Reflecting on the group process is a reflection on the relationships that were forged in the process.

Some guidelines for designing a cooperative learning experience

To make the cooperative learning experience effective, a teacher can follow some of these pointers while engaging the students. These are broad guidelines, and the list may be expanded to include more.

1. The objectives of the cooperative learning activity should be made explicit to the students. The activity should ideally begin with the teacher explaining the benefits of the activity. This is especially helpful while revising what has been taught in class.

2. A teacher should complement in-class cooperative learning with outdoor games. Sports and games are the best ways to help students learn the value of cooperation. Group games and sports help students explicitly see how their cooperation can result in the achievement of a goal. Teachers can also use board games and puzzles and convert them into a cooperative activity.

3. Teachers must encourage students to engage in discussions without hesitation or fear; they can facilitate the question-asking process by promoting open-ended questions and hypothetical situations with 'what-if' scenarios. Through these higher-order questions and hypothetical situations, children's critical thinking skills and language skills are also reinforced.

4. A cooperative learning activity can slip into chaos if the teacher does not structure it well. The teacher must set ground rules for the activity, including the use of language, turn-taking, asking for assistance when required, showing dissent without disruption, time limits, etc.

5. To reinforce learning through cooperation, one of the most fundamental prerequisites is that the teacher must have a meaningful relationship with the class, that is, the teacher must know the strengths of the students and their standing among their peers. While grouping students, skills and strengths must be carefully distributed, so as to avoid situations where certain students dominate the discussion/activity. Hence, the teacher must find balance when forming a group. For some teachers, assigning roles to students can help the groups coordinate their work better. For others, it might be best left to the group members to deliberate and decide.

As teachers, we understand that the most effective learning activities are those that fulfil two criteria: firstly, they are level-appropriate yet demanding and secondly, they are relatable. However, reinforcement through a cooperative group activity should satisfy a third criterion – a student should only be able to do the activity in a group. Group reinforcement can prove to be very effective because it is collaborative.

Reinforcing learning through cooperative activities requires active engagement by both the students and the teacher. Hence, these can be time-consuming in the class for the students, and tedious to design and assess for teachers. While they may require a lot of planning, there are too many strengths in the concept for us not to use it. Such a method will raise the confidence and motivation levels of students and learning with their peers and clarifying misconceptions, increases their understanding. The lasting benefits of this type of engagement go beyond the immediate and will serve a student in good stead as they prepare to be one with society.

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Another component of the open-book assessment was the open-ended questions. Children's opinions were sought on a given situation such as, 'If you were the minister of finance and desired to increase revenues what would you increase: the tax on salt or the tax on cars?' The idea was to elicit their answers and the reasoning behind them rather than match them with the text or the view of the teacher. It took some practice to internalise this aspect.

Arvind Sardana, Eklavya's Social Science Programme | A Reflection on Practice, page 8

Co-scholastic Activities for Reinforcing Learning
Uday Schools, Sawai Madhopur, Rajasthan

Vishnu Gopal

Gramin Shiksha Kendra[i] (GSK) has been working with children through Uday Community Schools since 2005. We have realised through our work that if children are to learn well, classroom processes, while extremely important, need to be reinforced with other strategies. Teachers need to go beyond textbooks to create opportunities that can help children develop their understanding and explore their world. When children are encouraged to convert an idea into action, they have an opportunity to bring together what they have learnt in different subjects and create linkages between them. Through this process, they are able to internalise and integrate their classroom learning, which may not have been possible through only subject-specific classroom learning.

> Through Uday Community Schools, GSK has made it a practice to initiate a variety of activities, as part of the teaching-learning process, that help reinforce learning. We believe that learning needs to be reinforced through multiple strategies and is not limited to learning from textbooks. John Dewey also emphasises the importance of experiences in learning. Our strategies help translate the subject knowledge acquired in the classroom into practical applications that help students assimilate, internalise and apply in new situations. This approach is also influenced by Gardener's theory of multiple intelligence.[ii]

In this article, we are sharing some of the approaches and strategies that we use in Uday Schools.

Some approaches and strategies

Before we go into the details of these activities, it is important to understand the background of the children studying here. Sawai Madhopur is one of the 100 most backward districts of India. Because of the poor quality of education that existed in the area, the community felt that education was useless as it did not lead to a government job nor made the children capable of farming. School education was characterised by rote learning and corporal punishment in government schools, and uniforms and English medium in private schools. The joy of learning and the connect between school education and life were missing. GSK was set up to demonstrate an alternative model and help parents see the relevance of education.

- *Music and rhyme:* Music and rhyme help children express themselves and communicate more openly and freely. Repetition to learn music enhances their language skills and helps them appreciate variety in expression and usage.

- *Creative writing:* Creative writing is a key element of learning and practising expression. We create opportunities for children to practise writing so that they develop their imagination, look at the world differently, appreciate the nuances of language and most importantly, learn to enjoy it.

- *Arts:* All children at Uday engage with both visual and performing arts. Playing with colours and creating new colours helps children express themselves more authentically as opposed to copying what is drawn on the blackboard. Theatre is seen as a live form of art wherein children use their bodies to express their thoughts and experiences - through theatre they live the lives of many characters and build their own understanding. Children are encouraged to dramatise the stories they read. Dance is also a part of a regular day at school. Many of these artistic expressions are inspired by the learning in classrooms.

- *Working with hands:* All children in Uday schools have regular engagement with carpentry and pottery. Carpentry exposes them to aesthetic elements and also helps them to apply the principles learned in maths and science to real life. Creating and recreating different forms with clay, students experience impermanence and recreation of newer forms with the same material while doing pottery.

- *Beyond textbooks:*
  - Exposure visits enable students to engage

with issues that they see around them and an opportunity to discuss and debate. These are linked to the topic they are studying and could be to other villages, fields, forest areas, special farms, government offices, industrial units etc.

- Students also work on individual and group projects that help them convert an idea into action. Peer learning, planning, coordination, communication and execution are important aspects of project work that children do.

- Students are encouraged to meet a wide range of people, like labourers, farmers, people's representatives, shopkeepers and government officials, and engage with them to understand their work and their world. Children are encouraged to prepare for this interaction through interviews and analyse the information elicited.

- *Engaging with nature:* Students grow seasonal vegetables and go through the entire growth cycle from seed to seed and understand the process. They learn about nutrients, their benefits and importance in agricultural operations. Growing food helps to strengthen their understanding of the subject and is a joyous experience. A natural progression of this is the Cooking Club where children learn to cook new foods from different parts of the country and learn about the people of other regions.

- *Sports:* A sports period is part of every child's day at Uday Schools. Children join a sport or a game of their choice - individual or group sport; indoor or outdoor. For children who choose to take up a sport more seriously, there is space and possibility for additional time available for practice. Sports for students promote teamwork, leadership, coordination, decision-making, strategy development, implementing strategy and evaluation of their own performance and, most importantly, readiness for receiving feedback from their peers and also giving it. Sports is encouraged also as learning to lose with dignity and to bounce back from failure.

- *Science exhibitions:* Children at Uday attempt to convert what they have learnt in school into models or other forms that can represent their understanding/learning. Annual science exhibitions are a regular feature in every school. Explaining to others helps students understand concepts more deeply. It also helps them articulate

questions that they would want answers to. Exhibitions also facilitate peer learning and help parents stay abreast of their child's learning.

- *School governance:* Annual school panchayat elections are held giving children a flavour of democratic processes.

Managing many activities

The reader may be curious as to how so many activities can be incorporated into the school timetable. Uday Schools run for six hours a day, during which formal education is imparted to the children. The rest of the school day is spent in the reinforcement activities we have described above. Some subjects have classes every day, some are weekly, some monthly and some even annually. Most clubs meet outside of school hours and are often managed by the students themselves. Teachers help when required.

All activities are conducted in mixed-gender groups. Some of these activities reinforce subject knowledge and some focus on developing an attitude that fosters learning. GSK believes that when children are given charge of organising activities (as in clubs), facets of leadership and organisational qualities, as well as their classroom learning, emerge.

One of the key principles that informs our approach is scaffolding where the teacher helps the child learn critical aspects in areas central to their development and this is how the daily learning plan of students is implemented. What is important to appreciate is the approach – GSK sees these co-scholastic activities as integral to the teaching-learning process that significantly impact the quality of education that the school offers to the children. This means that however simple they may be, effort and time are budgeted into the practice, so that they are part of the lesson plan and not appended activities, thereby ensuring that reinforcement takes place at every level.

What the approach means

The significance of our approach lies in the importance placed on making sure that children understand all that is done in the classroom and outside it and derive deeper lessons from these. For instance, explaining a model in the science exhibition to visitors means that the children know and understand the underlying principles. The annual school panchayat reinforces learning in the civics class. The Cooking Club ensures that children back up their experiences of taking care of a vegetable patch by getting recipes from different

parts of the country through which their knowledge of the country is enriched. Sports reinforces the need to challenge oneself to improve despite losing – an attitude that is essential for all learning. Mixed-gender classes reinforce the ideas of equality and democracy that are so important in today's world.

Endnotes

i   Gramin Shiksha Kendra, Rajasthan, works to make the ecosystem of education more conducive to the needs and aspirations of children and their parents in the Sawai Madhopur and Tonk districts of Rajasthan. A reflective and learning journey over the past 18 years has led us to undertake a number of initiatives. The main programme is centred around the Uday Community Schools which were set up and designed to demonstrate to the community and the other schools what quality education could be.

ii Harvard psychologist Howard Gardner theorizes that people do not have just an intellectual capacity, but have many kinds of intelligence, including musical, interpersonal, spatial-visual, and linguistic intelligences.

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