

school based teacher development programme transforming classroom practices

Transforming Classroom Practices Programme

The School Based Teacher Development (SBTD): Transforming Classroom Practices (TCP) is one of the dimensions UNRWA's Reform Strategy. The programme aims at improving the teaching and learning practices of teachers in the classroom by developing active learning pedagogies that will support effective engagement of the students. It will be the basis for an in-service training programme for all UNRWA teachers.

The programme adopts a blended learning approach and consists of 6 modules. Each module focuses on one of the aspects of the teaching-learning process. Collectively, the programme materials are the backbone of providing quality teaching and learning practices in UNRWA schools.

The modules are built interactively where the teacher is requested to reflect on his/her practices and to try the use of a variety of learner-focused strategies.



module four

the teacher's role in promoting literacy and numeracy



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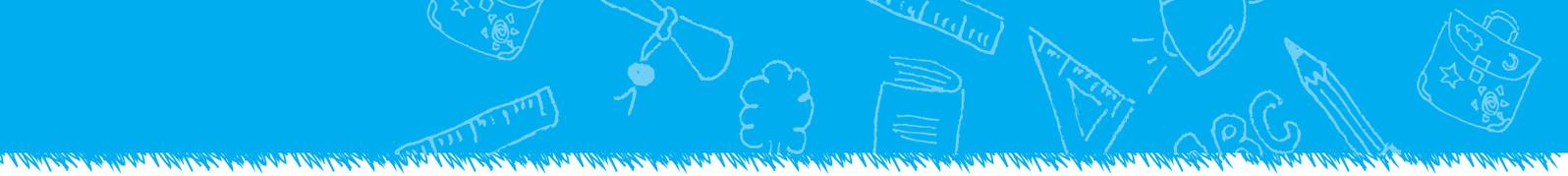
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Introduction to the School Based Teacher Development programme (SBTD)- Transforming Classroom Practices (TCP)

School Based Teacher Development programme (SBTD)- Transforming Classroom Practices (TCP) is a key dimension of UNRWA's Education Reform Strategy. The programme seeks to improve teaching and learning practices in the UNRWA classroom through developing interactive pedagogies or ways of teaching that will engage children more effectively in their learning. The SBTD is paving the way for comprehensive in-service training for all UNRWA teachers. There are six Open and Distance Learning modules and each of these focus on different aspects of teaching and learning that together provide an overview of many different approaches and ways to develop quality teaching and learning in UNRWA Schools. The text modules are interactive and ask the teacher to reflect on their practices, try new approaches and consider the impact they have on the children's learning and motivation.



Intro to Module 4: The teacher's role in promoting literacy and numeracy

Unit 13: Literacy across the curriculum

The first Unit in this module explores what it means to be literate and how important it is in enabling adults and children to access and make sense of many dimensions of their world. The Unit explores the different components of literacy and how becoming literate expands the learners opportunities to access wider understandings. The Unit also examines the knowledge and skills that all teachers, regardless of their subject specialism, need to understand in order to help students achieve their full potential in each subject.

Unit 14: Strategies for understanding and responding to information texts

Learning to read is not just about being able to read words. It is necessary for students to be able to read but more importantly to understand what they are reading and to be able to do this effectively they need to be able to access texts effectively. This Unit explores some skills, such as scanning and summarising that teachers can help their students develop in order to access different kinds of information texts quickly across a range of subjects.

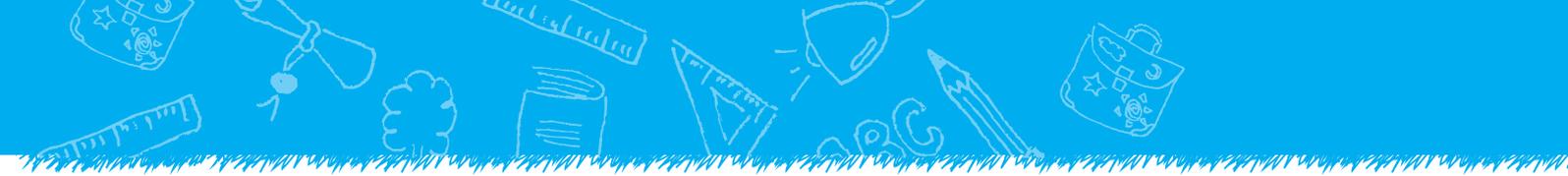
Unit 15: Numeracy across the curriculum

Numeracy, like literacy, is key for students to access and make sense of their world. Being able to quantify and measure their environment in different ways will help them to make wiser judgements about the kind of actions to take in their lives.

The Unit begins by exploring the knowledge and understanding of the nature and importance of numeracy across the curriculum. It then looks at how to develop teachers' ability to use a diverse range of strategies to stimulate student's interest in meaningful numeracy experiences.

Unit 16: Practical educational games to promote numeracy

There are many ways to make numeracy and mathematical teaching more interactive and engaging for students, but this Unit focuses on the use of games to develop students mathematical and numeracy understanding and skills. Playing games in the classroom provides a chance for children to practice their skills and extend their knowledge in a safe, supportive and fun environment. Different examples of types of games are explored to help teachers consider the value of games in their teaching.



Module 4 Unit 13

Literacy across the curriculum

Introduction

This Unit looks at the importance of literacy in modern-day society and how it is a basic human right. It explores what it means to be literate and how crucial literacy is to learning in any subject across the curriculum. It also examines ways of implementing interactive approaches to develop children's competency in literacy across the curriculum.

Teacher development outcomes

By the end of this Unit you will have developed your:

- knowledge and understanding of the concept of literacy and its different components;
- knowledge and understanding of the importance of developing literacy across the curriculum;
- skills and ability to use a range of strategies for teaching literacy across the curriculum.

We hope that, as you work your way through this Unit, you will want to become an advocate for the importance of literacy across the curriculum. Literacy is not just about learning to read and write. Literacy is necessary in order to learn any subject at school. It broadens our understanding of our community and the world around us, and enables us to participate in society politically, socially, educationally and in terms of our health. Becoming literate affects our educational prospects and our social and emotional development.

The concept of literacy

Basic literacy refers to the ability to construct, communicate and interpret meanings for a range of purposes and in a range of contexts. This is achieved through developing speaking, listening, reading and writing skills. Having a strong foundation in literacy enables learners to continue learning, and the development of literacy skills does not stop once a child has achieved basic literacy skills – it is just the start of a journey throughout life. It is essential that literacy skills are functional; that is, that they can be used for a range of purposes in a range of contexts.

Let us look first at the definition of literacy as provided by UNESCO: the 'ability to identify, understand, interpret, create, communicate, compute and use printed materials associated with varying contexts. It involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society' (Education for All; Global Monitoring Report, UNESCO, 2006).

This UNESCO definition supports the idea of literacy as beyond being able to just read and write, taking it across subject boundaries, encompassing scientific literacy, numeracy and cultural literacy. Today's society demands citizens who cannot only read and write, but can use these skills to evaluate and apply information gained from across a range of media. Literacy is also about developing in each individual a positive attitude towards lifelong learning and awareness of the wider world. Our development of literacy skills lies at the centre of being able to think and express our emotions. It is central to our well-being and self-confidence within society, and it lays the foundations for work and enhances employment opportunities.

But what are the building blocks needed for a child to become literate? There are many underlying skills learners need to develop in order to learn to read and write. They need to develop:

- phonemic awareness (be able to hear the difference between sounds);
- linguistic awareness (have an understanding of the structure, use and meaning of language);
- phonological awareness (being able to break spoken language into its smallest parts);
- language skills, including vocabulary;
- an understanding of the connection between the written word and the spoken word, including alphabet knowledge and early writing.

As these skills are developed, children will learn the mechanics of reading using a range of methods. These will include the phonetic approach, which involves joining sounds together to form syllables and words, and learning to sight-read, that is recognising words by their shape and context in the text. A sight word does not have straightforward spelling and, therefore, does not enable a learning reader to determine what spoken word it represents just by sounding it out according to phonetic rules. Learning readers recognise sight words from having memorised them or by drawing their meaning from context.

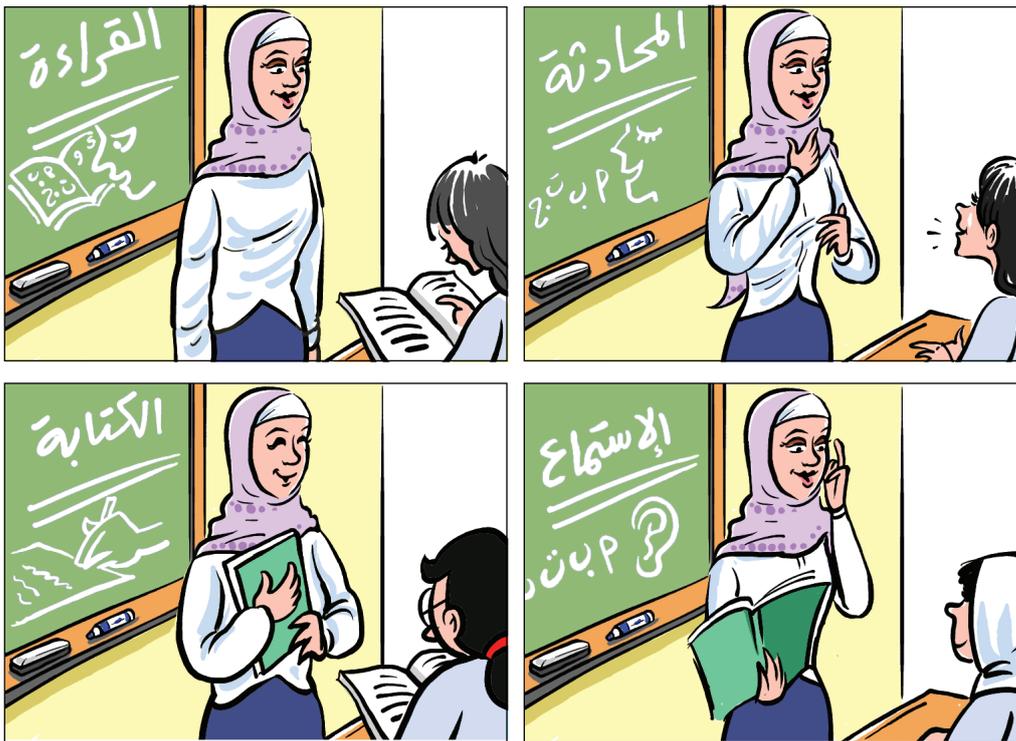


Figure 48: Students learn better when their literacy basics are well established

The mechanical skills of reading are, however, not enough on their own; learners need to be able to understand what they read and to develop reading comprehension skills. They also need to understand the value and purposes of reading, including reading for pleasure or for information, to make sense of their world, to share experiences or ideas, to support their social and emotional development, to understand different perspectives and to articulate and explore different emotions. Achieving this needs plenty of practice in reading over time and across subjects.

Literacy across the curriculum

As soon as a child is born they begin to 'read' the world, to make sense of what they see, hear and can do, over time. Parents, siblings and the wider family help the child become involved in their community and culture, and learn different ways of communicating. This is the starting point of the development of literacy skills. A strong foundation in literacy takes time to build: it requires exposure to listening, speaking, reading and writing.

Many young pupils may lack exposure to preschool education and a culture of reading and storytelling at home. Therefore, the role of the elementary school teacher is crucial in making sure possible gaps in the development of literacy skills are compensated for during the first years of schooling. Indeed, elementary school teachers have a huge role to play in ensuring that children develop a strong foundation in literacy skills.

Then the responsibility for literacy must not just lie with the language teachers, who admittedly are at the centre of the task, but with teachers of all subjects who have the responsibility of supporting children in developing their literacy skills. Developing literacy skills not only supports learning but also enhances understanding within the curriculum area and is a key way of raising standards and outcomes in all subjects.

The three major aims of learning and teaching literacy across the curriculum are to:

- broaden and enhance children's command of literacy skills by providing them with a range of different contexts in which to use and practise these skills;
- identify the literacy skills that are central to a particular subject to support children's learning;
- enhance the learning of the subject itself and the attitudes of children towards that learning.

Additionally, work across the curriculum provides a rich source of experience, language and stimulation to support the development of speaking, listening, reading and writing.

So how do you, as a teacher, engage children and maximise the learning of all your pupils? What are the implications for the way you plan, prepare and teach your lessons? Is there a set of generic literacy skills that can be applied across the curriculum? Are some skills more specific to certain subjects? We will consider some of these questions through the following Case Study and Activity. They will help you explore the notion of literacy across the curriculum.

Case study 26



Fatmeh joined Baq'aa School as an elementary teacher two years ago. She teaches science and is a teacher to a Grade 5 class. Many of her pupils have difficulties in reading from the science textbook so Fatmeh plans ways of teaching them about science that makes it easier for them to access the information in the textbook.

Fatmeh planned to teach the class about the classification of animals. She started the lesson by showing the children the names of the five 'classes' or groups of animals with backbones (vertebrates):

- mammals
- birds
- fish

- reptiles
- amphibians

She had written these on flashcards (strips of card with the name of one animal class on each card) and displayed them on her desk. She then gave each child a picture of an animal and then asked child in turn to come up to the front and put the picture next to the flashcard with the name of the animal class to which they thought it belonged. Then she asked children questions about what they knew about the animal classes, the characteristics of each class and the differences between the classes.



Figure 49: Flashcards are an effective teaching and learning resource for developing basic literacy.

Fatmeh then divided the students into five groups and gave each group one of the animal classes. She asked them to create something, for example make up a song or design a poster to show what they knew about that animal class. Or they could draw different animals from that class and write about them, which they could then make into a book.

In the next lesson, Fatmeh asked each group of students to present their work to the rest of the class. The children were really excited about the activities and some asked if they could do more work on their animal projects at home.

After the topic, Fatmeh thought about the lessons and how much the children had joined in and enjoyed them. She was very surprised how much they seemed to gain from them – even those who did not normally join in much with activities.



Comment

Fatmeh used flashcards and working together to develop the children's literacy skills, as well as extending their ways of learning by seeing, drawing, writing, singing and working together. Could you do something similar with your class? Putting emphasis on key content, such as the terminology of the subject, will improve your pupils' subject knowledge and literacy skills. Other ways of learning might include encouraging the children to observe and search for resources, or using storytelling, role play or brainstorming, all of which involve literacy skills. Understanding that you need to use a variety of teaching strategies in your class to cater for individual needs is very important when teaching any subject and when trying to extend children's literacy skills.

Let us continue to explore these skills further. You need to think how you might adapt such activities to your subject area, or try new approaches to help your class develop their understanding of terminology in your subject area and so extend their literacy skills. Now look at Activity 30, which is focused on building children's literacy skills.



Activity 30

The aim of this Activity is to make dictionary books together with your pupils in order to increase their literacy skills and make learning more interesting and fun.

Self-made books are good for many reasons: they are cheap, they can be made for every subject, children can participate in making them and they can be tailored to match the reading skills of the children. Books can be made about any topic. One idea is that children stick or draw a picture on each page and then write the name of the picture below (or a short explanation about the picture depending on their level of skills and ability.) To make this kind of book, this is what you, as the teacher, need to do:

- Choose a topic, for example famous people in history.
- Give the children some paper and ask them to draw or stick pictures of the people on the paper and write the name or description below. (You may need to provide some information books for them to look at or they could do searches on the internet.)
- Ask one group to make a hard cover for the book from cardboard or paper with the title of the book and illustration(s).
- Once all children have finished, staple their pages together and put on the cover.

- Share the new book with the class at the end of the lesson(s).
- Display the book in the classroom so that children can look at it and read it anytime. Make as many books as possible on different topics to form a class library.



Figure 50: Learning resources created by students are more meaningful and give students opportunities to develop their literacy skills and understanding.

After you have finished this Activity, use your Course Notebook to describe what you did in the lesson and what the outcomes were. What do you think the children learnt and how do you know this? What could you do to improve this Activity if you did it again?

One of your roles as a teacher is to expose your pupils to reading whenever you can. For example, display the children's names on their desks, label all resources, furniture and materials in the classroom, and make posters with key learning content to stick on the classroom wall, such as lists of words with the same root or lists of words that use the same blended sound. You should also display the pupils' own work in the classroom where they can read it. In this way, they will be exposed to literacy learning all the time, even at times when they are not focused on it specifically.

The next Case Study will explore further ways of developing literacy skills and linguistic awareness, that is, their understanding of how language works and sounds are formed.



Case study 27

Housni, an Arabic teacher in Sayda Elementary School in Ein Hilweh camp, has a Grade 3 class.

Housni wanted his pupils to develop their literacy skills beyond the classroom. He wanted them to understand how important literacy was to all aspects of life beyond the school. To do this he developed a literacy project that would encourage his pupils to explore literacy at home and in the community.

At the end of school one day, Housni asked his class to observe on their way home all the different places where they could read some text – street signs, names of shops, adverts and posters. He asked them to note down the different words they had seen. When the children came to school the next day, they shared what they had seen and Housni listed the words on the board. He then asked the children to make up sentences using the words they had collected. In the next lesson, he asked them to draw a ‘map’ of their way home with the different shops and signs they saw marked on the map.

On another occasion, Housni asked his pupils to collect empty food packets (for example chips, biscuits, juice, milk), wash them out and bring them to school. At school the children had a look at the different packets and what was written on them. They learned many new words this way, such as the names of the ingredients.

Another activity Housni used was based around daily newspapers, which he asked children to bring into class and which he also collected and brought in himself. He asked the children to look at a newspaper, select an article that interested them and make notes about it. He then arranged them in groups of four to six, putting children who had chosen the same article together so they could hear each other’s interpretation of the story and discuss the different ways of describing the same story. If they were different, why was this? The discussion was very lively as the children were really interested in what they had found out. He also asked all the class to comment on how clear the original newspaper articles were to read. Housni noted how well the children picked out the key points and how well they discussed the stories. He was also aware of how much their vocabulary had extended through this exercise.

All these activities that Housni did in and around the normal school day captured his class’s interest. Housni was most impressed with how well the children had worked together and with their learning of so many new words. The children were also comparing what they learned with their friends and talked about the activities daily. Housni started getting more and more ideas about how to teach literacy through everyday situations.



Figure 51: Resources from real life can help students to put literacy into a meaningful context.

Comment

Housni's activities did not require many resources or much extra time, but they made the learning of new terms and vocabulary more interesting and relevant to the children. This would undoubtedly enhance their learning.



There are many ways in which you, as a teacher, can develop children's literacy and life skills. You just need to think creatively about what you can do and be clear about what the learning intentions are for the children and then pitch your lessons at their level using appropriate resources, texts and language for them.

You could, for example, take your pupils to a shop, library, museum or other place in the community to expose them to reading and understanding the language around them in a different setting. If possible, show them computers, mobile phones and ways of utilising them for information sharing and communication. Encourage the children to practise writing in different ways, by writing adverts, announcements, letters, stories, factual texts and so on.

The next Activity asks you to do some work with your class that uses environmental print, that is, the print found around your school's location, to help their literacy learning. When planning the Activity, think about how new technologies might help you to record some of the print and signs they see, such as using a camera on a cell phone.



Activity 31

Choose a lesson you plan to teach this week that you could link to learning literacy and life skills outside the classroom. Think how you could use the local environment to develop your pupils' literacy skills. Could you ask them to gather information before the lesson on their way to school or could you go out with them to find the signs and information you need?

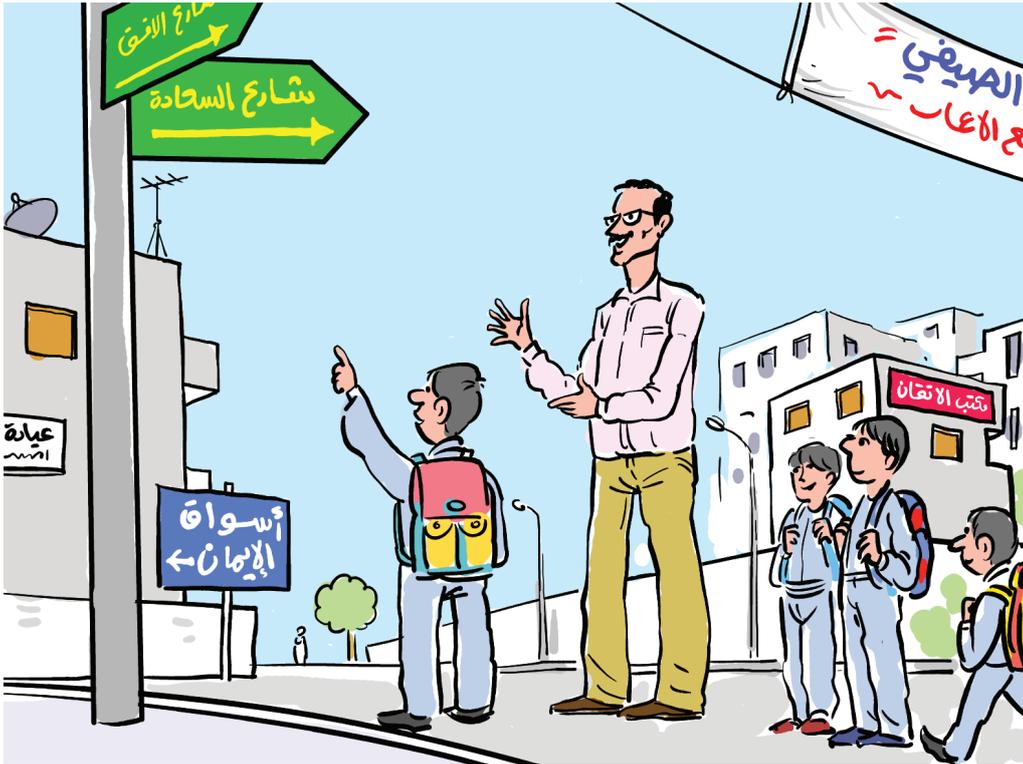


Figure 52: Opportunities for students outside the classroom add diversity to their experience and understanding.

This Activity works well across the curriculum. In history, you could arrange a visit to a local site of historical interest or to a local expert who has books and resources that the children could use. This will develop their historical knowledge, but also extend their literacy skills, such as skimming documents and texts for key ideas and information (there will be more about this in Unit 14). In science, you could ask children to look at food adverts and packaging and see how they can be used to explore scientific knowledge about food. In Arabic, you could use Housni's ideas from Case Study 27, but decide to focus only on signs that give directions. This will help the children develop their vocabulary of words relating to giving and using directions.

You could plan with another teacher to share your experiences about what went well and how you could develop the lesson further next time. Make sure you are clear about the learning intentions for the lesson, both in terms of the subject

and the literacy skills you want to develop, as this will make the planning of the lesson easier.

When you have taught the lesson and reviewed the experience with a colleague, write the lesson plan in your Course Notebook and your reflections on what went well and what you could improve if/when you teach this lesson again.

Comment

The learning achieved through this Activity depends on how clear you were about objectives and how appropriate the resources you used were for the class you were teaching. As you plan and teach your lessons, it is important that you are aware of the levels of language and literacy skills that you use, as well as the language in resources such as texts. Your language needs to be matched to the children's level of understanding and you need to ensure that you explain any new terms clearly.

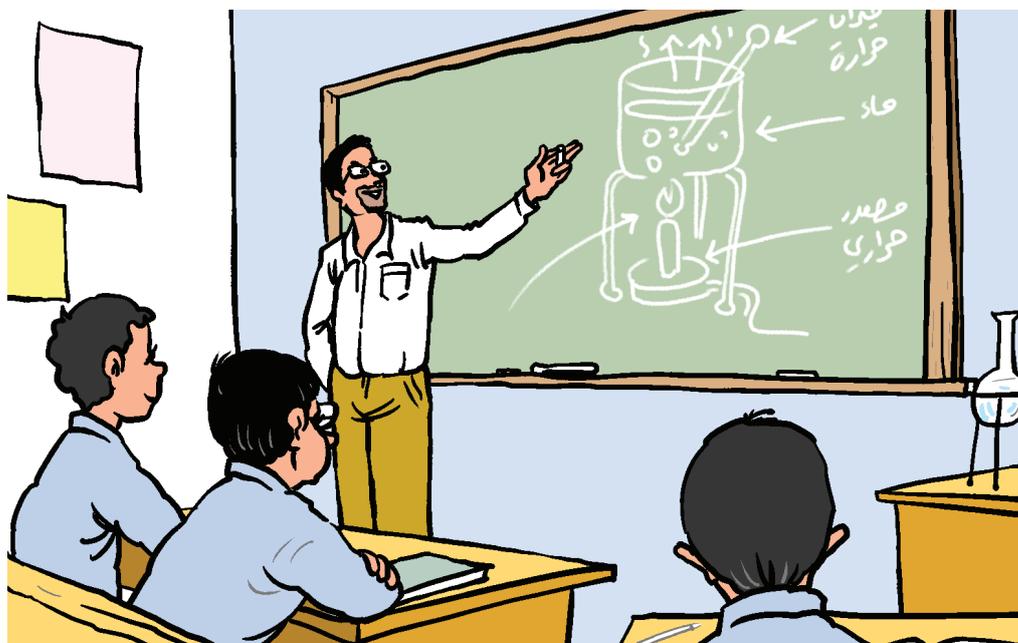


Figure 53: Visual representations, images, diagrams, tables, charts and graphs can enhance student understanding.

Teachers across the curriculum have a range of different literacy and language skills. Researchers into science teaching have, for example, identified that science teachers are able to use the following modes of literacy and language skills (Wellington & Osborne, 2001):

- the spoken and written word;
- visual representation;
- images, diagrams, tables, charts, models and graphs;

- movement and animation of physical models, e.g. a beach ball for the Sun, a pea for the Earth, or using multimedia, gesture or other body language;
- practical work, with its feel, touch, smell and sounds;
- mathematical symbols, either as shorthand or in the form of equations.

In history, geography or other subjects, the list of modes of language and literacy would be very similar but the materials used and the contexts would be different. For example, in geography the language would be subject-specific, such as talking about food exports and imports in a country and visual representations would be graphs of such exports and maybe pictures of how different crops are harvested and packed for export. The use of models will be for different purposes, such as modelling how settlements develop over time or how sedimentary rocks are formed. And in history, modelling might be used to illustrate how certain weapons worked and were transported in earlier times.

For children to be able to understand and enjoy any subject, they need to be able to employ similar skills in developing their understanding. So all teachers, regardless of the subject they teach, have an obligation to help children apply their generic literacy skills in a subject-specific way to maximise understanding. Adapting their use of language and literacy resources to the level of the children they are teaching will enable those children to access the curriculum better.

So, although the language teacher has the first responsibility for developing children's literacy and language skills, other subject teachers should also see it as part of their role to help children access the specifics of literacy in their subject area.

Summary



This Unit has only touched on some key aspects of the importance of literacy and its role in enabling children to participate fully in their communities. As a teacher, you owe it to your pupils to ensure that you give them the best possible chances in life. All children need to learn to read and write, and to use and practise these skills across the curriculum. Teachers need to make sure they utilise all available resources to engage children in wanting to learn and extending their literacy skills across the range of subjects.

Being literate will open up new avenues, understanding and potential for learning across the curriculum for students, enabling them to access more effectively the nature of different subjects. Such broadening of their knowledge expands their interests and provides students with greater choice and opportunities for the future.



Module 4 Unit 14

Strategies for understanding and responding to information texts

Introduction

Welcome to Module 4, Unit 14. The aim of this Unit is to help you to devise ways of introducing information texts to learners so that they will understand what they are reading and be able to respond appropriately.

Teacher development outcomes

By the end of this Unit, you should have:

- extended your knowledge and understanding of the strategies needed to help children understand and respond to information texts;
- developed your ability to utilise different strategies of reading and responding to information texts.

A major part of a teacher's role is to help children read and understand what they read. As we discussed in Unit 13, teachers of all subjects have a responsibility to extend children's literacy skills across the curriculum. As well as being able to read the words, children need to be able to make sense of what they read, be able to summarise the main ideas in a text and to respond with their own ideas. This will enable them to develop their understanding and make progress in a range of subjects. While it is important for children to be able to write answers to questions on what they have read, there are other ways that children can demonstrate that they have understood new concepts, such as making a poster or a pie chart.

This Unit explores how you can help children acquire the skills mentioned above and suggests ways to develop their comprehension and summarising skills. But first, it is important for us all to acknowledge that reading is not just about being able to say the words, but is about making sense of what is written. Teachers employ a variety of strategies to help children develop understanding of how words are built up, how texts work as a whole and how they provide information.

Teaching reading comprehension

Reading for comprehension is central to learning to read. With younger children, it is important to help them develop skills and strategies to access the content of the simple texts they are reading. This includes expanding their vocabulary by developing their recognition and meaning of an increasing range of words. Older children need to be able to read a variety of different types of texts, such as stories, poetry, plays, information texts, charts and tables. They also need to develop skills to extract information more quickly from the text, such as being able to use headings, subheadings, bullet points and pictures or diagrams. Without such skills, children will not be able to read, for example, a social science or science text.

As children become more competent readers, the skills of skimming, questioning and reviewing texts become much more important. Depending on the age of the children you teach, you will need to plan and adapt activities to match their levels and skills in reading. Young children may, for example, only pick out key words in a short text to help them skim for meaning, whereas older children would be able to pick out key phrases and significant indicators from headings, subheadings, pictures and charts to gain an overview of the text's main ideas.

Case Study 28 below demonstrates how you need to think very carefully about whether the 'reading comprehension' questions in textbooks really help you to know what children have understood from their reading, and what other questions or activities may be needed to help them.

Case study 28



At a teacher's workshop in Irbid, Jordan, teachers of Arabic as a Mother language were asked to read a 'nonsense' text and answer questions on it. The first sentence in this text was: 'I lived in the land of Egypt and there was nothing behind me and nothing in front of me.' and the first 'comprehension' question was 'Who was the speaker in this line of the poem?' Every teacher knew that the answer was 'I'. In their discussion, the teachers realised they could give the 'correct' answer because they know that in Arabic 'I' was the subject of this sentence. They didn't need to know who or what 'I' was, in order to give the answer. The teachers also realised that the question did not help their understanding of the text!

After the discussion, they worked in small groups to design questions and tasks to help them know whether or not children had really understood the texts on which their questions and tasks were based. They learned that questions should not require children to just copy information from one sentence in the text for their answer. The teachers instead designed tasks in which children had to complete

a table, design a poster or make notes to use in a debate, and listed the kinds of questions they would ask in order to assess their pupils' understanding.



Figure 54: Vary your questions to assess students' understanding.

Comment

If you look at any text in a subject textbook you may find good and bad questions. Try to think how these do or do not help children make sense of the text. If the questions are merely demanding one correct word, think how you could devise your own questions that would help your pupils understand the text better. Good questions don't just require a child to copy information but challenge them to think about the meaning of the text and even consider the implications of that meaning. The double Unit Module 3 Units 10–11 explored the types and range of questions you can use. There is a place for both easy and complex questions, so that all learners have a chance to access texts and demonstrate their understanding.

The next Activity asks you to try some different strategies to help children access texts more effectively.

Activity 32

Choose a lesson you are going to teach this week and follow the plan given here. You will need to identify an interesting text and, if you can, make copies of the text and tasks you devise for the students, or write the text and tasks on your blackboard.



Before your students read the text, ask some introductory questions about the subject. Your questions should help them to connect what they already know to the new information in the text. (If your students are young or you need to read the text to them, you could write their answers on the board.)

- Start by reading the text to the whole class.
- Next, ask children to read the text in silence and write answers to the tasks you have set. When they have finished, collect their books and assess their answers
- In the next lesson, return the books and give the whole class oral feedback on what they did well and discuss any difficulties they experienced.
- In the next lesson, ask the children to work in small groups on an activity related to the text they read. For example, if your text had been about 'litter', they could design an 'anti-litter' poster to display in the class or around the school to encourage everyone to keep their school clean and tidy.
- After the lesson think about how well it went and how the students responded to the task. Use your Course Notebook to reflect on what you think they learnt and how you know this.



Comment

Whether we are reading for pleasure or for another purpose, it is key that we understand what we read. The Activity above should have shown how you can increase children's understanding if you give them interesting things to read and interesting ways to access the information. As we have said, children need to develop a range of skills to access information quickly and accurately and it is part of the teacher's role to plan for this.

There are different styles of reading for different situations. The technique you choose will depend on the purpose for reading and the kind of text being read.

Summarising

Summarising is a key skill for reading and thinking. It can be one way to assess children's reading comprehension, but being able to summarise can also help the reader to come to a new understanding of a text. Children who can summarise effectively can learn more efficiently. But what is summarising? And how can we teach it?

At its most basic, summarising is the process of condensing a text or an experience into statements of the most important ideas. Children can be taught these skills

from an early stage, but activities to teach these skills need to be appropriate to their age. Summarising requires a reader to select the important ideas, ignore irrelevant information and paraphrase the author's words. For young children, this could be asking a child to tell retell a story orally to the rest of the class. It is best to start by asking children to summarise texts they are familiar with and move into more unknown texts as they become more skilled. This same kind of activity could be done collaboratively with a group or with the whole class, where children work together with the teacher 'scaffolding' the process in the early stages until the children fully understand it. To summarise a text, a reader needs to thoroughly understand what the author is saying.

It is easy to see why summarising is so often used as a measure of reading comprehension. But it is also a way of synthesising the key points of a text. Asking a child to write a summary of a short text can provide some interesting insight into how that child is reading and processing text. For example, some children will become sidetracked by details that are so interesting that they pull the reader away from the main ideas. These readers will need help with selecting the most important information from the text.

Skimming and scanning

We adjust our reading speed and technique depending on our purpose. If we are searching for specific information, looking for clues, or reviewing information we skim read the text or scan it for key words. These are skills that children need to develop, as without them it is difficult to move forward as children progress from primary to secondary school. The next Activity focuses on helping children to develop summarising skills.

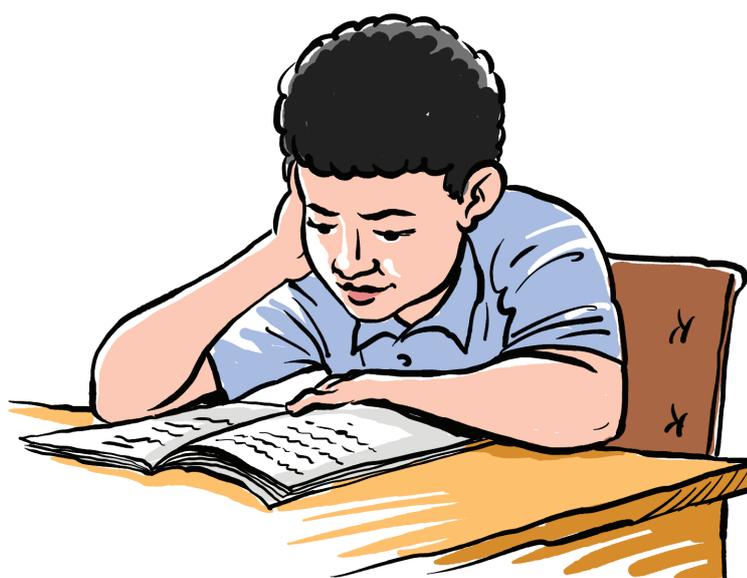


Figure 55: Skimming and scanning skills are important for students.



Activity 33

Before the lesson, select a text that you want the children to use to practise their summarising skills. It may be in the textbook related to the subject you teach or you may find it elsewhere. It should contain a number of paragraphs but no headings or subheadings. If it is not from the textbook, either copy the text for the children or write it on your blackboard. Also, collect a copy of a newspaper or a magazine that has headlines and subheadings.

Below is a guide as to how you might introduce children to the ways in which texts can be broken down to access information. Use these to help you plan your lesson and then teach the lesson. If you teach younger children, you may choose a story for them to summarise, but you will still need to ask them to highlight the key stages in the story and you may help them by providing subheadings if appropriate. You might suggest the children work in pairs to start with, so that they can talk and think together before they have to do it on their own. Here is a guide to helping the children break down information:

- Show the class some newspaper and magazine pages and ask why the articles have headlines and what they tell the reader.
- Now show the children the text you have selected (which doesn't have headings or subheadings). Ask them to work in pairs to decide which paragraphs of the text are on the same topic.
- Ask them to write headings that summarise the paragraphs for each topic.
- Ask some children to read out their headings and write these on the blackboard.
- Agree which are the best headings for each set of paragraphs on the same topic.
- Leave the 'best' headings on the board with some space under each one.
- Ask children to work in pairs to make a list of key points from the paragraphs on each topic.
- Under the headings you have written on the board, collate some of the key facts different pairs have suggested.
- Show the children ways to link headings and key points in a mind map to help them remember facts from the text you have chosen.

After you have taught this lesson, spend a short time writing in your Course Notebook about what the children were able to do and what they found difficult. Think

of and write down suggestions of activities you might do next to help your pupils develop their summarising skills.



Figure 56: Daily newspapers can be used to teach literacy skills.

Comment

Children new to this way of working may take time to understand what is expected of them. They may write more than is necessary because they find it hard to pick out the key points. If this is the case, you could give the children more support by saying you only want four or five key points. Working in pairs, they could talk about which are the key points and reach agreement. This is not an easy skill to acquire and takes practice, but will become easier if you use a range of different contexts and different ways of summarising such as making a poster, filling in a table, and so on .



Reading visual images

If you think about all the kinds of information texts that you read, whether these are in the pages of textbooks, in advertising leaflets or on computer screens, they frequently include diagrams, charts, graphs, drawings, photographs or maps. To be successful as readers, we all need to understand how words, figures and images work together to present information. Many writers on education now stress the importance of visual literacy. Learning how to read and respond to photographs and drawings is one part of becoming visually literate. Reading and responding to charts, graphs and diagrams is another.

Bar and pie charts are some of the easier charts to make and to understand. The next Case Study shows how Hadiya helped her class to present a large amount of data in a visually interesting way.

Case study 29



Hadiya likes to make each pupil in her Grade 6 class of 30 children feel special. In her classroom she has a large sheet of paper with the month and day of each pupil's birthday. On each birthday, the children sing 'Happy Birthday' to their classmates. One day, a pupil commented that in some months they sing the birthday song much more often than in other months. Hadiya decided to use this comment to do some numeracy and visual literacy work on pie charts. First, she asked the children to work in pairs to look at the big sheet and work out how many children had their birthday in each month. She then wrote the names of the months on the board and as a class they agreed on the final numbers. She wrote the number of children that had their birthday in each month next to the name of the month (e.g. January – 1, February – 3, and so on).

Next she drew a large circle on the board and told children to imagine that this was a pie and that as there were 30 in the class there would be 30 sections in the pie, one for each pupil. The sections would join to make slices. There would be 12 slices, because there are 12 months in a year. Each slice would represent the number of children who had their birthday in a particular month, so each slice would likely be a different size. She began with the month with most birthdays – September.

Children quickly got the idea of making 12 slices of different sizes within the circle to represent the number of birthdays in each month as a percentage of the class. Each child drew a circle and then divided the circle into 30 sections – one for each child (each section was 12 degrees on a protractor). They were then asked to make each slice a different colour to clearly show what proportion of children had birthdays in a certain month. The class talked about other information they could use and put into a pie chart. They decided to explore how many children played different sports, how many supported each team in the national soccer league and how many children spoke a different language. Different groups of children worked on the different pie charts and their final charts were displayed for all to see. The children were very interested in the range of information they could easily gather from the charts and they liked the fact that the information was based on their own lives.

There are 30 students

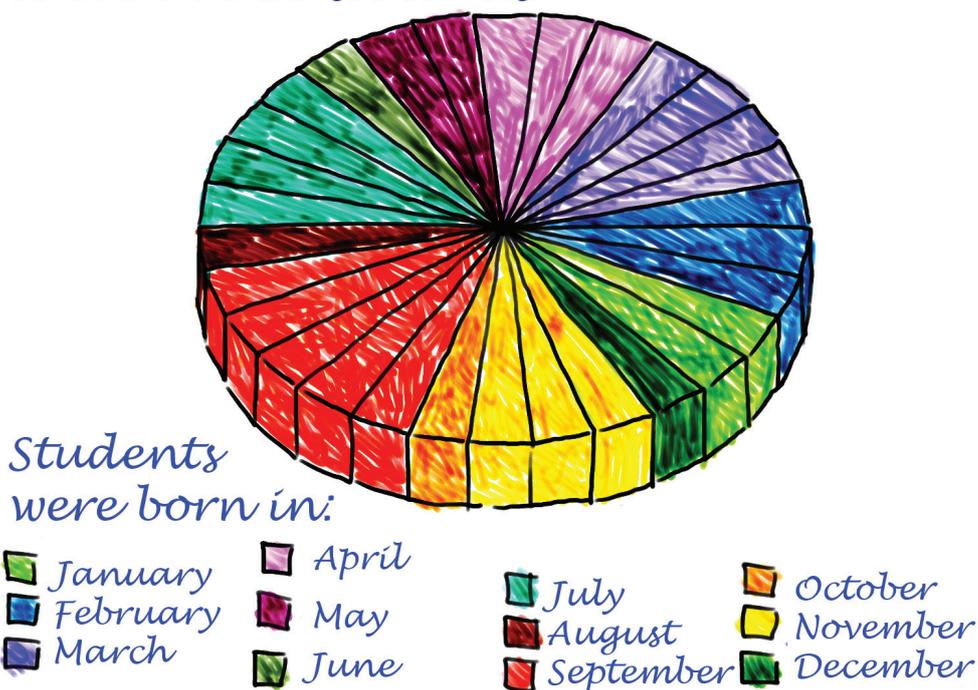
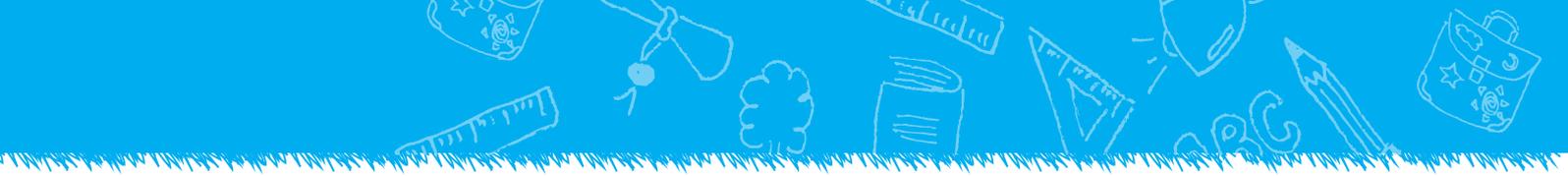


Figure 57: Charts and the use of colour can assist in explaining complex data.

Summary

Helping children to find key information from a text or from a chart, graph or diagram requires a range of reading skills and also knowledge about different ways of presenting information to access the main ideas. How well did your pupils carry out the Activities in this Unit? The information about how individual children succeeded will really help you to plan further lessons. In these lessons you will be able to differentiate the kind of support and strategies that you use to help those children who need more support. These approaches highlight again how important it is for you, as a teacher, to use a range of contexts and different techniques to ensure that all your pupils find ways that work best for them when reading information texts. For example, those with a strong visual approach will make more use of drawings or diagrams to record key information (although you do need to develop the varied skills of representation in all children). The range of ways to record key points should be explored across the curriculum subjects so that children are able to practise the skills of reading for understanding and extracting information.





Module 4 Unit 15

Numeracy across the curriculum

Introduction

Welcome to Module 4, Unit 15, which discusses the concept and importance of numeracy and explores interactive ways of developing children's competence in numeracy across the curriculum.

Teacher development outcomes

By the end of this Unit you will have developed your:

- knowledge and understanding of the nature and importance of numeracy across the curriculum;
- ability to plan and teach effectively in an interactive way using meaningful numeracy experiences.

What is numeracy and why is it important?

What does it mean when someone is said to be numerate and what does it mean to be numerate in this increasingly digital age? One definition states that 'we are numerate if we have developed the confidence and competence in using number which will allow us to solve problems, analyse information and make informed decisions based on calculations' (Scottish Government, Curriculum for Excellence: Building the Curriculum 4: Skills for learning, Skills for life, Skills for work, 2009). Being numerate enables a person to function in everyday life and contribute effectively to society. It also increases their opportunities within the world of work and establishes secure mathematical foundations, which can be built upon through lifelong learning.

Being numerate is an important fundamental life skill that permeates all aspects of our life – from doing the weekly shopping, to arranging a mortgage or bank loan, to finding a job. Being numerate is another form of literacy – it helps us to become more financially literate. Financial literacy involves being able to understand money and manage it wisely so that children may grow into financially responsible adults, free from the anxieties of debt and secure in their future. Being able to interpret numerical information appropriately, for example to check if there is enough money for the rent or to travel to school, and use such information to

draw conclusions, assess risk and make informed decisions about money matters is crucial to survival in a fiscal world.

Stop and consider what you think numeracy includes. Make a list of your ideas in your Course Notebook and also make a list of the different contexts in which you regularly need to use your numerical skills.

Numeracy can be defined as a proficiency, which involves confidence and competence with numbers and measures. It requires an understanding of the number system, a repertoire of computational skills and an inclination and ability to solve number problems in a variety of contexts. Numeracy also demands practical understanding of the ways in which information is gathered by counting and measuring, and is presented or represented in graphs, diagrams, charts and tables.

Numeracy includes:

- understanding the number concept and number system (ones, tens, hundreds, thousands);
- understanding and using mathematical symbols;
- being able to compare numbers;
- mastering basic number operations (addition, subtraction, multiplication, division);
- measurement (time, distance, area, weight, volume etc.);
- money;
- geometry;
- reading and explaining data, graphs, diagrams, charts;
- logical reasoning;
- mental arithmetic;
- estimation and rounding;
- fractions, decimal fractions and percentages.

These areas and skills relate to the whole curriculum and can be practised across all subjects and used in a range of contexts and situations. For example, being able to find the area of a shape mathematically enables a person to calculate how much paint is needed to decorate a wall or how many vegetables can be sown in a field. In the same way that being able to read is essential, being numerate is crucial to life in this digital age.



Figure 58: Using real life examples can help students to see the value in numeracy skills.

Strategies for numeracy across the curriculum

Numeracy is not perceived as easy to teach by most teachers and many may feel that they need more support to teach numeracy than literacy, perhaps because they themselves did not like maths at school. However, developing numeracy across the curriculum provides opportunities for children to improve their accuracy and learn how to interpret information. Learning how to present information in a quantitative way and develop children's problem solving and thinking skills goes beyond just the mathematics lessons. Making learning numeracy across the curriculum a success needs the support of all teachers if it is to be effective and have an impact on children' learning.

As a teacher, it is important for you to know the key areas of numeracy in order to explore within your subject the opportunities for extending and complementing numeracy teaching and learning in mathematics lessons. All teachers have a responsibility for promoting numeracy.

For example, in social studies, the teacher could present a map of a country to children and ask them to estimate the distance between two cities or to determine which is farther from, for example, Amman – Irbid or Zarqa? Or a science teacher could ask pupils to measure the difference in size between different species of snails that can be found in the local area. The following are examples of how numeracy concepts and skills can be applied in other subjects:

- History: includes concept of time, concept of number and dates, sequencing events and dates, understanding and comparing large numbers, using a timeline, logical reasoning. For example, being able to sequence numbers and dates will help a child be able to see why some events such as the start of a war happened.
- Science: includes making measurements, collecting data, comparing, and interpreting data, graphs and diagrams, estimation, logical reasoning. For example, asking children to measure the extension of a spring with different weights will involve them in various measuring tasks and devising ways of recording their results.
- Social studies: includes such ideas as concept of time, collecting data, comparing, and interpreting data, graphs and diagrams, estimation, logical reasoning, practical application of mathematics in everyday life (such as percentage calculations and dealing with money).
- Arabic: includes reading and writing numbers, learning to read the clock, learning about money.
- English: includes reading and writing numbers, time and measurement concepts in English.
- Vocational education and training: includes making measurements (distance, area, volume, timing), geometry (shapes), and estimation. For example, asking children to estimate how much of each material they will need to tile a floor and then working out the actual cost helps them to see how to judge the possibility of being able to afford to do the job.
- Physical education: includes number concept, measurements, and practical activities of measuring distance. Children can measure heartbeat and pulse rates and recovery rates to judge their fitness.
- Arts: includes geometry (shapes), perspective. Understanding how shapes tessellate will help children design their own patterns in traditional styles.
- Religion: time concept, practical situations in which you need numeracy such as events like funerals.

Think about your current practice. Do you ever link numeracy to the activities you plan in your subject area? Think how you could do this more and how you can help support children's learning in mathematics. Now read the following Case Study to explore how numeracy concepts and skills can assist children's learning in social studies.



Case study 30

Ali teaches a Grade 6 class in Haifa School.

Ali had been planning to develop his pupils' understanding of how maps work. He had been on a course about mathematics across the curriculum and was keen to apply numeracy in social studies. His first step was to involve them in constructing their own map of the school grounds. His focus would be to help the children develop their understanding of the compass, learn to read a map and be able to identify places and different symbols using coordinates. The mathematics teacher said they were also doing work on graphs next and that this would link well with Ali's work on coordinates.

As a result, Ali decided to make a scale grid of the school grounds where the scale was 1:500 (i.e. each centimetre on the map was equivalent to 5 metres on the ground). He marked the school building on the grid himself and then made seven copies of the grid.

Ali divided the class into seven groups of five and gave each group a copy of the grid. He explained which direction north was, showed them how to orientate their maps with north and then asked them to draw on the north point. He then discussed with the class how they were going to pace out the measurements on the ground and then translate this onto the grid.

Ali had arranged for a colleague to come out into the school grounds with him and his class so they could do the measuring and recording of non-moveable objects in the school grounds. He asked his class to first mark in the fence in relation to the school building. Next he asked them to measure the position of every object by measuring its distance from both the fence and the school building to help them place it on their scale grid. As the school grounds were rectangular in shape it was easier for them to locate objects and place them on their grid using the symbols they had agreed. Ali watched and listened as he went round the groups, helping where necessary, for example by showing them how to use coordinates to link the paces measured with the location of an object.

The class spent all lesson mapping the grounds and in the next two sessions they finished the mapping and putting all the details onto the map, including producing a key for the grid. All the maps were displayed on the wall of the classroom. Ali then organised the groups, one by one, to look at all the other maps and make notes on similarities and differences between them. As a class, they discussed why the maps varied and many reasons were given. Most agreed that, as they had measured by pacing, it depended on who did the pacing and how large that person's steps were.

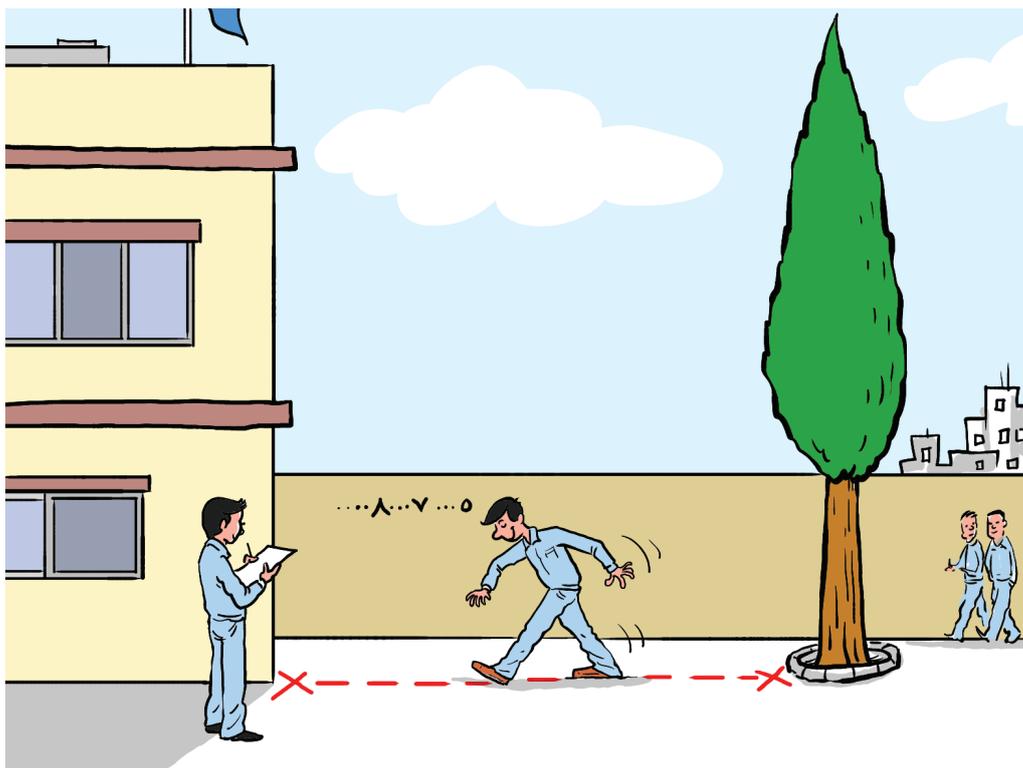


Figure 59: Students can use the school grounds to apply their numerical knowledge and skills in a practical way.

Ali then showed them a printed map of the school of a similar scale to compare with their maps. The class discussed the use of standard measures and the importance of being able to measure accurately, something he promised they would have more opportunities to develop later in the year as they did more work on mapping.

Comment

Mathematical skills play an important role in helping children learn about how maps work and how to use them in everyday situations. But children often need help to transfer their mathematical understanding and skills to another context. Teachers need to plan for this. For example, in history, children may be looking at records of population numbers affected by dates and events, in a particular country. They made need help to access the information and also to calculate the differences in population size and time.

The next Activity asks you to think about what you are doing currently in your subject teaching with one class and how you can support the children's development of numeracy skills while extending their knowledge and understanding in your subject.





Activity 34

Think about the lessons you are planning to teach over the next week in your own subject. How could you link one of these lessons to work done in mathematics or numeracy? Talk with the mathematics teacher for information about what the class has done already and what strategies you should encourage children to use to complement those taught in mathematics.

Choose the topic and think of which numeracy skills can be applied in that topic. Think about the resources you will need. Plan your lesson. As you teach the lesson, notice what works well and what needs further development.

Afterwards think how your pupils responded to the task. Were they able to do the numeracy Activity easily? If not, what help did you have to give? What will you do next to help their learning? Did the use of the numeracy aspects of the lesson help the children's learning in your subject? Write your thoughts about these questions in your Course Notebook and keep your lesson plan there too.

Comment



Planning how you will use mathematical and numeracy skills in your lessons will mean you are prepared to support the children in using these mathematical skills to access the information you want them to understand. Teachers of subjects other than mathematics often complain that children cannot do the necessary mathematics needed for their subject's work and they have to teach them. While there may be some truth in children not being able to apply their mathematics in different subjects, it is not always because they do not know the maths but that they need help and support to help them transfer the knowledge and skills to other subject areas. Children do not automatically transfer ideas from one subject to another, especially if they have not been given chances to try this. You can play a vital role in doing just that.

Teachers of all subjects need to be good role models for children by showing how they use mathematics in their professional lives as well as in their specific subject areas. It is also important that teachers avoid sharing any personal 'maths phobias' or dislike of mathematics if they have them. Teachers and educators never boast that they are illiterate, yet we often freely share that we are innumerate! Such information can play a part in demotivating pupils.

If we consider that children leaving school with poor numeracy skills show the lowest levels of full-time work in the labour market, even lower than those with poor literacy then we realise how important it is to encourage children in mathematics. Mathematics often suffers from a poor image among schoolchildren and so your

own attitude to mathematics and also how you teach and engage children in the subject or through other subjects is crucial.

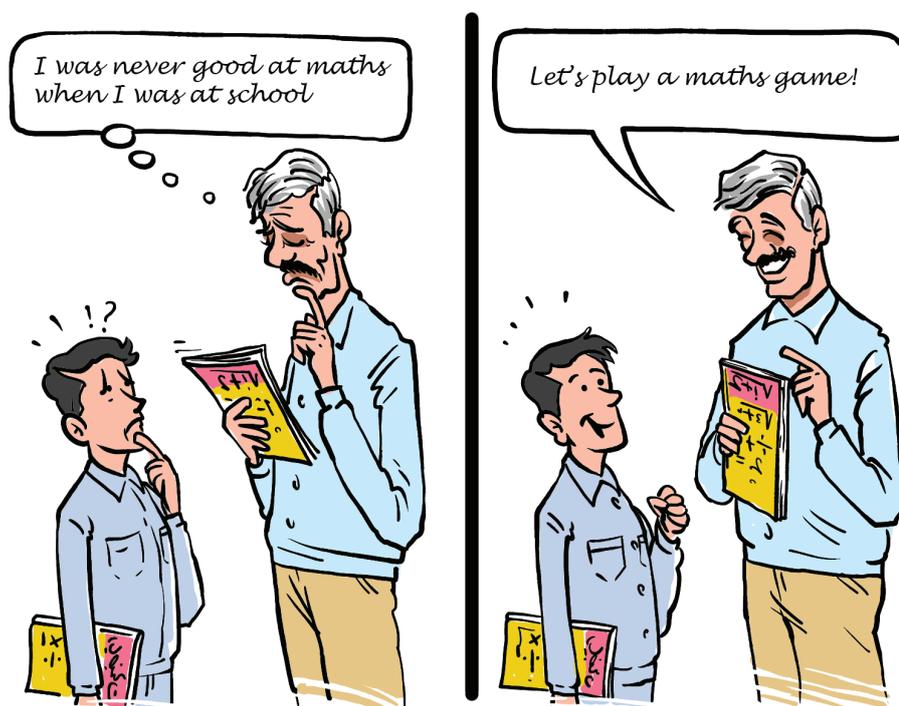


Figure 60: A positive attitude towards maths and numeracy can go a long way in encouraging students, try not to share your own phobias.

As a teacher, you need to be aware of the rich variety of ways you could, for example, teach calculation strategies. The next part of this Unit, starting with Case Study 31, explores this and looks at ways of assessing children's learning and competence.

Case study 31

Following a staff meeting that focused on how teachers could help children become more confident and competent in numeracy, Rhagda, a science teacher, was working on her planning for the next term. She was trying to identify key points in the topic on Forces where she could support the new school initiative of emphasising numeracy across the curriculum. She was aware that often, for example, she had to help some of her Grade 6 children with the calculations needed to do the science tasks. In the past, she just waited until the problem arose, but this time she planned lesson time to show the children how to do the necessary calculations once they had made their measurements.

Before the lesson, she checked with the head of mathematics the agreed method for the calculations she planned to do. She then set up two examples for the start of the lesson that would show the children how to do the measuring and discussed with them how to make a table to record their results in such a way that it would make it easier for the children to interpret their findings.



The pupils were introduced to a problem and the maths needed through a story that Raghda had written about how the spring of a toy broke. The children's task was to discover what spring would be best for a new toy. Raghda helped them to devise their tests and decide what measurements they needed to test the stretch and strength of the springs. She provided them with different springs and range of objects to test the springs.

The outcome was that the children were very focused as they worked in groups and shared the tasks. Raghda was amazed and very pleased at the quality of work from the children. During their plenary discussion of the task, she listened carefully to how they decided which the strongest spring was. The children discussed with Raghda how they measured the extension of their springs, and some of the problems they had in measuring such a moveable object as accurately as possible.

Raghda questioned each group about their methods and the mathematics they had done and was impressed at the level of understanding they showed. She was particularly pleased how many children whom she normally thought did not like number and mathematics were able to talk coherently about their findings. They had also learnt how to change just one variable as they did their tests to make sure it was a 'fair' test and that their measuring skills were accurate.

Comment



Through careful preparation and planning, Raghda pre-empted some of the problems she had experienced before when doing a similar activity. She helped the pupils to transfer their mathematical understanding and competence into another context and they felt able to ask for help more easily because she had set up a conducive environment.

Planning and thinking through possible stumbling blocks for children's learning, such as how well they can do a mathematical calculation, can make a marked difference to their participation and understanding. The next Activity explores ways of finding out how competent your pupils are at the mathematics you include in the lesson.

Activity 35



The next task is to plan an activity for one lesson with a special focus on finding out about children's mathematical competency. Look at what you intend to teach next week and identify a lesson that will involve children in using their numeracy skills. You will need to ensure that the activity you plan will allow the children to achieve your intended learning outcomes, for example being able to calculate

percentages of exports of particular crops from Jordan to compare with the exports of other countries.

Using group or pair work will enable children to talk through their ideas and help them think more deeply about the task.

When planning a lesson to find out students' mathematical competence in a particular area, consider the following steps:

- What numeracy skills will the children need to understand? (For example, working out percentages.)
- Find out if your children have already practised the skill in mathematics.
- Use this information to plan your lesson. (For example, plan to do some percentage sums and use data about crops as context.)
- Think of how to apply the numeracy concept in a real situation to show children the importance and relevance of mathematics. (For example, set a problem or question for children to find out what the biggest export crops from Jordan are.)
- Plan what resources you need to use. (For example, data about crop production in Jordan and exports of each crop.)
- Make sure you give the children time to explore and practise. (For example, show children how to work out the percentage of each crop that is exported in order to compare Jordan's exports with those of another country.)
- What kind of evidence will you gather to show what the children have learnt? You could listen to them as they are talking, make notes of their discussion, look at their plans, and/or look at their final outcome – whether this is a written account, a poster, an artefact they have made, or a presentation of what they did. What criteria will you use to judge their achievements in your subject and in numeracy? Make notes of your answers to these questions in your Course Notebook and think how you might develop your support within your subject area to help children be numerically confident and competent.

Comment

Children and young people can deepen their understanding and learn how to transfer numeracy skills to new contexts when numeracy is developed consistently across different areas of learning. As they practise the basic numeracy skills – including number bonds, multiplication facts and percentages – within a range of contexts, children will learn to use them more skillfully, giving them greater confidence in



applying and extending their skills. Where they use numeracy skills in ways that are relevant to them, children and young people will be more motivated to learn these skills and understand why they matter, in school and beyond.

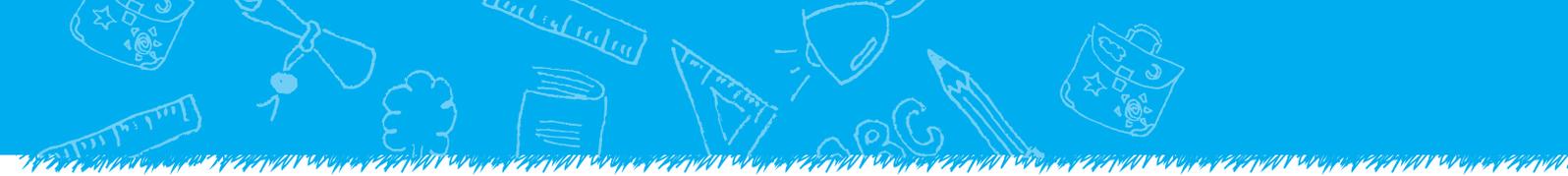
Summary



Providing stimulating and engaging opportunities for children to become totally at ease with the main mathematical functions is crucial. Improving children's numeracy skills will have an impact on learning in all curriculum areas. Children will be better able to describe, explain and justify their thinking as well as being more confident in using and handling numbers in a range of contexts.

How well children can work with numbers and data in these different contexts should be one area of focus when assessing their achievements in a relevant subject and topic (such as looking at a country's exports in geography, for example). How well pupils can select and apply the appropriate maths skills across the curriculum will indicate to a teacher the areas for development and the areas where children are competent and comfortable.

Most of all, it is important that teachers have high expectations and set challenging, yet achievable, targets for all children across the curriculum. The importance of numeracy across the curriculum cannot be over-emphasised – especially in a world that is changing so rapidly.



Module 4 Unit 16

Practical educational games to promote numeracy

Introduction

Using games to help children understand new ideas and practise new skills can be a very stimulating and engaging way for them to learn, but many teachers are anxious that if children are ‘playing’ games then they cannot be learning much. However, more and more research into the use of games now shows that they can provide a range of positive educational experiences and opportunities for children to explore new ideas and develop skills. In a games context, children can acquire skills without the pressure and fear of failure in quite the same way as they might feel in a more structured learning environment.

Games can range from electronic/online educational games to outdoor games to board games to simple paper-and-pencil type games. The value of using games in the classroom will be the same, but the ways in which games can be used and the kind of access pupils have to different kinds of games, such as electronic or online, will vary from school to school. Even when there is access to online games, it may not be possible for a whole class to play at once, but with good planning and organisation, games can be used with one group while the rest work on other tasks.

The Introduction to Geometry Games published by the Association for Mathematics Teachers suggests that the outcomes from using games can be divided into three categories:

- learning;
- ways of working;
- pupil or student experience.

This Unit explores how games can be used to benefit children’s numeracy skills during both mathematics lessons and in other subject areas. The examples will focus on pencil-and-paper and board games, but the same principles apply to using online or other games. Using games as a pedagogic tool to increase interaction and provide opportunities for children to work together and think more deeply is also explored throughout this Unit.

When devising and setting up games, a teacher needs to be clear which of these three outcomes is key for any game being developed, as knowing this should drive the design of the game and rules for playing it. Devising and setting up games for the first time can be time consuming and involve a certain amount of organisation by the teacher. But, as you work your way through this Unit, you will begin to see the advantages that games bring to learning and how they can open the classroom up to different ways of working. Playing games can also act as a trigger for many children to see mathematics in a more positive light and begin to see the patterns, logic and creativity of mathematics.

Teacher development outcomes

By the end of this Unit you will have developed your:

- knowledge and understanding of the value of games to develop understanding of mathematics across the curriculum;
- ability in selecting and utilising relevant and motivating games in the classroom to promote children's learning.

Using games to develop mathematical knowledge and skills can be both challenging and enjoyable. To make classes enjoyable, many mathematics teachers already employ games – some of which are numerically based and allow practice of the four rules of addition subtraction, multiplication and division, and others that are more conceptually based, such as exploring the properties of the movement of air. For example, with this last idea, a simple board game could be made where each player throws a dice and then moves their counter along a pathway on the board towards a winning point. When they student stops on a particular square on the board, they have to answer a question about the properties of air. If they answer correctly, then they can move on. If they do not answer correctly, they have to miss a turn before they can throw the dice and move along the board again. One student reads the questions out and has the answers.

As well as helping children learn new things, games can also play a part in just making many lessons fun and learning stimulating. Whatever topic you are teaching, such as the reasons for the decline of the Roman Empire in history or the table of elements in science, games can become a part of your classroom strategies for children to learn new ideas, practise skills or consolidate their thinking.

Now read Case Study 32, which tells the story of a mathematics teacher who uses games to help her pupils deepen their understanding of multiplication. As you read, think how you might employ such strategies in your teaching.

Case study 32



Sawsan teaches Grade 2 at Asma Elem Co Ed B School in Gaza.

Sawsan was planning work to develop her pupils' knowledge and understanding of the multiplication tables for 3, 4 and 5. She had spent some time using number charts with her pupils to work out the multiples in each table and now she wanted her class to become quicker at being able to use these tables. She talked with the school mathematics coordinator who suggested she used a game to help the children. At first, Sawsan was not too sure about this as she thought the children would not learn as easily or concentrate very well. However, she listened to the instructions as to how to play a kind of bingo that the maths coordinator gave her. She took a set of the bingo cards and the counters that he had made to use with his class to her own home to try it out for herself with her own children. In this way, she was prepared for what she was going to do and say in class and how she was going to organise the classroom and seat the children.

The next day, Sawsan arrived early at school and made sure the desks were organised for group work. She wanted the children to sit in groups of eight to play and she put a set of cards out for each group.

After registration, Sawsan told the class they were going to play a game and, of course, they were very excited. She explained the rules and told them that one person was to be the 'caller' and the rest needed a bingo card to play.

She gave each caller a card like this, which needed to be cut up into individual sums.

1×2	1×3	1×4	1×5
2×2	2×3	2×4	2×5
3×2	3×3	3×4	3×5
4×2	4×3	4×4	4×5
5×2	5×3	5×4	5×5
6×2	6×3	6×4	6×5
7×2	7×3	7×4	7×5
8×2	8×3	8×4	8×5
9×2	9×3	9×4	9×5
10×2	10×3	10×4	10×5

All the players had a card like the following, in which each number was an answer to one of the caller's sums.

12		9		18
	45		16	
20		27		32

As each sum was called out, the children had to look at their bingo cards to see if they had the answer. If they had the answer they would cover it with a counter. The first person to cover their entire card with counters called out 'Bingo!' Their bingo card was checked and if the child had covered all numbers that reflected the answers of the sums called out then that child was the winner. The group then changed the caller and played again. They played until everyone had had a go as caller, and then Sawsan stopped the class and asked if they had enjoyed the experience. The answer was a unanimous 'Yes!'



Figure 61: Educational games can motivate students to master maths and numeracy skills.

She then asked them to think what mathematics they had been learning and if playing the game had helped them. Sawsan was very impressed with their thoughtful answers and reflections on how much they had learnt without realising it. They asked if they could play again and Sawsan said they would do it every morning for the next week after registration, which they did. At the end of the week, she returned the set to the maths coordinator but planned to make a new set to keep in the maths corner of the classroom so the children could play it with their friends at playtime if they wished.

Comment

This Case Study showed how children's interest and motivation can be stimulated by playing games. Sawsan's pupils were not consciously aware of the mathematics they were practising and learning playing this game. They were enjoying the game and, because it was fun, they did not link it with lessons and learning. But many of the children learnt more multiplication bonds by heart because in order to win they had to be quick and accurate.

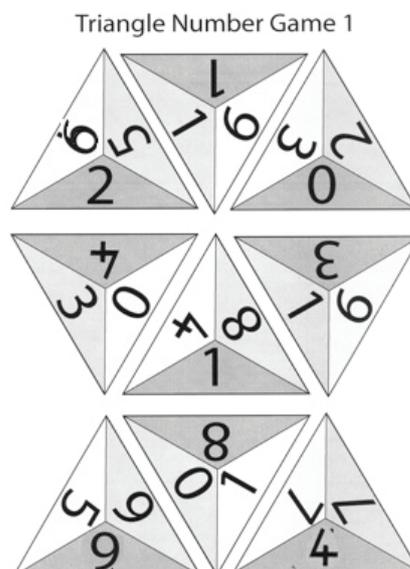
The more children play games such as this, the more they are practising their multiplication tables. Sawsan realised she could easily adapt the maths coordinator's set to practise the times tables from 6 to 12. She also planned other types of bingo games that used other mathematical ideas, such as doing simple divisions or even equations.

The first Activity in this Unit asks you to think how you could use a game that is about number bonds with your class in the next few days.

Activity 36

Look at the template of cards for the 'Triangle number game' below and think how you could use this game with your class.

A pack should consist of about 24 cards, so you can duplicate some of the cards shown here to make your full set. One child should deal the cards out to each player in a group (ideally each child should have an equal number of cards to start playing). The child next to the dealer places one card in the centre of the desk and then each child takes it in turn to put one of their cards next to the first card



according to the chosen rule e.g. numbers must add up to 9. (So, in this case, you could put a number 4 adjacent to a number 5, or a 0 adjacent to a number 9.) If a child cannot go, then the turn passes to the next child. The winner is the first person to place down their last card correctly.

Depending on the age of your class, you could change the criteria to making the numbers add up to 10 or saying that the sum of the two numbers must be a multiple of 3. This is another way for children to practise their skills.

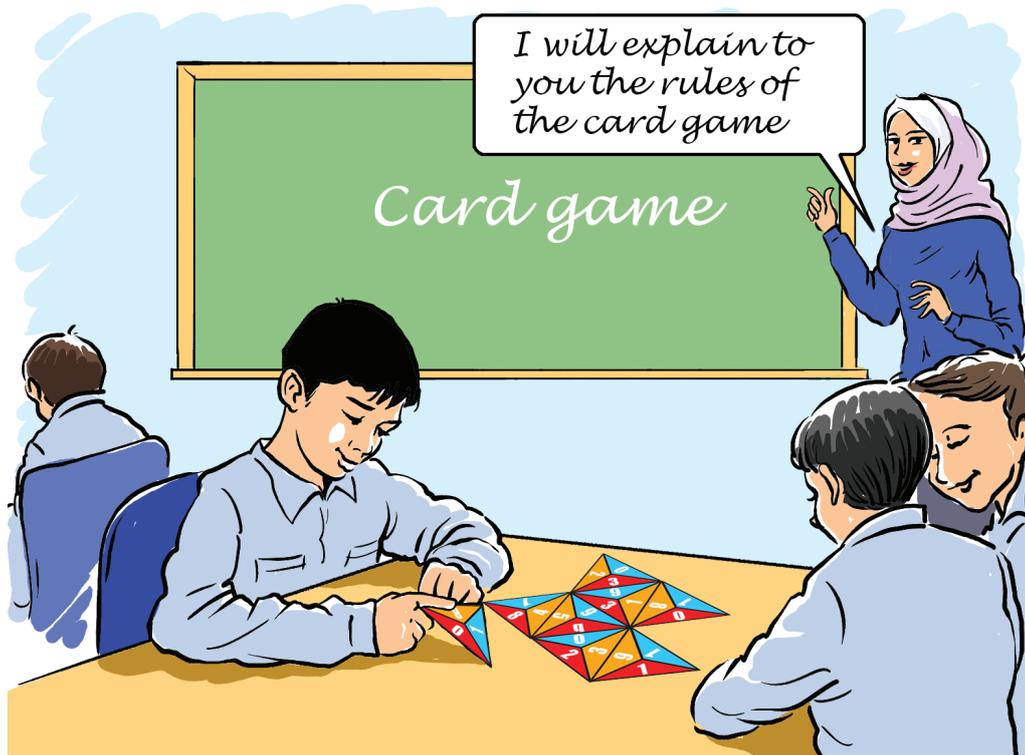


Figure 62: Maths and numeracy can be translated into a number of practical activities.

Now plan a lesson for your class using this game. You need to think about the following:

- How many sets of materials do you need to play this game?
- Could your class actually make the triangles for themselves and put on the numbers to make it quicker producing the resource? If so, when will they do this?
- If you have a large class, it may not be easy for them to all play at the same time, so you might want to just have one group playing, whilst the rest of the class do other work. (This makes it easier, as you will only need one set of triangles.)
- How will you introduce the game?

- Will the children each have a set of triangles or will they work in pairs? (If they work in pairs, they can talk about the answers and share ideas until they become more familiar with the game.)
- What limit will you put on the playing time?
- How will you know who is finding it easy and who needs extra help? How can you help these children?

At the end of the lesson, spend some time thinking how the lesson went.

- What went well? How do you know this?
- What didn't go as well as expected? Can you say why? What will you do next time to make it better?
- What did the children learn from the experience?

Write your answers to these questions in your Course Notebook. Think of other games you could make and play in your maths lessons. You could even introduce games into other subjects too. Use your Course Notebook to make notes of your thoughts.

Comment

Teaching some principles of mathematics through games can be very rewarding for children as it helps them to feel more confident and provides a safe environment for them to practise certain skills and explore new concepts. You may have noticed how much better children were able to talk about numbers after playing the game in Activity 36.

Through using games you can also encourage children to work with other members of the class and get to know each other better and to support each other in their learning. Being able to talk and explore ideas together helps children to clarify their thinking and understanding of key concepts.

You can design your own games to introduce more difficult ideas in a enjoyable way. Such games could include children having to visualise, explain and understand the properties of, for example, a shape. This could be particularly useful in geometry, where exploring the properties of shapes could be practised over and over again until the pupils feel sure of the facts and can test their ideas for themselves.



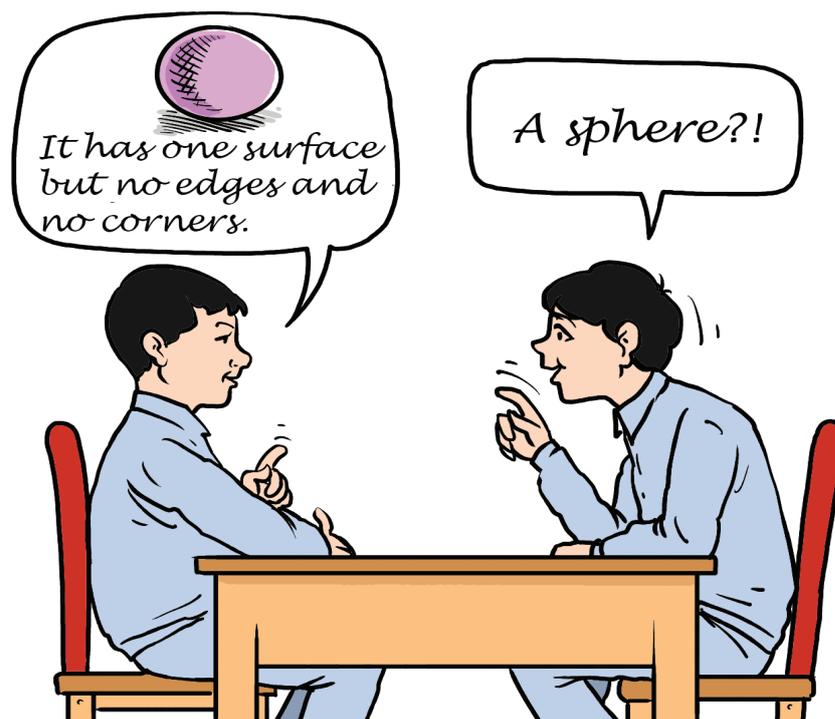


Figure 63: Games can help assess student understanding.

Evidence suggests that games enable learners to work at higher levels. Asplin (2003) noted in her study that simply playing a game as a time-filler or casually was not sufficient to improve mental computation skills. The author argued that if a game is deemed worthy of playing, then it should be elevated from the status of a time-filler or activity for early finishers to an integral part of the teaching sequence. Asplin went on to note that in a class where the teacher encouraged students to describe orally their moves in any game they were playing, and where the children were grouped according to ability, gains in mental computation ability were much higher.

Most children have a natural desire to win and this encourages them to look at the problem or game in different ways and so extend their thinking. The discussion that occurs within the group playing the game is often more task focused than in an ordinary mathematics lesson. The players are also encouraged to use mental arithmetic more. For example, when playing a game about the properties of different kinds of triangle, pupils may need to work out the size of the angles in an equilateral triangle. Listening to the talk as they try to work out the angles will give insight into what they understand. Do they know that the internal angles of an equilateral triangle add up to 180° and therefore each angle would be 180° divided by 3 i.e. 60° for each angle?

As games do not often have written outcomes, there have to be other ways to measure children's achievement. The next section explores this further. First, read the Case Study, which shows how Aasif shares his experience with his colleagues during a school professional development session.

Case study 33



Aasif had been using games in his class for some time, especially in mathematics, as he saw the benefit to the pupils when they played such games. The head teacher had been to see his class playing maths games and asked Aasif to share his ideas with the staff at a meeting to look at interactive ways of working in the classroom.

Aasif realised that many of his colleagues would be worried about how they would know what the children were learning if they used games and would be concerned that they would lose control of their classes. He decided to start by playing a simple number bond game with the staff for just a few minutes and then asked them to think about what they might learn from playing the game. There was much discussion about this and all the teachers agreed that the game provided time to practise skills in a supportive environment. They also talked of how they had enjoyed playing together and could see the benefit for the pupils. However, they did ask how this would allow them to assess children's achievement.

Aasif explained that when the children were playing games, he moved around the class and watched and listened to what the children were doing and saying. He told his colleagues that he found this a very useful way to identify problems and would sometimes spend time talking these through with the group or with the whole class if it was a common mistake or problem. But also he told the staff how he noticed children who were not very sure or confident, and was able to help them as they played. Sometimes he said he organised the whole class to play a game but with pairs acting as a single player. This method, he noted, was particularly helpful if the game was new and introducing quite difficult ideas and concepts, because each person could support the other as they decided on the answers or on what move to make.

He also showed his colleagues his record book, in which he recorded observations on each student about their achievements in each game. Here he also included children's own comments on their ability and understanding with regard to the games. He said how he had found out from this how much the children were able to assess their own competence and understanding.

Finally, he offered the staff the use of the small set of different games he had made to try in their own classes and suggested they could all talk about their experiences at the next staff meeting in a month's time.

Comment



Aasif showed his colleagues how using games in the classroom can emphasise deeper learning of concepts and how the children were able to see this for themselves. Aasif's colleagues had a chance to experience the games themselves, and from this were able to discuss the possible impact of this way of working. Encouraging his colleagues to have a go at playing one or two games with their own classes was a supportive, non-threatening way to begin the debate about introducing interactive ways of working into the classroom.

Aasif also explained how he interacted with the children by discussing with them how they played the games. He gave them feedback on the effectiveness of the tactics they used and suggested ways they might develop their skills in playing the game. How a child interprets and uses feedback, he suggested, is key. If the child does not perceive it as useful, they will ignore whatever is suggested. Understanding your pupils as learners and being sensitive to how you give feedback is therefore very important. Involving children in reflecting on their strategies and progress will help their learning and confidence.

The next Activity asks you to explore how using games in a lesson can help you find out more about the way the children in your class learn. Gathering evidence of pupils' learning and the strategies that they use will help you support their next steps in learning better.

Activity 37



For this lesson you need to select a mathematical game to play with a group or the whole class. Plan your lesson, and start by making sure that you give a clear explanation of the rules of the game and then play the game with your group or class. As the children play the game, watch each group, listen to their discussion, make notes of any significant comments or tactics they use and, at the end of the lesson, ask them what they liked about playing the game and what they think they have learnt.

Now use your Course Notebook to answer these questions:

- What did the children say about their learning?
- What do you think the children learnt?

- How do you know what they learnt?
- What evidence do you have to support your claims?
- How did you gather this evidence?
- How can you record what the children have learnt?
- How well did the children work?

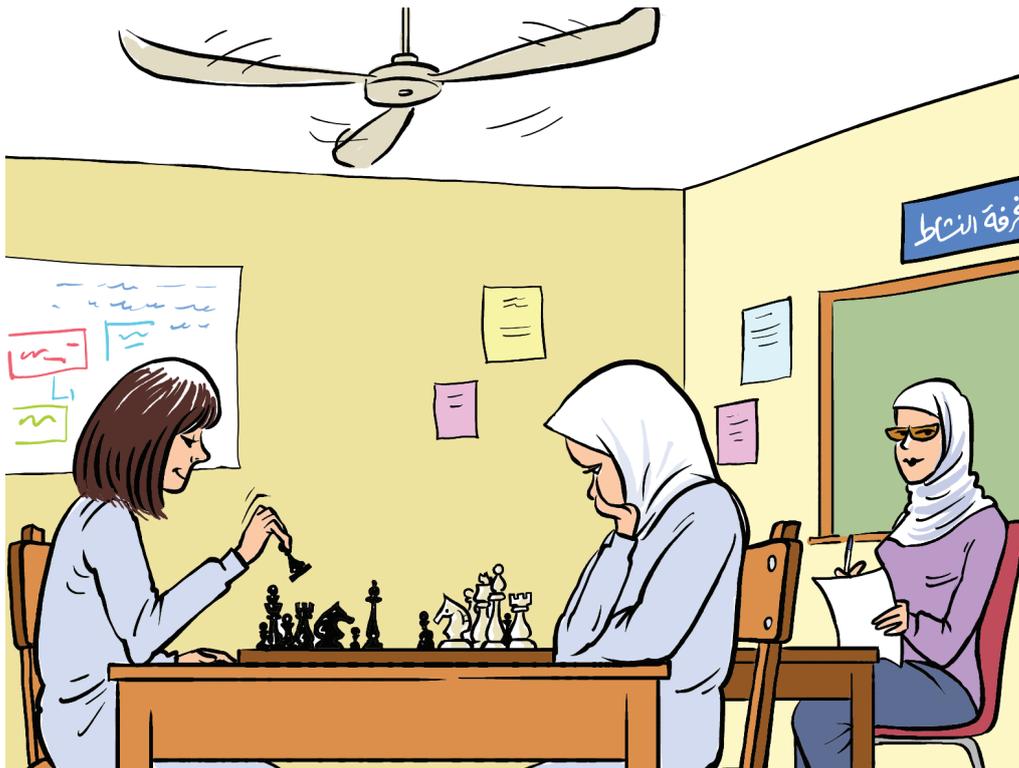


Figure 64: Games can assist students in developing skills that can be applied to their learning.

As we discussed in Module 3, assessment for learning involves sharing learning intentions, sharing and negotiating success criteria, giving feedback to pupils, effective questioning and encouraging pupils to assess and evaluate their own and each other's work. This all seems quite complex, but when children are playing games much can be achieved in this regard.

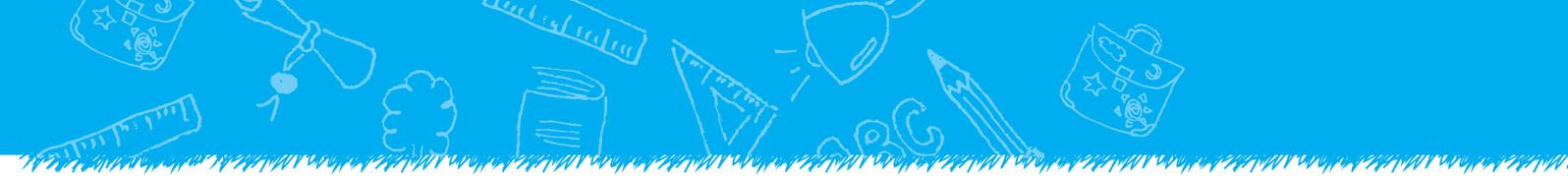
The process of seeking and interpreting evidence to decide at what stage the children are at in their learning, where they need to go next and how best to get there is crucial, and games can help this process be more engaging.



Summary

Playing numeracy games as part of the teaching and learning experience allows you as the teacher time to see what children know and can do as well as find out where the gaps are and show how some of your class will support and help others in their learning.

This highlights how written tests are not the only way to assess student achievement. By watching how your pupils play together, by listening to their discussion as they play and by asking the children about their assessment of their own learning, you are using valid ways of gathering evidence of learning. This will give you and the children a fuller idea of what they have achieved and provide you with insight for the next steps. Most important of all, games are a very good way of motivating children to engage with mathematics and numeracy in ways that ordinary textbook exercises may not. As a teacher, you can use standard games and devise your own, but both need to be used carefully so that they enhance learning and help children understand themselves better as learners.



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