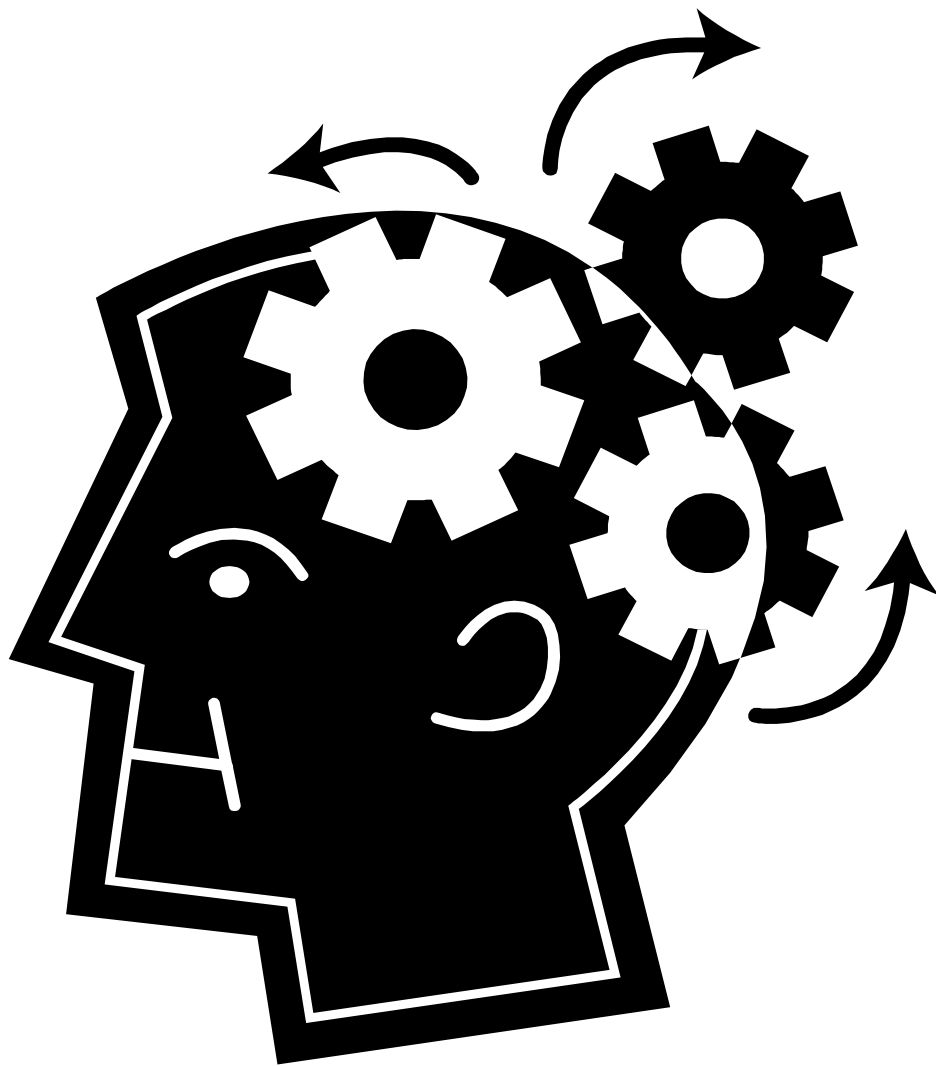


Learning to Think: Thinking to Learn



Lesley Dodd – 2004

Learning to Think: Thinking to Learn

Introduction

The Brain

Much of what we understand about how the brain works has been discovered during the last ten years. Advanced scanning technology has enabled neuro – scientists to detect and analyse the parts of the brain that are active during thinking and learning. We can put this knowledge to good use to improve learning and teaching in our classrooms.

How do the different parts of the brain work together to help us to learn?

The Brainstem

This is the most primitive part of our brain. It regulates basic life functions such as breathing, and controls our reactions and movements. It keeps our bodies running as they should, and ensures survival. Under stress, the brainstem tells us to fight, to run away or to freeze. If we feel stress when we are learning, the Brainstem can slow down our learning. It is sometimes called The Reptilian Brain and cannot be said to think or learn.

The Neo Cortex

The top layers of our brain allow us to think rationally and to solve problems. We achieve higher levels of thinking using this part of the brain. This ‘thinking’ brain evolved over millions of years and grew from our emotional brain, the Limbic System.

The Limbic System

This is the emotional and long-term memory part of our brain. We are good learners, and can remember things well, when we can use our emotions as we learn.

When we are comfortable, at ease and relaxed we can learn!
To maximise learning capacity we need to provide a calm and secure environment within which we can create degrees of challenge. We can then use our 'thinking brains' more effectively.

The Brain Needs Fuel

- The brain uses over 20% of the body's oxygen.
- It requires water, rest and protein.
- When we sit down for long periods of time, the brain is not as efficient because we use less oxygen.
- If we haven't had anything to eat or drink for a long period of time we run out of fuel, and learning becomes difficult.

If we have to sit for a long time in lessons and we are thirsty or hungry, we will be inefficient learners.

Brain-based Learning

The neo cortex, the thinking brain, is divided into left and right hemispheres. We use both sides of the brain to a greater or lesser extent in virtually all activities. Some people however, use one side of the brain more than the other.

The logical left hemisphere helps us with language, number and logic, sequencing, writing, reading and fine detail. The creative right hemisphere helps us to visualise, to see patterns, images and pictures and to appreciate music, art and design. Although the two sides operate in different ways we should aim to connect the hemispheres. If we can learn in variety of ways, we can retrieve information easily when we need to. The brain enjoys multi-sensory simultaneous input!

Information that has been received, processed and stored in a variety of ways is much more likely to be retrieved when we need it! Learning is best done when a balance of multisensory approaches is used.

About Learning

The average concentration span for children is their chronological age plus two minutes! Everyone learns more at the beginning of a lesson because concentration is higher, and there is usually an element of anticipation..... If we are asked to sit and listen for a long time we lose concentration, stop learning and may misbehave.

If we are asked to concentrate for longer than we are capable, we stop learning and sometimes misbehave!

Learning Styles

Everyone has a preferred learning style.

Some people like to see pictures and diagrams, moving images and colour. These people are visual learners.

29% of people are visual learners.



Some people like to hear sounds and voices. These people are auditory learners.

34% people are auditory learners.



Some people like to do things practically, move around and use touch to learn. These people are kinaesthetic learners.

37% of people are kinaesthetic learners.



We all use a combination of these learning styles, but most of us prefer to learn using only one or two of these ways. If we can learn to use both sides of the neo cortex (whole brain learning), and use different learning styles, our learning will improve.

See Appendix 1 for strategies to use with different styles of learning.

Giving the Brain a Workout - The Brain Gym

This is an effective way of improving the connections between both sides of the brain. A series of different exercises can be done to link the left and right hemispheres. The left side of the body is controlled by the right brain, and vice versa. The exercises also improve blood flow to the brain and this supplies the brain with oxygen. They are ideal to use in the classroom to refocus the children and for relaxation and release.

Some exercises

Practice rolling your head in circles: slowly one way, then slowly the other.

Pat your head with your right hand and rub your stomach with your left hand, then swap round your hands and rub your head and pat your stomach.

There is a long list of brain break activities like these in Appendix 2. Some of them can be done with music.

Thinking skills

Research suggests that there is much we can do to help children to learn to be better thinkers. When we talk about 'thinking skills' we are referring to higher order thinking. This is more than just rote learning. Learning how, for example, to spell a word for a weekly test does not require higher order thinking – devising a strategy to help to remember how to spell the word does!

Children need to be able to judge, analyse and think critically. They also need to think clearly and creatively and use information to solve problems. If we allow them time to reflect on their tasks and to challenge ideas, they will be able to deepen understanding.

Thinking skills teachers attempt to make children aware of their own thinking, and show them strategies they can use in all areas of the curriculum.

We can:

1. Teach explicit strategies for learning.
2. Provide challenge and interest to motivate.
3. Encourage supportive collaboration.
4. Help them to think about their learning.

The National Curriculum lists five higher-order skills children should develop:

Information processing

The ability to locate and collect relevant information, to sort, classify, sequence, compare and contrast.

Reasoning

The ability to give reasons for their opinions and actions, to draw inferences and make deductions, to use precise language to explain what they think, and to make judgements and decisions informed by reasons and/or evidence.

Enquiry

The ability to ask relevant questions, to pose and define problems, to plan what to do and ways to research, to predict outcomes and anticipate consequences and to test conclusions and improve ideas.

Creative thinking

The ability to generate and extend ideas, to suggest hypotheses, to apply imagination, and to look for alternative innovative outcomes.

Evaluation

The ability to evaluate information, to judge and value what they read, hear and do, to develop criteria for judging the value of their own and others' work or ideas, and to have confidence in their judgements.

We can strive to create a learning environment which will stimulate the development of these mental processes, and plan to infuse them in lessons throughout all areas of the curriculum.

We can attempt to make our children conscious of their thinking and we can show them strategies to use in all their learning.

The Thinking Classroom

The strategies described here will enable teachers to address the higher-order skills described in the National Curriculum, and can be used throughout the curriculum.

Questioning

The thinking classroom can be a place where children ask questions as well as give answers. Skilled questioning can generate high-level thinking and discussion, and also provide an excellent model for children so that they can adopt self-questioning strategies. Allowing time for reflection and providing opportunities for discussion also contributes to the thinking process.

Bloom's Taxonomy

In 1956, Benjamin Bloom headed a group of educational psychologists who developed a classification of intellectual behaviour important to learning.

Bloom found that 95% of test questions encountered by pupils required them to think only at the lowest possible level...the recall of information.

He identified six levels within the cognitive domain, and created a taxonomy for categorising the level of abstraction of questions that commonly occur in educational settings.

His taxonomy is useful to us because, it allows us to determine the levels and the quality of the questions we can use with our children.

The Levels of abstraction of questions

High

EVALUATION

- Judge
- Evaluate
- Recommend
- Justify
- Question

Example – Is there a better solution to...?

High

SYNTHESIS

- Compose
- Invent
- Predict
- Create

Example – What would happen if...?

High

ANALYSIS

- Compare
- Infer
- Contrast

Example – If,,, happened what might the ending have been?

Middle

APPLICATION

- Report
- Demonstrate
- Complete

Example – What questions would you ask of...?

Low

KNOWLEDGE and COMPREHENSION

- Describe
- Retell
- Name
- Locate

Examples What happened after...?
 What do you think could happen next...?

More information on questioning can be found in Appendix 3 – Questioning Techniques to Develop Comprehension.

Mind Mapping

Mind mapping is a powerful thinking tool. It is a graphical technique that *mirrors* the way the brain works, and was invented by Tony Buzan. Mind mapping helps to make thinking visible.

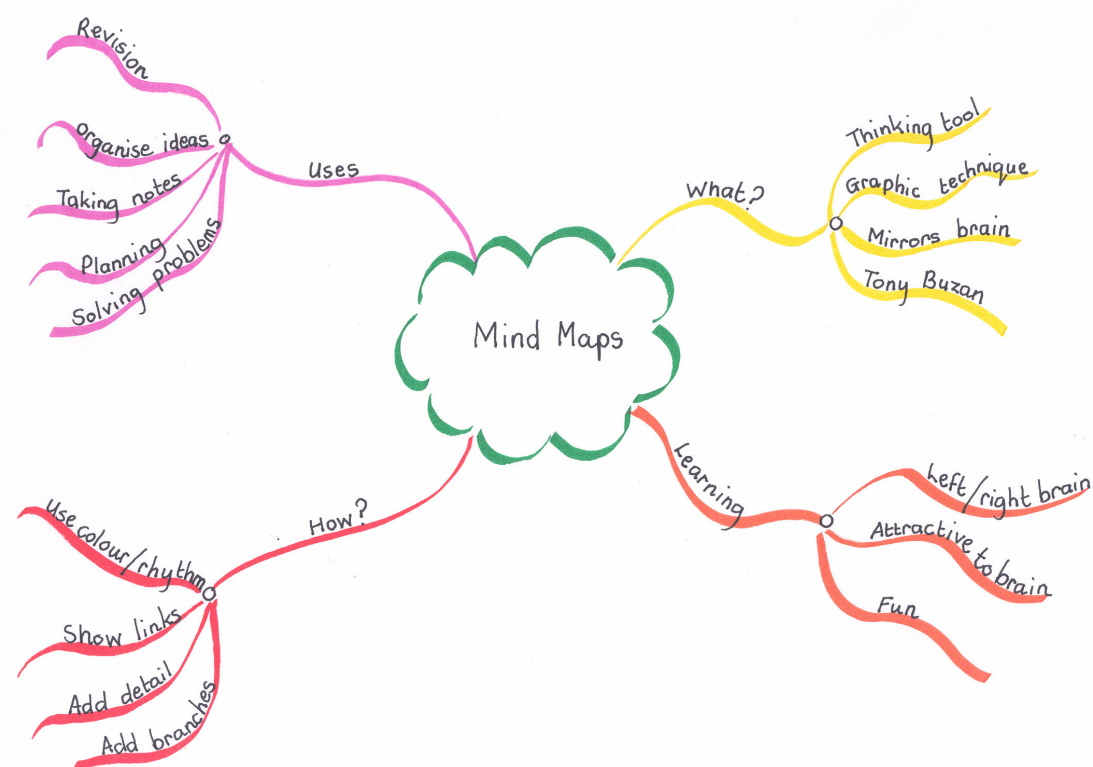
Most people make notes using lined paper and blue or black ink. Making notes more attractive to the brain by adding colour and rhythm can aid the learning process, and can help to make learning fun.

The subject being studied is crystallised in a central image and the main theme radiates out from the central image on branches. Each branch holds a key image or a key word. Details are then added to the main branches and radiate further out.

Mind maps have a wide variety of uses, for example, note taking, revision planning, planning for writing and problem solving can all be successfully carried out using the technique. The colours and the graphics used will help children to organise their ideas and thoughts. They can be very simple or, quite detailed depending upon the age of the children and the complexity of the subject.

Because creating the mind map involves the use of the left and right brain, remembering the information becomes easier! Children can also clearly demonstrate their understanding of a subject using a Mind Map.

Below is an example of a simple mind map linked to the information above.



How to draw a mind map

1. Turn the page on its side (landscape). Use plain paper.

2. Draw the central image using different colours. The central image should encapsulate the subject of the map.
3. Add the branches representing the subject's main topics or themes using key words or images.
4. Add detail with more key words and images. Use colour.
5. Print the words clearly.
6. Use arrows to connect linked ideas.

Mind mapping can be used in all curriculum areas and can help children to think about their learning.

Supportive Collaboration

“Language is an integral part of most learning and oral language in particular has a key role in classroom teaching and learning. Children’s creativity, understanding and imagination can be engaged and fostered by discussion and interaction. In their daily lives, children use speaking and listening to solve problems, speculate, shape ideas, make decisions and reflect on what is important.”

Speaking, Listening, Learning: working with children in Key Stages 1 and 2 (Primary National Strategy, 2003).

The above quote is taken from the first main publication from the Primary National Strategy, ‘Speaking, Listening, Learning; working with children in Key Stages 1 and 2.

The materials are the result of a two-year partnership between QCA and the National Literacy Strategy. They reflect the National Curriculum requirements in English and develop approaches to teaching, extending and reinforcing speaking and listening both in English and across the curriculum.

The materials offer an extensive range of ideas, activities and teaching sequences to help teachers address the objectives for each year group. The activities suggested link to the four aspects of speaking and listening – speaking, listening, group discussion and interaction and drama.

Group discussion and interaction

Working together in small groups or pairs helps children to learn to:

- develop the language and social skills needed for co-operation and collaboration;
- use exploratory language to try out ideas;
- extend their ideas as they share these with others;
- stretch their language as they talk critically and constructively;
- support and build on each other's contributions;
- take their turns in discussion.

The activities offer opportunities for children to work in groups:

- for different purposes – investigating, problem solving, sorting, planning, predicting, reporting, evaluating;
- with different outcomes – carrying out an experiment, constructing an artefact, making a presentation, deciding on actions;
- learning to use talk in different ways – discussing, hypothesising, agreeing and disagreeing, questioning, reflecting.

Examples of activities

Snowballing

Children are organised to discuss something or to investigate an issue in pairs. The pairs then join another pair to form a group and share their findings. The small groups then join together to make a larger one.

2 → 4 → 8 → 16 → whole-class

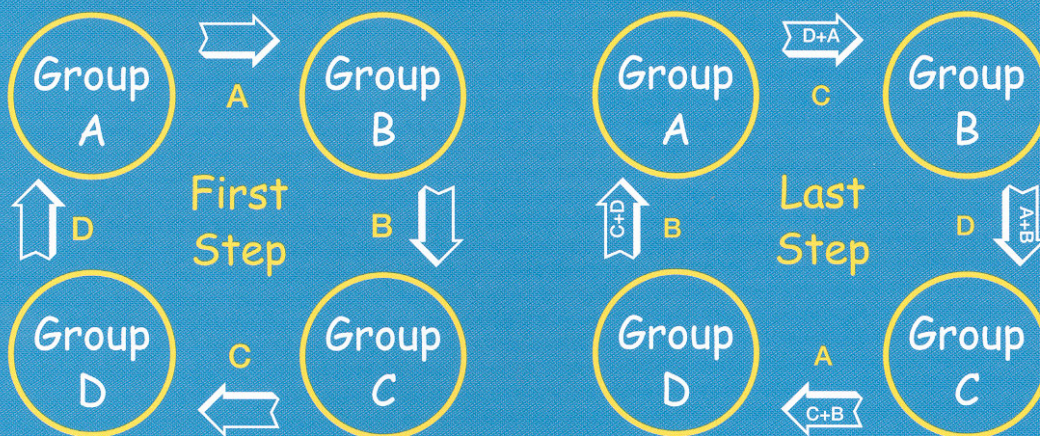
This approach can be useful when controversial material is being read and evaluated, perhaps for bias or for portraying stereotypical images, for example.

Envoys

This is a method of disseminating ideas and information that can overcome a more laborious and repetitive procedure of having each group 'report back' to the whole class. Once each group has completed its initial discussion, it sends out one member as an envoy to the next group. Envoys move round all the other groups in turn explaining/sharing ideas gathered from the groups they have visited (See diagram below).

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Think-Pair-Share

Children are asked to consider an issue or a problem individually, such as reading and preparing a response to an information text, or preparing a news item to be read aloud. They then explain their ideas to a partner. After the pairs have discussed the issue, they may join another pair, share views and emerge with a group conclusion or perspective.

Statements Game

A group is given a set of cards on which statements are written. The group is asked to agree, through discussion, how to categorise the statements, e.g. either agree or disagree with the statement or place them in order of importance or relevance, when some might be considered of equal importance, using the power triangle.

X
X X
X X X
X X X X

More ideas for activities can be found in the leaflet, *Group discussion and interaction – making it work in the classroom*.

The speaking and listening pack also contains leaflets describing activities to develop;

- Speaking
- Listening
- Drama

Edward de Bono's Six Thinking Hats



Edward de Bono developed the 'six hats method', A simple yet powerful tool which can be used to teach people to view problems from a range of perspectives, and so develop a more rounded way of thinking. It helps people to look at things in a collaborative way, beyond their normal perspective, and to see new opportunities.

When considering a problem or proposition, people within the group will look at the issues from different perspectives.

The White Hat deals with just the facts.

The Yellow Hat explores the positives and probes for value and benefit.

The Black Hat is the devil's advocate and spots the difficulties and where things could go wrong.

The Red Hat expresses emotions and feelings and shares fears.

The Green Hat focuses on creativity; the possibilities, alternatives and new ideas.

The Blue Hat is used to manage the thinking process and ensures the Six Thinking guidelines are observed.

Encouraging children to try out roles makes it easier for them to understand the approaches to thinking through problems.

For more information visit <http://www.edwdebono.co.uk/debono/home.htm>.

The information presented here touches the surface of the subject of teaching children to think. There is a vast amount of material available for teachers. We have included a list of selected resources for further reading which, we hope will be of use.

Finally it seems appropriate to end with a quote from Edward de Bono...

'Information is very important. Information is easy to teach. Information is easy to test. It is not surprising that so much of education is concerned with information. Thinking is no substitute for information but information may be a substitute for thinking.'

Teach Your Child to Think – Edward de Bono (1992), Penguin

Lesley Dodd, 2004

Appendix 1

Learning Styles

Kinesthetic Strategies

- Build in regular planned breaks
- Use different parts of the classroom for different activities
- Use open body language - avoid folded arms, shrugs, frowns etc
- Act things out
- Provide opportunities for learning through manipulating and doing
- Speak slowly
- Use laminated letters that can be organised and sorted for structuring words
- Use laminated words that can be organised and sorted for structuring sentence
- Use toys and props to enhance story telling and prompt story writing
- Ask questions through kinesthetic recall, 'what did it feel like?'
- Ask questions through kinesthetic imagination, 'what would you be doing?'
- Use physical associations and learn through movement, mime or gesture
- Ask the children if the spelling feels right
- Teach children to try spellings first by writing them with a finger on the palms of their hands, then with eyes shut, then saying the spelling at the same time
- Role play when possible – get the children to act out a volcano erupting or erosion
- Ask the children to pretend to be the people you are learning about – to walk like them, talk like them, mime their actions etc

Learners may...

- Like to 'get on with things' rather than listen to instructions
- Like to take regular breaks when working
- Wave hands around a lot when explaining things
- Like to learn in real life situations
- Find it hard to sit still – fidget

Strategies for Closing the Learning Gap Mike Hughes, Andy Vass The Learning Revolution
Gorden Dryden, Jeanette Vos

Auditory Strategies

- Establish protocols about sound levels
- Teach and practice good listening
- Use circle time or similar approach to practice active listening, give feedback, practice asking questions
- Make wise use of music to complement and enhance learning
- Keep classroom talk positive
- Talk through the content of posters and other visual material
- Encourage children to describe their story aloud to a partner before starting to write
- Make extensive use of singing, chanting and narrative verse
- Ask questions through auditory imagination, 'what would it sound like?'
- Ask questions through auditory recall, 'what did it sound like?'
- Before reading for information, use paired prediction activities - I think this book is about....my evidence is....

Learners may...

- Prefer to listen to the teacher than read it in a book
- When spelling a tricky word, may say it repeatedly to see if it sounds right
- Talk to themselves when working
- Tilt head or rest head in hand in lessons
- Repeat instructions under breath
- Find it easy to follow a speaker even when not looking at them
- Find it helpful to speak notes onto a tape recorder and play back

Strategies for Closing the Learning Gap - Mike Hughes, Andy Vass
The Learning Revolution - Gordon Dryden, Jeanette Vos

Visual Strategies

- use lots of visual stimuli such as prompt cards, posters, cue cards
- put a visual reminder about the day's work on the board
- use posters with positive messages in your classroom and around school
- place key words around the room and on prompt sheets on tables
- use visual prompts for story writing
- use visual references such as 'It looked like...'
- ask questions through visual recall such as 'What did it look like?'
- use lots of visual associations
- encourage spelling by imagining the word and breaking it into its constituent parts and seeing the process happen; change

Learners may...

- write down tricky words to spell to see if they look right
- remember best if able to write something down
- like to take a lot of notes
- look at teacher when s/he is talking as aid to concentration
- find it easy to understand maps, diagrams and graphs
- can visualise notes or textbook
- talk quickly - may talk more than listen
- say things like 'I see what you mean' - 'I get the picture'

Appendix 2

Brain Break Activities

Brain-Break Activities

1. Practise yawning! Stretch your mouth as wide as you can. Stick your chin out and move it from side to side.
2. Practise rolling your head in circles: slowly one way, then slowly the other way.
3. Practise rolling your eyes in circles: slowly one way, then slowly the other way.
4. Close your eyelids and try it again
5. Hold your ears and slowly roll your ear lobes between finger and thumb.
6. Hold your ears with your opposite hand and slowly roll your ear lobes between finger and thumb.
7. Make a steeple with your fingers in front of your face, now lift each pair of fingers together starting with your index fingers.
8. Make a steeple with your fingers in front of your face, now lift each pair of fingers together starting with your index fingers. Count quietly aloud as you do so.
9. With your forefinger and thumb of each hand pinched together, extend your hands out in front of your face and trace large circles in the same direction. Keep your lips and teeth together.
10. With your forefinger and thumb of each hand pinched together, extend your hands out in front of your face and trace large circles in the opposite direction. Keep your lips and teeth together.
11. Stand with a partner shoulder to shoulder, now move apart so that you can touch the tips of your forefingers. Now try to trace a circle together.
12. Stand with a partner shoulder to shoulder, now move apart so that you can touch the tips of your forefingers. Now try to trace different shapes together. Agree on what shape and its size beforehand.
13. Practise shrugging your shoulders slowly forwards, then slowly backwards.
14. With your elbows at shoulder height, practise making big circles, then small circles, forwards and backwards.
15. With a partner sit either side of a desk. Your partner should place both hands flat on the desk. With your finger and thumb 'draw' round the shape of their hands. Do it three times forwards and backwards and swap.
16. With a partner sit either side of a desk. Your partner should place both hands flat on the desk and so should you. Take turns to lift different fingers without taking any other fingers off the desk. The partner has five seconds to lift exactly the same finger from the same hand.
17. Do finger aerobics! With a partner sit alongside each other or either side of a desk. Your partner should place both hands flat on the desk and so should you. Take turns to lift different fingers without taking any other fingers off the desk. Do it together and in sequence. Start with simple lifts with each finger in turn, then do taps, then go for bends, then big stretches!
18. With a partner sit either side of a desk Place your elbows on the desk against your partner's. Your partner places his hands either side of yours with open palms. You have to push your hands put without moving your elbows.

19. Swap with your partner and now try again.
20. With a partner sit on chairs facing each other with your knees and toes touching. Hold hands over the middle. Slowly try these actions: raising a flag, swatting a fly, serving at a tennis match, driving a bus with a large steering wheel, boxing, picking up a very delicate flower. Hold hands all the time. Stay seated.
21. Place your right hand above your head and then slowly take it down your back as far as it will comfortably go. Now with your left hand hold your right elbow gently.
22. Swap hands and try again.
23. Try tickling yourself! Does it work? Try different places!
24. With your right thumb and forefinger hold your right ear. Now swap and swap again.
25. Touch your forefingers together out from the front of your face. Touch the tips of the outstretched fingers together. Now rotate in a circle but in opposite directions.
26. Try the same thing with your arms! Rotate then at the same time in wide circles from the shoulder but in opposite directions.
27. Write the keywords from the lesson in the air with your nose.
28. Mime an everyday activity around school or in the house. For example, changing a light bulb, washing dishes, changing a nappy or choosing lunch. Do so only with the upper part of you body and standing still. Ask your partner to guess what it is.
29. Create a 60-second role-play to demonstrate a key part of the lesson.
30. With a partner/make numbers with your bodies. Work your way from one to ten.
31. Make 2-D shapes with your body - a square, circle, rectangle, octagon.
32. Make 3-D shapes with a partner - a cube, sphere, cylinder.
33. Rotate your arm to represent angles, 90 degrees, 180 degrees, or turn a full circle for 360 degrees.
34. Rotate your arms to represent the time. Ask your partner to guess what time it is. Do not cheat!
35. Following your teacher's directions, jump back and forth to represent multiplication or division.
36. Ask the teacher to practice 'teacher says' with you. The teacher makes a movement and you copy it. If the teacher says 'do this', you do it. If the teacher says 'do that' you don't do it! Make sure you listen carefully.
37. On a partner's back do gentle chops with the back of your hand. Do them across your partner's back but do it gently.
38. On a partner's back do gentle squeezes with your fingers. Do them across your partner's back but do it gently.
39. Put your hands together and clap. Now move your hands in a circle as you clap. You have just given yourself a round of applause.
40. Put your hand on your back. Now give yourself a big pat and say 'Well done'.

Music and Brain Breaks – Sharon Rawstron – Casterton Primary School

Teachers sense when children are going off task and attempt to refocus attention. One way to make learning more productive is to give them a **Brain Break**.

The core purpose of brain breaks is to help keep the pupils in the most receptive state for learning. This may involve regular physical reprieve as movement increases the oxygen supply to the brain.

'Regular brain breaks give a moment for diffusion before returning to focus on the original task.. Some teachers use simple, fun brain breaks to alter the mood in their classrooms and create a positive, enthusiastic atmosphere at times when concentration may be slumping.'

www.acceleratedlearning.co.uk

Using brain breaks to alter physical levels can help to prevent the children from becoming lethargic. Brain breaks are also ideal to refocus pupils' attention after something exciting or distracting has happened.

Brain breaks are ideal to:

- Energise / stimulate
- Refocus
- Relax / release

Below are some suggested brain breaks, which are ideal to do to music.

Suggested Brain Breaks

Songs: Sing action songs e.g. *Head, shoulders, knees and toes', 'One finger, one thumb keep moving', If you're happy and you know it* and *Do your ears hang low?' (*Use a children's song tape*)

Cross crawl: In turn, children lift the left knee and touch with the right hand, then right knee to left hand and so on. Expand with elbows to knees and flicking heels backwards to touch the opposite hand. (Try any movements which involve moving one arm and the opposite leg.) (*Use energising music*)

Kneesies: Whilst crouching slightly, place the left hand on the left knee and right hand on the right knee. Move the knees until they touch, then transfer hands over to the other knees. Keep repeating. (*Use energising music*)

'Do this! Do that!': Make a movement for the children to copy. If you say *Do this!', you do it. If you say *Do that!', don't do it. (*This can be sung unaccompanied.*)

Conducting: Conduct a timed piece of music as if you were the character from a story. (*Use music which varies in speed e.g. Dance of the Sugar Plum Fairy.*)

Alphabet: Write the alphabet in the air whilst singing the alphabet song (or *Thrass Rap*) and standing on one leg.

Arm stretches: Place your right arm above your head then slowly take it down your back as far as it will comfortably go. Now with your left hand hold your right elbow gently. Swap arms. (*Use relaxing music*)

Arm rotations: Rotate the arms at the same time, in wide circles from the shoulder, but in opposite directions. (*Use relaxing music*)

Finger aerobics: Sit facing a partner. Place both hands flat on the desk. Take turns to lift different fingers without taking any other fingers off the desk. The partner has 5 seconds to lift exactly the same finger from the same hand. Extend by making up simple finger sequences including taps and bends.

Yawning: Practise yawning. Stretch your mouth as wide as you can. Stick your chin out and move it from side to side. (*Use relaxing music.*)

Head rolls: Practise rolling your head in circles: slowly one way, then the other. Roll from side to side, touching ears to shoulders. Try chin to shoulder. (*Use relaxing music.*)

Eye rolls: Practise rolling your eyes in circles: slowly one way and then the other. Close eyes and do it again. (*Use relaxing music.*)

Ear rolls: Slowly roll your ears between finger and thumb. Hold your ears with your opposite hand and slowly roll your ear lobes. (*Use relaxing music.*)

Steeple: Make a steeple with your fingers in front of your face; now lift each pair of fingers together starting with your index fingers. Keep your lips and teeth together. (*Use relaxing music.*)

Shoulder shrugs: Shrug shoulders slowly forwards, then slowly backwards. (*Use relaxing music.*)

Shoulder circles: With elbows at shoulder height, practise making big and small circles, forwards and backwards. (*Use relaxing music.*)

Rocking: Place feet flat on the floor and rock gently from heels to toes. (*Use relaxing music.*)

Feet rotation: Sitting in your seat with your hands holding the seat, extend your feet forwards and rotate your feet one way then the other. Rotate feet in opposite directions. (*Use relaxing music.*)

Touching toes: Stand up tall and in a space. Bend from the waist and stretch fingers towards your toes. (*Use relaxing music.*)

Knee Bends: Place one foot out in front and flat on the floor, slide the other foot back with just your toes touching. Bend gently at the knee and stretch carefully. Swap legs. (*Use relaxing music.*)

Nose & Ears: Put right hand across the front of the face to hold the left ear and the left hand on the right ear. Keep swapping so that the arm on top alternates. With your right hand pinch your nose and with your left hand touch your right ear. Keep swapping opposite hands to opposite ears.
(*Use energising music.*)

Opposite Circles: Touch your fingertips in front of your face. Rotate hands in a circle but in opposite directions. Try the same thing again but with arms in wide circles from the shoulders. (*Use uplifting music.*)

Rub a dubs: Circle the stomach with the right hand and pat the head with the left. Reverse the circling. Change hands. (*Use uplifting music.*)

Keywords: Write keywords in the air with one hand, then two hands. (*Use relaxing music.*)

Numbers & shapes: Trace circles and the number 8 in the air with two hands together. Follow your hand actions with eyes only. Keep the head still. Draw the outline of a partner in the air. (*Use relaxing music.*)

The orchestra: Select an energising piece of classical music. Organise the class into groups and tell each group which instrument they are to mime playing. Tune up*. Play the music and conduct the orchestra as they 'play*. (*Use energising music.*)

Musical Accompaniment: Give out a selection of silly instruments such as blowers, hooters and drums to half the class. The other half will sing a well-known song and the 'band*' will accompany them. You act as the conductor.

The Big Picture Challenge: Divide the class into teams each with a large sheet of paper and marker pens. Give the teams a drawing challenge, such as *a cat taking a bath*. Each team must draw a picture by taking turns to go to the paper and draw for ten seconds. Swap places when you hear the horn. (*Use energising music.*)

Ideas taken from:

'Brain Gym' by Paul E. Dennison & Gail Dennison

'Music With The Brain In Mind' by Eric Jensen

'The ALPs Approach' by Alistair Smith & Nicola Call

'The ALPs Approach Resource Book' by Alistair Smith & Nicola Call

'Daily Physical Activity' Produced by Muriel Warden from Angus Council

Appendix 3

Questioning Techniques to Develop Comprehension

The Lancashire Literacy Team

Question as a tool for learning

- ✓ Questions prompt pupils to inspect their existing knowledge and experiences to create new understandings.
- ✓ Questions focus pupils on the key issues.
- ✓ Questioning model for pupils how experienced learners seek meaning.
- ✓ Questioning is a key method of differentiation.

A well designed set of questions will lead pupils from unsorted knowledge to organised understanding. It models how learning evolves.

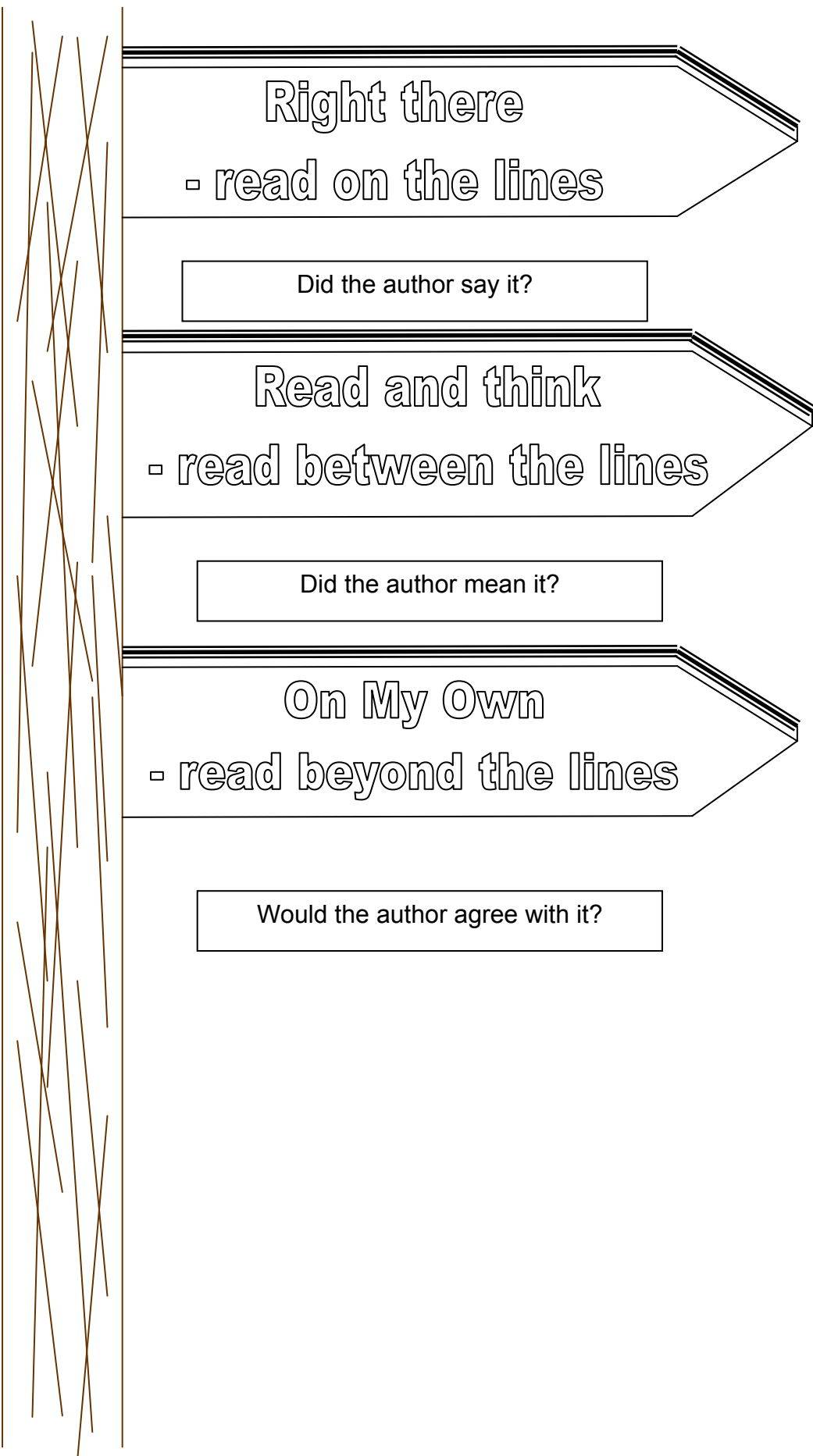
Education – educare (Latin) – lead out

- Answers to **literal questions** can be found in the text. It is simply a matter of locating them. For example:
 - What colour was the pet?
- Answers to **inferential questions** are found between the lines, and can only be decided by searching for clues and inferring their meaning. For example:
 - What sort of pet was it? How do you know?
- Answers to **evaluate questions** lie beyond the text and require readers to draw on their personal knowledge and experience. For example:
 - Would you like to have a pet like that?
 - Why was that pet so especially important?
 - What do you think would happen if you took a pet home without asking first?

Skilled questions maximise the potential of the reading material and generate high-level thinking and discussion. They also provide an excellent model for pupils who need to adopt self-questioning strategies and learn how to read 'into' a text to answer different types of questions. Generally, inferential and evaluative questions are open ended and therefore the pupils may give a range of answers. It is very useful to ask how pupils reached their conclusions. For example: 'I really knew the pet was a dragon because I looked at the picture, but even if I hadn't I'd have guessed, because of the scales and burning eyes.'

Pupils also need to justify their opinions by referring both to the text and to their own like experience. For example: 'my mum would kill me if I brought a pet home without asking, even if it was a kitten or a puppy and not a dragon. There'd be how much it cost to feed and who'd look after it if we went away and things like that.'

Where are the answers???



Right there

- read on the lines

Did the author say it?

Read and think

- read between the lines

Did the author mean it?

On My Own

- read beyond the lines

Would the author agree with it?

3 Kinds of Questions

Where is the answer found?

Type 1

(Literal)

Right There

The answer is in the story. It's 'Right There' for you to read.



Type 2

(Inferential)

Think and Search

Search for clues in the story and think about your answer.

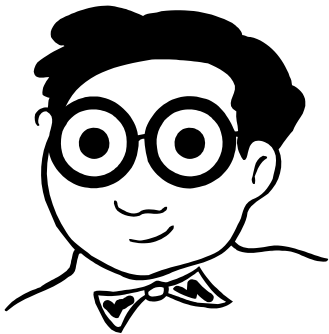


Type 3

(Evaluative)

On My Own

The answer won't be told by words in the story. You must find the answer in your head. Think: "I have to answer this question on my own. The story won't be much help."



BLOOMS TAXONOMY

High

- ❖ Judge
- ❖ Evaluate
- ❖ Recommend
- ❖ Justify
- ❖ Question

Evaluation

Was it a good or bad idea?

What do you think of the story?

High

- ❖ Compose
- ❖ Invent
- ❖ Predict
- ❖ Create

Synthesis

Can you think of a different ending?

High

- ❖ Compare
- ❖ Infer
- ❖ Contrast

Analysis

Compare two versions

Which part did you like best?

Middle

- ❖ Report
- ❖ Demonstrate
- ❖ Complete

Application

Why did x run away?

Low

- ❖ Describe
- ❖ Retell
- ❖ Name
- ❖ Locate

Knowledge and Comprehension

What happened in the story?

Literal and Higher Order Questions

Studies show that pupils learn more in classrooms where teachers use a mixture of different types of questions.

Teachers are aware of the difference between closed and open questions, however, the differences between literal and higher order questions are not so straightforward.

The following pages provide a detailed analysis of the kinds of questions teachers can ask pupils which will move their thinking from the literal to thinking which enables them to explore their understanding, and express their ideas.

The different categories of questions have been taken from Bloom's Taxonomy, and adapted to meet the demands of the literacy Strategy.

There needs to be an appropriate balance between literal and higher order questions with all age groups.

Statements written in *Italics* are drawn from level descriptions helping to identify and support progression.

Literal Questions

| | |
|---|---|
| <p><u>Recall Questions:</u></p> <p>These questions are designed to help children recall or revise material that has already been covered.</p> <p>They make relatively low intellectual demand on some children.</p> | <ul style="list-style-type: none">◆ Where does the story take place?◆ When did the story take place?◆ What did s/he/it look like?◆ Who was s/he/it?◆ Where did s/he/it live?◆ Who are the key characters in the book?◆ Where in the book would you find....? |
| <p><u>Simple comprehension questions:</u></p> <p><i>Children show an understanding of the main points of a story.</i></p> <p>They can describe what they know.</p> <p>They are able to restate, give examples, summarise or outline key basic points.</p> <p>They can link stories with personal experience.</p> | <ul style="list-style-type: none">◆ What do you think is happening here?◆ What happened in the story?◆ What might this mean?◆ Through whose eyes is the story told?◆ Which part of the story best describes the setting?◆ Which words and/or phrases do this?◆ What part of the story do you like the best? |

Higher Order Questions

| | |
|---|--|
| <p><u>Application questions:</u></p> <p>Application means that the information learned can be applied in different contexts.</p> <p>Children are able to transfer knowledge learned in one context to another.</p> <p>Children can make links with other stories.</p> | <ul style="list-style-type: none"> ◆ Can you think of another story that has a similar theme e.g. good over evil, weak over strong, wise over foolish? ◆ Do you know another story that deals with the same issues e.g. social, cultural, or moral issues? ◆ Which other author handles time in this way? e.g. flashbacks, dreams. ◆ Which other stories have openings like this? |
| <p><u>Analytical questions:</u></p> <p>This type of question requires the child to build on existing knowledge.</p> <p>They require the children to identify implicit meanings, <i>make inference and deduction</i> and become aware of the author's intentions.</p> <p><i>They ask children to show an understanding of significant themes, ideas, events and characters and refer to the text when explaining views.</i></p> <p>These questions ask children to analyse mood, setting and characters, style, structure and other key aspects.</p> <p>They encourage children to <i>express opinions and preferences about major events or ideas in stories or poems.</i></p> <p><i>They ask children to refer to the text when explaining views.</i></p> | <ul style="list-style-type: none"> ◆ What makes you think that? ◆ What words give you that impression? ◆ How do you feel about...? ◆ Can you explain why...? ◆ Do you agree with ---'s opinion? ◆ I wonder what the writer intended? ◆ I wonder why the writer has decided to...? ◆ What was in the author's mind? ◆ What do these words mean and why do you think the writer chose them? ◆ How has the author used adjectives to make this character funny? ◆ Why did the author choose this setting? ◆ Can you support your view with evidence? ◆ Are there any familiar patterns you notice e.g. familiar story structure, images? |

Higher Order Questions

| | |
|---|--|
| <p><u>Questions requiring synthesis:</u></p> <p>These kinds of questions ask children to take an idea from one context and reapply it in a different context.</p> <p>They encourage children to restructure text:</p> <ul style="list-style-type: none"> - Rewriting a narrative as a diary; - Discussing a familiar story and changing elements; - Changing an explanatory text into a diagram. <p>They ask children to innovate text (parody) e.g. Alex and the Glass Slipper.</p> <p>They ask children to develop a critical stance.</p> <p><i>Children can retrieve and collate information from a range of sources.</i></p> <p>This can lead to the construction of an argument, and opinion, or making predictions.</p> <p><i>Children can select sentences, phrases and relevant information to support their views.</i></p> | <ul style="list-style-type: none"> ◆ What is your opinion? What evidence do you have to support your view? ◆ Using all the evidence available, can you tell me what you feel about...? ◆ Given what you know about...what do you think? ◆ How would the views put across in these texts affect your views on...? ◆ What would this character think about...? (Possibly a present day issue) |
| <p><u>Evaluation questions:</u></p> <p>This type of question asks children to make judgements about what they have analysed and explain the reasons for those judgements.</p> <p>They also compare and contrast.</p> <p>They interrogate and evaluate the story.</p> <p>They require the use of evidence and reasoning.</p> | <ul style="list-style-type: none"> ◆ What makes this a successful story? What evidence do you have to justify your opinion? ◆ Does it work? ◆ Could it be better? Is it as good as...? ◆ Which is better and why? |

| Prompt Sheets for Guided Reading Sessions | | |
|--|---|---|
| <p>1. Recall Questions:</p> <ul style="list-style-type: none"> ◆ Where does the story take place? ◆ When did the story take place? ◆ What did s/he/it look like? ◆ Who was s/he/it? ◆ Where did s/he/it live? ◆ Who are the key characters in the book? ◆ Where in the book would you find.....? | <p>2. Simple Comprehension Questions:</p> <ul style="list-style-type: none"> ◆ What do you think is happening here? ◆ What happened in the story? ◆ What might this mean? ◆ Through whose eyes is the story told? ◆ Which part of the story best describes the setting? ◆ Which words and/or phrases do this? ◆ What part of the story do you like the best? | <p>3. Application Questions:</p> <ul style="list-style-type: none"> ◆ Can you think of another story that has a similar theme e.g. good over evil, weak over strong, wise over foolish? ◆ Do you know another story that deals with the same issues e.g. social, cultural, or moral issues? ◆ Which other author handles time in this way? e.g. flashbacks, dreams. ◆ Which other stories have openings like this? |
| <p>4. Analytical questions:</p> <ul style="list-style-type: none"> ◆ What makes you think that? ◆ What words give you that impression? ◆ How do you feel about...? ◆ Can you explain why....? ◆ Do you agree with ---'s opinion? ◆ I wonder what the writer intended? ◆ I wonder why the writer has decided to...? ◆ What was in the author's mind? ◆ What do these words mean and why do you think the writer chose them? ◆ How has the author used adjectives to make this character funny? ◆ Why did the author choose this setting? ◆ Can you support your view with evidence? ◆ Are there any familiar patterns you notice e.g. familiar story structure, images? | <p>5. Questions requiring synthesis:</p> <ul style="list-style-type: none"> ◆ What is your opinion? What evidence do you have o support your view? ◆ Using all the evidence available, can you tell me what you feel about...? ◆ Given what you know about...what do you think? ◆ How would the views put across in these texts affect your views on...? ◆ What would this character think about...? (Possibly a present day issue) | <p>6. Evaluation Questions:</p> <ul style="list-style-type: none"> ◆ What makes this a successful story? ◆ What evidence do you have to justify your opinion? ◆ Does it work? ◆ Could it be better? Is it as good as...? ◆ Which is better and why? |

Useful prompts to use when guiding children to understand narrative texts

Opening

How does the story begin? Is someone telling the story? Is there dialogue between characters?

How does the story opening make you want to read on? How does the author catch your interest?

Is it possible to predict the kind of story/the plot/events/outcome?

Setting

Where and when is the story located – past, present, future, real or imaginary world? Why has the location been chosen? Is it suitable for the plot? What other locations might have been used?

How does the period in which the story is set influence the plot (events, action, relationships)? How has the author created the setting? By telling the reader? By describing it? Through dialogue between characters? Has the author provided a strong visual/detailed image?

Plot (action / events / complications / solutions)

What are the main events? Which is the high spot of the story? Are there any unexpected events or twists in the story?

How many problems (complications / challenges) are there? Is there one main problem? Are there other minor problems woven into the story? How does this make the story interesting? How is the main complication resolved? In a stereotypical manner, e.g. and then I woke up/she waved her magic wand/they all lived happily ever after? A more original and interesting way?

Was the ending satisfactory or disappointing? Was the ending predictable or unexpected?

How could the ending have been improved? How could the story end with a twist?

Character

Who are the main characters? Who are the other characters in the story? Why are they included?

Are there any heroes/heroines? Who are they?

Are there any stock (stereotypical) characters, e.g. wicked witch, school bully etc?

Do you empathise with any of the characters? Which ones? Why? How has the author gained your empathy?

How are the characters described? Find examples which show their appearance/personality.

What do you think of the main characters? Do you like or dislike any qualities/mannerisms?

Do any of the characters change during the story? How? What effect does this have on the story?

What are the relationships between the characters? Show the relationships on a web or a chart (sociogram).

How important is each character to the story? Rank the characters in order of importance.

Discuss what difference it would make if any of the characters were not in the story.

Style

Is there anything about the author's style that is distinctive/interesting/unusual? Does the author use figurative language effectively (adjectives, adverbs, simile, metaphor, onomatopoeia)? How does the author make use of other literary devices, e.g. narrative voice, formal or colloquial language, foregrounding, foreshadowing, flashback, sentence structures, repetition, connotation, punctuation?

Mood/Atmosphere

How does the story make you feel (sad, happy, angry, surprised, sympathetic)?

Do you have different feelings at different times in the story? How? Why?

Do your feelings towards the characters change as the story develops? Why?

What particular events or actions by the characters effect your feelings and make you feel sad, happy, angry, surprised, sympathetic? Find examples in the story.

Theme

What is the story about? Is it about relationships, fear, bullying, greed, selfishness, self-sacrifice, fairness, goodness, honesty, or violence? Is it fiction, fantasy, bibliographic, realistic?

(Source: Roy Corden, Literacy & Learning, December/January 1999)



TRACKING DOWN THE MAIN IDEA

✧ DID I ASK MYSELF WHO, WHAT,
WHERE AND WHY?

✧ HAVE I USED THE CLUES TO
TRACK DOWN THE **MAIN IDEAS**?

✧ DID I GET THE **MAIN IDEA**?

Talking about Books

Using Questions and Statements

What makes you think that?

What do you think?

What words give you that impression?

How do you feel about...?

Can you explain why...?

Do you agree with _____'s opinion?

Do you like the bit where...?

I wonder if...?

Is there anything that puzzles you?

I'm not sure what I think about...I wonder what the writer intended,,,

This bit reminds me of...

I would hate to have that happen to me – would you?

I like the way the writer has...

Are there any patterns you notice (e.g. familiar story structure, images)?

I wonder why the writer has decided to...?

What was the writer trying to achieve?

How does the writer hold the readers' interest?

Are things in the right order?

Has anything been left out?

Should anything be cut?

Is anything puzzling or confusing?

Is the vocabulary strong, varied and appropriate to the mood of the piece?

Be a Reading Detective!



DON'T FORGET TO ASK:

- ✧ What kind of reading is this?
- ✧ Why am I reading this?
- ✧ How will I read this?
- ✧ How is the text organised?
- ✧ Will the headings have the information I need?
- ✧ Are there any diagrams or illustrations that will help me understand what this is about?
- ✧ Did I find the information I needed?
- ✧ Are there any words I need to check to help me understand?
- ✧ How will I express the information I have found?

Bibliography and Useful Resources

This selection of resources has been compiled by the NUT with assistance from Miranda Bell (Centre for the Use of Research and Evidence in Education, CUREE); Steve Higgins and Viv Baumfield (Centre of Thinking Skills at the University of Newcastle); and Patrick Costello (North East Wales Institute of Higher Education, Wrexham).

It draws together:

1. Introduction to Thinking Skills resources
2. Books and reports about teaching thinking and thinking skills
3. Academic articles about teaching thinking and thinking skills
4. Published programmes and classroom resources
5. Subject specific resources Geography History ICT Maths RE/PHSE Science
6. Books, articles and resources about research processes and tools
7. More general books and articles about teaching, thinking and learning
8. Magazines and websites

1. Introduction to Thinking Skills resources

Carol McGuinness's Research Brief for the DfES (McGuinness, 1999) gives a good general overview of some of the more well-known programmes in teaching Thinking Skills. She recognises three different kinds of approach, including those that:

- target thinking skills as a discrete entity;
- explore thinking skills in a subject specific approach;
- aim to infuse thinking skills in a generic way across all lessons.

The six key programmes that McGuinness mentions are:

- Feuerstein's Instrumental Enrichment (IE) (Feuerstein et al, 1980)

The best-known thinking skills programme, developed over 40 years ago. It has been widely used and extensively evaluated, showing positive effects mainly on non-verbal reasoning.

- Somerset Thinking Skills Course (Blagg, 1988 and 1989)

This is a UK version of the IE approach, developed when a study (Blagg, 1991) showed no positive outcomes of IE applied in a UK context. Shows positive effects on a range of cognitive outcomes.

- Matthew Lipman's Philosophy for Children (Lipman et al, 1980)

Closely linked with Robert Fisher's work on primary schools (Fisher, 1998), this is a widely used approach in the UK and is especially suited to application in the context of social and moral education. Evaluations have shown positive outcomes in many areas, including quality of students' discussion and argumentative skills, ability to formulate questions and self-esteem.

- CASE (Cognitive Acceleration through Science Education)

A highly successful programme aimed at 11-14 years, shown to be effective at raising GCSE grades for students (Adey and Shayer, 1994). Two subsequent projects have emerged: CAME (Cognitive Acceleration through Mathematics Education) and the Nuffield Primary Science Project which helps primary age students understand topics such as electricity, light, sound and energy.

- Thinking Through Geography (Leat, 1998)

A curriculum development project aimed at geography teaching at the post-primary level. Evaluation work is ongoing.

- ACTS (Activating Children's Thinking Skills) project. (McGuinness et al. 1997)

The UK adaptation of a US programme on the infusion approach to developing thinking skills (Swartz and Parks, 1994). The project is aimed at upper primary level, specifically Key Stage 2 and has been evaluated in the Northern Ireland curriculum.

The specific references identified above are provided in more detail later in the document.

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A copy of '**Better Cognition**' - the report of a conference 'A Whole Lot of Thinking Going On', held at NUT Headquarters during November 2001- can be obtained from Janet Friedlander, NUT Information Officer (e-mail: j.friedlander@nut.org.uk)

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<http://www.canteach.gov.uk/community/research/grant/summaries98 QQ.htm>

Higgins, S. (2000) **Figure Out the Framework**. *Teaching Thinking*, 2, pp.41-43 Birmingham: Questions Publishing Company

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Baumfield, V (Ed)(2002) **Thinking Through RE**. Cambridge: Chris Kingston Publishing.

Midgley, P. et al (2000) **Promoting Students' Spiritual, Moral, Social and Cultural development through specific teaching and learning strategies across the curriculum.** London: Teacher Training Agency. (Research Grant Scheme Summary).

Science

Adey, P.S., Shayer, M. and Yates, C. (1995) **Thinking Science: The Curriculum Materials of the CASE Project** London: Thomas Nelson and Sons.

Agar, J. et al (2000) **Teaching children to generate questions designed to improve their capacity to think critically about scientific problems.** London: Routledge.

6. Books, articles and resources about research processes and tools

Burden, R.L. (1999) **Children's self perceptions: child psychology portfolio.** Windsor: NFER/Nelson.

Edwards, A.D. and Westgate, D.P.G. (1994) (2nd Edition) **Investigating Classroom Talk.** London: The Falmer Press.

7. More general books and articles about teaching, thinking and learning

Black, P. & William, D. (1998) **Inside the black box: raising standards through classroom assessment.** London: King's College.

Bonnett, M. (1994) **Children's thinking.** London: Cassell.

Gardner, H. (1993) **Multiple intelligences: the theory in practice.** New York: Basic Books.

Hamers, J.H.M., van Luit, J.E.H. and Csapo, B. (eds) (1999) **Teaching and Learning Thinking Skills** Abingdon: Swets and Zeitlinger.

Kozulin, A. (1990) **Vygotsky's Psychology: a biography of ideas.** London: Harvester Wheatsheaf.

Mercer, N. (2000) **Words and minds: how we use language to think together.** London: Routledge.

Newton, D. (2000) **Teaching for Understanding** London: Routledge/Falmer ISBN 0-415227-91-7.

Novak, J.D. & Gowin, D.B. (1994) **Learning how to learn**. New York: Cambridge University Press.

Portelli, J.P. and Reed, R.F. (1995) **Children, Philosophy and Democracy**. Calgary: Detselig Enterprises Ltd. ISBN 1 55059 1150

Sharp, P. (1999) **Promoting emotional literacy**. Southampton: Southampton City Council.

White, R. and Gunstone, R. (1992) **Probing Understanding** London: Falmer Press.

8. Magazines and websites

Edward de Bono's catalogue of resources (such as CoRT and the Thinking Hats) is on-line (<http://www.edwdebono.co.uk/debono/home.htm>) and colour-coded like his six thinking hats.

Thinking Together (<http://www.thinkingtogether.org.uk>) have a site offering free software, articles for downloading and details of recent publications.

Alistair Smith's Accelerated Learning has its own website (<http://www.alite.co.uk/>) as does Robert Fisher (<http://www.teachingthinking.net/>)

Kings College London's two thinking skills programmes CASE (Cognitive Acceleration Through Science Education) and CAME (Cognitive Acceleration Through Maths Education) and Let's Think for Key Stage 1 pupils. Information about CASE can be found at: <http://www.kcl.ac.uk/depsta/education/teaching/CASE.html>. And CAME similarly at: <http://www.kcl.ac.uk/depsta/education/teaching/CAME.html>.

Dialogue Works (<http://www.dialogueworks.co.uk/>) produce Newswise, an on-line resource to promote thinking through news stories, and Storywise, a handbook by Karen Murris and Joanna Haynes for developing Community of Enquiry with young children.

SAPERE (Society for the Advancement of Philosophical Enquiry and Reflection in Education) is a UK based educational charity offering resources, conferences, and training in philosophy for children. Membership forms from Sara Liptai, 7 Cloister Way, Leamington Spa CV32 6QE. SAPERE website: <http://www.sapere.net>

IAPC (Institute for the Advancement of Philosophy for Children) (<http://chss.montclair.edu/iapc/homepage.html>) produces 'Thinking'. The Institute for Critical Thinking (<http://www.chss.montclair.edu/ict/homepage.html>) produces 'Inquiry'. Both are at Montclair State University, Upper Montclair, New Jersey, 07043, USA.

ICPIC (the International Council for Philosophical Inquiry with Children) distributes 'Thinking, Analytic Teaching and Critical and Creative Thinking'. Subscriptions from ACER, Private bag 55, Camberwell, Victoria 3124, Australia. Reports and papers from their annual conference are available on the SAPERE website (see above)

Teaching Thinking is a quarterly magazine from Questions Publishing Company, Birmingham (<http://www.teachthinking.com>) and has regular articles about developing thinking in the classroom.

The DfES Standards site 'Schemes of Work' section (<http://www.standards.dfes.gov.uk/schemes>) has a section on thinking skills related to different areas of the curriculum. Go to the Teachers' Guide' link under the specific subject area, and then 'Links with Other Areas of the Curriculum'.

The GTC has a Research of the Month (RoM) website (<http://www.gtce.org.uk/research/romhome.asp>) which aims to bring research to practitioners in an accessible format by summarising studies and articles of direct interest to teachers. Relevant RoMs to date are **Improving learning through cognitive intervention** based on the study by Adey and Shayer (1994).

The Scottish Council for Research in Education (SCRE) Spotlights series (<http://www.scre.aauk/spotlight/index.html>) are short papers on general education issues. Relevant papers are:

- Spotlight 26: John Nisbet (1990), **Teaching Thinking: an introduction to the research literature**
- Spotlight 79: Valerie Wilson (2000), **Can thinking skills be taught**
- Spotlight 82: Keith Topping (2001), **Peer and Parent Assisted Learning in Reading, Writing, Spelling and Thinking Skills**

Teaching Thinking Skills, (<http://www.nwrel.org/scpd/sirs/6/cu11.html>) by Kathleen Cotton, is another entry in School Improvement Research Series at Northwestern University with information on a number of approaches.