

# The TESS-India compendium for teacher development: improving classroom practice



Teacher Education  
through School-based  
Support in India  
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*The TESS-India compendium for teacher development: improving classroom practice* was compiled by Lina Adinolfi and Freda Wolfenden.

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*All India – English*

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# Foreword

As in many other countries, teachers in schools across India face multiple challenges as they endeavour to support children and young people to learn the skills and knowledge that they need to live healthy, productive and rewarding lives. Teachers are expected to fulfil an increasingly complex role: to manage changes in school enrolment, to adapt to curriculum changes reflecting shifts in employment patterns and community needs, to meet an ever more diverse range of student learning needs, and to be attentive to global trends, including technological advances and increasing personalisation of learning. This often leaves them with little time and energy to attend to their own professional learning.

But, as practitioners, academics and policy makers, we know that good and improving teaching is a critical determinant of success in improving student learning. Hence teachers need opportunities to draw on new thinking about learning and to develop capabilities to be more participative and inclusive in their practice. To do this they need support that is integral and relevant to their classroom practice, easily accessible, and continuously available.

This small collection of resources, drawn from the TESS-India OER, offers one such form of support relevant to all Indian elementary school teachers: those in pre-service, those relatively new to the profession and those who have been teaching for many years. It engages with them as professionals participating in the collective endeavour of supporting children's learning.

The design of this compendium owes much to the many teachers, teacher educators and education leaders who have engaged with TESS-India over the last five years. Its development drew on multiple conversations and classroom observations across India. On behalf of the entire TESS-India team, I would like to thank everyone who graciously allowed us access to their classroom and who gave their time to share their experiences and ideas.

We hope that *The TESS-India compendium for teacher development: improving classroom practice* will become an invaluable aid for teachers and teacher educators across the country as they work to transform teaching and learning for all students.

Freda Wolfenden  
TESS-India Academic Director, 2014–2019



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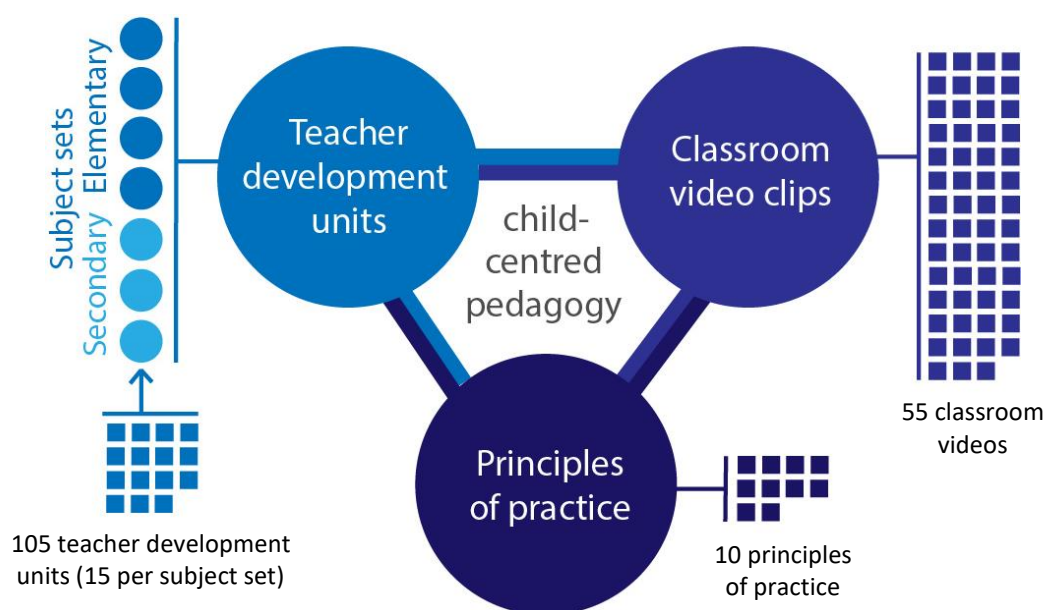


# Introduction

TESS-India (<http://www.tess-india.edu.in/>) is an award-winning mass-scale initiative that aims to strengthen India's teacher professional development systems and processes. With its emphasis on enhancing the practice-based element of these systems, TESS-India offers an innovative approach to realising the paradigm shift towards child-centred classroom pedagogy visualised in India's National Curriculum Framework (2005) and the National Curriculum Framework for Teacher Education (2009).

Led by The Open University UK in partnership with the Government of India's Ministry of Human Resource Development (MHRD), with the support of the British Council and Save the Children, TESS-India's sustainable approach to pre- and in-service teacher education centres on a suite of freely available, adaptable Open Educational Resources (OER). The product of a collaboration between more than 200 Indian and UK experts, these text- and video-based professional development materials are accessible in multiple formats and five Indian languages – Hindi, Assamese, Bengali, Kannada and Odia – as well as English. The OER can be selected, sequenced and integrated flexibly into teacher education programmes according to the priorities and needs of states, districts, schools and individuals. Although they can be engaged with independently, the intention is that their use will be mediated by teacher educators, mentors or peers. The whole set of TESS-India OER can be found at <http://www.tess-india.edu.in/>. The videos are also available on the Tess-India YouTube channel, <https://tinyurl.com/tess-india-youtube>.

As Figure 1 shows, the TESS-India OER embrace three interlinked components (although note that a set of resources aimed at school leaders is also available).



**Figure 1** Interlinked components of the TESS-India OER.

The teacher development units correspond to four subject sets at elementary level and three at secondary level, namely:

- Elementary Language and Literacy
- Elementary English
- Elementary Maths
- Elementary Science
- Secondary English
- Secondary Maths
- Secondary Science

Each subject set consists of 15 units. Each unit includes case studies, reflective tasks, and – most importantly – activities for teachers to prepare and enact in their classrooms, drawing on evidence from the outcomes to enhance their subsequent pedagogic practice.

The teacher development units are underpinned by ten principles of practice, which have been identified as a means of capturing some of the core elements of effective classroom teaching and learning, independent of subject area, as follows:

- Involving all
- Using questioning to promote thinking
- Talk for learning
- Pair work
- Monitoring and giving feedback
- Groupwork
- Assessing progress and performance
- Planning lessons
- Using local resources
- Storytelling, songs, role play and drama

These principles of practice are described in a set of ten reference OER, also called Key Resources. It is important to recognise that this list represents one of many possible ways of classifying and labelling teaching practices and competencies. Some adjustment may be necessary to map them onto existing professional development frameworks.

Classroom teaching is a multi-faceted, integrated activity, so in reality no single principle of practice will be applied in isolation, but will necessarily combine with several others at any one time. Thus the principle of talk for learning will very likely co-occur with involving all, pair work or groupwork, and assessing progress and performance, for example.

The ten principles of practice provide an organisation framework for a set of 55 short video clips that show teachers applying these techniques in connection with different subject lessons, topics and age groups in authentic classroom contexts in India. The commentary-mediated videos are not intended to demonstrate model practice but to prompt discussion and inspire teachers to experiment with similar techniques in their own classrooms.

## Why the compendium?

Since its launch in 2015, TESS-India has been very successfully deployed in multiple elementary and secondary level pre- and in-teacher development programmes in the states of Assam, Bihar, Karnataka, Odisha, Madhya Pradesh, Uttar Pradesh and West Bengal.

Evaluations of patterns of use nevertheless suggest that, of its three components, two – the Key Resources and the video clips – are being drawn on more extensively than the teacher development units. This is perhaps due to the challenge of selecting possible complementary elements (case studies, practical activities and reflective tasks) from the many teacher development units available, and then creating integrated practice-focused professional learning pathways from this range of resources.

*The TESS-India compendium for teacher development: improving classroom practice* has been assembled to facilitate and promote the use of the content of the teacher development units alongside the Key Resources and video clips. It does so by providing teacher educators and teachers with a sample of ‘ready-made’, thematically organised mini-compilations of materials from each of the three complementary TESS-India components.

The compilations in the compendium are not intended to be prescriptive or comprehensive. Instead, their purpose is to provide a number of possible starting points for engaging with interlinked elements of the TESS-India OER, which can be selected from and adapted as desired. Hopefully, using this compendium will encourage teachers to identify further professional development trajectories from the complete set of OER, in response to local priorities on the one hand and teacher progress on the other.

While TESS-India embraces both elementary and secondary levels, the compendium focuses specifically on the former: that is, teachers of Classes I to VIII, some of whom will be subject specialists and others responsible for several curricular areas.

## How the compendium is organised

The elementary teacher development units are arranged according to subject. However, this compendium is organised and sequenced according to the ten principles of practice that underpin the TESS-India programme more generally (e.g. involving all, questioning, talk for learning, as listed above).

Each of the ten sections of the compendium follows the same format. Each begins with a description of the specific principle of practice under focus, i.e. the Key Resource.

The next sub-section – ‘example applications’ – illustrates four possible ways of applying the specified principle of practice in the elementary classroom. Each of the example applications usually includes a case study, a practical activity and a reflective task (referred to as ‘pause for thought’). These have been selected from the TESS-India Elementary Language and Literacy, English, Maths, and Science teacher development units. Although the examples relate to a subject or topic, the techniques that each example demonstrates are adaptable more widely across the curriculum. The sequencing of the examples therefore varies in line

with the incremental complexity of the techniques presented in each case. Some of the examples are accompanied by a video clip.

The final section of each principle of practice – ‘developing your practice’ – is intended to encourage teacher educators and teacher users go beyond the material selected for the compendium by identifying further developmental opportunities among the whole set of TESS-India OER available. One unit is suggested as a possible starting point, but there are many other possibilities.

### How to use this compendium

*The TESS-India compendium for teacher development: improving classroom practice* is intended to be used alongside other content in pre-service teacher education programmes, such as the D.El.Ed and B.Ed (specifically in the Foundation, Pedagogy and Practicum courses), and in in-service programmes at national, regional, state, district, block and cluster level.

It is important that teachers engage fully with the compendium-related tasks to gain maximum benefit. This should encompass:

- careful reading
- video viewing
- conferring with colleagues
- planning classroom activities, aligning them with the textbook content as necessary
- trying out the classroom activities
- writing reflective notes to evaluate their success
- considering how to refine them.

Sufficient time and a clear schedule will be required to support these developmental processes.

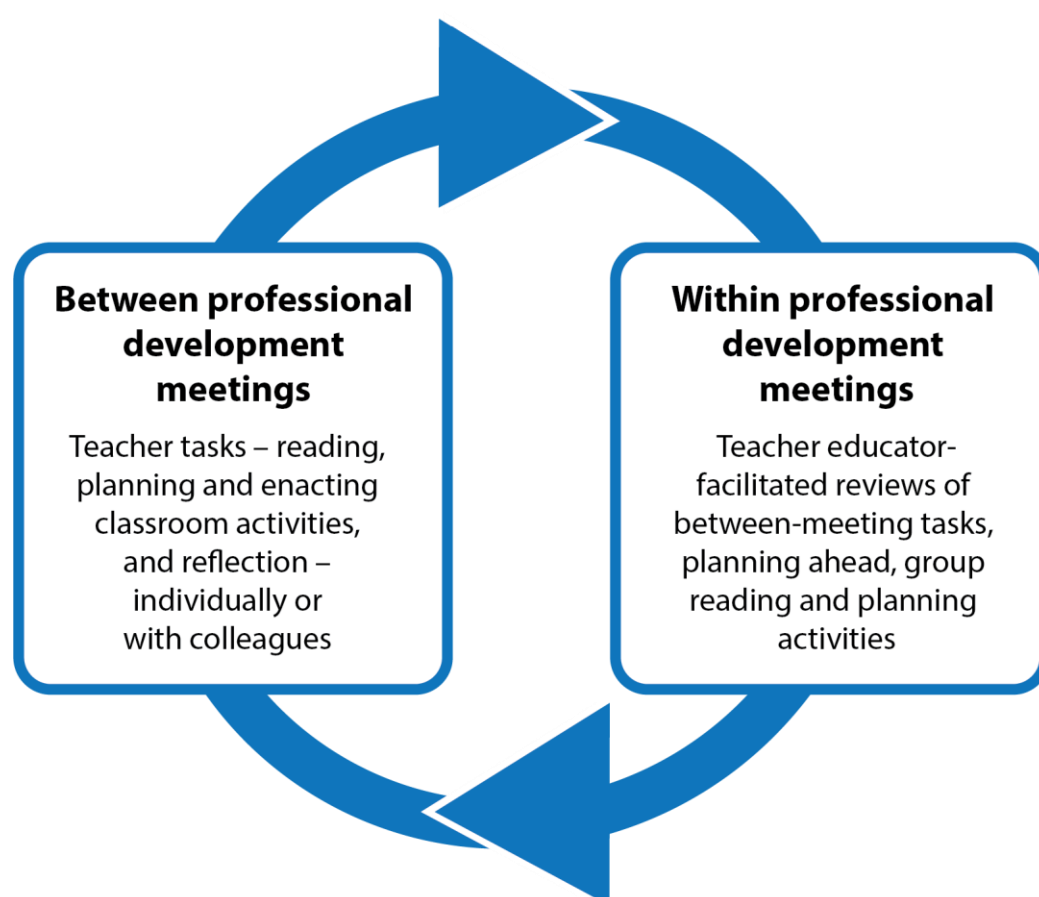
Approaches to using the compendium will vary, but the ideal might involve an alternating series of teacher educator or mentor-facilitated professional development events, whose focus would be on exploring ideas together, with specific tasks for teachers to undertake and reflect on between the sessions.

One possible approach would be to identify the principle of practice to focus on and have teachers read it before a professional development meeting. The meeting could begin with a discussion about the reading text, perhaps in conjunction with watching an associated video clip. The rest of the meeting would be dedicated to preparing teachers to try out one of the examples of that principle of practice. This might involve clarifying the instructions to a classroom activity and discussing how it might be adapted to the teachers’ own context, or discussing the related case study.

Teachers would be given time to revisit the case study, prepare and enact the classroom activity, and make reflective notes on these before the next meeting. They should be encouraged to discuss these tasks with their school colleagues wherever possible.

They would then share their learning experiences at the next professional development meeting. With the teacher educator and their peers, they would each consider how to enhance and build on their classroom experiences between this and the next meeting. This might involve making small amendments to the organisation of the activity to ensure that all students are involved, or adapting it to a different subject area or age group. Alternatively, it might involve trying out another of the four examples associated with the same principle of practice, starting on another section of the compendium, or identifying suitable follow-on activities from the TESS-India OER as a whole.

Having agreed which tasks to focus on outside the session, they would spend the rest of the session preparing for these together. This might involve some collaborative reading, video watching or lesson planning, for example. In this way the practice-focused professional development cycle would continue.



**Figure 2** The practice-focused professional development cycle.

We hope this compendium will provide a useful and exciting springboard for accessing and exploring the many teacher development opportunities available among the TESS-India OER, for identifying alternative trajectories through the resources, and for connecting with the extensive community of practitioners associated with the programme, with the aim of enhancing child-centred teaching practices in schools in India.

## Reflections from existing users of the TESS-India OER

We conclude this introduction with a selection of comments from existing users of the TESS-India teacher professional materials.

The TESS-India materials are extremely well written, simple and easy to follow and, most importantly, connected to the curriculum and teaching pedagogy in schools. What I really appreciate is the reflection and different case studies as they make one pause, think, plan, and only then move on. Most of us do not usually do this.

DIET Teacher Educator, Odisha

I feel more confident in taking classes after the TESS-India program started in our state. My children are also enjoying the classes and interact more with me.

Teacher, Bihar

After exposure to the TESS-India programme and materials, I felt I could do something different. I felt this is what could help me to improve the quality of education and my students too. It has changed my life.

Senior Faculty Member,  
State Institute of Science Education, MP

# 1 Involving all

This section of the compendium focuses on ways of enhancing the involvement of all your students in your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

## What does it mean to 'involve all'?

The diversity in culture and in society is reflected in the classroom. Students have different languages, interests and abilities, and come from different social and economic backgrounds. We cannot ignore these differences; indeed, we should celebrate them, as they can become a vehicle for learning more about each other and the world beyond our own experience.

All students have the right to an education and the opportunity to learn regardless of their status, ability and background: this is recognised in Indian law and the international rights of the child. In his first speech to the nation in 2014, Prime Minister Modi emphasised the importance of valuing all citizens in India regardless of their caste, gender or income. Schools and teachers have a very important role in this respect.

We all have prejudices and views about others that we may not have recognised or addressed. As a teacher, you carry the power to influence every student's experience of education in a positive or negative way. Whether knowingly or not, your underlying prejudices and views will affect how equally your students learn. You can take steps to guard against unequal treatment of your students.

## Three key principles to ensure that you involve all your students in learning

- **Noticing:** Effective teachers are observant, perceptive and sensitive; they notice changes in their students. If you are observant, you will notice when a student does something well, when they need help, and how they relate to others. At times, you may also perceive changes in your students, which might reflect changes in their home circumstances or other issues. Involving all requires that you notice your students on a daily basis, paying particular attention to students who may feel marginalised or unable to participate.
- **Focus on self-esteem:** Good citizens are ones who are comfortable with who they are. They have self-esteem, know their own strengths and weaknesses, and have the ability to form positive relationships with other people, whatever their background may be. They respect themselves and they respect others. As a teacher, you can have a significant impact on a young person's self-esteem. Be aware of that power and use it to build the self-esteem of every student.
- **Flexibility:** If something is not working in your classroom for specific students, groups or individuals, be prepared to change your plans or stop an activity. Being flexible will enable you make adjustments so that you involve all your students more effectively.

## Approaches that you can use all the time

- **Modelling good behaviour:** Be a good example to your students by treating them all well, regardless of their ethnic group, religion or gender. Treat all students with respect and make it clear through your teaching that you value them equally. Talk to them all respectfully, take account of their opinions when appropriate and encourage them to take responsibility for the classroom by taking on tasks that will benefit everyone.
- **High expectations:** Ability is not fixed: all students can learn and progress if supported appropriately. If a student is finding it difficult to understand something in the lesson, do not assume that they will never understand. Your role as the teacher is to work out how best to help each student learn. If you have high expectations of all your students in your class, they are more likely to assume that they will learn if they persevere. High expectations should also apply to behaviour. Make sure the expectations are clear and that students treat one other with respect.
- **Build variety into your teaching:** Students learn in different ways. Some students like to write; others prefer to draw mind maps or pictures to represent their ideas. Some students are good listeners; some learn best when they get the opportunity to talk about their ideas. You cannot suit all the students all the time, but you can incorporate variety into your teaching and offer students a choice about some of the learning activities that they undertake.
- **Relate the learning to everyday life:** In order to engage your students, make sure that, whenever possible, you relate the learning to a context that is relevant to them and that you draw on examples from their own experience.
- **Use of language:** Think carefully about the language you use. Use positive language and praise, be this for effort or achievement, and do not ridicule your students.
- **Challenge stereotypes:** Find and use resources that show girls in non-stereotypical roles or invite female role models, such as scientists, to visit the school. Try to monitor and address your own gender stereotyping and that of society as a whole.
- **Create a safe, welcoming learning environment:** All students need to feel safe and welcome at school. You are in a position to make create a positive environment by encouraging mutually respectful and friendly behaviour from everyone. Think about how the school and classroom might appear and feel like to different students. Think about where they should be asked to sit and make sure that any students with visual or hearing impairments or physical disabilities sit where they can access the lesson. Check that those who are shy or easily distracted are where you can easily include them.

## Specific teaching approaches

There are several specific approaches that will help you to involve all students. These are described in more detail in other principles of practice, but a brief introduction is given here:

- **Questioning:** If you invite students to put their hands up, the same ones tend to answer. There are other ways to involve more students in thinking about the answers and responding to questions. You can direct questions to specific individuals, for example. Tell the class you will decide who answers, then ask those at the back and sides of the room, rather than those sitting at the front. Give all your students 'thinking time' and invite contributions from specific people. Use pair or groupwork to build confidence so that you can involve everyone in whole-class discussions.
- **Assessment:** Develop a range of techniques for formative assessment that will help you to know each student well. You need to be creative to uncover hidden talents and shortfalls. Formative assessment will give you accurate information rather than assumptions that can easily be drawn from generalised views about certain students and their abilities. You will then be in a good position to respond to their individual needs.
- **Groupwork and pair work:** Think carefully about how to divide your class into groups or how to make up pairs, taking account of the goal to include all of them and encourage students to value each other. Ensure that all students have the opportunity to learn from one other. Some students will have the confidence to express their ideas and ask questions in a small group, but not in front of the whole class.
- **Differentiation:** Setting different tasks for different groups will help students start from where they are and move forward. Setting open-ended tasks will give all students the opportunity to succeed. Offering students a choice of task helps them to feel ownership of their work and to take responsibility for their own learning. Taking account of individual learning needs is difficult, especially in a large class, but by using a variety of tasks and activities it can be done.

## Example applications

The involvement of all your students in active learning is relevant to all curricular areas.

The following examples demonstrate some of the ways in which the principle of involving all can be applied in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages. To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

### Example 1: Valuing multilingualism in the school and classroom

In much of the world, including India, multilingual students are the norm rather than the exception. There is much research and evidence about the cognitive and practical benefits of knowing more than one language. Such knowledge is a tremendous resource for teaching and learning. Whatever their subject specialism, every teacher should seek out opportunities to celebrate, promote and exploit the linguistic knowledge and skills of all their students.

#### Activity 1: Learning and teaching in multilingual contexts – key principles

The three statements that follow are based on the findings of international educational research on effective classroom practice in multilingual contexts:

- Students learn best in the language they know best.
- Teachers teach most effectively in the language they're most familiar with.
- The longer teaching and learning take place in the first language, the better the educational outcomes.

Now answer the questions below, discussing them with a colleague if possible:

- As a teacher, what are the challenges of integrating these statements into your daily classroom practice?
- Is there a 'language gap' between you and your students, or among the students that make up your class? If so:
  - How does this affect your teaching and their learning?
  - How does this affect relationships in the classroom?
- Do you do anything to acknowledge your students' other languages in your teaching? Why or why not?

The three statements above reflect increasing powerful evidence of the positive impact that prolonged teaching in the mother tongue has on students' school attendance and their long-term educational success.

While the introduction of wholly mother tongue-based teaching may not be possible in your school, there are many small changes you can make to your teaching practice to draw on the valuable home language resources that your students bring to the classroom.

#### Case Study 1: Observing students talking in their home languages

*Mr Dharmendra, a Class I and II teacher in a rural school in Madhya Pradesh, describes what he noticed when he observed his students communicating in their home languages.*

I used to have quite negative attitudes towards my students using their home language in school. I felt that the best way for them to learn the school language was to listen to and use it all the time. I believed that mixing languages in school could be confusing to them.

Perhaps the fact that I could understand and speak only very little of their home languages was another reason why I was uncomfortable about them using them in class.

Some of my Class I and II students were very quiet in my lessons. It was difficult for me to know what they understood and what they were learning. One morning, I noticed that two normally reticent students that I had paired up were talking animatedly about a Hindi reading text in Neemadi, the language they spoke at home. That lunchtime, I overheard a very shy student explaining a recently introduced science-related concept to his friend in the playground, with the help of a diagram, in their home language, Bhili. At the end of the day, I observed a child who did not usually talk, retelling a story I had told the class earlier in Hindi to her grandfather in their home language, Malvi.

I was struck by the confidence, capability, good humour and social skills of these children, as they communicated with others in the language they knew best. I realised that I needed to provide opportunities for them to display these same qualities in the classroom too.



### Pause for thought

Take time each day to observe and listen to those students who may otherwise be quiet in class when they are talking to others in a more familiar shared language.

- What qualities and behaviours do they demonstrate that perhaps you had not been aware of before?
- How could you enable your students to transfer these behaviours to their classroom learning?

### Activity 2: Valuing your students' multilingualism by undertaking a class language survey

Undertake a language survey with your class. Start by talking to your students about the languages you know – perhaps clarifying whether you can understand a few words, speak the language fluently or write it – and explaining how you gained that knowledge, be this from your parents or grandparents, from living somewhere, or from studying it in school, for example.

Using chart paper, make a large table. Write with your name, followed by your students' names, down the left-hand side, and a list of languages across the top. Invite your students to state which languages they know and add ticks to the chart accordingly. When you have finished, put the survey chart up on the classroom wall.

If any students are absent on the day you do the survey, be sure to update the chart on their return. Insert extra rows at the bottom in case any new students join the class during the year. You may wish to survey the head teacher and other members of staff and add this information, too.

Depending on the age of your students, you could make the survey more detailed by noting whether they can understand, speak, read or write the languages have mentioned.



### Pause for thought

- Were your students pleased to share their language knowledge?
- Did you encounter any difficulties in trying to find out which languages your students know? If so, what were they?
- What could you do as a follow-up activity with your students?

Discriminatory perceptions of low-status castes may mean that some students are reluctant to 'admit' to knowing some of the languages associated with these communities. In this activity it is therefore important to positively emphasise the value that knowledge of different languages and cultures brings to people's lives in general and the classroom in particular. Talk about your own knowledge of minority languages, even if it is limited, or your wish to learn them.

The fact that the distinction between languages and dialects is often fluid, or the possibility that students may not know the names of the languages they speak, are other reasons why it is not always straightforward to obtain precise information about such knowledge. Your chart should therefore be viewed a starting point, with students helping to amend the information over time.



### Video: involving all

The following links illustrates how a teacher focuses on involving all in an Elementary Language and Literacy lesson:

<https://www.youtube.com/watch?v=gIZbEcAeOuk&index=13&list=PLljfVZ89nnNI7IEZRdanOTVxzuosUW0Bp>

<https://www.youtube.com/watch?v=v82TckJZfm0&list=PLljfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=15>

This example was adapted from the TESS-India Elementary Language and Literacy unit, 'Multilingualism in the classroom'.

### Example 2: Incorporating varied, meaningful activities into your practice

Learning to write – whether in Hindi, English or a student's home language, is a complex skill but can be made more interesting and enjoyable through their use of different writing implements and surfaces. As your students' writing skills develop, they will benefit from being introduced to different purposes for writing.

### Activity 3: Where can students write?

Look at Figure 1. Which of these activities would be possible to do with your students in your classroom and school? Discuss this with a fellow teacher if possible. Think of the spaces in your classroom, and outside your classroom, where students could practise writing.



**Figure 1** Examples of where students can write: in sand with fingers; outside with sticks; on the pavement with chalk; on the wall with paint; on recycled paper with pens; and on boards with chalk.

Now look at the checklist below.

- **What to write with?** Pencils, pens, paint, chalk, brushes, sticks.
- **What to write on?** Sand, pavement, chart paper, recycled paper, board, walls, floors, dirt, notebooks, small books made from recycled paper.

Discuss this checklist with a fellow teacher, if possible.

What resources are available in your school? Think of the writing resources you have, inside and outside the classroom, to encourage students to practise. Can you see any areas inside or outside your classroom where students could make marks and write freely?

Plan some sessions in your classroom over the next two to three weeks where you use one or more of the ideas given here. Discuss your plans with a fellow teacher or with your headteacher. You could organise lessons where groups of students do free writing in rotation throughout the week.

#### Activity 4: Writing for different purposes

Do you ever ask your students to write any of the following in your class? Tick any that you use with your students:

- |                   |                                  |
|-------------------|----------------------------------|
| • lists           | • notes                          |
| • greeting cards  | • reminders                      |
| • birthday cards  | • labels                         |
| • postcards       | • tickets                        |
| • letters         | • catalogues                     |
| • invitations     | • programmes                     |
| • thank you notes | • emails                         |
| • menus           | • text messages                  |
| • advertisements  | • multimedia presentations, i.e. |
| • recipes         | posters.                         |
| • signs           |                                  |

How are all of these different to writing stories or poems? Why are they written and who are they for? Where do we see them?

Do you think your students would enjoy writing any of the above? Why, or why not? Can you find recent textbook lessons that refer to any of these kinds of writing? Can you bring some examples of them into your class to share with your students?

Create opportunities for your students to use these kinds of writing in your lessons – you can use them in all the different subjects.



#### Pause for thought

- Were your students excited to try out different kinds of writing?
- Did all your students take part? Which languages did you use?
- How did you display their writing? Are there ways you could share their writing with parents and other community members?
- What could you do as a follow-up activity with your students?

Students will enjoy writing more when it is authentic and meaningful for them – that is to say, when they can see a genuine purpose for the writing and they know who is going to be the audience. Using different kinds of writing and allowing students to write in different languages will help all students to participate in learning.

This example was adapted from the TESS-India Elementary English unit, 'Mark-making and early writing'.

### Example 3: Creating a positive learning environment

The physical, social and emotional climate of the classroom has a significant influence on students' wellbeing, motivation and achievement. Creating a positive learning environment that stimulates your students' interest in science – and indeed other subjects – is best achieved collaboratively, by involving them in the process.

#### Case Study 3: Ms Kabita involves her students in making their science classroom more appealing

*Ms Kabita teaches science to Class V and is planning to undertake an investigation with them. She describes how a visit to another school inspired her to involve her students in making her classroom more attractive and practical.*

A few weeks ago I visited a school a few miles from my school. I had heard that the teacher, Mr Pathak, had made his classroom more colourful and interesting without having to buy any resources. I looked around his classroom and saw that he had put up on the wall, pictures that he had drawn and his students' work. He had written labels on the work and put up questions for them to answer as they looked at it. He said the students liked to look at these and often talked about them and their content. He also had resource boxes with recyclable and reusable materials to use in lessons. Over the next few weeks I spent many spare moments looking at my classroom from different perspectives and thinking about what I could do to make it more exciting. A lot of questions came to mind:

- How could I sit my students so that they were all more involved?
- What could I do to make the walls more interesting?
- What resources would I need? Where could I get these?
- What would the students think about any changes I would make?
- Should I involve them in thinking about what we could do? How would I do this?
- How could I start this process with studying germination?

I decided to start my changes by asking my students to help me. I had two large, low, storage boxes under the blackboard that I had not bothered about much. I wanted to move these and use their tops for display, as well as the wall above.

One box would store some of the recyclable and reusable materials that I had been gathering over the months from around the small town where I live. Often shops have old cardboard boxes that are left out and I have asked the shopkeeper for these for school. The man was reluctant at first but when I said it would help the students' learning, he relented. I had also collected envelopes from the school office when they came and found some big sheets that I could use for posters and for students' work to do displays and brainstorm, etc. Finally, I decided that I had spent enough time thinking and needed to act if I was going to make a difference to my classroom. At the end of one science lesson I took ten minutes to ask the students three questions about the classroom:

- What do you like about this room?
- What do you not like?
- How do you think we could make it a more attractive, practical classroom?

As they were used to working in groups, I asked them to talk together and for one person to write their responses and ideas on a small sheet of paper. Each group gave their three responses orally and I listed them on the blackboard. I told them I would read their lists, and in the next lesson we would consider what we will do first and how we will do it, when we began to investigate germination. They left the classroom talking animatedly about what they could do.



### Pause for thought

- How do you react to Ms Kabita's approach and her reasons for making her classroom more enticing?
- Do you think your classroom environment could be made more appealing?
- How could you involve your students in making this happen?

By asking her students for their ideas to for improving their classroom, Ms Kabita is making a move towards including all of them in exploring what would improve their learning environment. She is not only changing the physical environment, but also the kind of interaction in her classroom. This is showing her students that she respects them as individuals and wants to share ideas with them. This is a big boost for all her students on both counts. Try something similar in your own classroom – this can be in any subject.

This example was adapted from the TESS-India Elementary Science unit, 'Developing the learning environment'.

### Example 4: Encouraging exploratory learning

Play is about exploring and experimenting, which anyone of any age can and should do. Play enables the exploration of many possible solutions in a spontaneous, creative way. In the process of exploring and experimenting, it is important that students have the choice to approach a problem from any angle, the option to make mistakes, and the possibility of coming up with their own conjectures and testing whether they are valid or not. In order to encourage students to adopt a playful way of thinking in their maths lessons, it helps to use examples that are light-hearted, and even funny.

#### Activity 4: Developing proportional reasoning skills through a playful maths activity

This activity presents students with an image of an extremely large shoe and asks them to imagine how tall they would be if the shoe fitted them. By exploring possibilities, making their own choices about how to go about working out the maths and, no doubt, getting things wrong in the process, the students will develop their proportional reasoning skills.

You will need to make one or more copies of Figure 2 (ideally large scale) in advance, to show your students or use another example of a very large or a very small object.

Tell your students that the image shows the world's largest pair of shoes. The shoe is 5.29 metres (17.4 ft) long and 2.37 metres (7 ft 9 in) wide. It is said to be equivalent to a French shoe size of 753. The French shoe size of 34 is equivalent to the Indian shoe size of 6. Ask your students: If this was your shoe, how tall would you be?

Invite your students to work in pairs and talk about how they would solve the problem. Explain that, while sharing their ideas in this way is important, they should also try to work out some of the sums on their own.

When they have finished, ask them to share their ideas and possible solutions with the whole class.



**Figure 2** The world's largest pair of shoes, on display in Marikina, 'the shoe capital of the Philippines', as certified by the Guinness Book of World Records in 2002. (Source: Ramon F. Velasquez)



### Pause for thought

- What responses from your students were unexpected in your lesson? Why?
- What questions did you use to probe your students' understanding?
- Did you modify the task in any way? If so, what was your reason for doing this?
- Did all your students participate? If not, how can you encourage more participation next time?

### Case Study 4: Mrs Mohanty reflects on using Activity 2

I did Activity 4 with my Class VIII students. I thought it would be nice to start with an open discussion with the whole class so I decided to show them the picture and then passed it around the classroom so all the students could have a close look. They all laughed when they saw the shoe and I could feel they got curious about what this shoe was doing in their maths lesson!

I wrote down the measurements of the shoe on the blackboard and asked them the question, 'If this was your shoe, what would be your height?' Initially they seemed puzzled. Then Manisha raised her hand and said that they could compare their own shoe size and height. Bharat wondered if that relationship was constant, as he argued that sometimes people with the same height have different shoe sizes. He suggested asking each student what their shoe size and height was.

I thought that was a lovely idea but feared that having my 86 students measure their height and the length of their feet and share that data there and then in the classroom would result in chaos! I expressed my concern about this to my students, who proposed that by using measuring sticks and rulers at lunchtime, everyone could find out their measurements then and write them on the blackboard. Two students volunteered to oversee that this happened in a good manner.

We continued with the activity after lunch. I asked them first to work in groups of four to see whether height always matched the same foot length, then to work out individually what the proportional relationship was between their height and the length of their feet and to check with each other that they had done their calculations right. This way they would already get a lot of practice in working out proportions and ratios and they would get to know about different ways of working this out.

I then showed my students the picture of the big shoe again and posed the same question: 'If this was your shoe, what would be your height?'

Different suggestions were made as to how to work this out, such as:

- comparing their own shoe size with that of the big shoe and then using that ratio to multiply their height
- using the ratio they had worked out earlier of their foot length to their height and multiplying this by the length of the big shoe.

I told my students that they could use any of their suggested methods, adding that it would be interesting to see whether different methods gave different results. If so, they could start thinking about and discussing why this would be. Not many students reached this point in the end, but even so, I was pleased I asked the question because it might have planted a little seed for them to think about. We ended the lesson with a discussion about the various things that can be observed in nature that are in proportion and those that are not.



### Video: involving all

The following link illustrates how a teacher focuses on involving all in an Elementary Maths lesson:

<https://www.youtube.com/watch?v=bV7fILQPTxg&index=14&list=PLLjfVZ89nnNI7IEZRdanOTVxzuosUW0Bp>

This example was adapted from the TESS-India Elementary Maths unit, 'Creative thinking in mathematics: proportional reasoning'.

### Developing your practice

Involving all features in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep a record of them below. To get you started, involving all is featured in the Elementary Maths unit, 'Physical representation in mathematics: handling data'.



## 2 Using questioning to promote thinking

This section of the compendium focuses on ways of enhancing your questioning techniques to support your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

### Why using questioning to promote thinking is important

Teachers question their students all the time; questions mean that teachers can help their students to learn, and learn more. According to one study, on average, a teacher spends one-third of their time questioning students (Hastings, 2003). Of the questions posed, 60 per cent recalled facts and 20 per cent were procedural (Hattie, 2012), with most answers being either right or wrong. But does simply asking questions that are either right or wrong promote learning?

There are many different types of questions that students can be asked. The responses and outcomes that the teacher wants dictates the type of question that the teacher should utilise. Teachers generally ask students questions in order to:

- guide students toward understanding when a new topic or material is introduced
- push students to do a greater share of their thinking
- remediate an error
- stretch students
- check for understanding.

Questioning is generally used to find out what students know, so it is important in assessing their progress. Questions can also be used to inspire, extend students' thinking skills and develop enquiring minds. They can be divided into two broad categories:

- **Lower-order questions**, which involve the recall of facts and knowledge previously taught, often involving closed questions (a yes or no answer).
- **Higher-order questions**, which require more thinking. They may ask the students to put together information previously learnt to form an answer or to support an argument in a logical manner. Higher-order questions are often more open-ended.

Open-ended questions encourage students to think beyond textbook-based, literal answers, thus eliciting a range of responses. They also help the teacher to assess the students' understanding of content.

### Encouraging students to respond

Many teachers allow less than one second before requiring a response to a question – so therefore often answer it themselves or rephrase it (Hastings, 2003). The students only have time to react – they do not have time to think! If you wait for a few seconds before

expecting answers, the students will have time to think. This has a positive effect on students' achievement. By waiting after posing a question, there is an increase in:

- the length of students' responses
- the number of students offering responses
- the frequency of students' questions
- the number of responses from less capable students
- positive interactions between students.

### Your response matters

The more positively you receive all answers that are given, the more students will continue to think and try. There are many ways to ensure that wrong answers and misconceptions are corrected, and if one student has the wrong idea, you can be sure that many more have as well. You could try the following:

- Pick out the parts of the answers that are correct and ask the student in a supportive way to think a bit more about their answer. This encourages more active participation and helps your students to learn from their mistakes. The following comment shows how you might respond to an incorrect answer in a supportive way: 'You were right about evaporation forming clouds, but I think we need to explore a bit more about what you said about rain. Can anyone else offer some ideas?'
- Write on the blackboard all the answers that the students give, and then ask the students to think about them all. What answers do they think are right? What might have led to another answer being given? This gives you an opportunity to understand the way that your students are thinking and also gives your students an unthreatening way to correct any misconceptions that they may have.

Value all responses by listening carefully and asking the student to explain further. If you ask for further explanation for all answers, right or wrong, students will often correct any mistakes for themselves, you will develop a thinking classroom and you will really know what learning your students have done and how to proceed. If wrong answers result in humiliation or punishment, then your students will stop trying for fear of further embarrassment or ridicule.

### Improving the quality of responses

It is important that you try to adopt a sequence of questioning that doesn't end with the right answer. Right answers should be rewarded with follow-up questions that extend the knowledge and provide students with an opportunity to engage with the teacher. You can do this by asking for:

- a how or a why
- another way to answer

- a better word
- evidence to substantiate an answer
- integration of a related skill
- application of the same skill or logic in a new setting.

Helping students to think more deeply about (and therefore improve the quality of) their answer is a crucial part of your role. The following skills will help students achieve more:

- **Prompting** requires appropriate hints to be given – ones that help students develop and improve their answers. You might first choose to say what is right in the answer and then offer information, further questions and other clues. ('So what would happen if you added a weight to the end of your paper aeroplane?')
- **Probing** is about trying to find out more, helping students to clarify what they are trying to say to improve a disorganised answer or one that is partly right. ('So what more can you tell me about how this fits together?')
- **Refocusing** is about building on correct answers to link students' knowledge to the knowledge that they have previously learnt. This broadens their understanding. ('What you have said is correct, but how does it link with what we were looking at last week in our local environment topic?')
- **Sequencing** questions means asking questions in an order designed to extend thinking. Questions should lead students to summarise, compare, explain or analyse. Prepare questions that stretch students, but do not challenge them so far that they lose the meaning of the questions. ('Explain how you overcame your earlier problem. What difference did that make? What do you think you need to tackle next?')
- **Listening** enables you to not just look for the answer you are expecting, but to alert you to unusual or innovative answers that you may not have expected. It also shows that you value the students' thinking and therefore they are more likely to give thoughtful responses. Such answers could highlight misconceptions that need correcting, or they may show a new approach that you had not considered. ('I hadn't thought of that. Tell me more about why you think that way.')

As a teacher, you need to ask questions that inspire and challenge if you are to generate interesting and inventive answers from your students. You need to give them time to think and you will be amazed how much your students know and how well you can help them progress their learning.

Remember, questioning is not about what the teacher knows, but about what the students know. It is important to remember that you should never answer your own questions! After all, if the students know you will give them the answers after a few seconds of silence, what is their incentive to answer?

## Example applications

Questioning is relevant to all curricular areas.

The following examples demonstrate some of the ways in which questioning can be applied in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages. To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

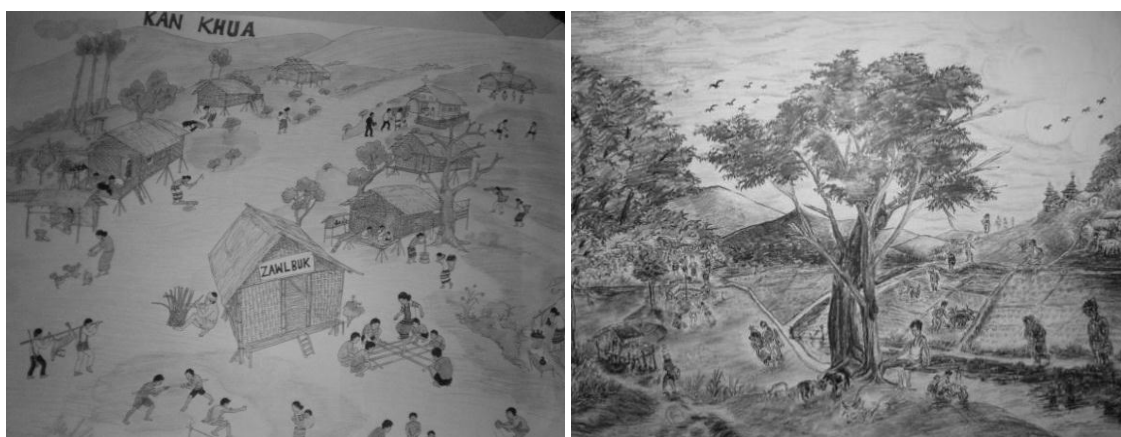
### Example 1: Using questions with pictures

In Case Study 1, the teacher's questions are used to prompt student talk based on picture prompts. Picture-based questioning is not only a simple, effective way of involving all your students, but also provides you with a simple, effective way of learning more about the experiences that they bring to the classroom. This example relates to a Language and Literacy lesson but the same technique can be applied to any curriculum area.

#### Case Study 1: Using questions with pictures to stimulate classroom talk

*Ms Priyanka is a Class I teacher in a rural school in Uttar Pradesh. Here she talks of how she employs questions with images of familiar scenes as prompts for classroom talk.*

I use pictures [see Figure 1] to encourage my students to talk. The title of the first picture is 'My Village' and the title of the second one is 'Agriculture'.



**Figure 1** Two pictures – 'My Village' (left) and 'Agriculture' (right) – that Ms Priyanka uses to encourage her students to talk.

First I put the pictures up on the wall. I don't mention them, but let my students notice and examine them in their own time. Over the next day or two I observe my students talking to one another about the pictures and discussing the details in them.

I then organise a 20-minute session to discuss the two pictures with a group of students each day. I set the rest of the class other quiet work to do at the same time.

I list a number of questions in advance. Some questions are intended to elicit simple descriptions, while others are more open-ended. Here are some examples of each type:

- What is this a picture of?
- Can you describe what you see in the picture?
- What are the people doing?
- Have you ever played these games? Can you explain how to play them?
- Have you ever helped your family in the jum fields?
- What is your favourite food from the fields? How do you prepare that food?
- What part of the picture do you like best? Why exactly?

I listen to each student carefully without correcting or interrupting them. I insist that the other students listen carefully too. By encouraging my students to talk about what they see and know, I learn a lot about them. This helps me to assess their ability and consider ways of supporting or extending them further.

A few of my students are too shy to speak, but they are clearly listening to their classmates. I try to ask them simple questions that allow them to respond with a single word, a nod or a shake of their head to indicate that they understand me.

I always attempt to give my students good models of speaking and listening. I talk clearly, make eye contact with those who respond and ask further questions to indicate my interest in their answers.



### Pause for thought

- Which of Ms Priyanka's questions are more open-ended?
- How does she ensure that all of her students are involved in the activity?
- What opportunities does Ms Priyanka have to evaluate her students as speakers and listeners?

Your students will probably be from diverse social, cultural and linguistic backgrounds. The speaking and listening activities that you incorporate into your classroom should draw on the varied knowledge that your students bring to school. This is particularly true for students whose home language is different from the school language. Notice how the picture prompts used in Case Study 1 would have been familiar scenes to all of Ms Priyanka's students. Be aware that students who are silent may still be participating by listening, thinking and learning.

In Activity 1 you will use questions with pictures to encourage speaking and listening among your students.

### Activity 1: Using questions to prompt a picture-based group discussion

You can use any pictures from your textbook or from other sources in your school or community for this activity.

Using Case Study 1 for ideas, plan a lesson in which you use a picture or a series of pictures to encourage your students to talk about what they see or imagine to be happening, relating it to their knowledge and experience.

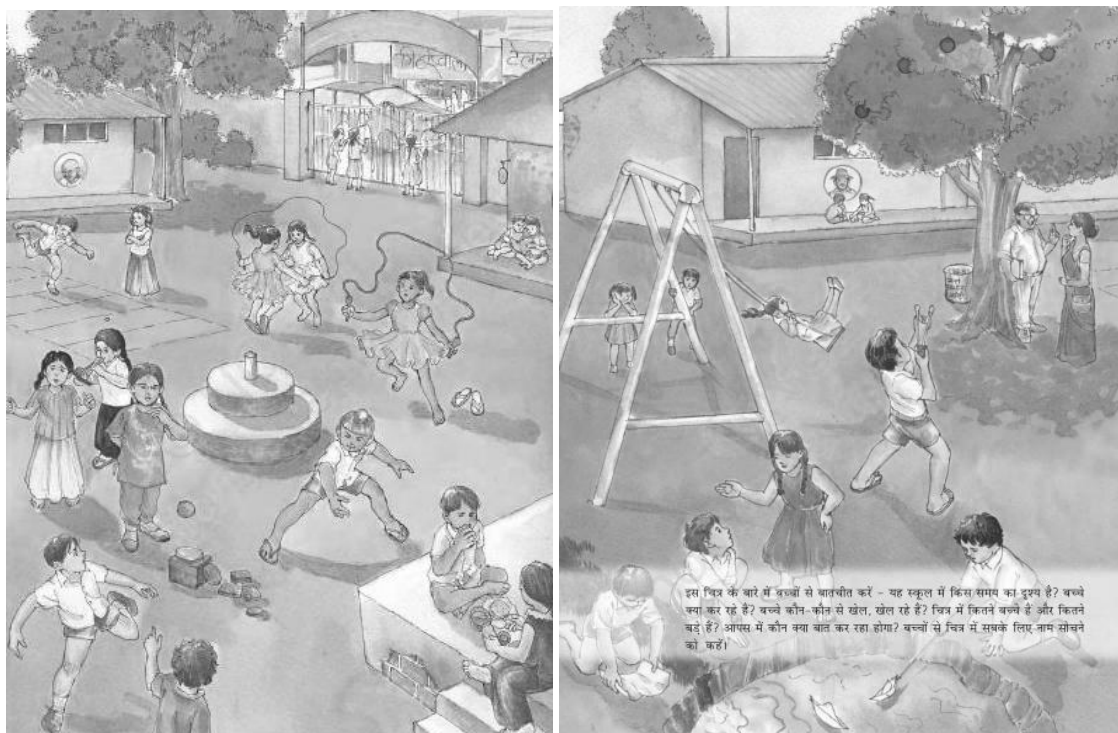
Before you plan the lesson:

- Think about how you will organise the activity. Consider whether it will involve pairs, small groups or the whole class, and whether it will take place indoors or outdoors.
- Brainstorm with a colleague the types of questions you could ask your students.

The following questions are based on the pictures in Figure 2. You will need to devise other questions depending on the images you use and the age of the class you are teaching. Only a small number should be necessary:

- Description questions:
  - What do you think is happening in this picture?
  - What are the children doing?
  - How many girls are there? How many boys? How many adults?
  - What colours can you see?
- Reasoning questions:
  - Point to some of the adults and ask, 'Who do you think they are, and what are they saying to each other?'
  - Point to some of the children and ask, 'What do you think they are saying?'
  - What is the weather or the season? How do you know?
  - What time of day do you think it is? Why?
  - Is it quiet or noisy? How can you tell?
  - Do you think the boy who is eating can see the girls skipping from where he is sitting?
  - Are the children sad or happy? How can you tell?
  - Why do the girls and boys play different games?
  - Does the girl like the loud noise in her ear?
- Prediction questions:
  - What will happen when the boy shoots his sling shot?
  - Will the boy catch the ball?
  - What do you think will happen next?
- Relating the picture to your students' own experience:
  - Does your school compound look like this?
  - Do you play these games?

- What games do you like to play?
- What would you like to do if you were in the playground?



**Figure 2** Two pictures to prompt student talk.



### Pause for thought

Once you have undertaken this activity with your class, answer these questions:

- What type of questions did you ask?
- What did you notice about the length and quality of your students' responses?
- What skills were your students learning while doing this activity? (These might include listening to others, answering questions, talking about their experiences or using language to think and reason, for example.)
- Was any of their talk related to other curriculum areas, such as maths, geography or science? If so, how could you draw on what they said when you teach any of those subjects?
- What questions and pictures would be suitable to use in the

This example was adapted from the TESS-India Elementary Language and Literacy unit, 'Speaking and listening'.

## Example 2: Using questions to prompt discussions around topic

Questions can also provide valuable prompts for students to brainstorm and share their ideas, knowledge and experiences in relation to a particular topic. Activity 2 is intended to heighten students' awareness of the use and value of different languages, including English, in their everyday lives. However, the same questioning techniques can be applied to other topics and curricular areas.

### Activity 2: Using questions as the basis of brainstorming discussions

Both the English language and its alphabet are gaining increasing popularity in Indian communities, in part because of their role in technology. These days, almost everybody has a mobile phone. Now people commonly send each other text messages, often employing English phrases to do so. The roman script is increasingly used to write texts in local languages as well.

Ask your students to work in groups and brainstorm answers to the following question:

How do you communicate in writing with each other and your families – both those family members you live with and those who live elsewhere?

When you use a brainstorm activity, one student in each group should take responsibility for writing down the group members' contributions. They can do this in their notebook or on a large sheet of paper. At the end, the note-taker or another member of each group should report some or all of the points discussed to the whole class.

Walk around the room as your students do the brainstorm. Listen to their ideas. If some students are finding it difficult to think of ideas, you might want to use one or two of these questions to help them. You can ask these orally or write them on the board after the main question.

- Do your family members leave notes for one another?
- Do you use the telephone or a mobile phone?
- Do you send text messages?
- Have you ever seen a typewriter?
- Have you used a word processor (computer)?
- Do you or your parents write letters or emails?
- What forms of social media do you use with members of your family?

When they have written down their ideas about how their family members communicate in writing, ask them to think about what language(s) people use for these activities. Is it English, Hindi or local a language? Or a mix of these? They should add this information on their brainstorm chart.

Then gather the students together and hold a class discussion about what determines which language they use for each activity. Is it easier to use English for some forms of written communication because of the computer keyboard? Do they use the roman script for transliterated Hindi words? Write the class ideas on the board.



### Pause for thought

- How might the note-taker and reporter be selected for the group brainstorming?
- How might you follow up this activity, as either (a) a homework task or (b) another lesson?
- What question prompts could you use as the basis of a brainstorming discussion on another topic or subject area?

This example was adapted from the TESS-India Elementary English unit, 'Community resources for English'.

### Example 3: Asking questions to support student understanding

Asking questions that support student learning requires preparation and practice. The following example focuses on preparing, trying out and evaluating the effectiveness of questions about fractions in your elementary maths lessons.

#### Activity 3: Asking effective questions about fractions

##### Part 1: Preparing to ask effective questions

If you can do this part of the activity with another teacher, you may find that it is easier and more productive.

Think about the next lesson in which you will teach fractions. What is it you want your students to know? Write some notes about that now.

What previous knowledge do you think they will need in order to understand the ideas you want them to learn? Write a question that will enable you to know whether or not they have that prior knowledge. For example, you could ask your students: 'Can you give me an example of ...? And another? And another? And another? And another?' Asking for more examples could help you to find out the extent of their knowledge and some of the students' misconceptions.

Think about some of the ways that fractions are used in the real world. Write a question that might interest or engage your students because it is based on something they know about and use.

Now write an easy question for the particular topic you have to teach and then write a difficult question. Write a sequence of questions that will challenge your students – but not too much!

Think about all the ways that misconceptions can happen in fractions. Write two or three questions that will help you check whether or not your students have these misconceptions. You can find some examples of such questions in Case Study 2 below. It is also important to think ahead about how you might respond to your students' answers in the best way to reinforce learning and extend their thinking.

Now write a question that will encourage your students to reason their way to a solution. For example, 'Your big sister never believes what you say. How will you convince her that your method works?'

### **Part 2: Using your questions in the classroom**

Now you have written these questions, use them with your class.

Don't forget to use real objects to allow your students to work with ideas on fractions and to approach challenging questions through a process of reasoning.

### **Case Study 2: Mrs Mohanty questions the students to check their understanding of fractions**

When thinking about Part 1 of Activity 3, I decided I would use my normal introduction to fractions by demonstrating fractions on the blackboard as usual, but to be very precise and repetitive in the questions and instructions I was going to use. I wrote them down on a piece of paper, and put them on my desk so I would not forget them.

These are the questions and prompts I prepared:

- Show me how you divide this circle into halves/quarters/eighths.
  - How do you know this is correct?
  - Please describe your method clearly.
  - Would anyone do it another way?
- Show me on this circle one half/one quarter/one eighth.
  - How do you know this is correct?
  - Please describe your method clearly.
  - Would anyone do it another way?
- Show me on this circle one third/one sixth/one twelfth.
  - How do you know this is correct?
  - Please describe your method clearly.
  - Would anyone do it another way?
- Show me on this circle one third/one fifth/one seventh.
  - How do you know this is correct?
  - Please describe your method clearly.

- Would anyone do it another way?
- Show me on this circle three quarters/six eights.
  - How do you know this is correct?
  - Please describe your method clearly.
  - Would anyone do it another way?

I drew the circle using chalk. I then invited students to come to the blackboard, and asked them these questions. Having the questions written down really helped me to focus and helped to avoid diversions from what I had intended to do. I also noticed that as a result there was less 'teacher talk', and more student talk and student work.



### Pause for thought

- What questions did you use to probe your students' understanding of fractions?
- Did you need to change your planned questions at any time? Why?
- How effective did you feel your responses to the students' answers were in reinforcing learning and helping you to understand the way your students think?
- What might you do differently next time?

Example 3 was adapted from the TESS-India Elementary Maths unit, 'Asking questions that challenge thinking: fractions'.

### Example 4: Monitoring your classroom questioning techniques

Case Study 3 includes different approaches to using questions to help students explore the scientific concept of forces and reflect on your own practice when using questions in the science classroom.

#### Case Study 3: Two teachers use questions to teach their class about forces

*Mrs Nair's description of her lesson:*

At the start of my lesson I asked the students to watch me push a book across my desk and asked the class, 'What am I doing?' One of the class replied, 'Pushing the book.'

'Good,' I say. 'And that is what a force is. Say after me, "A force is a push."' The class copied what I asked, and I asked them to say it again. I asked again what a force was, and they repeated it over and over until I thought they knew it.

Next, I pulled the book across my desk towards myself and ask the pupils, 'What am I doing?' They replied that I was pulling the book and I said that that was correct. I next asked them to repeat, 'A pull is a force.' I tell them to repeat the statement several times before we return to the textbook and the next section.

*Mrs Sharma's description of her lesson:*

First I asked my class, in their groups, to list as many things as they could think of that move. As they wrote, I went round and gave each group a set of objects – a mixture of all kinds of things, small and large, heavy and light – from a stone to a picture of a rickshaw bike [Figure 3] taken from the newspaper.



**Figure 3** A rickshaw: an example of an object that moves.

I then asked them the question, 'How can you make these objects move?' I gave them several minutes to discuss and try out some of their ideas before asking each group to list their responses on a sheet of paper for all to see. They displayed these on the wall and together the students and I picked out the common ideas and words or terms they had used, such as 'push', 'pull', 'lift', 'drop', 'strong', 'weak', 'gentle', 'friction', 'heavy', 'light' and 'movement'. Next I asked them, 'Can you write a sentence or two to describe what you think causes things to move?'



### Pause for thought

- Which of these two teachers do you think is encouraging their students to think more deeply and develop their understanding about movement and forces most?
- How does that teacher do this? What teaching strategies is she using?
- How is her teaching and use of questions different from the other?

It is easy to see that the second teacher, Mrs Sharma, is helping her students explore their own ideas in a more practical, creative way by asking them higher-order types of questions, while also asking them to share their ideas with each other. The students in Mrs Nair's lesson are not being challenged intellectually as much as those in Mrs Sharma's.

Mrs Sharma gives her students time to respond to the questions and follows up some of their questions with probing supplementary questions. By being able to feel the difference between the force that is needed to push, say, a brick across the mat on the floor of the classroom, and how much easier it is to push a smooth round stone or ball across the same surface, the students will be able to build up ideas in their head that fit in with what they have felt happening. It helps them to relate theory with their observations better.

#### Activity 4: Reflecting on the questions you use in class

Think of a science lesson you taught during the week and go through what you did and said to your students. If you can, list all the questions that you asked. Do not change them at all. Now look at your list, however short it is, and think about how much these questions helped your students in their learning about what you were doing and talking about during the lesson.

- How many of your questions involved yes or no answers? How many involved students spending time thinking about possible answers and/or problem solving?
- Can you remember how the students responded to the different types of questions?
- Who responded? Is it always the same students who answer? Why do you think this happens?
- Did you give your students time to think before asking them to reply?

Make a few notes about your use of questioning in that class and others you can recall in response to the questions above. Look through your notes and assess your own questioning skills. Decide where your strengths lie and think about what skills you could and would like to improve and extend before you read on. Remember that your role as a teacher is to help your students to understand and learn about scientific phenomena. To do this, you need to challenge their current ideas and explore how well-formed they are.

- Consider how you can adapt your questioning in light of this reflective activity when planning your next science lesson.
- Afterwards, do a similar review as the one above. What differences were there in terms of your questioning techniques and the students' responses?
- Discuss your experiences with a fellow teacher. Invite them to observe and comment on your classroom questioning, and offer to do the same in one of their lessons.
- How can you apply your evolving questioning skills in the science classroom to your teaching of other subjects?



#### Video: using questioning to promote thinking

The following link illustrates how a teacher focuses on using questioning to promote thinking in an Elementary Science lesson:

<https://www.youtube.com/watch?v=RuyvPB3cXBo&list=PLLjfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=29>

This example was adapted from the TESS-India Elementary Science unit, 'Teacher's questioning: forces'.

## Developing your practice

Questioning features in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep a record of them below. To get you started, using questioning to promote thinking is featured in the Elementary Science unit, 'Using demonstration: food'.

### 3 Talk for learning

This section of the compendium focuses on ways of enhancing opportunities for talk for learning in your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

#### Why talk for learning is important

Talk is a part of human development that helps us to think, learn and make sense of the world. People use language as a tool for developing reasoning, knowledge and understanding. Therefore, encouraging students to talk as part of their learning experiences will mean that their educational progress is enhanced. Talking about the ideas being learnt means that:

- those ideas are explored
- reasoning is developed and organised
- as such, students learn more.

In a classroom there are different ways to use student talk, ranging from rote repetition to higher-order discussions. Traditionally, teacher talk was dominant and was more valued than students' talk or knowledge.

However, using talk for learning involves planning lessons so that students can talk more and learn more in a way that makes connections with their prior experience. It is much more than a question and answer session between the teacher and their students, in that the students' own language, ideas, reasoning and interests are given more time. Most of us want to talk to someone about a difficult issue or in order to find out something, and teachers can build on this instinct with well-planned activities.

#### Planning talk for learning activities in the classroom

Planning talking activities is not just for literacy and vocabulary lessons; it is also part of planning maths and science work and other topics. It can be planned into whole class, pair or groupwork, outdoor activities, role play-based activities, writing, reading, practical investigations, and creative work.

Even young students with limited literacy and numeracy skills can demonstrate higher-order thinking skills if the task is designed to build on their prior experience and is enjoyable. For example, students can make predictions about a story, an animal or a shape from photos, drawings or real objects. Students can list suggestions and possible solutions about problems to a puppet or character in a role play.

Plan the lesson around what you want the students to learn and think about, as well as what type of talk you want students to develop. Some types of talk are exploratory, for example:

- 'What could happen next?'
- 'Have we seen this before?'
- 'What could this be?'
- 'Why do you think that is?'

Other types of talk are more analytical, for example weighing up ideas, evidence or suggestions. Try to make it interesting, enjoyable and possible for all students to participate in dialogue. Students need to be comfortable and feel safe in expressing views and exploring ideas without fear of ridicule or being made to feel they are getting it wrong.

### **Building on students' talk**

Talk for learning gives teachers opportunities to:

- listen to what students say
- appreciate and build on students' ideas
- encourage the students to take it further.

Not all responses have to be written or formally assessed, because developing ideas through talk is a valuable part of learning. You should use their experiences and ideas as much as possible to make their learning feel relevant. The best student talk is exploratory, which means that the students explore and challenge one another's ideas so that they can become confident about their responses.

Groups talking together should be encouraged not to just accept an answer, whoever gives it. You can model challenging thinking in a whole class setting through your use of probing questions like 'Why?', 'How did you decide that?' or 'Can you see any problems with that solution?' You can walk around the classroom listening to groups of students and extending their thinking by asking such questions.

Your students will be encouraged if their talk, ideas and experiences are valued and appreciated. Praise your students for their behaviour when talking, listening carefully, questioning one another, and learning not to interrupt. Be aware of members of the class who are marginalised and think about how you can ensure that they are included. It may take some time to establish ways of working that allow all students to participate fully.

### **Encourage students to ask questions themselves**

Develop a climate in your classroom where good challenging questions are asked and where students' ideas are respected and praised. Students will not ask questions if they are afraid of how they will be received or if they think their ideas are not valued. Inviting students to ask the questions encourages them to show curiosity, asks them to think in a different way about their learning and helps you to understand their point of view.

You could plan some regular group or pair work, or perhaps a 'student question time' so that students can raise queries or ask for clarification. You could:

- make a section of your lesson 'Hands up if you have a question'
- put a student in the hot-seat and encourage the other students to question that student as if they were a character, e.g. Pythagoras or Mirabai
- play a 'Tell Me More' game in pairs or small groups
- give students a question grid with who/what/where/when/why questions to practice basic enquiry
- give the students some data (such as the data available from the World Data Bank, e.g. the percentage of children in full-time education or exclusive breastfeeding rates for different countries), and ask them to think of questions you could ask about this data
- design a question wall listing the students' questions of the week.

You may be pleasantly surprised at the level of interest and thinking that you see when students are freer to ask and answer questions that come from them. As students learn how to communicate more clearly and accurately, they not only increase their oral and written vocabulary, but they also develop new knowledge.

### Example applications

Talk for learning is relevant to all curricular areas.

The following examples demonstrate some of the ways in which talk for learning can be applied in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages. To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

### Example 1: Prompting student talk using pictures

In an example from the science curriculum, the teacher in Case Study 1 uses pictures to prompt students to devise questions together as a means of thinking more deeply and creatively about a topic.

#### Case Study 1: Mrs Pandya encourages her students to devise questions as the basis of a classification activity

*Working with her Class IV students, Mrs Pandya aimed to devise criteria to identify the many different species of plants and animals found around the school and in the community.*

The first step I wished to take with my students was to develop their understanding of the key features of plants and animals. They could then use this as the basis for looking at the similarities and differences among a collection of different living things.

In the first lesson I explored with them the common features of animals. To do this, I collected together a collection of pictures of animals found in India that I cut out of magazines and newspapers. I displayed the pictures on the wall, so that everyone could see them. The pictures I used were of a tiger, elephant, cow, monkey and a horse.

My students are used to working in pairs. I asked them to talk to their partner and think of some questions that could ask about all the animals as a means of distinguishing them from non-animals on the one hand, and from different animals on the other.

After a few minutes I asked for volunteers to suggest questions, which I recorded on the blackboard. These included 'Does it have a tail?' and 'Does it have fur?'

Then I asked them to explore how they could sort the animals using their questions as classification criteria. The criteria that arose from their questions included the following similarities: a head, two eyes, a mouth, teeth, nose, nostrils, tails, four legs, body and skin, which I listed on the blackboard. Next I asked what differences they could see between the animals when they looked at the pictures. The students' answers included colour, size, shape, skin and different patterns on their skin. We then discussed which features were best for sorting the animals into groups. I explained that, as humans, we belong to the group of animals and the sub-group of humans therefore have common features with both.

In the next lesson I plan to bring in some more pictures of different types of birds, especially local birds. I will ask my students to establish criteria to differentiate them too.

I was pleased with how interested my students were in talking about how to group animals and by the quality of questions they raised as a means of distinguishing them.



### Pause for thought

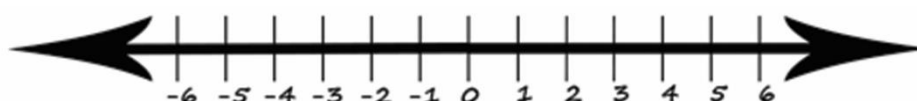
- How could you do something like this with your students in one of your lessons? What topic could you apply it to?
- What could you use to stimulate their questions? This could be photographs, an audio recording or a video – all of which could be downloaded from the internet onto your mobile phone.
- Now try out your plan with your class. Remember to walk round and listen to your students as they work together. This will help you to find out about what they know and what they are interested in. At the end of the lesson ask them what they liked about the lesson. This will help you improve how you encourage student talk in the future.

This example was adapted from the TESS-India Elementary Science unit, 'Pupils' questioning: sorting and classifying things'.

## Example 2: Creating opportunities for imaginative student talk

This next example encourages student by exploring positive and negative numbers in an imaginative way. Imaginative student talk of this kind can be very powerful in supporting learning, and can be applied to many other subjects and topics.

A number line such as Figure 1 is a geometrical idea that can be imagined as a set of points arranged in particular order on a straight line. A mathematical line has infinite length and is infinite in mutually opposite directions, but it is always centred at the origin, or zero. A number line can help students make sense of negative numbers and begin to understand adding and subtracting them.



**Figure 1** A number line.

It is a good idea to construct and display a large number line divided into equally spaced intervals in any classroom where maths is learned, as in Figure 2.



**Figure 2** A blank number line.

Making the line in such a way that the numbers it represents can be written or attached separately will mean that it can be used for thinking about any part of the number system. Each division can then represent:

- units, tens or hundreds, etc.
- fractions or decimals, including very small decimals
- standard form

– as well as many other mathematical ideas.

Once students are used to seeing a number line on a wall or on their desks, they will be able to imagine the line when checking their reasoning.

The idea of a negative number only has existence in relation to positive numbers using zero as the origin. That is, a point is selected on a number line and zero is assigned to it so that one side of zero is positive and the other negative. In order to help students think in terms of opposites, it is conventional to use the right-hand side of a horizontal line to represent positive numbers and the left-hand side to represent negative numbers. However, it is also a good idea to also use a vertical line, where the numbers above zero are represented by positive numbers and the negative numbers are below zero.

Whether using a horizontal or a vertical line, moving the point that is assigned to zero can help students understand that this is just a part of an infinite line, and that this part is being considered in lessons on negative numbers because zero is where things change.

Activity 1 uses a number line drawn on a blackboard in a way that will help the students think about how to use negative numbers and how to add and subtract those numbers. The activity also uses the expression 'Imagine if ...'. This expression can help the students to use their imagination and not be limited by their belief that maths can only be 'right' or 'wrong'. Knowing this is especially important in mathematical modelling (such as in word problems) where a model represents a perceived situation, which is not necessarily valid in all cases or may not even reflect a true real-life situation (Bruner, 1986).

### Activity 1: Exploring positive and negative numbers

#### Part 1: How positive was that?

Draw a number line on the blackboard going from  $-10$  to  $10$ . Ask the students to imagine positive things that can happen and ask them to imagine where they would put that on the number line. For example, 'Someone gives me Rs. 10' is a little positive; 'Someone gives me Rs. 100' is more positive.

Then ask them to suggest negative things, for example, 'My new outfit was splashed with mud when a rickshaw went past and I didn't notice', or 'My cricket team lost a match'. Each time ask them to imagine where to put the idea on the number line, asking them to imagine 'How positive do you feel?' or 'How negative was that?'

Try to ask all your students in the class for one example. If your class is very large, then ask your students to work in groups to agree on an example to contribute.

#### Part 2: The 'happiness model'

The ideas in Part 1 can then be extended to adding and subtracting negative numbers. Say to the class:

- 'I feel OK today. Imagine I score 2 (pointing to the number line) on this happiness scale.'
- 'Imagine if someone gave me nine sweets (a positive!), how would I feel then? Yes, I could move up 4, to 6.'
- 'Now imagine if someone told me I had to stay after school (negative) how would I feel then? Yes, down 1 to 5.'
- 'Imagine if you took away seven of my chocolates? How would I feel? Sadder? Yes, I need to go down 7 to  $-2$ .'
- 'What if you told me I could go home early?'

Adding something positive or taking away something negative improves the situation (go up the number line).

Adding something negative or taking away something positive makes the situation worse (go down the number line).

(Source: Part 2 was adapted from NRICH.)

## Case Study 2: Mrs Agarwal reflects on using Activity 1

I used the ideas in Activity 1 to explain positive and negative numbers to my class. Before I started, I said, 'I believe that adding and subtracting with negative numbers makes sense'.

I wrote a big number line along the top of my blackboard. With the students, I brainstormed their ideas about 'Things that are positive' and 'Things that are negative', including things that we receive and things that are taken away.

Then we went on to use the 'happiness model'. I talked about receiving sweets and losing them, pointing to where I was on the happiness scale and then writing down the mathematical expression of what I was saying. I asked several of the students to tell their own story using the scale and wrote the associated sums as they did so.

I then asked the students to work in groups of three or four. They drew a number line in chalk on their desks then one told a story while another pointed to where they were on the number line and another wrote the addition and subtractions that they were doing. I have never seen so many smiles!



### Pause for thought

Imaginative talk of this kind is particularly helpful in making students understand that there are many different ways of looking at the world, while encouraging them to value the ideas of their peers.

- How well did Activity 1 go with your class?
- What responses from students were unexpected? Why?
- Did you modify the task in any way? If so, what was your reasoning for this?
- What did you learn about your students' understanding of positive and negative numbers?
- How will you use this knowledge in planning your next lesson?

This example was adapted from the TESS-India Elementary Maths unit, 'Using a number line and the expression "Imagine if ...": positive and negative numbers'.

### Example 3: Encouraging simple storytelling to support learning

In Case Study 3, the teacher asks her students to construct simple stories to practise their developing knowledge of English. Students usually enjoy activities like this and should be encouraged to share their stories with their parents and other family members. This is also a good opportunity for the teacher to assess her students' understanding of what has been studied.

Too frequently students are taught to memorise and chant letters and words but this does not necessarily mean they understand what they are reading. Asking students to use new language in context will help them learn it more effectively.

### Case Study 3: Parveen teaches the sound of 'b'

*Parveen is a Class I teacher.*

I had some small objects like a bag, a balloon and a brush, and some pictures of things that start with 'b' like boat, bicycle and buffalo. I also had piece of cloth that was blue.

I started the lesson by saying, 'Today we will focus on the letter "b" and the sound of "b". Let's all learn some words in English that start with the sound "b".'

Sometimes students came up with words in Hindi that start with the 'b' sound. When they did this, I confirmed that the sound in our language is similar to the English 'b'. I also liked to point out the students in the class who have names that start with the 'b' sound, like Baldev and Bala.

Once we had a list of words that start with 'b', I created a very simple story from the list:

Bala went to the market to buy a new bag for her school books, a brush for her hair and a basket to keep the brush in. But when she got there she saw a blue balloon and she bought that instead.

Then the students drew pictures of the words that start with the sound 'b' and created a different story from these pictures to tell each other in small groups. Each group voted for the best story in their group. These students then shared their stories with the whole class.



### Pause for thought

- How did Parveen prepare for this lesson?
- Do you think students would be confused by the difference between the name of the letter and the sound of the letter? How did Parveen prevent this confusion?
- How did Parveen evaluate her students' understanding?
- How could you use familiar objects to encourage student talk in your lessons?

This example was adapted from the TESS-India Elementary English unit, 'Letters and sounds of English'.

### Example 4: Using a class project as the basis for student talk

Case Study 4 highlights how a teacher has used her knowledge about her students to plan an extended project on festivals. She talks to her students about different festivals in India and, through groupwork, asks them to prepare posters. Her students are also motivated to talk to their families and gather information about the festivals their group is working on. This is followed by group presentations and questioning.

#### Case Study 4: Ms Balema's language and literacy project about festivals

*Ms Balema, a Class V teacher, was prompted by a textbook lesson on festivals.*

My students had just completed a textbook lesson describing the main festivals in India, such as Eid and Holi. In our own communities we have many interesting festivals, so I decided to focus on our local ones, several of which were coming up soon.

I began by asking my students what festivals that they had been involved in and wrote their responses on the blackboard.

I then organised my students into groups, each one representing a festival. I gave each group a large piece of paper and explained that they had to write down as many things about their festival as they could: what the festival celebrated, what deities were worshipped, what communities were involved, what rituals were followed, what food was cooked, whether anyone wore special clothing and what activities there were. I told them that they could use their home language for the discussion and their notes if they wished to.

Next I asked each group to present their brainstorm to the whole class. I prompted the groups a little by asking them questions such as, 'What time of day does that happen? When you go to the temple, what do you wear? Do your grandparents celebrate?', and so on.

I then explained that each group would create a poster to represent their festival. For homework, I asked my students to find out more about the festival from their parents, grandparents and anyone else at home or in the community. I gave them some sample questions: 'Has the festival always been celebrated here? Was it always so large? Has the music changed?' I allocated one lesson a day over a week for my students to work on their posters. I moved from group to group, listening to and observing them, and helping them as necessary.

I explained that they could write in the school language or their home language on the poster, or a mix of the two. This was the first time some of them had written in their home language in the classroom. They were excited as they did so.

When they had finished, each group presented their poster to the rest of the class. The other students and I asked them questions. We all learned so much. I then fixed the colourful posters on the wall for everyone to read and enjoy.



### Pause for thought

- What opportunities did Ms Balema have to assess her students in this project?
- How would you adapt this project for younger students?
- For older students, how could the project be extended?
- How could you apply ideas from Case Study 4 with your own class?
- How would you assess your students' learning?

This sequence of activities provides many opportunities for students to develop their language and literacy skills. It involved:

- whole class and small group discussions
- conversations with members of their family and community
- note-taking
- writing
- oral presentations
- active listening
- asking questions.

Throughout, they were encouraged to use both the school and their home languages. At the heart of the project was the students' local knowledge. The teacher had time to monitor individuals and groups, keeping notes or a checklist about her students' skills and levels of participation.

For younger students, speaking and listening should be emphasised in a project such as this. They may draw pictures or dramatise aspects of a festival. For older students, a written project would be more appropriate, incorporating research and using specialist vocabulary and knowledge about festivals, and drawing on language, history and traditional culture.

This example was adapted from the TESS-India Elementary Language and Literacy unit, 'School-home communication'.

### Developing your practice

Talk for learning features in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep a record of them below. To get you started, talk for learning is featured in the Elementary Maths unit, 'Conjecturing and generalising in mathematics: introducing algebra'.

## 4 Pair work

This section of the compendium focuses on ways of enhancing the use of pair work to support your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

### Why pair work is important

We work alongside other people, speak and listen to them, and see what they do and how they do it. This is how we discover new ideas and information. In classrooms, if everything is centred on the teacher, then most students do not get enough time to try out or demonstrate their learning or to ask questions. Some students may only give short answers and some may say nothing at all. In large classes, the situation is even worse, with only a small proportion of students saying anything.

### Why use pair work?

Pair work is a natural way for students to talk and learn more. It gives them the chance to think and try out ideas and new language. It can provide a comfortable way for students to work through new skills and concepts, and works well in large classes.

Pair work is suitable for all ages and subjects. It is especially useful in multilingual, multi-grade classes, because pairs can be arranged to help each other. It works best when you plan specific tasks and establish routines to manage pairs to make sure that all of your students are included, learning and progressing. Once these routines are established, you will find that students quickly get used to working in pairs and enjoy learning this way.

### Tasks for pair work

You can use a variety of pair work tasks depending on the intended outcome of the learning. The pair work task must be clear and appropriate so that working together helps learning more than working alone. By talking about their ideas, your students will automatically be thinking about and developing them further.

Pair work tasks could include:

- **'Think–pair–share':** Students think about a problem or issue themselves and then work in pairs to work out possible answers before sharing their answers with other students. This could be used for spelling, working through calculations, putting things in categories or in order, giving different viewpoints, pretending to be characters from a story, and so on.
- **Sharing information:** Half the class are given information on one aspect of a topic; the other half are given information on a different aspect of the topic. They then work in pairs to share their information to solve a problem or come to a decision.

- **Practising skills such as listening:** One student could read a story and the other ask questions; one student could read a passage in English, while the other tries to write it down; one student could describe a picture or diagram while the other student tries to draw it based on the description.
- **Following instructions:** One student could read instructions for the other student to complete a task.
- **Storytelling or role play:** Students could work in pairs to create a story or a piece of dialogue in a language that they are learning.

### Managing pairs to include all

Pair work is about involving all. Since students are different, pairs must be managed so that everyone knows what they have to do, what they are learning and what your expectations are. To establish pair work routines in your classroom, you should do the following:

- Manage the pairs that the students work in. Sometimes students will work in friendship pairs; sometimes they will not. Make sure they understand that you will decide the pairs to help them maximise their learning.
- To create more of a challenge, sometimes you could pair students of mixed ability and different languages together so that they can help each other; at other times you could pair students working at the same level.
- Keep records so that you know your students' abilities and can pair them together accordingly.
- At the start, explain the benefits of pair work to the students, using examples from family and community contexts where people collaborate.
- Keep initial tasks brief and clear.
- Monitor the student pairs to make sure that they are working as you want.
- Give students roles or responsibilities in their pair, such as two characters from a story, or simple labels such as '1' and '2', or 'As' and 'Bs'). Do this before they move to face each other so that they listen.
- Make sure that students can turn or move easily to sit to face each other.

During pair work, tell students how much time they have for each task and give regular time checks. Praise pairs who help each other and stay on task. Give pairs time to settle and find their own solutions – it can be tempting to get involved too quickly before students have had time to think and show what they can do. Most students enjoy the atmosphere of everyone talking and working. As you move around the class observing and listening, make notes of who is comfortable together, be alert to anyone who is not included, and note any common errors, good ideas or summary points.

At the end of the task you have a role in making connections between what the students have developed. You may select some pairs to show their work, or you may summarise this for them. Students like to feel a sense of achievement when working together. You don't need to get every pair to report back – that would take too much time – but select students

who you know from your observations will be able to make a positive contribution that will help others to learn. This might be an opportunity for students who are usually timid about contributing to build their confidence.

If you have given students a problem to solve, you could give a model answer and then ask them to discuss in pairs how to improve their answer. This will help them to think about their own learning and to learn from their mistakes.

If you are new to pair work, it is important to make notes on any changes you want to make to the task, timing or combinations of pairs. This is important because this is how you will learn and how you will improve your teaching. Organising successful pair work is linked to clear instructions and good time management, as well as succinct summarising – which all takes practice.

### Example applications

Pair work is relevant to all curricular areas.

The following examples demonstrate some of the ways in which pair work can be applied in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages. To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

### Example 1: Using pictures as the basis of pair work

Pair work can be used for very short activities during many lessons. Sometimes it may last two to three minutes. During pair work you, the teacher, can find out who is confident with the ideas that are being introduced and who may need more time and support to develop their understanding of them.

The teacher in Case Study 1 improvises on a textbook topic, using pictures to develop her students' English speaking and vocabulary. This type of activity can be adapted to any subject lesson.

#### Case Study 1: Mrs Aman uses pictures to develop language

*Mrs Aman used Class IV students' existing knowledge about their family to teach English. Here she talks about the lesson.*

Unit 1 in the textbook was about a child and her family. I showed the students the 'family' words and pictures in the textbook. We said the words aloud and I wrote them out on the board. Then I told them to draw pictures of their own father, mother, grandfather, grandmother and so on, and then to label the pictures in English. They began to ask me questions such as:

- 'Does English not have different names for the father's mother and the mother's mother?'
- 'Is the word for elder sister the same as for younger sister?'

I taught them to say 'elder sister' and 'younger sister', and 'mother's mother' and 'father's mother', even though these expressions are not in the textbook. Then I demonstrated how to form sentences orally, using the students' drawings as examples:

This is my mother.

This is my elder sister.

We practised saying these sentences aloud together. It was good practise for my own English.

Later in the week, I extended the lesson. First I had students circle the 'he' and 'she' words in the textbook. Then I demonstrated aloud, using their pictures, how to add to their first sentences using new vocabulary:

This is my mother. She is a shopkeeper.

This is my elder sister. She is tall.

This is my brother. He is crying.

This is Amrita's grandmother. She is kind.

This is Sushant's father. He is a farmer.

I put my students in pairs and asked them to practise sentences with each other, showing their drawings to demonstrate their words. As they did this, I could observe and make notes on their confidence and skills.

Some of my students come from the local orphanage and have no family. I asked them to draw pictures of their friends or other people they know in the village. I did this carefully, without singling them out and making them feel unduly self-conscious. To involve the less confident students, I pointed to their pictures and asked, 'Is this your father? Is this your sister? Is this your friend?' They answered 'yes' or 'no', or just shook their head, so I could assess their understanding.

### Activity 1: Using pictures in pair work

Use Case Study 1 to help you to plan and teach a lesson in any subject where students use pictures to discuss ideas with their partner.

- Take a textbook lesson – for example, about family, animals, food, travel, the environment or history. It can be a lesson you have already taught or a new lesson.
- Introduce the topic, showing your students the pictures and practice the vocabulary together.
- Have your students draw their own pictures and label their pictures. Ask them to talk to their partner about their pictures using the vocabulary they have learnt.

- How will you assess your students? Will you listen to them as they work, or will you have them explain their work to you, or perform to the class?
- What will you do to support students who need additional time or help? Your plan should be flexible to accommodate these needs. If you have a large or multi-grade class, direct the more confident students or the older students to help the younger ones.



### Pause for thought

- Did all your students listen carefully to their partner?
- How might you encourage students to develop good listening skills as well as speaking skills?
- What did you learn about their developing ideas?
- How will you use this knowledge in planning your next lesson?



### Video: pair work

The following link illustrates how a teacher focuses on using pair work in an Elementary English lesson:

[https://www.youtube.com/watch?v=xDKBlul\\_I0A&list=PLljfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=24](https://www.youtube.com/watch?v=xDKBlul_I0A&list=PLljfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=24)

This example was adapted from the TESS-India Elementary English unit, 'Using the textbook creatively'.

### Example 2: Paired reading in the classroom

Encouraging your students to use their home language can help them feel confident and comfortable at school, and can help them to improve their Hindi. Even if you don't speak the same home languages as all of your students, there may be some students in the school who can help others. Students who speak the same home language can be encouraged to read in pairs or small groups. In this way they can help one another by using their home language to support the development of the school language. This technique can be used in all subject lessons.

### Case Study 2: Pair work for bilingual reading support

*Mr Roy teaches Class V in a rural school in Madhya Pradesh.*

Some of my students speak Rathwi Bareli [from the Bili group of languages] as their home language. They have made steady progress in understanding and speaking Hindi at school, but lack confidence in reading aloud. I noticed how one of my students, Surumi, used to look at books in the classroom. She seemed to be absorbed by the pictures but she did not appear understand the words on the page.

One day, I sat down beside her as she was looking at a book and asked her what the story was about. She understood my question, but found it difficult to answer. I therefore read part the book to her while pointing to the words and pictures. I asked her some simple questions and she answered in a mixture of Rathwi Bareli and Hindi.

I had the idea of asking an older student who spoke Rathwi Bareli and Hindi to read the book to Surumi. As he did so, he explained the meaning in her home language. Surumi listened attentively and responded to his questions in a mixture of Rathwi Bareli and Hindi.

I looked for other books with attractive pictures that I thought Surumi might enjoy. I found one that included well-known folk tales and a simple reader with repeating phrases. I asked a colleague to translate the stories into Rathwi Bareli so that Surumi could see them written both in Hindi and her home language. Gradually, Surumi became more familiar with Hindi and could understand more and more of these books. She is now reading slightly more difficult books with longer sentences. It has been very satisfying to observe her progress.



### Pause for thought

- Why did paired reading with a student who knew Rathwi Bareli help Surumi?
- Can you think of any students in your class who would benefit from support from paired reading support of this kind?
- How could you go about arranging this in your forthcoming lessons in different subjects?

### Activity 2: Introducing and organising paired reading

Students do not need to have a different home language from Hindi to benefit from paired reading. Pairing more and less confident readers of Hindi can be helpful, as can pairing those with similar reading levels.

This activity can be done in pairs. Decide in advance which students you wish to pair together. Choose what the students are going to read, making sure you have sufficient copies of the text.

Start by modelling paired reading so that your students know what you expect them to do. Show the students the book – or the passage – that they are going to read and choose one of them to come up and be your partner. Explain that you will start by reading a paragraph aloud together and then take turns to continue reading. Start by reading the first paragraph together. Then let the student continue reading the next one. Change over and read the subsequent one yourself. Take turns several times.

Choose another student to pair up with the first one and let them demonstrate how to do paired reading together. If you plan to have larger groups, ask a third or fourth student to join in.

Tell your students that, if their partner or group member is having difficulty, they should wait a few seconds before helping them, to give them the opportunity to resolve the problem. Explain that it is better to provide the student with a clue – such as the first sound of a word – rather than the whole answer.

Initially, paired reading should last a total of ten minutes, building up to a maximum of 30 minutes as your students get used to this activity. Encourage your students to read aloud using quiet voices so as not to disturb their classmates.

Move around the class and listen carefully to check that your students have understood the activity. Give support to those who find reading difficult. Keep a note of which students have worked together, observing how well they do. While some individuals may be particularly suited to working with each other, it can also be helpful to vary pairings or groupings from time to time.

After the activity, ask your students whether they enjoyed the activity and found it useful. Praise them for helping each other.



### Pause for thought

- In what ways was your first attempt at Activity 2 successful? How do you know?
- How might you improve on it next time?
- If you teach another subject, how could you integrate paired reading into your lessons? Or how could you support a colleague in your school to introduce paired reading in their class?



### Video: pair work

The following link illustrates how a teacher focuses on using pair work in an Elementary Language and Literacy lesson:

<https://www.youtube.com/watch?v=okLRsjolX-M&list=PLLIjVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=26>

This example was adapted from the TESS-India Elementary Language and Literacy unit, 'Reading for pleasure'.

### Example 3: Encouraging pair discussions to support learning

A well-crafted whole-class discussion involves student-to-student as well as teacher-to-student conversations. Many students may initially be reluctant to speak out in whole-class discussions because they do not want to expose their ignorance. If this is the case, it is important to build up a culture of support that allows students to feel confident enough to know that their contributions will be accepted and handled sensitively.

As a teacher, you should be interested in what everyone has to say on the topic. Encouraging more in-depth thinking, getting a variety of viewpoints, and creating a classroom environment where everyone's questions and contributions are valued are key to effective discussion. With younger students, the kinds of discussion that you plan need to take account of the limited knowledge and experience that they have compared to older students and to their different stage of intellectual development.

Classroom discussions can take the form of free-flowing conversations or can be organised in more structured ways. It may be necessary to stage the discussion in steps, and plan ways to organise your students, using pairs, groups and then the whole class.

#### Activity 3: Using pairs to discuss science-related ideas

Select a science topic that your students are studying. The topic in your textbook, as well as the age and range of ability of your students, will determine the type of question you might ask.

For example, if you were studying nutrition with younger students, you could use questions such as, 'What would happen to your body if you did not eat?' or 'What if you only ate rice?' They could also be used with older students, but you would expect a deeper exchange of ideas about why we eat food and its impact if we don't eat sensibly.

Having identified the question that your students are going to discuss, think about how you will introduce the activity and organise the pairs. If you have a large class, for convenience, the students could talk to their neighbour on their left. Set them a time limit to discuss their ideas and encourage them to make notes.

Will your students need any extra information to help them talk about the issue and, if so, where can they get this? It could be from the internet, radio, library, TV or the textbook, or you could write some facts on the blackboard. What will be your role as they talk – will you go around and just listen, or will you interact with pairs? If so, when and why?

When the time is up, invite students to share their ideas with other pairs sitting near them.



### Pause for thought

- How did your students respond to being able to talk to each other without interference from you? Were they all involved and talking?
- What went well in the pair discussions? How do you know this?
- What was not so successful? Why was this?
- What could you do to change this?
- Did using the pair work discussion help you to know who understands the topic?

This example was adapted from the TESS-India Elementary Science unit, 'Discussion in science: malnutrition'.

### Example 4: Using pictures and pair discussions to explore complex concepts

A very efficient way for students to develop understanding and give meaning to any mathematical concept is through talking.

Children need to learn how to ... use mathematical language to create, control and express their own mathematical meanings as well as to interpret the mathematical language of others.

Pimm, 1995, p. 179

#### Activity 4: Using pictures to prompt maths-related ideas

Begin by making sure your students are seated in pairs and that they can hear each other well. The timings below are suggested only. If you your students need extra time at any point, that is fine.

When they are all seated, ask your students how many of them have travelled in an autorickshaw, showing them an image of an autorickshaw, such as the one in Figure 1.

Then ask them to work in pairs to think of as many (measurable) quantities as they can that are associated with an autorickshaw ride. You may wish to give them an example to start with. The pair that writes the greatest number of such quantities in four minutes will be the winner. You could suggest that they nominate one person in the pair or group to write down the ideas.



**Figure 1** Autorickshaw driver and passenger. (Source: Muhammad Mahdi Karim)

After the time limit, ask them to put their pencils down and share with the rest of the class. This could be organised as follows:

- Each pair suggests one idea from their list in turn, and you – or another student – writes these on the board.
- Alternatively, you can ask the students to count the number of ideas on their lists. Then invite a student from the pair that wrote the least number of quantities and one from the pair that wrote the most to come and write the quantities they thought of on the blackboard simultaneously. This will save time. Ask the students to stay at the blackboard.
- Ask each group in the class to share any other quantities they came up with that are different to those already on the blackboard. Ask one of the students at the blackboard to write down each of the new suggestions. Having so many scribes at the blackboard at once means that this can be done quickly.
- Soon you will have a lot of quantities related to an autorickshaw ride on the blackboard. Some of these may include:
  - number of passengers
  - total fare for a journey
  - time taken for a journey
  - number of red lights at traffic signals during the journey
  - distance of a journey
  - number of wheels on an autorickshaw
  - number of bolts on each wheel of an autorickshaw
  - registration number of the autorickshaw
  - speed of the autorickshaw
  - cost of the autorickshaw
  - mileage of the autorickshaw.

If you can, leave this list on the blackboard and ask your students to copy it. You can use this list to introduce students to the ideas of constants and variables.

Students who do not learn how to ‘talk maths’ lose out on many things; in particular, as Pimm says above, they do not have the resources to available to create, control and express their own mathematical ideas.

Encouraging students to talk about maths and helping them to develop appropriate vocabulary and phraseology to do so is an important part of learning.

Like Activity 1 above, Activity 4 uses pictures as a prompt for talking in pairs. Here the students are asked to think about identifying quantities drawing on their experiences from their real life. It uses a picture to prompt their thinking. The activity suggests giving a short time limit for students to come up with their ideas to give a sense of urgency, competitiveness and excitement. This also means they will have little time to worry about doing algebra.

### **Case Study 3: Mrs Bhatia reflects on using Activity 4**

*This is the account of a teacher who tried Activity 4 with her students.*

I sometimes get confused about variables and constants, and how they relate to each other, so I thought it would be good for my own subject knowledge development to do these activities to prepare carefully in advance of my lesson.

First I did all the activities on my own, and then with a colleague during a lunch break. The difference between doing them on my own and with my colleague was that we could talk and help each other when something was not clear. It was also fun. Having a go at this first made me feel much more confident about doing these activities in class.

To introduce Activity 4, I showed my students the picture of the rickshaw and asked them to tell the class a little bit about their own journeys in an autorickshaw. That helped to elicit some variables to think about, such as: different distances and times of journeys or numbers of passengers. Only then did I ask them to do the activity.

I asked my students to work in pairs. Telling them they had only four minutes really spurred them into immediate action and there was a sense of competitiveness and eagerness. However, I wonder if the tight timeframe gave the shy students an excuse not to contribute so much. Perhaps next time I will allow longer and add the instruction of making sure that everyone in the group has contributed at least two ideas.

To feedback to the class, I used the approach that is suggested in the activity. The main advantage of it was that we had lots of examples on the blackboard in a very short time. I thought this worked very well.



### Pause for thought

- How did this activity go with your class?
- What responses from students were unexpected? Why?
- Did you feel you had to intervene at any point?
- Did you modify the task in any way? If so, what was your reasoning for this?
- Do you need to reorganise the pairs of students in the next lesson?



### Video: pair work

The following link illustrates how a teacher focuses on using pair work in an Elementary Maths lesson:

<https://www.youtube.com/watch?v=YSbhdFvqIcE&index=25&list=PLLjfVZ89nnNI7IEZRdanOTVxzuosUW0Bp>

This example was adapted from the TESS-India Elementary Maths unit, 'Learning through talking: variables and constants'.

### Developing your practice

Pair work features in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep a record of them below. To get you started, pair work is featured in the Elementary Science unit, 'Pair work: life processes'.

## 5 Monitoring and giving feedback

This section of the compendium focuses on ways of enhancing your monitoring and feedback techniques to support your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

### Why monitoring and giving feedback is important

Improving students' performance involves constantly monitoring and responding to them, so that they know what is expected of them and they get feedback after completing tasks. Your constructive feedback can help them to improve their performance.

#### Monitoring

Effective teachers monitor their students most of the time. Generally, most teachers monitor their students' work by listening and observing what they do in class. Monitoring students' progress is critical because it helps them to:

- achieve higher grades
- be more aware of their performance and more responsible for their learning
- improve their learning
- predict achievement on state and local standardised tests.

It will also help you as a teacher to decide:

- when to ask a question or give a prompt
- when to praise
- whether to challenge
- how to include different groups of students in a task
- what to do about mistakes.

Students improve most when they are given clear and prompt feedback on their progress. Using monitoring will enable you to give regular feedback, letting your students know how they are doing and what else they need to do to advance their learning.

One of the challenges you will face is helping students to set their own learning targets, also known as self-monitoring. Students, especially struggling ones, are not used to having ownership of their own learning. But you can help any student to set their own targets or goals for a project, plan out their work and set deadlines, and self-monitor their progress. Practising the process and mastering the skill of self-monitoring will serve them well in school and throughout their lives.

#### Listening to and observing students

Most of the time, listening to and observing students is done naturally by teachers; it is a simple monitoring tool. For example, you could:

- listen to your students reading aloud
- listen to discussions in pairs or groupwork
- observe students using resources outdoors or in the classroom
- observe the body language of groups as they work.

Make sure that the observations you collect are true evidence of student learning or progress. Only document what you can see, hear, read or count.

As students work, move around the classroom in order to make brief observation notes. You can use a class list to record which students need more help, and also to note any emerging misunderstandings. You can use these observations and notes to give feedback to the whole class or prompt and encourage groups or individuals.

### Giving feedback

Feedback is information that you give to a student about how they have performed in relation to a stated goal or expected outcome. Effective feedback provides the student with:

- information about what happened
- an evaluation of how well the action or task was performed
- guidance as to how their performance can be improved.

When you give feedback to each student, it should help them to know:

- what they can actually do
- what they cannot do yet
- how their work compares with that of others
- how they can improve.

It is important to remember that effective feedback helps students. You do not want to inhibit learning because your feedback is unclear or unfair. Effective feedback is:

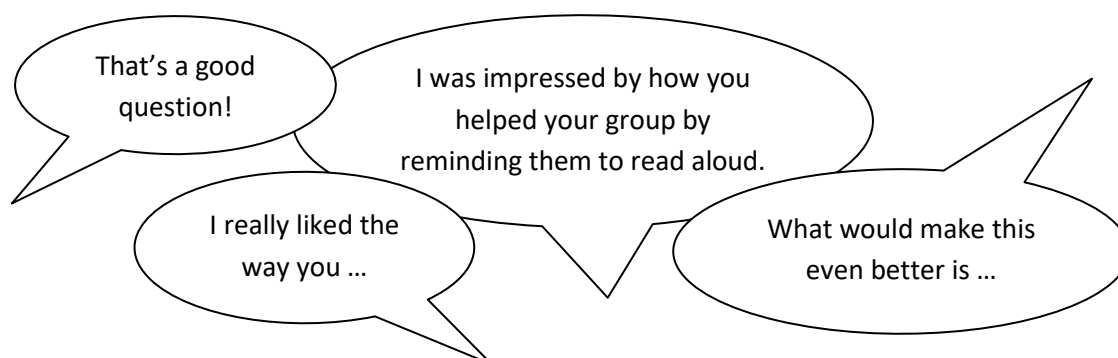
- **focused** on the task being undertaken and the learning that the student needs to do
- **clear and honest**, telling the student what is good about their learning as well as what requires improvement
- **actionable**, telling the student to do something that they are able to do
- given in **appropriate language** that the student can understand
- given at the **right time** – if it's given too soon, the student will think 'I was just going to do that!'; too late, and the student's focus will have moved elsewhere and they will not want to go back and do what is asked.

Whether feedback is spoken or written in the students' workbooks, it becomes more effective if it follows the guidelines given below.

### Using praise and positive language

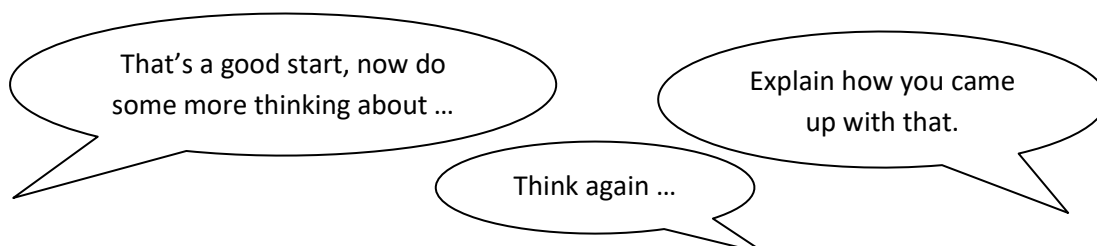
When we are praised and encouraged, we generally feel a great deal better than when we are criticised or corrected. Reinforcement and positive language is motivating for the whole

class and for individuals of all ages. Remember that praise must be specific and targeted on the work done rather than about the student themselves, otherwise it will not help the student progress. 'Well done' is non-specific, so it is better to say one of the following:

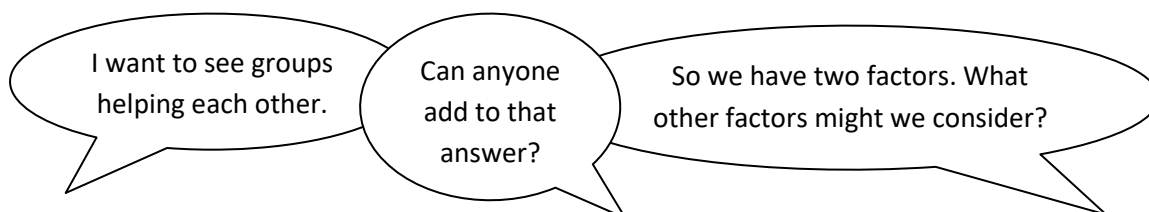


### Using prompting as well as correction

The dialogue that you have with your students helps their learning. If you tell them that an answer is incorrect and finish the dialogue there, you miss the opportunity to help them to keep thinking and trying for themselves. If you give students a hint or ask them a further question, you prompt them to think more deeply and encourage them to find answers and take responsibility for their own learning. For example, you can encourage a better answer or prompt a different angle on a problem by saying such things as:



It may be appropriate to encourage other students to help each other. You can do this by opening your questions to the rest of the class with such comments as:



Correcting students with a 'yes' or 'no' might be appropriate to tasks such as spelling or number practice, but even here you can prompt students to look for emerging patterns in their answers, make connections with similar answers or open a discussion about why a certain answer is incorrect.

Self-correction and peer correction is effective. You can encourage this by asking students to check their own and each other's work while doing tasks or assignments in pairs. It is best to focus on one aspect to correct at a time so that there is not too much confusing information.

### Example applications

Monitoring and giving feedback is relevant to all curricular areas.

The following examples demonstrate some of the ways in which monitoring and feedback can be applied in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages. To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

### Example 1: Observing your students as they work

Watchful monitoring is one of the core skills of an effective teacher because it helps them gauge the extent to which their students make learning gains from the tasks they are set.

Whether such monitoring involves the whole class, small groups or individual students, and whatever subject it may involve, the following question should be at the forefront of the teacher's mind: how is this lesson being experienced and understood by my students?

#### Activity 1: Monitoring your whole class



**Figure 1** Monitoring the whole class.

In your class, give your students some classwork to do independently and silently for approximately 15 minutes. A short textbook-based reading or writing activity would be ideal for this. While your students are working, stand back and observe them. Consider the following questions:

- What kinds of things are your students doing?
- Do any of them appear unsure of what to do? How do you know?

- Who appears to be more confident in their use of language? Who appears to be struggling with language-related issues? How is this evident?
- Are your students working at different speeds? How can you tell?
- What can the quicker ones do when they finish?
- Do you anticipate that some of the students will not finish within the time set? How can they be supported?
- How will you evaluate your students' learning from the task you have set them?

## Activity 2: Monitoring groups



**Figure 2** Monitoring groups.

Divide your class into groups of four or five and ask them to do a short talk-based task. This could involve making up a story to accompany a picture or responding to a problem or a controversial question. The group discussion should last no more than 15 minutes. Remind your students how to work politely together, taking turns and listening to one another's contributions.

Walk around the class, observing and listening to your students as they talk.

Consider the following questions:

- What kinds of things are your students doing?
- Did they understand your instructions? How can you tell?
- How have they organised themselves for the task?
- Do they need additional support? If so, what kind?
- Are any students silent?
- Are any students especially confident?
- How will you evaluate your students' participation in and learning from the task?



### Pause for thought

Activities 1 and 2 invited you to observe and monitor your students as they undertook language and literacy-related tasks individually and in a group.

- How did the two observation tasks compare?
- How easy was it to observe your students both individually and in a group?
- What did you learn from doing so?
- How could you record useful information about individual students as a result of observing them?
- How might you use these observation and recording techniques in other subject lessons?



### Video: monitoring and giving feedback

The following link illustrates how a teacher focuses on monitoring and giving feedback in an Elementary Language and Literacy lesson:

[https://www.youtube.com/watch?time\\_continue=3&v=p115-lk4Gqo](https://www.youtube.com/watch?time_continue=3&v=p115-lk4Gqo)

This example was adapted from the TESS-India Elementary Language and Literacy unit, 'Monitoring, assessment and feedback'.

### Example 2: Gauging your students' prior understanding of a concept

From an early age, children develop ideas and personal theories to explain the world around them and how it works. Children's ideas form the basis of their predictions and rules for action. For example, they quickly learn that a fire is hot and not to touch it. They learn that stones sink and wood floats. By the time children go to school, they have already formed their own theories about many of the phenomena you are teaching them. Quite often, their ideas are different from the accepted scientific understanding. A good starting place for teaching concepts is to find out what ideas or conceptions your students hold about them. With this awareness, you can then plan ways of supporting their learning and developing their understanding more effectively.

#### Case Study 1: Finding out about your students' current understanding of a scientific concept

*Mr Mishra used prediction to find out what his Class VII students understood and believed about heat and temperature when liquids were mixed. Here he explains what he did and found out.*

I decided to ask my students to predict what would happen when I mixed different volumes of water at different temperatures. I started by asking them what a thermometer does. Most knew it was used to measure the temperature, but a few

students thought it measured heat. I just said that was interesting, rather than telling them the answer, because I wanted them to feel comfortable in revealing their ideas.

Next, I took two beakers of water of the same volume and temperature – the water was cold. I asked one student to read the temperature of each beaker to check they were the same. I asked the students to write down their prediction about what would happen to the temperature of the water when both beakers of water were mixed in one container. Would the temperature go down, go up or stay the same? I also asked them to predict the final temperature. Most of the students thought it would be the same, but some thought the temperature would go down because it was a bigger volume of water, which I hadn't expected.

I followed the same procedure for different volumes and temperatures of water. I used:

- one litre of hot water and one litre of cold water
- half a litre of hot water and one litre of cold water
- one litre of hot water and half a litre of cold water.

It didn't take long to do this activity, and what the students predicted and the reasons behind their predictions helped me to understand their current thinking. For example, two students thought 'hot' was stronger than 'cold'. Although most predicted correctly whether the temperature would go up or down or stay the same, they were not so confident when predicting the temperature of the mixtures. Some students just subtracted one temperature from the other. Some added them up.



### Pause for thought

- What do you think Mr Mishra's students understood about temperature?
- What alternative conceptions did he discover?
- How did he encourage them to reveal their true thinking?

### Activity 3: Finding out about your students' ideas

Plan and carry out a predictive activity (perhaps in science or environmental studies) to find out about your students' existing ideas and understanding of the topic.

You might carry out a demonstration like Mr Mishra or you might show students some pictures or ask the students to work in pairs of small groups to brainstorm their ideas.

They can then report their ideas to the class. Good questions to ask are:

- 'What do you think is happening here?'
- 'What do you think will happen if we ...?'
- 'Why do you think this is happening?'



### Pause for thought

- What did you find out about your students' ideas?
- How will you use these ideas in planning the next lesson in this subject?
- Are there students in your class who need are less confident with the topic? Could you use peer discussion to help these students develop their ideas?

This example was adapted from the TESS-India Elementary Science unit, 'Alternative conceptions: heat and temperature'.

### Example 3: Assessing and providing feedback on your students' writing

Even if your class is large, it is important that you give regular individual feedback to all your students.

There is no single way of giving feedback or remarks on your students' writing. It is important, however, to identify and praise the positive elements of their work and the effort involved.

Whatever the subject, you should consider aspects of the content (composition) – did the student have a good idea for a story, and did they include the main points of a report? – as well as features of transcription, such as spelling and grammar.

For feedback on transcription, you could mark their drafts with symbols such as those in Figure 3 below, making sure to explain to the whole class what these mean. Try to focus on a few aspects at a time to ensure that your students don't become dispirited by over-correction.

Symbol	Meaning	Incorrect
P	Punctuation	I live <sup>P</sup> work, and go to school in Lucknow.
⤿	Close space	Every <sup>⤿</sup> one works hard.
SP	Spelling	The <sup>SP</sup> maneger is a woman.
PL	Plural	<sup>PL</sup> Apple are the most nutritious fruit.
Ø	Unnecessary word	The student <del>she</del> studies all the time.
O	Missing word	Please don't <sup>O</sup> me that question anymore.

**Figure 3** Symbols for feedback on students' writing.

## Case Study 2: Ms Afreen assesses her students' English dictation

I gave my students a dictation from the textbook. When the students handed me their work, I reviewed it and saw that a ten-year-old girl had spelled the words 'pencil', 'rubber' and 'boxes' as follows:

- pensl
- rubr
- bokss

My first reaction was to correct these mistakes. But then I realised that the girl knew the consonant sounds of these English words and was using the corresponding alphabetical letters in a logical way to represent them. Although this was not the conventional spelling of these words – as can be seen from her use of 'k' for 'x' and 's' for 'c' – and she had not used sufficient vowels, this student was clearly in the process of mastering the complex sound-letter correspondences of the English spelling system.

I praised her attempts at these words, while also writing the correct forms next to her own versions. I also encouraged her to read more, because the more she reads in English, the better her English spelling will become.

I do not ignore errors in writing, and I give students feedback and correction. But I try to see how their mistakes give me clues about their thinking process and developmental level. Their mistakes show me what I need to plan next.



### Pause for thought

- What do you think of the girl student's spelling of the words above?
- Can you think of any examples of your students' irregular spelling – in English, Hindi or their home language – that reflects the logic behind their understanding of sound-letter correspondences?
- How could you make better use of these kinds of mistakes to support individual students in your forthcoming lessons?

## Activity 4: Giving encouraging feedback on your students' writing

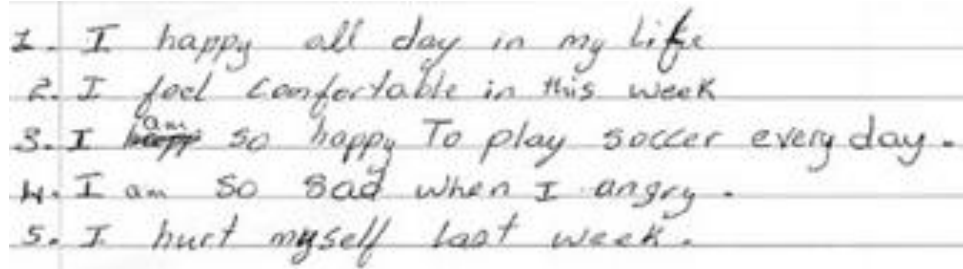
Errors in writing can be categorised broadly as:

- 'oversights' or slips that students can correct on their own, once these have been pointed out to them
- 'misunderstandings' that students cannot correct themselves and that need to be explained by teachers
- 'attempts' where students try out something but make mistakes because they do not yet have the required language skill or knowledge.

Look at two pieces of writing by students. Do they show evidence of 'oversights', 'misunderstandings' or 'attempts'?

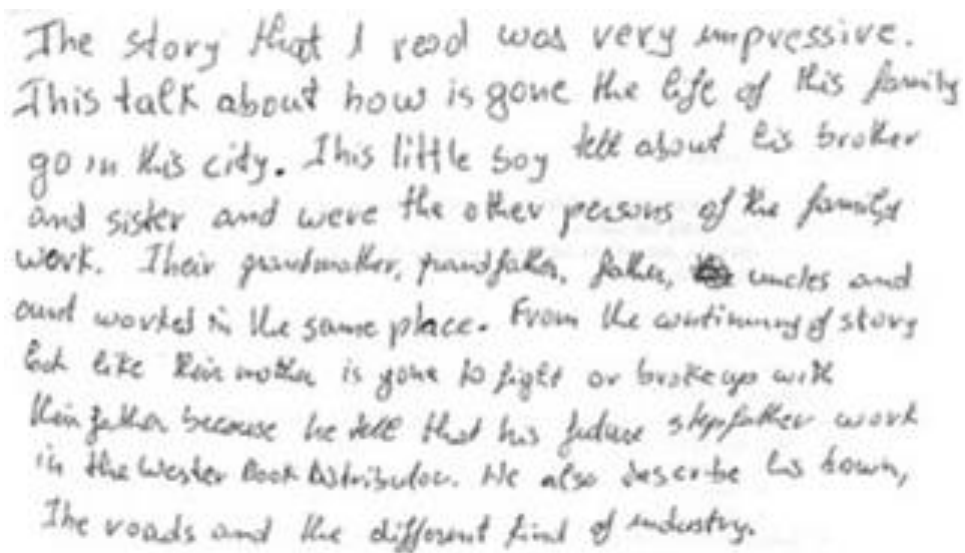
What would you say to each student, to give them encouraging feedback? Talk about these examples with other teachers in your school and compare your ideas for evaluation and feedback.

1. A nine-year-old boy was told to write five sentences about himself:



1. I happy all day in my life  
2. I feel comfortable in this week  
3. I ~~happy~~<sup>am</sup> so happy To play soccer every day.  
4. I am so bad when I angry.  
5. I hurt myself last week.

2. A 12-year-old girl was told to write a paragraph about the first chapter of a book she had read:



The story that I read was very impressive. This talk about how is gone the life of this family go in this city. This little boy tell about his brother and sister and were the other persons of the family work. Their grandmother, grandfather, father, ~~the~~ uncles and aunt worked in the same place. From the continuing of story but like Rein mother is gone to fight or broke up with Rein father because he tell that his future stepfather work in the Wester Book Distributor. He also describe his town, The roads and the different kind of industry.

When students speak and write in English they sometimes miss out English words if their first language does not use these words, for example, articles such as 'a', 'the' or 'an'. Make this an opportunity to talk to students about the different structures of English compared to other languages.

The more students listen to English and read in English, the better will be their writing in English. When you teach students to speak and read in English, you are also teaching them to write in English.



### Pause for thought

- Look at your marking of your students' recent work: how much of your marking is correcting simple errors? What sort of comments do you give students?
- How might you change your marking to help students correct their own simple mistakes?
- What sort of comments can you give students to help them develop their ideas and their writing?



### Video: monitoring and giving feedback

The following link illustrates how a teacher focuses on monitoring and giving feedback in an Elementary English lesson:

<https://www.youtube.com/watch?v=msvy8td2MXM&list=PLlJfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=33&t=0s>

This example was adapted from the TESS-India Elementary English unit, 'Developing and monitoring writing'.

### Example 4: Using monitoring and feedback to support exploratory tasks

Mathematical vocabulary is not always straightforward and may act as a barrier to learning. It is often helpful for students to appreciate this, and for the teacher to draw special attention to mathematical words and where they come from. Greek students do not tend to find the word 'perimeter' difficult to understand, because the word comes from the Greek words 'peri' (which means around) and 'meter' (which means measure).

In Activity 5 you will ask your students to explore perimeters by describing, tracing and working out the perimeter of everyday objects. Then you will ask them to use this knowledge to explore possible variations in drawing different rectangles with the same perimeter, and to generalise their observations.

Before attempting to use these activities with your students, it would be a good idea to complete all, or at least part, of the activities yourself. It would be even better if you could try them out with a colleague, as that will help you when you reflect on the experience. Trying them for yourself will mean you get insights into your students' experiences that can, in turn, influence your teaching and your experiences as a teacher.

When you are ready, use the activities with your students and, once again, reflect on how well they went and what learning took place. This will help you to develop a more student-focused teaching environment.

### Activity 5: Finding perimeters of objects that surround us

To prepare for these tasks ask your students to point out (and if possible trace around) the perimeters of several objects they can see in the classroom. Discuss with them the mathematical definition of perimeter, which is the path around a two-dimensional shape.

#### Part 1

Ask your students to work in pairs and find the perimeter of at least three objects they can find in their bags and around the classroom. Give them a time limit (for example five minutes). Stand back and observe them. There is no need to interrupt their activity or give them any hints.

#### Part 2

At the end of the time limit, ask your students for feedback. Because they will have worked out the perimeter of different objects, they will not all have the same results.

Now ask your students to feed back some information about the shape of the object they found the perimeter of, and then their method of finding it out. Write these answers on the blackboard or ask the students to come and write them up themselves.

#### Part 3

For this part of the activity it is helpful to have squared paper for the students to work on.

The students should continue to work in pairs. Ask them to draw as many rectangles or squares that they can think of with a perimeter of 16 cm and to prepare to answer the question, 'How do you know you have got all possible solutions?'

Take feedback about possible solutions and how they know they have got all of them. Do not tell your students the reason (that two numbers that can be added together to make six), but let them formulate this observation themselves.

### Case Study 3: Mrs Aparajeeta reflects on using Activity 5

*This is an account of a teacher who tried Activity 5 with her students.*

When I asked my students to point out perimeters and areas in the classroom, I was surprised that they did not say 'this is the perimeter of the door' and point at the edges of the door. What happened was that a few students explained how to calculate the perimeter and others looked a bit bewildered.

I really needed to prompt them and give an example myself before they could say 'this is the perimeter of the door' or 'the perimeter of the blackboard would be this' and use their hands and fingers to indicate and point this out. By spending some time on this, the other parts of the activity went very smoothly and I got the impression that most of the

students now understood what they were talking about and what they were finding out, and understood better their methods for finding out the perimeter.

My students were very enthusiastic about Part 1 of the activity. They took items from their bags to find the perimeters. One brave student, Dheeraj, tried to find the perimeter of his pencil. He took a piece of thread and tried to wrap it round the pencil to get the answer. I asked him to note down the difficulty he had in doing this and that we would discuss this with the rest of the class.

Then we had a lively discussion about the items the students had found the perimeters of and how they had gone about doing so. The discussion then moved on to measuring the perimeter of two and three-dimensional objects. I was impressed at my students' ability to express themselves and come up with mathematical ideas and theories themselves.

Drawing the rectangles with a fixed perimeter was really fun for the class. They did this very quickly. Some made a mistake because they added just two sides to get 16 cm, so there was a great discussion amongst them of how their perimeter was not 16 cm but 32 cm. One student, Shanu, explained his answers to Part 3 very well. To also get the other students involved in that discussion I asked them whether they agreed with Shanu, understood the reasoning, and could explain it in another way.



### Pause for thought

Dheeraj's attempt to find the perimeter of the pencil led to some discussion that went beyond Mrs Aparajeeta's original plans for the lesson. What do you think are the advantages or disadvantages of allowing your students' discussion to move in a different direction? What might be the implications of this for planning future lessons?

Now think about how your own class got on with this activity or a similar activity and reflect on the following questions:

- How did it go with your class?
- Did you feel you had to intervene at any point?
- What points did you feel you had to reinforce?
- When monitoring your students, did you notice that any of them did something unexpected, or take a different approach that prompted rich discussion with the rest of the class?
- Were there ideas that some of the students struggled to understand?
- How could you help them?

This example was adapted from the TESS-India Elementary Maths unit, 'Using rich tasks: area and perimeter'.

## Developing your practice

Monitoring and giving feedback features in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep a record of them below. To get you started, monitoring and giving feedback is featured in the Elementary Language and Literacy unit, 'Pair work for language and literacy'.

## 6 Groupwork

This section of the compendium focuses on ways of enhancing your use of groupwork to support your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

### Why groupwork is important

Groupwork is a systematic, active, pedagogical strategy that encourages small groups of students to work together to achieve a common goal. These small groups promote more active and more effective learning through structured opportunities for student dialogue.

### The benefits of groupwork

Groupwork can be a very effective way of motivating your students to learn. It encourages them to think, communicate, exchange ideas and thoughts, and make decisions. Your students can both teach and learn from others: a powerful and active form of learning.

Groupwork is more than students sitting in groups; it involves discussing, working on and contributing to a shared learning task with a clear objective. You need to be clear about why you are using groupwork for learning and know why this is preferable to lecturing, pair work or to students working on their own. Thus groupwork has to be well-planned and purposeful.

### Planning groupwork

When and how you use groupwork will depend on what learning you want to achieve by the end of the lesson. You can include groupwork at the start, the end or midway through the lesson, but you will need to allow enough time for it. You will need to think about the task that you want your students to complete and the best way to organise the groups.

As a teacher, you can ensure that groupwork is successful if you plan:

- the goals and expected outcomes of the group activity
- the time allocated to the activity, including any feedback or summary task
- how to split the groups (how many groups, how many students in each group, criteria for groups)
- how to organise the groups (role of different group members, time required, materials, recording and reporting)
- how any assessment will be undertaken and recorded (taking care to distinguish individual assessments from group assessments)
- how you will monitor the groups' activities.

## Groupwork tasks

The task that you ask your students to complete depends on what you want them to learn. By taking part in groupwork, they will learn skills such as listening to each other, explaining their ideas and working cooperatively. However, the main aim is for them to engage in dialogue to develop their ideas about the subject that you are teaching. Some examples of tasks could include the following:

- **Presentations:** Students work in groups to prepare a presentation for the rest of the class. This works best if each group has a different aspect of the topic, so they are motivated to listen to each other rather than listening to the same topic several times. Be very strict about the time that each group has to present and decide on a set of criteria for a good presentation. Write these on the board before the lesson. Students can then use the criteria to plan their presentation and assess each other's work. The criteria could include:
  - Was the presentation clear?
  - Was the presentation well-structured?
  - Did I learn something from the presentation?
  - Did the presentation make me think?
- **Problem solving:** Students work in groups to solve a problem or a series of problems. This could include conducting an experiment in science, solving problems in maths, analysing a story or poem in English, or analysing evidence in history.
- **Creating an artefact or product:** Students work in groups to develop a story, a piece of drama, a piece of music, a model to explain a concept, a news report on an issue or a poster to summarise information or explain a concept. Giving groups five minutes at the start of a new topic to create a brainstorm or mind map will tell you a great deal about what they already know, and will help you pitch the lesson at an appropriate level.
- **Differentiated tasks:** Groupwork is an opportunity to allow students of different ages or attainment levels to work together on an appropriate task. Higher attainers can benefit from the opportunity to explain the work, whereas lower attainers may find it easier to ask questions in a group than in a class, and will learn from their classmates.
- **Discussion:** Students consider an issue and come to a conclusion. This may require quite a bit of preparation on your part in order to make sure that the students have enough knowledge to consider different options, but organising a discussion or debate can be very rewarding for both you and them.

## Organising groups

Groups of four to eight are ideal but this will depend on the size of your class, the physical environment and furniture, and the attainment or level of your students and age range of

your class. Ideally, everyone in a group needs to see each other, talk without shouting and contribute to the group's outcome.

- Decide how and why you will divide students into groups. For example, you may divide groups by friendship, interest or by similar or mixed attainment in this subject. Experiment with different ways and review what works best with each class.
- Plan any roles you will give to group members (for example, note taker, spokesperson, time keeper or collector of equipment), and how you will make this clear.

## Managing groupwork

You can set up routines and rules to manage good groupwork. When you use groupwork regularly, students will know what you expect and find it enjoyable. It is a good idea to initially work with your class to identify the benefits of working together in teams and groups. You should discuss what makes good groupwork behaviour and possibly generate a list of 'rules' that might be displayed; for example, 'Respect for each other', 'Listening', 'Helping each other', 'Trying more than one idea', etc.

It is important to give clear verbal instructions about the groupwork that can also be written on the blackboard for reference. You need to:

- direct your students to the groups they will work in according to your plan, perhaps designating areas in the classroom where they will work or giving instructions about moving any furniture or school bags
- be very clear about the task and write it on the board in short instructions or pictures – allow your students to ask questions before you start.

During the lesson, move around to observe and check how the groups are doing. Offer advice where needed, if they are deviating from the task or getting stuck.

You might want to change the groups during the task. Here are two techniques to try when you are feeling confident about groupwork – they are particularly helpful when managing a large class:

- **'Expert groups'**: Give each group a different task, such as researching one way of generating electricity or developing a character for a drama. After a suitable time, re-organise the groups so that each new group is made up of one 'expert' from all the original groups. Then give them a task that involves collating knowledge from all the experts, such as deciding on what sort of power station to build or preparing a piece of drama.
- **'Envoys'**: If the task involves creating something or solving a problem, after a while, ask each group to send an envoy to another group. They could compare ideas or solutions to the problem and then report back to their own group. In this way, groups can learn from each other.

At the end of the task, summarise what has been learnt and correct any misunderstandings that you have seen. You may want to hear feedback from each group, or ask just one or two groups who you think have some good ideas. Keep students' reporting brief and encourage them to offer feedback on work from other groups by identifying what has been done well, what was interesting and what might be developed further.

Even if you want to adopt groupwork in your classroom, you may at times find it difficult to organise because some students:

- are resistant to active learning and may not engage
- are overly dominant
- do not participate due to poor interpersonal skills or lack of confidence.

To become effective at managing groupwork, it is important to reflect on all the above points, in addition to considering how far the learning outcomes were met and how well your students responded. Consider and carefully plan any adjustments you might make to the group task, resources, timings or composition of the groups to ensure that all students benefit to the full.

Research suggests that learning in groups need not be used all the time to have positive effects on student achievement, so you should not feel obliged to use it in every lesson. You might want to consider using groupwork as a supplemental technique, for example as a break between a topic change or to jump-start a class discussion. It can also be used as an ice-breaker or to introduce experiential learning activities and problem solving exercises into the classroom, or to review topics.

### Example applications

Groupwork is relevant to all curricular areas.

The following examples demonstrate some of the ways in which groupwork can be applied in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages. To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

#### Example 1: Moving from pair work to groupwork

In this example, the teacher first uses pair work by asking students to work with the person sitting next to them and then moves to groupwork by asking two nearby pairs to work together. This simple, effective approach can be used in all subject lessons. It enables all students to have the opportunity to explore their ideas with a partner and then a large group.

Students need to learn the reading strategies that different information-based texts require. They need opportunities to practise reading for information and to talk about what they have read in order to internalise the new language and concepts they have encountered. Case Study 1 shows how moving from pairs to groups can be applied to a reading activity.

## Case Study 1: Widening students' reading repertoires

*Mr Gaurav is a Class VIII teacher in Faizabad. Here he describes how he attempts to widen his students' reading repertoire in class by reading information-based texts aloud to them.*

I often read aloud to my students, but instead of a story or a poem, I sometimes choose a short article from the newspaper that I think they will find interesting. I think it is helpful for them to listen to different types of written texts. It also informs them about the world we live in.

Last month, I began by introducing the topic of cosmetic testing on animals and asked my students what they knew about it. I wrote some of the key words used in this introductory discussion on the blackboard. I then asked my students to listen to me read out the article [see below] with the following question in mind: 'What is the article about?' I then read the article slowly, pausing to explain any unfamiliar vocabulary, such as 'compassion', 'countless', 'outsourcing' and 'jurisdiction'. As I wrote the words on the blackboard, I asked if anyone could explain what they meant.

When I had finished, I asked my students to talk briefly in pairs about what they thought the article was about. After a brief feedback session, I wrote three more focused questions on the blackboard:

- 'Do you think this ban is a positive step? Why, or why not?'
- 'Should we care if animals suffer?'
- 'The beauty industry is very big in India. Do you think these laws will affect our economy badly?'

I placed two pairs of students together and asked each group of four to consider one of the questions listed as I read the article again. When they had finished discussing the question, I asked a volunteer to report back their thoughts to the rest of the class.

Since then, I have varied this activity by using different articles, and getting my students to think of suitable questions for the second re-reading themselves. I have also encouraged them to note down any words or expressions that they can't understand, rather than me anticipating these myself. I have also started to give my students a copy of the text after I have read aloud once and they have had an initial discussion about it. They then read it themselves before considering the more focused set of questions.

I usually follow up the reading activity by getting my students to write out the article in their own words, or explain their views on the issues discussed in an essay.

Now try Activity 1. You can use this activity in any subject. If you don't have a magazine or newspaper article, you could use something from the textbook.

### Activity 1: Developing your students' reading repertoires

Taking Case Study 1 as a guide, choose a short newspaper or magazine article to read aloud to your class. Decide how it will fit into your lesson plans. How can you link to one of the topics that you are currently teaching? Discuss your ideas with your colleagues.

- Show your students the magazine or newspaper that the article comes from. Make it evident that you find the topic interesting and that you think your students will be interested in it too.
- Show your students any photographs or diagrams that accompany the article.
- Explain the meaning of any unfamiliar words and phrases before reading it.
- Pose your students one or two questions at the start to give them a reason for listening.
- Read the text aloud slowly. Pause to explain new words and phrases in context.
- Invite your students to discuss the initial question together in pairs. Then ask them to join up with another pair and set them one or two further questions to consider during your re-reading of the text.
- As your students gain confidence, give them a copy of the passage to read in pairs or small groups instead of you re-reading the article yourself.
- Allow your students to discuss these questions in pairs or groups and bring the class together for a final feedback session.
- As your students talk together you should move around the room listening carefully to their discussions. You can offer questions and ask them to clarify their thinking if this helps their discussion, but try not to interrupt when students are engaged in the discussion.
- Note down the words and phrases that you can include in a spelling or comprehension test on another day.



#### Pause for thought

- Did using pair work first help your students to engage in productive and interesting small group discussions?
- What did you learn about their thinking and prior experiences as you listened to their discussions?
- Did all your students take part in the small group discussions? If not how could you modify this approach?

#### Additional resource: newspaper article

##### **India bans testing of cosmetics on animals**

India is the first country in South Asia to ban the testing of cosmetics and their ingredients on animals.

Alokparna Sengupta, Humane Society International (HSI)/India's Be Cruelty-Free campaign manager, said: 'This is a major victory for countless animals who will no longer be made to suffer, and it is a proud moment for India as it becomes the first country in South Asia to end cosmetics cruelty.'

The decision was taken at a meeting of the Bureau of Indian Standards (BIS) Cosmetics Sectional Committee, chaired by the Drugs Controller General of India and is in line with the European Union's stand.

The decision follows appeals from various quarters, including that from the National Advisory Council Chairperson Sonia Gandhi and campaigner for animal rights Maneka Gandhi, to prevent cruelty to animals.

The People for the Ethical Treatment of Animals, India, has also been campaigning to end the testing of household products and their ingredients on animals.

Any cosmetic product which carries out animal testing will face action as per provisions of the Drugs and Cosmetics Act and the Animal Cruelty Act. Violation of the Drugs and Cosmetics Act by any person or corporate manager or owner is liable for punishment for a term which may extend from three to ten years and shall also be liable to fine which could be Rs. 500 to Rs. 10,000, or with both.

The use of modern non-animal alternative tests also becomes mandatory, replacing invasive tests on animals. This means that any manufacturer interested in testing new cosmetic ingredients or finished products must first seek the approval from India's regulator Central Drug Standards Control Organisation. A manufacturer will be given approval to test only after complying with the BIS non-animal standards.

More than 1,200 companies around the world have banned all animal tests in favour of effective, modern non-animal tests, but many still choose to subject animals to painful tests.

Member of Parliament Baijayant 'Jay' Panda said, 'This is a great day for India and for the thousands of animals who will no longer suffer, yet more work must be done. Our government must go a step further by banning cosmetics products that are tested on animals abroad and then imported and sold here in India. Only then will India demonstrate its commitment to compassion and modern, non-animal research methods and truly be cruelty free.'

Israel and the 27 countries that make up the European Union have implemented both testing and sales bans to bring an end to cosmetics animal suffering in their respective jurisdictions, and HSI is leading the campaign to persuade India to become the next fully cruelty-free cosmetics zone. A sales ban will prevent companies from outsourcing testing and importing animal-tested beauty products back into India for sale.

(Adapted from Dhar, 2013)



### Video: groupwork

The following link illustrates how a teacher focuses on groupwork in an Language and Literacy lesson:

<https://www.youtube.com/watch?v=kz3cNsAO7V0&list=PLLjfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=36>

This example was adapted from the TESS-India Elementary Language and Literacy unit, 'Reading for information'.

### Example 2: Dividing your class for group and other work

Small groupwork can be difficult to organise and manage, particularly if you have a large number of students in your class. Case Study 2 shows how one teacher managed this situation with her science class. Her approach can be used in all subjects, but you need to ensure that the students not doing groupwork have an engaging, productive task to do instead.

#### Case Study 2: Grouping the class for practical investigations

*Mrs Vimala was teaching her class about floating and sinking, and wanted them to have a chance to predict which objects would float or sink before they tested their predictions in groups.*

I have 43 children in my class and only enough equipment for four groups, so I decided to teach my lesson to half my students at a time. I hoped that by working with half the class (21 students) I could give them more time to talk, think and share ideas with their classmates.

While I did the floating and sinking activity with half the class, the other half did some research work on another aspect of our topic using a sheet of information that I had prepared. They had to answer some questions and solve a problem that they wrote up in their books. I would look at this work when the whole class finished the floating and sinking activity.

I sorted out four sets of similar objects and called the first half of the class to the front half of the classroom while the others were working at the back.

At the front I divided the students into four groups, gave them their collection and asked them to predict the 'floaters' and 'sinks' by filling in a sheet. I encouraged them to reach a consensus if possible, but if there was any disagreement they should put objects they were not sure of in the 'not sure' circle. As they discussed their ideas I went around the back half of the class and helped any students who needed support before returning to the front of the class and listening to the students talking about what floats. I only intervened if they were really confused, or I asked simple questions like 'Why do you think that?', so that they had to think more about why they think objects float or sink.

When all the groups had finished I gave them each a bowl of water [Figure 1]. I used old washing up bowls and a big empty tin, as we do not have much equipment in school. I gave them five minutes to test their ideas and record their results by ticking those that did what they predicted and leaving the others unmarked. Out of all the objects they tested, the students suggested that a stone, a coin, a piece of concrete, pieces of wood, a piece of metal, a spoon, a pan, a dish, a feather, some paper and a pencil would sink.



**Figure 1** Students predicting what will float or sink.

Next I asked the students to discuss in their groups why they thought things sank or floated. I listed their key ideas before I then asked them to take one object that sank and work out a way to make it float. After giving them time to discuss this, I ask for volunteers to come out and try to make their sinkers float. One student put his coin on a piece of wood that floated and the coin ‘floated’ because it was on the wood. I asked whether this was true floating, which prompted much discussion. For their homework I ask them to write their own ideas about why things floated or sank.

At the end of the session I was very pleased at how interested the students were and impressed at their level of thinking about why things float or sink. My next lesson will help the whole class clarify their ideas when they have all completed the task. What pleased me most was the way that some students who very rarely speak in whole class lessons participated much more in the smaller groups – and they had much to say.



### **Pause for thought**

Think about how you might use some or all of Mrs Vimla’s strategies and actions to stimulate group activity in your teaching. This teacher wanted to have closer contact and interaction with a smaller number of students so that she could find out their current understanding of floating and sinking. How can you use groupwork to explore your students’ thinking more closely?

## Activity 2: Planning and teaching using groupwork

Using your thoughts about which type of group you would like to use with your class plan, either on your own or with a colleague plan a lesson involving groupwork. Think about the following:

- What ideas do you want the students to learn about? What are your learning objectives?
- How will working in groups support student learning?
- How will you support those with special educational needs as they work in groups?
- How you are going to introduce your class to the idea of working together?
- How will you organise the groups? Or will you work with one group at a time, or a few groups at a time?
- How will you explain what they have to do so that they are able to work well together?
- What do you want your students to learn about working together?
- What equipment will you need? How will this determine how you do the activity?
- What will you do as the students work in groups?
- How will you know and assess what the students have learnt?

Having planned your lesson, gather together your resources for the session and – when you are ready – teach the lesson.

At the end of the lesson ask the students what they liked about it.



### Pause for thought

Immediately after the lesson, answer the following questions about the experience for yourself:

- How did the lesson go?
- What worked well? Why did it go well?
- What did not go quite as you hoped?
- Why do think this was?
- What could you do next time to improve your skills in using groups?

Make notes about your responses to discuss with your colleagues. What are their experiences of this type of lesson? Perhaps you might observe another colleague doing a groupwork lesson and discuss it afterwards.



### Video: groupwork

The following link illustrates how a teacher focuses on groupwork in an Elementary Science lesson:

<https://www.youtube.com/watch?v=zGLpr6Kze9U&index=37&list=PLljfVZ89nnNI7IEZRdanOTVxzuosUW0Bp>

This example was adapted from the TESS-India Elementary Science unit, 'Using groupwork: floating and sinking'.

### Example 3: Using groupwork to explore real-life problems

This example uses real-life problems to teach mathematical concepts. You can use this approach in other subject areas to make learning more relevant for your students. Students usually enjoy attempting this sort of practical activity. Groupwork enables them to stimulate one another's thinking by building on one another's ideas.

The concept of division can be difficult for students to grasp, partly because there are many ways of talking about it. A problem such as '42 divided by 6' can be interpreted as:

- 'How many times does 6 go into 42?'
- 'How many groups of 6 can be made out of 42?'
- 'How many would be in each of the six groups?'
- 'What is one-sixth of 42?'

Although the answer is always 7, the ways one can get to that answer can be very different and can therefore result in confusion.

Helping students to be aware that there is more than one way to think about division and to be alert to the possibility of ambiguity in everyday language will support their mathematical development. It is important to teach them to think very carefully about the meaning of every problem they encounter that asks them to divide, such as 'divide 42 into 6'.

Being able to visualise what is happening is an important step to understanding the algorithm. In the following activity you will ask your students to use division intuitively and in context to find the quotient and the remainder.

Before using this activity with your students, it is a good idea to complete it yourself. Even better would be to do so with a colleague.

### Activity 3: Dividing up lengths

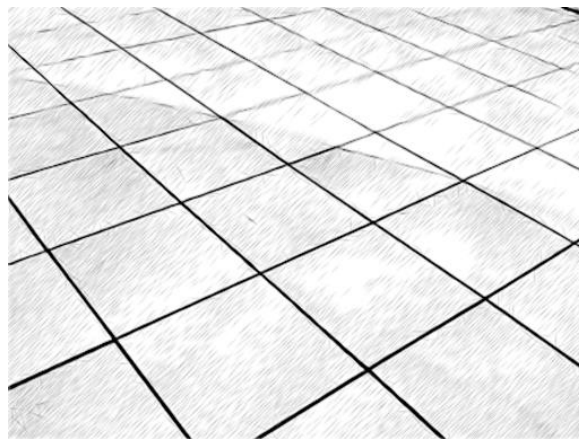
#### Preparation

This activity sets out to challenge students' mathematical understanding of division. If your students are younger or have less experience with division, use easier numbers. It is the picture they build and the thinking they do that are important here.

This activity is best done with groups of four to six students working together.

#### The activity

Tell your students that Rajni is to have new ceramic floor tiles in her bedroom (Figure 2). The length of the bedroom floor is 5,273 mm and its breadth is 4,023 mm.



**Figure 2** Tiles for Rajni's bedroom floor.

She has looked at a catalogue and shortlisted two designs of tiles: Pink Sparrow and Rosewood Matte.

Pink Sparrow is a square tile of 600 mm in length and Rosewood Matte is a square tile of 450 mm in length.

- What is the shape of Rajni's bedroom floor?
- Draw Rajni's bedroom floor in your notebook. Before you start, think about this: you cannot draw a rectangle of length 5,273 mm and breadth 4,023 mm in a notebook. How will you manage to draw a rectangle that represents Rajni's bedroom floor? Discuss in your group.
- (Note for the teacher: If your class is younger or you have not yet covered scales, skip to the next question). Now:
  - Draw three different-sized diagrams, using different scales of Rajni's bedroom floor as accurately as you can. (Use just one scale if different scales makes the activity too difficult.) Remember to note the scale used next to the diagram. Describe the differences between the three diagrams.
  - In each of the three drawings, cover the floor diagram with Pink Sparrow tiles and Rosewood Matte tiles.

- Is the number of tiles used to cover the diagrams of different sizes the same? Why?
- How many rows of tiles would Rajni use to cover the floor with each type of tile? Would these rows cover the entire floor? Why, or why not?
- How many columns of tiles would Rajni use to cover the floor with each type of tile? Would these columns cover the entire floor? Why, or why not?

### Case Study 3: Mrs Agarwal reflects on using Activity 2

*This is the account of a teacher who tried Activity 2 with her elementary students.*

I tried this activity with a class that was having major problems with the division algorithm. It seemed as though they could not understand what it really meant when they were dividing two quantities.

I reduced the numbers for this activity to three-digit and two-digit numbers so that they could do the arithmetic more easily, as I wanted them to think about and visualise what they were doing. I thought that some of them would have a problem representing the room on paper, so I did some exercises with their atlases where we saw how scales were used to represent large distances. After that, when I actually did this activity, most of them had the idea and could draw the three bedroom floor figures.

Arun wanted to know what I meant by 'three sizes'. Mita answered his query by saying that maybe we could take different scale sizes. I gave them sheets of squared paper and they all got busy with their drawings. I also set them a time limit and said that they should delegate the different sizes to different students in their group.

When they had done their drawings of the bedroom, I asked them if they could make copies so that each student in the group had one copy to use to make the tile layout. I then asked them to cover the floor with either Pink Sparrow or Rosewood Matte tiles.

I remembered to ask: 'Why is the number of tiles the same, even though the scales are different?' At first they were unsure of how to answer but eventually someone said 'Because it's the same room' and another said 'We had to use the scale for the tiles as well'. I was pleased with these answers because they weren't just mechanically doing what was asked, but were thinking about what the maths meant.

Then we had the discussion on the last two questions with contributions from the entire class. They were a lot quicker at coming up with answers to the 'Why?' questions this time and I was able to help them see that they were dividing up the space and doing divisions, which helped them a great deal. The remainder meant something here as well – 'the bit left over' that you would have to cut a tile to fill was a real concept for them.



### Pause for thought

- What responses from your students were unexpected? What did these responses tell you about their understanding of the meaning of a remainder?
- What points did you feel you had to reinforce?
- Did you modify the task in any way? If so, what was your reasoning for this?

This example was adapted from the TESS-India Elementary Maths unit, 'Using real-life contexts: the formal division algorithm'.

### Example 4: Encouraging group talk about a textbook topic

This example is from the English curriculum but the same approach can be used in all subjects to introduce a new topic. Listening to students' group discussions can help you to find out what they know already. You can then use this knowledge to plan the next lessons. Notice how groupwork only forms part of the activity in Case Study 4. It can be appropriate to allow students to work alone or in pairs as part of same lesson, depending on the nature of the task. As your students become familiar with working in groups, they can quickly organise themselves for such short activities.

### Case Study 4: Mr Rangan relates the textbook topic to his students' lives

*Mr Rangan teaches English to Class VIII. He is trying to think of ways to get his students to speak more English in class.*

After the readings in the textbook, there are speaking activities. In one textbook there is an activity that asks students to prepare a short speech motivating girl athletes to dream big. I tried this activity, but it wasn't very successful. Some students simply read out some of the sentences from the associated reading text in English. Others discussed it in Hindi. Many just sat quietly. Often my students don't have much to say about the topics in the textbook, which makes talking about them more difficult. I have noticed, however, that outside their lessons, they talk freely to one another about their hobbies and interests.

I started to think of ways that I could encourage them to speak more freely in class, while also making the textbook lessons more interesting for them. We were looking at the chapter with a passage about the Wimbledon tennis champion Maria Sharapova. While this did not seem so relevant to them, I knew that they were interested in other types of sport and enjoy talking about them. I therefore decided to try a speaking activity around the topic of sport.

I began by asking my students to name their favourite sporting heroes. Then I wrote some sentences on the blackboard and I told them to copy the sentences and complete them:

- 'My greatest sports hero is ...'

- 'I admire this person because ...'
- 'Their highest achievement is ...'

I then asked my students to sit in groups of four or five. I asked them to compare their answers and agree on who the greatest sports hero is. I gave them five minutes for this activity. As they talked, I walked around the room and listened to one or two groups. Some of the groups were very animated and disagreed about the choices. I left them to their discussions.

I always prefer it if my students speak English in my English classes and I usually encourage them to do so. However, I didn't mind which language they were using for this activity as I didn't want to hinder their motivation and their attempt to reach a consensus!

One group was not talking at all. I decided to sit down and help them. I looked at their notebooks and said:

'Ravi likes Lionel Messi the football player but Santosh prefers Sachin Tendulkar. Is Messi better than Tendulkar? What do you think?'

In another group, I noticed that some students were excitedly using their home languages or a combination of English and their home languages. Where this was the case, I tried to help them with translations for words or phrases in English.

After five minutes I stopped the activity. I asked one student from each group to say who the greatest sports hero is.

I then asked if students had heard of Maria Sharapova. They hadn't, so I asked if they could guess what sport she was famous for. After they had made a few guesses, I asked them to open their books at page 105 so that we could start the textbook activity. They were much more interested in reading the text than they usually are.

Now, whenever I think that a topic in the textbook is difficult for students to talk about, I try to relate it to their lives and interests. This is more engaging for them and helps them to speak about it more.

#### **Activity 4: Relating a textbook topic to your students' lives**

In Case Study 4, the teacher tried to make the lesson more interesting and easier to talk about by relating it to your students' interests. Follow these steps to try this approach in your classroom.

1. What is the next topic in your textbook? Do you think it is one that your students would enjoy talking about?
2. If it is, write down some sentences about the topic that they can complete. So if the topic is 'wedding ceremonies', you could write sentences such as:
  - 'The last wedding I went to was ...'

- 'A good wedding should have ...'
- 'In my view, the best food at a wedding is ...'

If the topic is more difficult for them to talk about, you could think of one that is more loosely related to the textbook lesson, but would be of more interest.

Organise your class into groups of four or five. Allow five minutes for this task.

As your students discuss the questions, walk around the room and give help to those who need it. If it is an English class, encourage everyone to use English where possible.

You may feel that talking about something that is not in the textbook might be a poor use of class time, but activities like this can be very beneficial because they raise students' interest in learning English and give them opportunities to practise useful language skills.



### Pause for thought

After trying this activity in class, think about the following questions:

- If it was an English class, how much English and home language did your students use? How can you encourage them to use more English next time?
- For other subjects, how much did you learn about your students' ideas? Did this help you to introduce the topic?
- Can you think of other topics that would encourage your students to try speaking?

This example was adapted from the TESS-India Secondary English unit, 'Building your students' confidence to speak English'.

### Developing your practice

Groupwork features in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep a record of them below. To get you started, groupwork is featured in the Elementary Maths unit, 'Mathematical stories: word problems'.

## 7 Assessing progress and performance

This section of the compendium focuses on ways of enhancing your assessment of students' progress and performance to support your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

### Why assessing progress and performance is important

Assessing students' learning has two purposes:

- **Summative assessment** looks back and makes a judgement on what has already been learnt. It is often conducted in the form of tests that are graded, telling students their attainment on the questions in that test. This also helps in reporting outcomes.
- **Formative assessment** (or assessment for learning) is quite different, being more informal and diagnostic in nature. Teachers use it as part of the learning process, for example questioning to check whether students have understood something. The outcomes of this assessment are then used to change the next learning experience. Monitoring and feedback are part of formative assessment.

Formative assessment enhances learning because in order to learn, most students must:

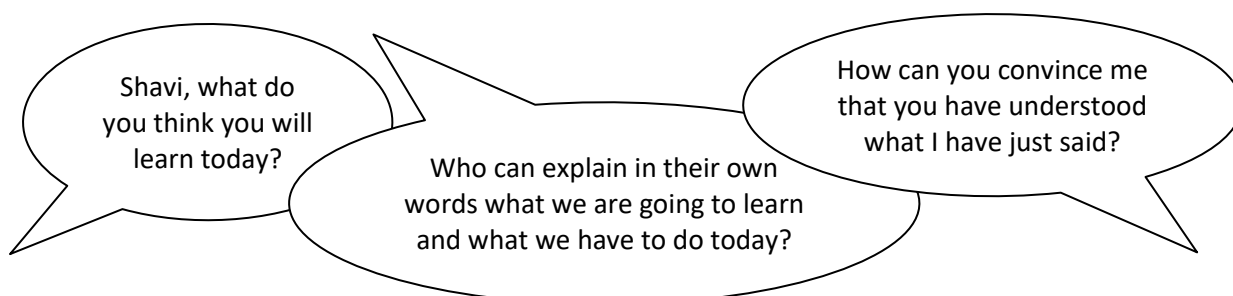
- understand what they are expected to learn
- know where they are now with that learning
- understand how they can make progress (that is, what to study and how to study)
- know when they have reached the goals and expected outcomes.

As a teacher, you will get the best out of your students if you attend to the four points above in every lesson. Thus assessment can be undertaken before, during and after instruction:

- **Before:** Assessing before the teaching begins can help you to identify what the students know and can do prior to instruction. It determines the baseline and gives you a starting point for planning your teaching. Enhancing your understanding of what your students know reduces the chance of re-teaching the students something they have already mastered or omitting something they possibly should (but do not yet) know or understand.
- **During:** Assessing during classroom teaching involves checking if students are learning and improving. This will help you make adjustments in your teaching methodology, resources and activities. It will help you understand how the student is progressing towards the desired objective and how successful your teaching is.
- **After:** Assessment that occurs after teaching confirms what students have learnt and shows you who has learnt and who still needs support. This will allow you to assess the effectiveness of your teaching goal.

### Before: being clear about what your students will learn

When you decide what the students must learn in a lesson or series of lessons, you need to share this with them. Carefully distinguish what the students are expected to learn from what you are asking them to do. Ask an open question that gives you the chance to assess whether they have really understood. For example:



Give the students a few seconds to think before they answer, or perhaps ask the students to first discuss their answers in pairs or small groups. When they tell you their answer, you will know whether they understand what it is they have to learn.

### Before: knowing where students are in their learning

In order to help your students improve, both you and they need to know the current state of their knowledge and understanding. Once you have shared the intended learning outcomes or goals, you could do the following:

- Ask the students to work in pairs to make a mind map or list of what they already know about that topic, giving them enough time to complete it but not too long for those with few ideas. You should then review the mind maps or lists.
- Write the important vocabulary on the board and ask for volunteers to say what they know about each word. Then ask the rest of the class to put their thumbs up if they understand the word, thumbs down if they know very little or nothing, and thumbs horizontal if they know something.

Knowing where to start will mean that you can plan lessons that are relevant and constructive for your students. It is also important that your students are able to assess how well they are learning so that both you and they know what they need to learn next. Providing opportunities for your students to take charge of their own learning will help to make them life-long learners.

### During: ensuring students' progress in learning

Students need your feedback to be both useful and constructive. When you talk to them, make sure that you:

- help them know their strengths and how they might further improve
- be clear about what needs further development
- be positive about how they might develop their learning, checking that they understand and feel able to use the advice.

You need to provide opportunities for students to improve their learning, so you may have to modify your lesson plans to close the gap between where your students are in their learning and where you want them to be. In order to do this, you could:

- go back over some work that you thought they knew already
- group students according to needs, giving them differentiated tasks
- encourage students to decide for themselves which of several resources they need to study so that they can 'fill their own gap'
- use 'low entry, high ceiling' tasks so that all students can make progress – these are designed so that all students can start the task but the more able ones are not restricted and can progress to extend their learning.

Slowing the pace of lessons down can very often actually speed up learning, because it gives students the time and confidence to think and understand what they need to do to improve. By letting students talk about their work among themselves, and reflect on where the gaps are and how they might close them, you are providing them with ways to assess themselves.

### **After: collecting and interpreting evidence, and planning ahead**

While teaching–learning is taking place and after setting a classwork or homework task, it is important to:

- find out how well your students are doing
- use this to inform your planning for the next lesson
- feed it back to students.

The four key states of assessment are discussed below.

### **Collecting information or evidence**

Every student learns differently, at their own pace and style, both inside and outside the school. Therefore, you need to do two things while assessing students:

- Collect information from a variety of sources – from your own experience, the student, other students, other teachers, or parents and community members.
- Assess students individually, in pairs and in groups, and promote self-assessment. Using different methods is important, as no single method can provide all the information you need. Different ways of collecting information about the students' learning and progress include observing, listening, discussing topics and themes, and reviewing written class and homework.

### **Recording**

In all schools across India, the most common form of recording is by using a report card, but this may not allow you to record all aspects of a student's learning or behaviours. There are some simple ways of doing this that you may like to consider:

- noting down what you observe while teaching–learning is going on in a diary/notebook/register

- keeping samples of students' work (written, art, craft, projects, poems, etc.) in a portfolio
- preparing every student's profile
- noting down any unusual incidents, changes, problems, strengths and learning evidences of students.

### Interpreting the evidence

Once information and evidence have been collected and recorded, it is important to interpret it in order to form an understanding of how each student is learning and progressing. This requires careful reflection and analysis. You then need to act on your findings to improve learning, maybe through feedback to students or finding new resources, rearranging the groups, or repeating a learning point.

### Planning for improvement

Assessment can help you to provide meaningful learning opportunities to every student by establishing specific and differentiated learning activities, giving attention to the students who need more help and challenging the students who are more advanced.

The section above indicates how important it is to continually assess the progress and performance of all students if you want all your students to learn and reach their full potential. One of the core skills of an effective teacher is assessing students' progress and performance effectively in an objective manner: this will help you gauge the extent to which your students are progressing and learning from the tasks they have been set and their teaching–learning practices. However, it is also important to remember that assessment needs to be undertaken continuously in a manner that it is an integral part of your classroom practices and processes.

Equally important is that every student is assessed across all curricular areas. As a teacher, the following questions should be at the forefront in your mind: how is this lesson being experienced and understood by my students? Are they learning? If not, why not? Am I using teaching methods that helps them understand the topic well and learn easily? However, it is equally important that teachers themselves also reflect on how they are facilitating student learning in every class and what they can do to improve their own teaching in the future, based on the students' requirements and level of learning. This calls for teachers to reflect on how they have taught, whether there are any gaps in the teaching, what went as planned and what did not. All this will help in planning better for the next class.

### Example applications

Assessing progress and performance is relevant to all curricular areas.

The following examples demonstrate some of the ways in which assessing progress and performance can be applied in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages.

To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

### Example 1: Different approaches to assessing and giving feedback to students

The approach you take to assessing and giving feedback to your students has a direct effect on their motivation and learning gains, whatever the subject area. In Case Study 1, you will read about different approaches to student assessment and feedback in two Language and Literacy lessons.

#### Case Study 1: Two teachers' approaches to student assessment and feedback

*Ms Asan teaches Class IV in a rural school near Indore.*

Recently I finished teaching 'बसके निचे बाघ' ('Bus ke niche bagh', or 'A Tiger under the Bus').

I decided to follow this by testing my students' spelling skills. I wrote ten difficult words from the lesson on the blackboard and asked my students to copy them out in their notebooks and prepare to be tested on them the next day.

The following morning, I read out the words in turn and asked my students to write them down. I took in their notebooks, marked their work and returned it to them.

Many students got full marks. Some made spelling mistakes and scored less well. I asked the students with the highest scores to raise their hands, then those with the lowest to raise theirs. I told those who did less well to practise writing the words again at home.

*Mr Dubashi teaches Class V in a large school in Kanpur.*

I wanted to assess my students' spelling of the words they had encountered over the last few lessons. I began by announcing: 'Today we will have a dictation activity.'

I asked my students to work in groups of four. I explained that I would read out five short sentences and that they had to listen to each sentence carefully before they started writing it out. I checked that everyone had understood my instructions. I then dictated the sentences, giving my students time to write them in turn.

When they had finished, I asked my students to discuss their sentences with the other members of their group, comparing their work and making any corrections if necessary. Finally, I told them to compare their sentences with those I had written out on the blackboard.

During the activity, I walked around the classroom and observed who was participating in the discussion, who wrote their sentence correctly the first time and who needed to correct their work subsequently. I noted these observations in my assessment book.

The next day, I described to the whole class the typical spelling problems I noticed in the activity the day before. I did this to ensure that those students who had had difficulties with the task were not made to feel exposed.

I now do an activity of this kind at the end of every topic. My students seem to look forward to it. I have found that it is most effective if I include a student with a higher level of attainment in each group, as they can support the others.



### Pause for thought

- What are your reactions to Ms Asan and Mr Dubashi's distinct approaches to assessing their students' spelling ability?
- What do you think are the advantages and disadvantages of each approach?
- Which of the approaches most closely reflects your current classroom practice?
- Does this vary from subject to subject? If so, can you justify this?

Ms Asan's approach to assessment has the advantage of taking very little class time. However, it separates testing from other learning and draws attention to those students who do not perform well. Mr Dubashi's approach to assessment takes longer, but actively involves his students in this process, incorporates talk for learning, is supportive of those who experience difficulties with spelling and provides helpful feedback afterwards. The spelling test is also more meaningful in that the words are embedded in sentences rather than being assessed out of context. This approach is more likely to result in long term learning gains and is applicable to all curricular areas.

This example was adapted from the TESS-India Elementary Language and Literacy unit, 'Monitoring, assessment and feedback'.

### Example 2: Assessing your students' understanding and use of language

The second example has two activities taken from the curriculum area of English.

Activity 1 illustrates how the teacher tries to establish classroom routines that promote the use of English by her students. It also shows how the teacher has incorporated assessment as an integral part of classroom transaction.

Activity 2 highlights how the teacher records what she is doing with the aim of assessing her own performance in order to improve her teaching-learning further.

### Activity 1: Assessing student understanding and use of routine expressions in their English lessons

Think about the activities that you routinely do in your class and what you say to students before, during and after these activities. Rework what you usually say in Hindi or the local language into English.

Make a copy of Table 1 and write down what you would say in the right-hand column. An example has been provided for you. Consider extending the table with more expressions, perhaps with the support of a colleague.

**Table 1** Routine expressions to use in your English lessons.

Getting ready for an activity	'Are you ready to start?'
Beginning a lesson	
Instructions for using a textbook	
Maintaining discipline	
Ending a lesson	
Organising students to work together	

Practise saying these phrases in English aloud, first slowly, then a bit faster, ideally with a friend, relative or colleague. You may wish to accompany the phrases with some kind of gesture or action.

When you feel confident, try out your new English phrases in the classroom. Encourage your students to respond.

Make it a habit to greet your students in English. Encourage them to say 'good morning', 'sorry', 'excuse me', 'please' and 'thank you' to you and one another, by using these expressions yourself when you speak to them. Keep a note of other routine expressions that you can introduce to your students over time and at different levels.

When you evaluate your students' listening and speaking in English, you may observe that they understand the general meaning without knowing the individual words. For example, if you regularly say 'See you tomorrow' at the end of the day, your students may initially understand that it is a form of saying 'Goodbye', because of when you say it, but they may not know the meaning of each word in isolation. Later they may identify the meaning of word 'tomorrow' and may start to use it themselves in a different context.



**Figure 1** Addressing the class.

Support your students by encouraging their efforts that they make to speak English, no matter how small. Try to listen carefully when they speak, and do not interrupt to correct small errors.

Keep a large notebook, with a page or two for each student, to build evidence of records of achievement. Make a note of those students who remember the words and phrases that you use regularly, those who start to use their learning in new situations, those who speak easily and confidently, and those who are still too shy to speak. Give the shy ones more opportunities and encouragement to say something in English, and praise them for doing so.



### **Pause for thought**

- What has been your students' response to your increased use of routine expressions in your English language lessons?
- How easy have you found it to assess their understanding and use of this language over time?

This example was adapted from the TESS-India Elementary English unit, 'Classroom routines'.

### **Example 3: Assessing students as they undertake exploratory activities**

This maths example demonstrates how to assess students' progress and performance as they undertake a collaborative activity in small groups. In this instance, the aim is to develop students' understanding of division by applying it to contexts that they are familiar with in school. The same technique can be applied to many other concepts and topics, however.

## Activity 2: Using the division algorithm in a real-life situation

### Part 1: In the school grounds

#### Preparation

In this activity students will create a tiling plan for a particular part of their school, for example an area of the playground.

When taking students to work in the school grounds (Figure 2), you should always make sure that your students are aware of safety hazards they might encounter, such as moving vehicles or building works, and that they are prepared for changes in the weather.



**Figure 2** Using the school ground for an activity.

Note that in the original TESS-India unit that this activity is taken from, it builds on earlier work done with the same group of students.

Before starting the activity, it is important that the students are informed that:

- a rectangular area of floor or wall will be selected for tiling
- the tiles will be square
- the number of complete tiles used along the length (or breadth) of the chosen area will be represented by 'q'.
- the length (or breadth) of the area that remains uncovered after the maximum number of complete tiles have been put along the length (or breadth) will be represented by 'r'.

It will help if they write a relation between the length of the area to be tiled,  $q$ , the side length of the tile, and  $r$ . (For instance, length of area to be tiled =  $q \times \text{tile length} + r$ .)

### The activity

Divide your class into groups of two or three students. Ask each group to do the following:

1. Identify a place in the school where they would like to lay tiles. They can choose stairs or steps, hallways, rooms, open areas, floors or walls, etc. The constraint is that the shape of the chosen section for tiling must be a rectangle.
2. Measure the length (L) and breadth (B) of the floor or wall they would tile.
3. Choose the side length (l) of the square tile with which they want to tile the floor or wall.
4. For the chosen tile with side length l, calculate the value of q and r for both L and B.

Once they are done, every group comes back to the classroom to report.

### Part 2: Back in the classroom

#### Preparation

On the blackboard, make a table as shown in Table 2 with as many rows as there are groups.

**Table 2** Using the division algorithm in a real-life situation.

	L			B		
	l	q	r	l	q	r
Group 1						
Group 2						
Group 3						
Group 4						
Group 5						
Group ...						

### The activity

Ask the groups to fill in their row in the table on the blackboard with their findings from Part 1 of this activity. Discuss the following with the class:

- What is the same and what is different between the observations of each group of students?
- Did some of you get the value of r as 0? Why do you think you got this value?
- If you wanted to make sure that  $r = 0$ , how would you change the values of l?
- If, for both L and B, the value of  $r = 0$ , what is the relation between L and B?

How is the relation between L, B, l, q and r linked to the division algorithm?



### Pause for thought

After trying out the activity with your students, consider the following:

- What questions did you use to probe your students' understanding?
- What feedback did you give them to support their learning?
- What responses from your students were unexpected? What did this reveal about their understanding of the division algorithm?
- Did you modify the task in any way? If so, what was your reasoning for this?

### Case Study 2: Mr Chadha reflects on using Activity 2

My students really enjoyed this activity. They took a long time discussing where to place the tiles. Some of the groups were keen to measure some difficult-shaped areas, but I advised them to keep things simple. After distributing tape measures, I gave them a time limit to take the measurements so they had to be very efficient.

When they were all back in the classroom, they had to decide whether to use big or little tiles to fill the space. Some of them thought that big tiles would be best but then did not like the division sums that they had set themselves so opted for smaller ones. After about another five minutes they all had their answers ready to go into the table which I had drawn on the blackboard.

The discussion about whether any of them got  $r = 0$  was interesting and there was a lot of talk about how and when they could get that. It also led to talk about multiplicands and the divisibility of numbers and when we one say a number can be completely divided by another. There was also a discussion about how remainders can be any number left when we remove a certain multiple of the divisor and why it's important to try to remove the maximum numbers of times of the divisor. This included thinking about how the remainder could not be more than the divisor.

By the end of the activity I felt that most of my students were able to understand the division algorithm and would know why they were doing what they were doing when using it.



### Pause for thought

- How did Mr Chadha's experience compare with yours?
- What assessment strategies did he use to find out whether his students had understood the division algorithm?
- Is there anything else he could have done to supplement these?



### Video: assessing progress and performance

The following link illustrates how a teacher focuses on assessing progress and performance in an Elementary Maths lesson:

[https://www.youtube.com/watch?v=BLqF9g9Eark&list=PLlJfVZ89nnNI5Rqdn\\_g9fQnaEq4u3ONuqX&index=2](https://www.youtube.com/watch?v=BLqF9g9Eark&list=PLlJfVZ89nnNI5Rqdn_g9fQnaEq4u3ONuqX&index=2)

This example was adapted from the TESS-India Elementary Maths unit, 'Using real-life contexts: the formal division algorithm'.

### Example 4: Listening to and observing students as they explore scientific concepts

This example is similar to the previous one in that it involves assessing students as they engage in an exploratory task. However, in this case it involves a scientific concept – shadows. The techniques for listening to and observing students as they talk and work can be applied across many subjects and activities.

Students begin to construct their own ideas about particular concepts and phenomena through play. These will not all be the same for each student. Your role is to develop, extend and challenge their thinking so that they gradually understand what really happens. To do this, you will also need to provide opportunities for them to talk together about their ideas.

### Case Study 3: Observing shadows during the day

*Mrs Latika describes a shadow-related lesson that she undertook with her Class V students.*

I began by checking what my students knew about how shadows are formed. I started by asking them a riddle: 'What follows you around all day, but sometimes disappears?' They guessed it was a shadow. I asked them what made a shadow. I used a torch and showed them how a shadow is made when an object blocks a light source. They then made their own shadows in the playground using the sun, and in the classroom using a torch. They really enjoyed making animals and other funny shapes using their hands, and seeing how they could change the shape of the shadow by moving the torch.

In the next lesson, I asked my students, 'Does a shadow stay the same through the day?' Some of them had noticed that they change, but others had not. I asked, 'How do shadows change?' They weren't sure of the answer, so I asked them to work in small groups to discuss how we could investigate how they changed. The discussion was very lively and they had lots of ideas as to how they could go about this.

In the end, we decided it was easiest to observe the shadow of an object in the playground at different times of the day to confirm our ideas. Each group chose their object in the playground, made a shadow and drew around it with some chalk, marking the spot where they did the measuring so that they could go back to it each time.

The students measured the length and width of their shadow with a rule and noted down the time of day. They also noted where the Sun was in the sky, although I made sure to tell them not to look at the Sun directly. One person in each group drew the shadow in their notebook and noted down the observations they had made.

Over the course of the day, my students went out another three times to do more measurements. I noticed how much they talked about what they were doing and shared their ideas about what would happen next. I used my phone to take photos of them and their shadows throughout the day.



**Figure 3** Drawing shadows with chalk.

Finally, I asked my students to look at their drawings and observations and discuss what they could deduce. Most of my students understood that the shadows changed and moved around, and that it was the position of the Sun in the sky that caused these changes. Others found it easier to see the difference from the photos on my phone.

I was very pleased with the outcome of this activity, because more students this year understood about how shadows are formed and how they change than they did last year, when they learnt from the textbook alone. I think this is because they could changes over time were able to discuss their ideas with their peers.



### Pause for thought

- How did Mrs Latika find out what her students already knew about shadows at the start of her lesson?
- What kinds of things could she learn about her students from observing and listening to them as they worked in their groups over the course of the day?

## Activity 2: Making a sundial

Read through the activity description carefully and prepare a lesson plan that is suited to the ages and abilities of the students in your class.

1. Choose a sunny spot in an outdoor area that is not shady and is free of shadows.
2. Organise your students into small groups of three or four.
3. Choose a tall object that will stand up by itself, such as a brick or bottle of sand, or ask your students to push a thick stick or pole into the ground. Whatever you use, the object needs to be stable and cast a measurable shadow.
4. Tell your students to mark the shadow that is created by the tall object or stick, placing a small stone at the shadow's tip or making a chalk mark. Write the time on the stone or next to the chalk mark.
5. Repeat this activity throughout the day.
6. Ask your students to describe what is happening to the shadows over time. Ask them to explain why they think the shadows are changing.
7. The following day, show your students how to use the sundial to tell the time. Take your students outside at half past the hour and ask them to tell you what the time is.



### Pause for thought

After the lesson, consider the following:

- How did the lesson go?
- Was every child involved?
- What did you notice about individual students as you listened to and watched them engage in the activity in their groups?
- How can you draw on these observations to inform your next lessons?

This example was adapted from the TESS-India Elementary Science unit, 'Observing patterns: shadows and night & day'.

### Developing your practice

Assessing progress and performance features in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep a record of them below. To get you started, assessing progress and performance is featured in the Elementary Science unit, 'Practical investigation: change'.

## 8 Planning lessons

This section of the compendium focuses on ways of enhancing your lesson planning to support your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

### Why planning and preparing are important

Good lessons have to be planned. Planning helps to make your lessons clear and well-timed, meaning that students can be active and interested. Effective planning also includes some in-built flexibility so that teachers can respond to what they find out about their students' learning as they teach. Working on a plan for a series of lessons involves knowing the students and their prior learning, what it means to progress through the curriculum, and finding the best resources and activities to help students learn.

Planning is a continual process to help you prepare both individual lessons as well as a series of lessons, each one building on the last. The stages of lesson planning are as follows:

1. Establish your students' prior learning and current understanding of the topic as a starting point.
2. Decide how you are going to teach in a way that all your students will understand. Be sure to allow for flexibility to respond to how the lesson progresses.
3. After the lesson, reflect on how it went and what your students have learnt in order to inform your future planning.

### Planning a series of lessons

When you are following a curriculum, the first part of planning is working out how best to break up subjects and topics in the curriculum into sections or chunks. You need to consider the time available as well as ways for students to make progress and build up skills and knowledge gradually. Your experience or discussions with colleagues may tell you that one topic will take up four lessons, but another topic will only take two. You may be aware that you will want to return to that learning in different ways and at different times in future lessons, when other topics are covered or the subject is extended.

In all lesson plans you will need to be clear about:

- what you want the students to learn
- how you will introduce that learning
- what students will have to do and why.

You will want to make learning active and interesting so that students feel comfortable and curious. Consider what the students will be asked to do across the series of lessons so that you build in variety and interest, but also flexibility. Plan how you can check your students'

understanding as they progress through the series of lessons. Be prepared to be flexible if some areas take longer or are grasped quickly.

### **Preparing individual lessons**

After you have planned the series of lessons, each individual lesson plan will need to be revisited and adjusted, based on the progress that students have made up to that point. Your aim will be to ensure that all your students make progress and feel successful and included. You will know what the intended learning objects are at the end of the series of lessons, but you may need to recap something unexpected or move on more quickly. When planning lessons for large classes, you may need to create different activities and questions and for different groups.

Each lesson plan should allow sufficient time for each activity, and list all the resources that need to be available for practical activities or groupwork.

When you are teaching new topics, you may need to make time to practise and talk through the ideas with other teachers so that you are confident about teaching them.

Think of preparing your lessons in three parts. These parts are discussed below.

#### **The introduction**

At the start of a lesson, explain to the students what they will learn and do, so that everyone knows what is expected of them. Get the students interested in what they are about to learn by allowing them to share what they know already.

#### **The main part of the lesson**

Outline the content based on what students already know. You may decide to use local resources, new information or active methods including groupwork or problem solving. Identify the resources to use and the way that you will make use of your classroom space. Using a variety of activities, resources and timings is an important part of lesson planning. If you use various methods and activities, you will reach more students, because they will learn in different ways.

#### **The end of the lesson to check on learning**

Always allow time (either during or at the end of the lesson) to find out how much progress has been made. Checking does not always mean a test. Usually it will be quick and on the spot – such as planned questions or students presenting what they have learnt – but you must plan to be flexible and to make changes according to what you find out from the students' responses.

A good way to end the lesson can be to return to the goals at the start and allowing time for the students to tell each other and you about their progress with that learning. Listening to the students will make sure you know what to plan for the next lesson.

## Reviewing lessons

Look back over each lesson and keep a record of what you did, what your students learnt, what resources were used and how well it went so that you can make improvements or adjustments to your plans for subsequent lessons. For example, you may decide to:

- change or vary the activities
- prepare a range of open and closed questions
- have a follow-up session with students who need extra support.

Think about what you could have planned or done even better to help students learn.

You cannot predict everything that will happen in a lesson, so you need to be prepared to adapt your plans and respond flexibly to what you find out about your students' actual learning and progress.

## Example applications

Planning lessons is relevant to all curricular areas.

The following examples demonstrate some of the ways in which planning lessons can be applied in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages. To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

Please be sure to use the lesson planning template required in your school or state when integrating these techniques into your practice.

### Example 1: Planning different activities around a text

This example shows how you can plan an English lesson to meet students' different language learning needs using a single story or poem. With other subjects you could use another kind of text, such as a newspaper article. Each group of students should work on activities suitable for their level, with all the activities being linked to the same text.

In Case Study 1, a teacher plans multiple activities linked to a familiar story.

## Case Study 1: Mythili plans multiple activities around a text for an English language class

*Mythili teaches a large mixed age group of students in Classes I, II and III.*

In my class there are students of different ages and English language levels. Instead of giving different language books to different groups, I plan learning activities based on one story that each group can achieve at their level.

All my students love the story of 'The Puri Boy' [see the additional resource below]. For this story, I planned four activities for students at different language levels. I put the students into groups and set them their distinct tasks. The less advanced students worked with me and the more advanced students worked independently. This was a good skill for them to learn.

Here are my activities for 'The Puri Boy'. Can you guess which groups worked with me, and which groups worked independently?

1. Extend the story orally with pictures, introducing other animals such as a dog, goat, ox, bullock, elephant or monkey, along with the sounds they make. The students then tell me the names of these animals in their mother tongue.
2. Read these phrases from the board and practise other action words:
  - Run, run, as fast as you can
  - Jump, jump, as high as you can
  - Skip, skip, as far as you can
  - Walk, walk, as far as you can

To ensure that students with physical disabilities do not feel excluded, these phrases can also be used:

- Eat, eat as much as you can
  - Clap, clap as loud as you can
  - Sleep, sleep as long as you can
3. Word search: students identify other words hidden in these words: 'catch', 'woman', 'late', 'fast' and 'dough'. Less advanced level students match pictures and words.
  4. Practise and write English dialogue in pairs: one student is the talking puri and the other student talks to the puri. Start by using the words and phrases of the story, and try out other English phrases such as 'Oh no! Don't eat me! I will run away!'

I always plan some extension activities for students to do, such as:

- Extending the story or devising different endings: the students can say or write what would happen if the fox didn't eat the puri boy.

- Creating new characters such as a talking car, a talking doll, or a talking chapati, and telling or writing new stories with these new characters.

Finally, I plan activities for the whole class to do. This brings the learning together for everyone:

- Mask making: draw on a sheet of paper any character from the story. Cut out the eyes. Punch a hole on either side of the mask. Thread the holes and knot up the ends. Learn additional vocabulary reinforced through craft instructions, e.g. 'draw', 'cut', 'string', 'eyes', etc. Label craft resources in English.
- Playscript writing: dialogue between characters, acting out the story using the new characters, the new action words and the masks.

My students do not get bored returning to the same story. Planning different activities around one story gives them – and me – repeated opportunities to practise English using a familiar and playful theme. With multiple activities around a text, my students have time to develop confidence in using English and I have assessment opportunities when I work with groups.



### Pause for thought

- Do you think your students would enjoy this kind of story-based lesson? Why or why not?
- Which of these ideas could you use with your class?
- What are the difficulties for you, as a teacher, in organising such lessons?

Now plan your own multiple activity lesson using the ideas below to guide you.

### Activity 1: Planning multiple activities with a story

Do this activity with a colleague if possible. Use the short story below or choose one from your own English textbook.

#### 'Raja'

Raja called Shyama to come and play with him. Shyama said that he had to work and could not play. Raja went to a field with a ball. Raja saw honey bees and called them to play. The honey bees said they could not play as they had to work. He then saw ants. Raja called out, 'Ants! Ants! Come let us play!' 'No, we cannot play. We have to work,' said the ants. Raja went home. He helped his father at work. Father said, 'You are a good boy.' Raja felt happy.

Brainstorm and list possible activities based on the story of Raja's search for playmates. Think about activities that might involve the following elements:

- art and craft
- games
- drama, dialogue or role plays
- reading and writing
- links to other subjects, using English.

As you do this, think about the language level of your students. How could the activities support their learning? Which English words do you want them to practise?

Here are the activities from a group of Class III teachers. All the activities use the story of Raja. In each activity, there is an emphasis on reading, writing or speaking English.

- **Craft activity:** Make insect and animal masks. For a sight-impaired or blind student in the class, other students can outline the masks for them. Label tools and materials (mask, paper, scissors, paint, string) in English.
- **Drama or role play:** Act out the dialogue, adding other animals and friends of Raja using the masks made in the craft activity. Practise English pronunciation and speaking.
- **Reading and vocabulary development:** Read the story aloud together from the chalkboard or the textbook, looking at the sentences 'Come let us play' and 'No, we cannot play'. Substitute and read together different words in the sentences, such as 'Come let us dance', 'Come let us cook' or 'Come let us sing', and 'No, we cannot dance/cook/sing'. Focus on new vocabulary.
- **Writing:** Draw a series of scenes from the story with speech bubbles and write in the dialogues. Students with writing difficulties are encouraged to label the scenes. Encourage attempts to write in English.
- **Links to other subjects:** Use English to describe insect and animal habitats, and differences between insects and mammals. Use English beyond the language lesson.

Now choose no more than three activities that you feel you could implement using a short story or a poem. Choose a text that you and your students will enjoy. Plan some activities that you feel confident doing with students.

You might feel more confident about using a craft or a game, or you might feel more secure with a reading activity. When you have chosen a story and thought of some activities, discuss your ideas with your colleagues. Revise your ideas in light of their feedback.

Before you try the lesson think about the following issues:

- How will you group your students?
- Will different groups do different activities or will they all do the same activities?
- Which groups will you try to support most? Can you use students with higher literacy levels to support other students?
- How will you organise your classroom space? Is there enough room or will some groups have to go outside?

How will you ensure that students with special learning needs and students with disabilities can participate?



### Pause for thought

- Did your students work well together in their groups? Might you change the composition of any of the groups next time?
- Did your students enjoy the activities?
- How could you use these types of activities in other lessons?

### Additional resource

#### 'The Puri Boy'

Once upon a time, an old woman and her husband lived alone in a little old house. They had no children. One day the woman made a puri shaped like a boy. She carefully rolled out the dough, and cut out a very nice-looking boy. What a fine looking boy he was!

The old woman put him in the pan full of hot oil, to fry. After he was fully fried and fluffy, she carefully lifted him from the pan. Up jumped the puri boy, and he ran out the door saying, 'Run, run, as fast as you can! You can't catch me! I'm the puri boy!'

The old woman and the old man ran after him, but they could not catch him.

And so the puri boy ran and ran. While he was running, he met a cow.

'Moo,' said the cow. 'You look very fine! Fine enough to eat!' and the cow started to chase the little boy.

But the puri boy ran faster, saying, 'I ran away from an old woman, I ran away from an old man, and I can run away from you!'

And he laughed, 'Run, run, as fast as you can! You can't catch me! I'm the puri boy!'

The cow ran after the puri boy, but it could not catch him.

While he ran, he met a cat.

'Meow,' said the cat. 'You look good enough to eat. I'm going to eat you, puri boy.'

But the puri boy just laughed, 'I ran away from an old woman, I ran away from an old man, I ran away from a cow, and I can run away from you!'

And so he ran singing, 'Run, run, as fast as you can! You can't catch me! I'm the puri boy!'

The cat ran after the puri boy, but it could not catch him. The puri boy was proud that he could run so fast.

'Nobody can catch me,' he thought. So he kept on running until he met a fox. He wanted to tell the fox how he ran faster than all the others.

'Mr Fox,' he said, 'I ran away from an old woman, I ran away from an old man, I ran away from a cow, I ran away from a cat, and I can run away from you.'

'Why would I want to eat you?' asked Mr Fox. 'I do not like puris.'

The puri boy was happy to hear this. He stopped running. Immediately, the fox ate him up. The fox said, 'Sorry, puri boy – I do like puris.'



### Video: planning lessons

The following link illustrates how a teacher focuses on planning lessons in an Elementary English lesson:

<https://www.youtube.com/watch?v=6aar5yh3Ok&index=11&list=PLlJfVZ89nnNI7IEZRdanOTVxzuosUW0Bp>

This example was adapted from the TESS-India Elementary English unit, 'Planning around a text'.

### Example 2: Planning a classroom investigation

Investigations are common in science or environmental studies but can be included in other subject lessons too. Investigations encourage students to be curious, to ask questions and to explore the world around them. They can be both memorable and enjoyable. However, investigations need careful planning to be successful.

The following activity – from an Elementary Science unit – is concerned with the study of germination, but the questions can be used to help you plan a classroom investigation on any subject.

## Activity 2: Planning an investigation

You are going to set up an investigation with your students to explore what seeds need in order to germinate. You will involve all your students in as many aspects of this investigation as possible. To do this, a list of questions has been provided below that will guide you through the main things you need to think about. You need to read this and then plan what you have to do before the first lesson when you plant the seeds. Think too about how you will follow up the growth (or not) of the seeds over time.

Now consider these questions:

1. What do you want your students to learn about the topic?
2. Over how long will you undertake the investigation? How will you structure each lesson? What resources do you need? How can you get these?
3. How could your students help you to find the resources needed?
4. How will you organise distribution of resources?
5. How will you involve your students in the design of the investigation and the controlling variables?
6. How will you organise your students during the lesson(s)? In pairs or groups?
7. How will they record the investigation and share their findings? This could be done in their books, on a poster or in the form of a presentation. You could use your mobile phone to record them talking about their investigation.

Write out your plan for an investigation about germination and set a date to start it.



### Pause for thought

- Having written out your plan, do you have a clear idea in your mind about how you will organise the investigation?
- How will you ensure that all your students are able to participate? Do you need to make any adjustments for students with disabilities?
- Are you prepared to be open to your students' ideas as they explore this topic?
- Can you think of any topics that lend themselves to investigation in other subject areas?

This example was adapted from the TESS-India Elementary Science unit, 'Developing the learning environment'.

### Example 3: Incorporating flexibility in your lesson plan

When planning a lesson, you should take your students' prior learning and current understanding of the topic as a starting point, as this is what you will need to build on. You should also think back to when you taught the topic to another class and try to recall the aspects of the topic that those students found difficult. How could you make these clearer

and more accessible? However, all students are different, and it is not always easy to predict the challenges that individuals may encounter in any given lesson. You may need to adapt your lesson plan and allow them time to discuss their uncertainties or to explore any ideas that they are puzzled by.

This example from Elementary Maths illustrates how to approach planning lessons concerned with area and perimeter. The questions can be used for any topic in maths and in other subjects.



### Pause for thought

Think about your life outside the maths classroom. Where else do you need to work with the concepts of area and perimeter? Note down some examples.

- Do you think your students might have similar experiences?
- What knowledge and misunderstandings might your students bring into the maths lesson from their lives outside it?

Although the concepts of area and perimeter are widely used in everyday life, students often find them confusing when they encounter them in maths lessons. Some of the issues that students have about learning about area and perimeter are as follows:

- They may not link their everyday experiences and intuitive understanding of area and perimeter to what they learn in the maths classroom.
- They may see area, and sometimes perimeter, as purely an application of formulae without understanding what area and perimeter actually are.
- They sometimes mix up the concepts of area and perimeter.
- They may have difficulty developing an understanding of dimension. Often they do not understand that perimeter is a length, which is one-dimensional and measured in units of length such as metres, centimetres or inches, while area is measured in squares with bases of a certain length and hence is expressed in two-dimensional units such as  $\text{m}^2$  (metres squared, or square metres).
- They may not know why it is better to use standard units of measurement, such as centimetres and metres, instead of unconventional units of measurement such as handspans or twigs, which are less reliable because they vary.



### Pause for thought

Think back to when you taught area and perimeter on a previous occasion.

- Do you remember your students having any of the difficulties described above?
- Think about specific students in your class who you think might have experienced some of these difficulties. How could you tell? Thinking of a particular student might help you to spot similar issues more easily in future with other students.

In Case Study 2, a teacher describes a lesson on teaching perimeter. Note where you think she has changed her lesson plan to ensure that she gives time to talk about her students' uncertainties with the concept of perimeter.

### Case Study 2: Mrs Aparajeeta's lesson on perimeter

When I asked my students to point out perimeters and areas in the classroom, I was surprised that they did not say 'this is the perimeter of the door' and point at the edges of the door. Instead, a few students explained how to calculate the perimeter and others looked a bit bewildered.

I really needed to prompt them and give an example myself before they could say 'this is the perimeter of the door' or 'the perimeter of the blackboard would be this', and use their hands and fingers to indicate and point this out. By spending some time on this, the other parts of the activity went very smoothly and I had the impression that most of the students now understood what they were talking about and understood better their methods for finding out the perimeter.

After this introduction, I asked them to find the perimeter of objects around them. They were all very enthusiastic and took some items from their bags to find the perimeters. One student, Dheeraj, was trying to find the perimeter of his pencil. He took a piece of thread and tried to wrap it round the pencil to get the answer, so I asked him to note down the difficulty he had in doing this and explained that we would discuss this with the rest of the class.

Then we had a lively discussion about the items the students had found the perimeters of, and how they had gone about finding the answer. At that point I asked Dheeraj to share his predicament with the rest of the class. While discussing it, the discussion moved to the observation that perimeter relates to dimensions and solids, with students suggesting examples such as faces, cross-sections, etc. I was amazed by my students' ability to express themselves and come up with mathematical ideas and theories themselves – even those who are usually shy and quiet.



### Pause for thought

Dheeraj's attempt to find the perimeter of the pencil led to a discussion that went beyond Mrs Aparajeeta's original lesson plan. What do you think are the advantages or disadvantages of allowing students' discussion to move in a different direction? What might be the implications of this for planning future lessons?

Now think about a recent lesson with your own class and reflect on the following questions:

- How did it go with your class?
- What questions did you use to probe your students' understanding of the topic?
- What points did you feel you had to reinforce?
- Did any of your students do something unexpected, or take a different approach that prompted rich discussion with the rest of the class?
- Were there ideas that some of the students struggled to understand?
- How could you help them?

When you do activities with your class, reflect afterwards on what went well and what went less well. Consider the questions that led to your students being interested and able to progress, and those you needed to clarify. If students do not understand and cannot do something, they are less likely to become involved. Use this reflective exercise every time you undertake an activity, noting, as Mrs Aparajeeta did, that small things can make a difference to students' learning.

This example was adapted from the TESS-India Elementary Maths unit, 'Using rich tasks: area and perimeter'.

### Example 4: Planning a project

A thematic project is intended to span a number of lessons over a period of several weeks. Thematic projects can be used in any subject. It is important to be clear about the learning objectives for your students, so such projects need very carefully planning.

The following activity, from a Language and Literacy unit, can help you to choose a topic for a class project that can relate to any subject area.

#### Activity 3: Identifying a topic for a project

A good starting point for a project is the community of the school.

With a colleague, make a list of possible citizenship-related topics for your class. Your list is likely to be tailored to your school and community context; however, we have suggested some topics below:

- how to make the school more attractive
- keeping the village clean
- obtaining blankets for new born babies or for elderly people in the village
- helping lonely, disabled and sick people in the community
- organising a sale of items to raise money for a local cause
- collecting children's books for the anganwadis, schools or homes in the area
- recycling paper, food or household items that are no longer used
- addressing local problems of dumping waste
- saving energy
- conserving water
- preventing water-borne diseases
- improving healthcare for girls and women, including recruiting more female healthcare workers
- female – rather than male – students having to do household chores and not being able to play freely outside
- the problem of animals being hunted to extinction
- the impact of current and future climate changes upon the environment
- promoting the use of local minority languages.

Which topics in the list would be most suitable for you and your class? Some of the factors to consider when choosing a topic are:

- whether the topics are age-appropriate, relevant and interesting to all your students
- how far they align with the content of your school curriculum
- what subjects – such as maths, environmental studies, science or social studies – they embrace
- whether the topics are overly sensitive or controversial
- how confident and comfortable you are in investigating them with your class.

Now list the subject related opportunities that your selected topics lend themselves to. Here are some suggestions that relate to language and literacy learning:

- reading newspapers or other texts to understand the issue and its causes
- interviewing a local person
- organising a debate
- writing a class letter to a politician or newspaper editor
- creating and distributing leaflets or posters
- organising an awareness-raising campaign, starting a petition or devising a fundraising initiative
- writing a play on the issue to present to the other students in the school or to members of the local community.

Once you have identified the topic, the learning objectives and the activities of the project, you are ready to start making detailed plans as to how to execute the associated lessons.

#### **Activity 4: Making detailed plans for multiple activities**

Multiple activities work well when planning is detailed and flexible. Here are some points to consider.

##### **Timing**

How much time will you need for each activity, including time needed for giving instructions, grouping students, moving equipment and distributing resources?

Activities should be planned over two or more periods, or on different days of the week. Look at the school calendar to find a suitable time to do the activities without interruption.

##### **Language development**

Make the activities into opportunities for language learning. This is valuable for all subjects. What words or phrases do you want students to practise? How will you make sure these are used? Make a list of these words and phrases. You could display them in your classroom either on the board or on a poster. These might be words in Hindi or English, or terms associated with maths, science or other subjects.

##### **Classroom space and organisation**

You might need to change the way your classroom is set up. Do you need to move chairs or desks? Students can help you to do this. How will you organise the students to start, stop or change from one activity to another? Practise words and phrases to organise students and get their attention. Here are a few examples:

- 'Turn around and face each other.'
- 'Turn your chairs around.'
- 'Form a circle.'
- 'Move around quietly.'
- 'Listen to me.'
- 'Is everyone ready?'
- 'Please stop and look at me.'
- 'It's time to stop now.'

Now note down some phrases of your own related to your activity, your classroom and your students. Practise these at home or with a colleague.

##### **Resources and classroom management**

Make a list of the resources that you will need. How will you organise the distribution of the resources? For example, you could:

- lay out the resources on tables beforehand and instruct your students as to how many of them should stand at each table
- tell your students to group themselves and assign one member of each group to pick up the resources
- call out names of students and ask them to collect the resources.

You should now have a very detailed plan for multiple activities based on a story or other text, covering timing in the lessons, the language you will use and encourage your students to use, and the resources needed.

Review and discuss your plan with a colleague, reworking it if necessary.



### Pause for thought

- What comments did your colleague have on the plan you devised? How will you amend it following their review?
- Would it be helpful to involve parents or other community members in the project?
- How could you record what happens in the project to share with parents?



### Video: planning lessons

The following link illustrates how a teacher focuses on planning lessons in an Elementary Language and Literacy lesson:

<https://www.youtube.com/watch?v=c32omKeRw78&index=10&list=PLljfVZ89nnNI7IEZRdanOTVxzuosUWOBp>

This example was adapted from the TESS-India Language and Literacy unit, 'Language, literacy and citizenship'.

### Developing your practice

Planning lessons features in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep an ongoing record of your TESS-India learning trajectory. To get you started, planning lessons is featured in the Elementary Language and Literacy unit, 'Authentic writing'.



## 9 Using local resources

This section of the compendium focuses on ways of enhancing your use of local resources to support your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

### Why using local resources is important

Many learning resources, other than just textbooks, can be used in teaching. Ways of learning that use different senses (visual, auditory, touch, smell, taste) will help all students participate in learning. There are resources all around you that you could use in your classroom, and that could support your students' learning. Any school can generate its own learning resources at little or no cost. By sourcing these materials locally, connections are made between the curriculum and your students' lives.

You will find people in your immediate environment who have expertise in a wide range of topics, and you will also find a range of natural resources. This can help you to create links with the local community, demonstrate its value, stimulate students to see the richness and diversity of their environment, and – perhaps most importantly – work towards a holistic approach to student learning: that is, learning inside and outside the school.

### Making the most of your classroom

People work hard to make their homes as attractive as possible. It is worth thinking about the environment that you expect your students to learn in. Anything you can do to make your classroom and school an attractive place to learn will have a positive impact on your students.

You can do plenty of things to make your classroom interesting and attractive for students – for example:

- making posters from old magazines and brochures
- bringing in objects and artefacts related to the current topic
- displaying your students' work
- changing the classroom displays to keep students curious and prompt new learning.

### Using local experts in your classroom

If you are doing work on money or quantities in maths, you could invite market traders or dressmakers into the classroom to come to explain how they use maths in their work. Alternatively, if you are exploring patterns and shapes in art, you could invite maindi (wedding henna) designers to the school and ask them to explain the different shapes, designs, traditions and techniques in their work. Inviting guests works best when the link with educational aims is clear to everyone and there are shared expectations of timing.

You may also have experts within the school community (such as the cook or the caretaker) who can be shadowed or interviewed by students related to their learning; for example, to find out about quantities used in cooking, or how weather conditions affect the school grounds and buildings.

### Using the outside environment

Outside your classroom there is a whole range of resources that you can use in your lessons. You could collect (or ask your class to collect) objects such as leaves, spiders, plants, insects, rocks or wood. Bringing these resources in can lead to interesting classroom displays that can be referred to in lessons. They can provide objects for discussion or experimentation, such as an activity in classifying living or not-living objects. Bus timetables or advertisements may be readily available and relevant to your local community, and can be turned into learning resources by setting tasks to identify words, compare qualities or calculate journey times.

Objects from outside can be brought into the classroom – but the outside can also be an extension of your classroom. There is usually more room to move outside and for all students to see more easily. You could take your class outside to learn activities such as:

- estimating and measuring distances
- demonstrating that every point on a circle is the same distance from the central point
- recording the length of shadows at different times of the day
- reading signs and instructions
- conducting interviews and surveys
- locating solar panels
- monitoring crop growth and rainfall.

Outside, their learning is based on realities and their own experiences, and may be more transferable to other contexts.

If your work outside involves leaving the school premises, before you go you need to obtain the school leader's permission, plan timings, check for safety and make rules for the day clear to the students. You and your students should be clear about what is to be learnt before you depart.

### Adapting resources

You may want to adapt existing resources to make them more appropriate to your students. These changes may be small but could make a big difference, especially if you are trying to make the learning relevant to all the students in the class. You might, for example, change place and people names if they relate to another state, or change the gender of a person in a song, or introduce a child with a disability into a story. This can make the resources more inclusive and appropriate to your class and their learning.

It's good to work with your colleagues on this, because you will have a range of skills between you to generate and adapt resources. One colleague might have skills in music, another in puppet making or organising outdoor science. You can share the resources you use in your classroom with your colleagues to help you all generate a rich learning environment in all areas of your school.

### Example applications

This use of local resources is relevant to all curricular areas.

The following examples demonstrate some of the ways in which local resources can be used in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages. To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

### Example 1: Creating a print-rich classroom

Students take their first steps towards literacy when they become aware that the printed material they see around them carries meaning. 'Environmental print' at home and in the community is often the first writing that students learn to read. This is the writing that is part of everyday life, such as writing we see all around us on signs, tickets, newspapers, packets and posters. When students come to school, they see new forms of environmental print: charts, lists, schedules, labels and all kinds of reading material. Teachers can make good use of these low-cost community and school resources, be these in English, Hindi or a community language.

#### Case Study 1: Ms Pillai creates a print-rich English and Hindi classroom environment

When I first became a primary school teacher, I was given Class I. Most of the students were first-generation learners. I felt I had full responsibility for the students' literacy development. Using part of my allocation to purchase teaching and learning materials (TLM), I bought coloured paper, marker pens, glue, and some scissors,

Then I sought the help of my students, my most important resource in the teaching and learning process. I asked them to get any print materials they could lay their hands on. I was amazed by what they brought into the classroom: film posters, advertisements, recycled magazines and newspapers, food packets, festival greeting cards, political leaflets, mobile phone instructions, computer and printer instructions, and health announcements. The print material that students brought also reflected their interests, things they wanted to know or read, and things they were curious about, such as the examples in Figure 1.



**Figure 1** Examples of print materials.

With these resources, we began to develop the classroom's print environment.

Students used scissors to cut letters and words from the print material they had brought in. While they built words and short sentences with my help in Hindi, I wrote out the English equivalents. We compared the same words in the two different languages, and in different scripts:

house	ghar	घर
teeth	dant	दाँत
father	baap	बाप
mother	maa	माँ

This activity was also good for the development of students' fine motor skills and eye-hand coordination. We also copied out letters and words in English and Hindi, and displayed these with drawings to illustrate the words. We made a word wall of our favourite and most interesting words.

All this was very encouraging for me as a new teacher. My students learned that words are symbols for people, places and things in their world. They increased their vocabulary and they developed confidence as bilingual students. I also gained more confidence in using English in the classroom.



### Pause for thought

- What kinds of resources do you have in your local environment?
- How can you do something similar with your students – perhaps focusing on different subjects and topics?
- How could you ensure that all your students were learning from it?



### Video: using local resources

The following link illustrates how a teacher focuses on using local resources in an Elementary English lesson:

<https://www.youtube.com/watch?v=W1FGKhNLBIM&list=PLlIfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=46>

This example was adapted from the TESS-India Elementary English unit, 'The learning environment'.

### Example 2: Outdoor learning

Children have a natural tendency to explore their world spontaneously. The outdoor school environment and beyond has the potential to offer real-world, hands-on experiences that will engage students and stimulate their thinking. Outdoor learning is relevant to all subjects but lends itself very well to a number of elementary science content areas.

#### Activity 1: Exploring the local area for additional learning resources

In this planning activity you are going to use your local environment to develop your students' understanding of environmental issues. You may wish to do this with a colleague.

Go outside and walk around your school grounds and the local area. As you walk, make a list of the areas that have the potential to provide outdoor learning opportunities to support the elementary science curriculum, especially environmental studies. Think about how you might be able to use these areas. For example, which areas could you use to investigate the structure of plants and the different habitats that they live in?

### Case Study 2: A resourceful school

*Mrs Nagaraju, a teacher in a small school, describes how she and her colleagues discussed how they could do to be more resourceful in using the local environment to enhance their lessons.*

Our Principal is a very good teacher who regularly uses the local environment to enhance his lessons.

As part of our weekly meeting, he asked us as a group to think how we could use the local environment more regularly in our teaching. As we talked, he listed our ideas and this exchange of ideas stimulated more and more suggestions of how to use the local area. Our ideas included:

- taking students out to explore such things as the flora and fauna
- mapping the area
- measuring the school buildings and site for different purposes
- gathering resources from the environment to use in the classroom
- developing trails to investigate different things

- looking at habitats
- studying shadows and the sun, etc.
- using local experts to speak to students at school or in their settings/work
- looking at local conservation issues
- collecting and recycling materials to supplement our lack of paper, such as using card from the boxes and saving and reusing envelopes.

I had not thought about such possibilities before and I was quite excited at the list and the prospect of trying out some of these ideas. Our next task was to look at how and when we could go about this.

First, we agreed to encourage our students to help us gather some materials from the local area and we put up a list of things for them to search for over the next few weeks.

Second, as I was about to start teaching deforestation with my Class VII, I asked the Principal's permission to invite the local forest manager to come in and talk to my students about the problems he faced.

I went home to plan my lesson and to think how I would need to brief the forest manager about my learning intentions for my class if he agreed to come.



### Pause for thought

- How does your list from Activity 1 match the ideas in Case Study 2?
- Did the case study suggest other opportunities that you can add to your list? If so, add them now.
- How could mobile phones (and their camera, video and audio recording) complement these ideas?
- How could you develop an initiative in your class, or the school, for collecting materials that could be used to help your teaching and that of your colleagues?



### Video: using local resources

The following link illustrates how a teacher focuses on using local resources in an Elementary Science lesson:

<https://www.youtube.com/watch?v=38QM5nxDSGc&list=PLLjfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=48>

This example was adapted from the TESS-India Elementary Science unit, 'Using the community: environmental issues'.

### Example 3: Involving members of the community in classroom activities

Students learn best when they are engaged in practical, purposeful activities that relate to their everyday lives. They respond well to a variety of different stimuli that engage their senses and curiosity, both inside and outside the classroom. School textbooks cannot offer such a range of learning opportunities, so it is important to supplement them with a range of complementary activities. The advantage of drawing on the print and speech-based resources available in the local environment is that they represent and can generate authentic language use.

#### Case Study 3: A visit from a cotton weaver

*Ms Hena, an elementary teacher in Uttar Pradesh, describes a visit from a guest speaker that she organised for her Class IV students.*

One of the textbook chapters that we had been working on was on the subject of cotton-growing. We have an artisan weaving and printing collective in our village. I thought it might be interesting to invite one of the workers to the class to talk to my students about his craft.

One day, after school, I visited the collective and discussed my idea with Mr Arun, the head weaver [Figure 2]. He was very happy to oblige. I explained to him the ages of the students and the kinds of things they would be interested in. I suggested he bring with him various samples of cloth, different coloured dyes, and some small loom-related items, such as a shuttle, to show them during his talk.



**Figure 2** A weaver.

I then informed my students of Mr Arun's forthcoming visit. They were very excited. To prepare for the visit, I organised my students in groups of four and asked them to think of two questions that they wished to ask Mr Arun about his work and write them in their exercise books. I noticed that my students were very talkative during this activity. This talk was not limited to agreeing the questions, but also involved discussing how best to write them out.

When they had finished, I asked the groups to nominate a member to share their proposed questions with the rest of the class. Rather than write the questions on the blackboard myself, I asked if anyone would like to do so. There were so many offers! I will try to incorporate opportunities for others to do this in my future lessons.

At the end of the feedback session, we had a long list of possible questions. Together, we identified and crossed out any that were very similar and organised the remaining eight into a suitable sequence. To finish, I asked my students to copy the final list of questions into their exercise books.

Some of my students were very keen to ask Mr Arun a question; others seemed shyer. Rather than allocate the questions to particular students in advance, I suggested that all of them prepare to be asked any of the questions by Mr Arun himself during his visit the next day. My students took their homework very seriously that evening.

Mr Arun's visit proved to be a great success. He started with an introduction to his weaving and printing work, illustrating this with samples of cloth and letting my students hold his tools. He then invited random students – some of them more confident, some less so – to ask questions. Because he had already answered some of their anticipated questions during his introductory presentation, some of those that my students had prepared were no longer appropriate. One or two students asked him unplanned questions instead.



### Pause for thought

- What language learning was achieved:
  - in preparing for Mr Arun's visit?
  - during his visit?
- Did it matter that some of the questions the students had planned were no longer relevant?

There are many people in the local and wider community who you could invite to talk to your students about their knowledge, skills and experiences – particularly those that relate to the topics you are covering in class. Planning for and following up such visits can be integrated into a series of lessons.

Consider asking members of the local government or the police force, district health workers, vendors in nearby shops or market stalls, crafts people, mechanics, artists, musicians, farmers or cooks, for example.

Parents or grandparents have much to contribute as well. By talking about what they remember about the past, they can provide students with valuable insights into the history and culture of the area.

Ask your colleagues for suggestions and contacts too.

### Activity 2: Inviting a guest speaker into your classroom

Plan a class visit from a member of the local community. Approach the speaker in person, by phone or in writing, to invite them. If they agree, follow this up with a more detailed discussion about the kinds of things that would interest your students. Agree a date for the visit.

Let your students know about the guest speaker's visit to the school in advance and set aside time for them to prepare some questions that they would like to be answered (see Case Study 3).

Think ahead to the kinds of activities that could usefully follow up the guest speaker's visit. How could you reinforce your students' learning of any new vocabulary associated with the speaker's occupation, for example?

Make sure your students write a thank you letter to the guest speaker afterwards.



### Pause for thought

- What language learning opportunities arose as a result of the guest speaker's visit?
- What kinds of follow-up activities could you do with your students after the visit?
- What forms of internet-based resources could complement these activities?

Visits such as these may be followed by individual or group writing tasks. Your students could write an illustrated account of the visit in their exercise books. Alternatively, they could describe 'a day in the life' of the guest speaker from what they have learned about their work. If a visitor talked about life in the past, students could write a descriptive piece comparing this with the present.

As an alternative or follow-up to having a guest speaker in the classroom, older students might be encouraged to identify members of the community to interview in the locality, making audio or video recordings of such encounters on a mobile phone or other device, if available. By combining the answers from a series of small-group interviews of a

complementary range of people, your students could write a class project considering a local issue from a range of perspectives. You may wish to approach a local newspaper to see if they would consider publishing some of this student work.

Students could also follow up guest visits or interviews with role plays. Working in pairs, one person could take the role of the interviewer, and the other, the interviewee. The role plays could be either unscripted or written out beforehand. They could be performed to classmates or to other classes within the school. Where facilities allow, photos, audio recordings or video recordings are excellent ways of capturing these student performances.



### Pause for thought

Consider the follow-up activities proposed above.

- For each one, indicate with the letter 'S', 'L', 'R' and 'W' whether they involve speaking, listening, reading or writing, or a combination of these skills.
- What other skills do they incorporate?
- What skills did you emphasise in the follow up activities with your students?



### Video: using local resources

The following link illustrates how a teacher focuses on using local resources in an Elementary Language and Literacy lesson:

<https://www.youtube.com/watch?v=V2Vfpr9roT8&list=PLlJfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=44>

This example was adapted from the TESS-India Elementary Language and Literacy unit, 'Using local resources'.

### Example 4: Playing number games with easy-to-find resources

Games are an enjoyable, memorable, inclusive way of supporting the understanding of mathematical and other concepts. Below are three suggestions that draw on local or classroom-based resources. With imagination, you will be able to invent new ones or adapt these to different concepts.

### Activity 3: Using games with your students to teach negative numbers

#### Preparation

This activity has three different ideas to help students appreciate the need for negative numbers as part of the number system. Using all the ideas (not necessarily in the same lesson) will give the students a wider exposure to thinking about negative numbers.

Each activity uses resources that you can find around you in the local community as well as your students.

To illustrate 'positive' and 'negative', try to find pictures of mountains and deep seas, fish, rocks, boats and so on to help you discuss ideas of 'above' and 'below'.

#### The activity

##### Idea 1: Above and below sea level

Draw a large picture, either on a large piece of paper on the wall or on the blackboard. Your picture should show the sea, mountains above the sea, and some space below sea level. Use the pictures that you have collected from magazines or drawn. Suitable items would be a plane, an octopus, a whale, a boat, a house, a car, a fish, etc.

Ask the students where they would place the items on your picture. Encourage them to say 'above the sea level' or 'under the sea level'. When all of the items are stuck on, discuss how high the plane might be and how far under the sea the octopus might be, and so on. Introduce the minus sign to indicate 'under the sea level'.

##### Idea 2: Robot steps

Make a space down the centre of the classroom, ensuring that all the students can see this pathway. Mark its centre with a chalk cross and ask a student to stand on the cross. Tell the class to imagine that the student is a robot who only moves forwards and backwards in a straight line. Use pieces of paper or chalk marks to number paces forward from the cross.

Ask the robot to move to 2, then ask them to move two spaces back. Ask the students to say what number should be put on the cross – hopefully they will say zero.

Ask others to give the robot instructions to move to a certain number and then back to a certain number. Now ask the robot to move to 3 and then move four spaces backwards. They have gone beyond zero! What number can be used to represent one step back from zero? Introduce other numbers beyond zero and ask the students to practise saying negative numbers by telling the robot where to move to.

### Idea 3: A game with benches

Place as many benches as you can across the front of the room and divide the benches into individual seats with chalk lines. Write with chalk a zero on one of the seats (not at the end) and then number the other seats on the benches to the right of zero as 1, 2, 3 and so on. Ask the students how the seats to the left could be numbered. Suggest the negative sign if they do not think of it.

Then play games that involve negative and positive numbers. For example:

- Stand a student behind a seat. The class call out the seat they want the student to move to, for example '5' or '-2' and so on.
- Sit a student on the seat and ask the class to say which seat the student should sit on. Encourage them to use just '3' or '5', and so on for numbers to the right, and 'negative 2', 'negative 4' and so on for numbers to the left of zero.

Next, make the task more difficult. Sit a student on the seat labelled 5 and ask the class what 'move' has to be made to go to seat 2. This is more difficult because 'negative 3' can indicate a position relative to zero and can indicate the action of moving three to the left. Make sure you discuss these two meanings.

Now ask the student to make a move and then ask what move would 'undo' that move.

Use games like this as often as you can to help build your students' confidence. You could stick the numbers to the wall rather than use chairs. In this way your students will use addition and subtraction of negative numbers naturally for the game.

### Case Study 4: Mrs Kapur reflects on using Activity 3

*This is the account of a teacher who tried Activity 3 with her elementary students.*

I remember that my classes developed a dislike for negative numbers because there seemed to be so much to remember and it was easy to get mixed up.

I decided to play some of the games in Activity 3 with them. They already knew about negative numbers so they were quick to say that the octopus would be at negative 8 metres. I drew the picture on paper on the wall with a scale marked positive and negative, and left it there after we had done this brief activity. In the morning many of the students arrived with pictures they had drawn so we put them in their correct places on the big picture and had another occasion to think about positive and negative numbers.

Later in the term we played the bench game. They enjoyed this and, although they sometimes found it hard working out a move that is across the zero – from say 5 to -2 – they practised this a lot just because they wanted to keep playing. I definitely think making the actual moves themselves or instructing others to do so helped them to be able to visualise what was happening when we started to do the exercises on negative numbers in the textbook.

To help make the step to using the textbook even easier, I think I will repeat some of these ideas and then also have discussions with the students about how we could record what we are doing in mathematical notation and write this on the blackboard. Hopefully they will then see how the actions relate to the mathematical notation and sums, and to what is asked in the textbooks.



### Pause for thought

In Case Study 4, Mrs Kapur said that she was thinking about repeating some of the activities and recording the outcomes on the blackboard using mathematical notation and sums. What do you feel might be the advantages of doing this after the students have a lot of experience of the activities and games?

Now think about the following questions:

- How did the activities and games go with your class?
- What responses from students were unexpected? What did these tell you about their understanding of positive and negative numbers?
- What questions did you use to probe your students' understanding?
- What points did you feel you had to reinforce?
- What will you do differently next time you use these activities in your teaching?



### Video: using local resources

The following link illustrates how a teacher focuses on using local resources in an Elementary Maths lesson:

<https://www.youtube.com/watch?v=8qH09KymbWE&list=PLLjfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=47>

This example was adapted from the TESS-India Elementary Maths unit, 'Using a number line and the expression "Imagine if ...": positive and negative numbers'.

### Developing your practice

Using local resources features in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep a record of them below. To get you started, using local resources is featured in the Elementary Maths unit, 'Using manipulatives: decomposition and regrouping'.



## 10 Storytelling, songs, role play and drama

This section of the compendium focuses on ways of enhancing the use of storytelling, songs, role play and drama to support your elementary classroom practice.

For guidance on how to use this and other sections of the compendium, please refer to 'How to use this compendium' (pp. 6–7).

### Why using storytelling, songs, role play and drama is important

Students learn best when they are actively engaged in the learning experience. Your students can deepen their understanding of a topic by interacting with others and sharing their ideas. Storytelling, songs, role play and drama are some of the methods that can be used across a range of curriculum areas, including maths and science.

### Storytelling

Stories help us make sense of our lives. Many traditional stories have been passed down from generation to generation. They were told to us when we were young and can explain some of the rules and values of the society that we were born into.

Stories are a very powerful medium in the classroom that can:

- be entertaining, exciting and stimulating
- take us from everyday life into fantasy worlds
- be challenging
- stimulate thinking about new ideas
- help explore feelings
- help to think through problems in a context that is detached from reality and therefore less threatening.

When you tell stories, be sure to make eye contact with your students. They will enjoy it if you use different voices for different characters and vary the volume and tone of your voice by whispering or shouting at appropriate times, for example. Practise the key events of the story so that you can tell it orally, without a book, in your own words. You can bring in props such as objects or clothes to bring the story to life in the classroom. When you introduce a story, be sure to explain its purpose and alert students to what they might learn. You may need to introduce key vocabulary or alert them to the concepts that underpin the story. You may also consider bringing a traditional storyteller into school, but remember to ensure that what is to be learnt is clear to both the storyteller and the students.

Storytelling can prompt a number of student activities beyond listening. You can ask them to note down all the colours mentioned in the story, draw pictures, recall key events, generate dialogue or change the ending. They can be divided into groups and given pictures or props to retell the story from another perspective. By analysing a story, students can be asked to identify fact from fiction, debate scientific explanations for phenomena or solve mathematical problems.

Asking your students to devise their own stories is a very powerful tool. If you give them structure, content and language to work within, the students can tell their own stories, even about quite difficult ideas in maths and science. In effect they are playing with ideas, exploring meaning and making the abstract understandable through the metaphor of their stories.

## Songs

Using songs and music in the classroom may allow different students to contribute, succeed and excel. Singing together has a bonding effect and can help to make all students feel included because individual performance is not in focus. The rhyme and rhythm in songs makes them easy to remember and helps language and speech development.

You may not be a confident singer yourself, but you are sure to have good singers in the class that you can call on to help you. You can use movement and gestures to enliven the song and help to convey meaning. You can use songs you know and change the words to fit your purpose. Songs are also a useful way to memorise and retain information – even formulas and lists can be put into a song or poem format. Your students might be quite inventive at generating songs or chants for revision purposes.

## Role play

Role play is when students have a role to play and, during a small scenario, they speak and act in that role, adopting the behaviours and motives of the character they are playing. No script is provided but it is important that students are given enough information by the teacher to be able to assume the role. The students enacting the roles should also be encouraged to express their thoughts and feelings spontaneously.

Role play has a number of advantages, because it:

- explores real-life situations to develop understandings of other people's feelings
- promotes development of decision making skills
- actively engages students in learning and enables all students to make a contribution
- promotes a higher level of thinking.

Role play can help younger students develop confidence to speak in different social situations, for example, pretending to shop in a store, provide tourists with directions to a local monument or purchase a ticket. You can set up simple scenes with a few props and signs, such as 'Café', 'Doctor's Surgery' or 'Garage'. Ask your students, 'Who works here?', 'What do they say?' and 'What do we ask them?', and encourage them to interact in these areas, observing their language use.

Role play can develop older students' life skills. For example, in class, you may be exploring how to resolve conflict. Rather than use an actual incident from your school or your community, you can describe a similar but detached scenario that exposes the same issues. Assign students to roles or ask them to choose one for themselves. You may give them planning time or just ask them to role play immediately. The role play can be performed to

the class, or students could work in small groups so that no group is being watched. Note that the purpose of this activity is the experience of role playing and what it exposes; you are not looking for polished performances or Bollywood actor awards!

It is also possible to use role play in science and maths. Students can model the behaviours of atoms, taking on characteristics of particles in their interactions with each other or changing their behaviours to show the impact of heat or light. In maths, students can role play angles and shapes to discover their qualities and combinations.

## **Drama**

Using drama in the classroom is a good strategy to motivate most students. Drama develops skills and confidence and can also be used to assess what your students understand about a topic. A drama about students' understanding of how the brain works could use pretend telephones to show how messages go from the brain to the ears, eyes, nose, hands and mouth, and back again. Or a short, fun drama on the terrible consequences of forgetting how to subtract numbers could fix the correct methods in young students' minds.

Drama often builds towards a performance to the rest of the class, the school or to the parents and the local community. This goal will motivate students and give them something to work towards. The whole class should be involved in the creative process of producing a drama.

It is important to consider differences in confidence levels. Not everyone has to be an actor; students can contribute in other ways (organising, costumes, props, stage hands) that may relate more closely to their talents and personality. You also need to think about why you are using drama to help your students learn. Is it to develop language (e.g. asking and answering questions), subject knowledge (e.g. environmental impact of mining), or to build specific skills (e.g. team work)? Be careful not to let the learning purpose of drama be lost in the goal of the performance.

## **Example applications**

Storytelling, songs, role play and drama are relevant to all curricular areas.

The following examples demonstrate some of the ways in which storytelling, songs, role play and drama can be applied in an elementary classroom context. While the examples relate to specific subjects, namely Language and Literacy, English, Maths, and Science, the techniques are adaptable to different subjects and topics, and to children of different ages. To gain the greatest benefit, it is important that you engage fully with both the practical activities and the reflective tasks that are included.

### **Example 1: Using rhymes, poems and songs to support language development**

Rhymes, poems and songs can help to build students' confidence in using language, whether this be Hindi, a community language or English. They are a fun, inclusive way to expand students' early vocabulary, and they introduce simple sound and sentence patterns.

Here is an example of a children's rhyme in English:

One, two, three-four-five  
Once I caught a fish alive  
Six, seven, eight-nine-ten  
Then I let it go again.

What vocabulary, sentence patterns and sound patterns does this rhyme teach? Compare your ideas with ours:

- **Rhyming words and sound patterns:** The rhymes are 'five' and 'alive', and 'ten' and 'again'. You can help students to learn more words that rhyme with these pairs, e.g. 'dive', 'hive' and 'arrive' (they may notice also that 'give' does not rhyme with 'five'), and 'men', 'hen', 'pen', 'when' and 'then'.
- **Vocabulary:** The number names for one to ten; 'alive' (opposite of dead); 'again' (once more, to repeat).
- **Sentence patterns:** These include 'let ...' (allow, permit) and 'once ...' (to speak about an incident in the past). You can demonstrate to students and teach them how to use words like these in different ways. Encourage and help students speak about what they want to do and what has happened, using 'let ...' and 'once ...'. For instance: 'Let it go!'; 'Let us out!'; 'Let me play!'; 'Let her speak!'; 'Let me come in!'; 'Let the baby sleep!'; 'Once upon a time ...'; 'Once I got lost'; 'Once I ate ten rotis!'; 'Once I saw a crocodile'; 'Once I found a baby bird'.

### Activity 1: Using poems or rhymes in English

This is a planning activity for you to undertake in preparation for an English lesson.

Choose a short poem, rhyme or song in English that would be suitable for your students. You may find one in your English textbook, or in a book of nursery rhymes or children's poems. Two sample poems are provided below.

Practise saying or singing it in English. Think about some appropriate gestures or actions that could accompany it and practise doing these too.

In the poem you chose, make sure you can identify:

- the rhyming words and sound patterns
- the sentence patterns
- the key vocabulary.

Make a plan to use the poem with your students. Think about how you will teach it.

What resources will you need? For example, will you use pictures or word cards to help students understand? Where will you teach it – inside the classroom or outside?

When you are ready, try out the poem with your students.



### Pause for thought

After the lesson, consider the following questions:

- Did your students enjoy this activity? How do you know?
- Was your choice of poem and the accompanying actions suitable for all your students? Is there any way you would adapt it next time to ensure this?
- What did your students learn from reciting the poem? How can you reinforce their learning in a subsequent lesson?
- How could you use songs and poems in other subject areas? Can you think of any suitable Hindi ones to use in an environmental science lesson, for example?

### Additional resources

#### ‘Action Song’

Hop a little, jump a little  
One, two, three  
Run a little, skip a little  
Tap one knee  
Bend a little, stretch a little  
Nod your head  
Yawn a little, sleep a little  
In your bed!

#### ‘Wiggles’

I wiggle my fingers  
I wiggle my toes  
I wiggle my shoulders  
I wiggle my nose  
Now no more wiggles  
Are left in me  
And I will be  
As still as can be.



### Video: storytelling, songs, role play and drama

The following link illustrates how a teacher focuses on storytelling, songs, role play and drama in an Elementary English lesson:

[https://www.youtube.com/watch?v=jcx\\_hoy\\_d88&list=PLLjfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=54](https://www.youtube.com/watch?v=jcx_hoy_d88&list=PLLjfVZ89nnNI7IEZRdanOTVxzuosUW0Bp&index=54)

This example was adapted from the TESS-India Elementary English unit, ‘Songs, rhymes and word play’.

### Example 2: Using multilingual stories to create positive home-school links

Collecting stories, songs, poems or other oral traditions from the community creates a positive link between the school, your students’ families and other local people. It enables students to ask thoughtful questions and listen carefully to accounts of the history and culture of their locality. Encouraging students to retell these stories in their home languages emphasises the value of these languages in the local environment. It also allows students to use these languages to develop their Hindi.



**Figure 1** Community stories are a useful resource for your teaching.

### Case Study 1: Collecting local stories

*Ms Kuheli is an elementary school teacher from Lucknow. Here she describes how she encourages her students to share stories from their community.*

I ask my students to learn a story from their family members or neighbours. I give them about a week to collect and learn the story. I then invite one or two students a day to tell their story to the class, using different voices, gestures and actions to accompany it.

The first time I did this, my students told their stories in Hindi. However, the next time, I decided to include stories in the various local languages spoken in Lucknow, such as Awadhi, Braj, Bhojpuri, Koeli and Urdu. I asked the students who speak these languages to collect a story and tell it to the class. When they had finished, they translated the story into Hindi, with the help of their classmates.

I followed this up by inviting the whole class to draw pictures to illustrate the key events or main characters in the story they had heard or to write it out in their copybooks.

By sharing the stories from their communities with their peers, this activity seems to be building connections among my students within the classroom.



### Pause for thought

- What is the value of encouraging students to tell stories in their home language?
- How might students who are shy be supported to tell their stories to their classmates?
- What other activities can you think of to follow up the students' stories?

If some students seem hesitant to tell their stories, you might ask them to tell you their story after the lesson. This would give them an opportunity to try telling it in a safe and private space, instead of in front of their peers. Make sure to praise and encourage these students so as to build their confidence. You could also try pairing them with students that you know are their friends, or who speak the same home language.

### Activity 2: Collecting stories from the community

Organising the collection of stories by your students will need time, along with sensitive and careful planning.

- Using Case Study 1 as a guide, prepare your students to ask their family members at home if they are familiar with any stories, songs, or poems. You may wish to specify a particular topic or theme, or leave the choice open. Encourage your students to learn these stories, songs or poems, in Hindi or their home language, using voice, gestures and actions to accompany them if they wish.
- Make a special time each day, or once a week, for a student to tell their story.
- Allow them to practise the story with a partner or small group before telling it to the whole class.
- Model to the rest of the class how to be a good and appreciative listener. Respond positively to your students' efforts to tell the stories and encourage their classmates to do the same.
- If the story is in a local language, allow time to discuss the translation into Hindi, focusing on the corresponding key words in the story.
- Seek out opportunities for your students to tell their stories to other classes, at the school assembly or at a local event.
- Ask your students write out their stories in their copybooks, accompanying them with illustrations.



### Video: storytelling, songs, role play and drama

The following link illustrates how a teacher focuses on storytelling, songs, role play and drama in an Elementary Language and Literacy lesson:

<https://www.youtube.com/watch?v=92bo3GyaZTA&index=51&list=PLLjfVZ89nnNI7IEZRdanOTVxzuosUW0Bp>

This example was adapted from the TESS-India Elementary Language and Literacy unit, 'Storytelling'.

### Example 3: Using stories with curricular topics

Another way of exploiting the imagery of stories and poems in the classroom is to use them to introduce a particular topic, which could relate to history, geography, maths or science or any other area of the curriculum. This can be a very effective way of capturing students' attention and helping them make sense of complex issues.

#### Activity 3: Using a story or poem in the science classroom

This activity asks you to teach a lesson using a story or a poem about the environment. Use the story or poem to introduce a new topic or lesson to gain your students' interest and to stimulate their ideas about an environmental issue. Read the guidelines provided after this activity for possible ways to do this.

- Decide what topic you are going to introduce, e.g. river pollution, the problems of litter, healthy drinking water, saving trees or the impact of traffic on local indigenous plants.
- What do you want the students to learn? Brief any visitor or storyteller about this so they can support you.
- Next, identify a suitable story or poem that you can read or recount to help set the scene for the topic. You may want to make up your own story or draw on a local legend or historical anecdote to set the scene more specifically. Perhaps you could use a community storyteller whom you have briefed about the kind of story you want. Another approach you could use is to invite an environmentalist to come in to talk about a local issue such as how the water has become so polluted.

A sample story - 'The Rat Snake and the Rats' - has been provided below.

- Write a lesson plan. What questions might you ask your students after you have told the story? What activities will they do next to deepen their learning? How will these enhance and supplement the content of the textbook?
- Now teach your lesson and, as it progresses, note how the students participate, and how their comments reflect their engagement and evolving understanding.



## Pause for thought

After the lesson, reflect on what went well and why.

- Were your students stimulated by your creative way of introducing the lesson? How do you know this?
- Were those with special needs more active in the lesson and did they understand it better than they usually do? What evidence do you have to indicate that it had a positive effect on their learning?
- What didn't go quite as you expected? Why?
- What can you do to make your lesson better next time?
- What stories and poems could you use to introduce other science topics? How could you use them with the other subjects you teach?

## Additional resources

### Guidelines: ways of using stories in the science classroom

You need to be sure that the stories you select relate to the science topic you are teaching and how you could use the story in the lesson. There is no purpose in reading a story if it does not have any relevance to your science topic. Look at children's stories whenever you can and note titles that might be useful in lessons later. An interesting story is one that has:

- a clear story throughout, with an introduction, development and a swift conclusion
- action and vivid description
- repetition of main themes for emphasis
- an appeal to feelings and emotions
- characters that children can identify with and villains they can dislike
- subject matter that relates to your science topic
- a story that you can use to stimulate your students' thinking.

When you have selected the story you want to use, you need to plan your lesson and think about how and when you will read the story. For example, do you want to read the whole story? Or do you want to read only part of it so that you can set a problem or investigation for the students to do based on the story? Maybe you can read the story and then ask the students to role play different people or animals and explore ideas from within the story. This is often possible with environmentally based stories, as often they are written specifically to explore the questions around such matters as protecting trees or investigating pollution.

How and where you read a story can also affect its impact. Reading a story about light in a room that is perhaps not well lit by the sun can add atmosphere for the students.

Alternatively, reading a story outside when exploring shadows can help students to look at shadows as you read.

As a school, teachers could work together to build up a list of stories to tell or to read around science topics and so help students enjoy science more.

### Sample story: 'The Rat Snake and the Rats'

A rat snake lived in an anthill on the edge of a rice field. It ate the rats that came to the field and the godown. One day the snake was very hungry and chased a rat that came near the godown. But the rat was very clever – she ran fast and escaped into the godown. The snake slithered off to find another rat.



**Figure 2** A rat snake.

Like other rats, the rat ate about 50 grams of rice a day.

One day the rat gave birth to eight babies. A mother rat produces babies in three weeks. The rat and her babies grew up without fear as the farmer tending the field had killed the snake because he did not know that rat snakes are not poisonous and are harmless to humans.

Very soon the rat's eight babies grew up and started eating rice.

Baby rats can produce more rats at an age of about five weeks. All of them eat the rice in the godown. Six weeks later our first rat has become a grandma and four of her babies now have babies of their own – eight each!

In five weeks these babies start eating rice and now many rats are all eating 50 grams of rice a day. One rat eats 1.5 kilograms of grains in 30 days but rats eat not only rice but also any grain they can find, even cooked food and vegetables. They also carry many germs and cause disease among humans. Of course, the godown has many other rats too so the population continues to grow.

How do you think rats affect us? What could we do to limit the number of rats without being cruel? Why should we do this?



### Video: storytelling, songs, role play and drama

The following link illustrates how a teacher focuses on storytelling, songs, role play and drama in an Elementary Science lesson:

<https://www.youtube.com/watch?v=EpurWxbLyLk&index=53&list=PLljfVZ89nnNI7IEZRdanOTVxzuosUW0Bp>

This example was adapted from the TESS-India Elementary Science unit, 'Using stories: environment'.

### Example 4: Using role play to relate topics to real-life situations

At times, textbook maths activities can be rather abstract. Role play can help connect mathematical calculations to real-life situations and support the collaborative exploration of possible solutions in an inclusive creative way.

In the following example, students are asked to imagine they are doing the maths as part of setting up their own sweet shop. As with all role play, it is important that they are encouraged to express their ideas freely and spontaneously.

#### Activity 4: Role play, gulab jamuns and direct and inverse variations

##### Part 1: Planning to stock your sweet shop

Introduce your class to the following scenario.

Sant Sweets Shop prepares gulab jamuns that are spheres of diameter 1.5 inches. The cost of each gulab jamun is Rs. 12. In each 1 kg box, Sant Sweets can pack 24 gulab jamuns.

- Do you think all sweet shops in India prepare gulab jamuns with the same diameter of 1.5 inches?
- Do you think all sweet shops in India sell gulab jamun for Rs. 12?

Now, imagine you are opening a sweet shop and you are thinking of selling gulab jamuns (Figure 3), but you want to make yours a little bit different from Sant Sweets Shop.

- If you increase the diameter of the gulab jamun, do you expect the price of the gulab jamun to increase or decrease?
- If you increase the diameter of the gulab jamun, will the number of gulab jamuns that can be packed into one box increase or decrease?
- In business it is always important to foresee what will happen when you change something. Based on your responses so far, fill in a copy of Table 1 below. In the table, plus (+) denotes an increase in value and minus (–) indicates a decrease in value. For each row, you are given one variation. You have to find the other two.



**Figure 3** Making gulab jamuns.

This part of the activity is suitable for developing into a role play. For example, you might want to organise your class into groups, with each group making up a name for their sweet shop and assigning roles to group members.

**Table 1** Planning to stock your sweet shop.

Size of gulab jamun	Price of gulab jamun	Number of gulab jamuns in 1 kg box
	+	
		+
+		
–		
	–	
		–

## Part 2: Exploring direct and inverse variation

- Ask each student, on their own or in pairs, to think of their sweet shop and to write as many pairs of quantities they can think of whose values are related to each other (e.g. if the size increases, the price will increase).
- Ask the students to classify each pair of quantities as:
  - Direct variation – if one quantity increases, the other does too.
  - Inverse variation – if one quantity increases, the other decreases.
  - No variation – a change in one of the quantities does not mean a change in the other quantity.



### Pause for thought

- What responses from your students were unexpected? Why?
- What did their responses tell you about their understanding of direct and inverse proportion variation?
- How will you use this evaluation in your next lesson? Did you feel you had to intervene at any point?
- Did you modify the task in any way? If so, what was your reasoning for this?



### Video: storytelling, songs, role play and drama

The following link illustrates how a teacher focuses on storytelling, songs, role play and drama in an Elementary Maths lesson:

[https://www.youtube.com/watch?v=ZQzoRQ9K9tU&index=3&list=PLljfVZ89nnNILwNetB\\_x6PSMBkMtZFxyX](https://www.youtube.com/watch?v=ZQzoRQ9K9tU&index=3&list=PLljfVZ89nnNILwNetB_x6PSMBkMtZFxyX)

This example was adapted from the TESS-India Elementary Maths unit, 'Creative thinking in mathematics: proportional reasoning'.

### Developing your practice

Storytelling, songs, role play and drama feature in many other TESS-India units, in combination with other principles of practice. Many such techniques can be adapted to different subjects and topics. We encourage you to explore the TESS-India units available and identify suitable activities to try out and reflect upon. You may wish to keep a record of them below. To get you started, storytelling, songs, role play and drama is featured in the Elementary Language and Literacy unit, 'Knowing and using children's literature'.

## Afterword

We hope that the activities in this compendium have provided useful opportunities to try out new classroom practices, reflect on their success, and consider ways of adapting and improving on them in future lessons.

The sample of practice-focused activities in this compendium represents a very small selection of the many OER available on the TESS-India website (<http://www.tess-india.edu.in/>). We very much hope that users of the compendium will feel inspired to explore this extensive bank of resources further, selecting from and adapting them as wished, and designing alternative professional development trajectories to suit local and individual needs, with the goal of enhancing pupils' learning experience in classrooms across India.

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# Acknowledgements

**Involving all:** Figure 1 (p. 15), (top left) <http://theguilletots.blogspot.co.uk>, (top centre) courtesy of Ellen Shifrin/Flickr, (top right) [http://www.childrens-mathematics.net/gallery\\_pastgraphics.htm](http://www.childrens-mathematics.net/gallery_pastgraphics.htm), (bottom left) courtesy of [http://webfronter.com/walthamforest/stoneydown/menu6/Early\\_Years\\_Foundation\\_Stage/Early\\_Years\\_Foundation\\_Stage\\_Page.html](http://webfronter.com/walthamforest/stoneydown/menu6/Early_Years_Foundation_Stage/Early_Years_Foundation_Stage_Page.html), (bottom centre) <http://earlyyearsmaths.e2bn.org/library/>, (bottom right) <http://montessoriteachings.blogspot.co.uk/>; Figure 2 (p. 19) © Ramon FVelasquez, [http://commons.wikimedia.org/wiki/File:MarikinaRiverBankShoesjf9425\\_34.JPG](http://commons.wikimedia.org/wiki/File:MarikinaRiverBankShoesjf9425_34.JPG) made available under <http://creativecommons.org/licenses/by-sa/3.0/deed.en>.

**Questioning to promote thinking:** Figure 1 (p. 26), (left) 'My Village' (right) 'Agriculture', © local artists – unidentified; Figure 2 (p. 29), NCERT, Rimjhim, Hindi, Class 1, Chapter 2 (<http://ncert.nic.in/NCERTS/textbook/textbook.htm?ahhn1=2-23>); Figure 3 (p. 34) taken from a newspaper.

**Pair work:** Figure 1 (p. 56) © Muhammad Mahdi Karim, [http://commons.wikimedia.org/wiki/File:Autorickshaw\\_Bangalore.jpg](http://commons.wikimedia.org/wiki/File:Autorickshaw_Bangalore.jpg).

**Monitoring and giving feedback:** Figure 1 (p. 62) provided by Mythili Ramchand; Figure 2 (p. 63), extract from <http://esol.coedu.usf.edu/>; Figure 3 (p. 68), extract from <http://esol.coedu.usf.edu/>.

**Groupwork:** Article (pp. 78–9) adapted from Dhar, A. (2013) 'India bans testing of cosmetics on animals', *The Hindu*, 29 June (<http://www.thehindu.com>).

**Assessing progress and performance:** Figure 2 (p. 97), Clare Lee.

**Planning lessons:** 'The Puri Boy' (pp. 109–10), a traditional tale adapted and developed by the RVEC (<http://www.rvec.in/>).

**Using local resources:** Figure 1 (p. 122), (left) photo of *Times* (India) by Aviva West/Flickr, (centre) photo courtesy of the Medical Materials Clearinghouse at the Johns Hopkins University Bloomberg School of Public Health/Center for Communication Programs, (right) *Barfi* film poster, <http://infinitymoviez.blogspot.co.uk/>; Figure 2 (p. 125), © Peter Grima/Flickr made available under [https://creativecommons.org/licenses/by-sa/2.0/deed.en\\_GB](https://creativecommons.org/licenses/by-sa/2.0/deed.en_GB).

**Storytelling, songs, role play and drama:** Figure 1 (p. 138) courtesy of Eram Gomango from Gajipati district of Odisha; Figure 3 (p. 144), [http://commons.wikimedia.org/wiki/File:Gulab\\_Jamun.jpg](http://commons.wikimedia.org/wiki/File:Gulab_Jamun.jpg), made available under <http://creativecommons.org/licenses/by-sa/3.0/deed.en>.









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