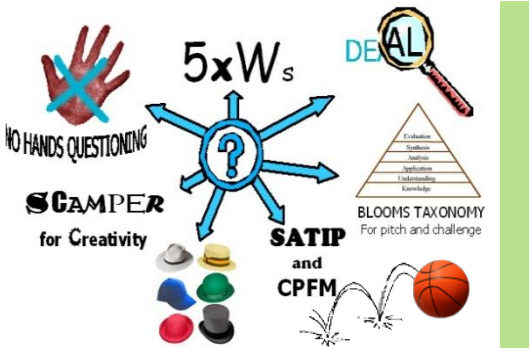
Effective Questioning and Classroom Talk

To develop learning & higher order thinking, promoting imagination, speculation, creative thinking & to pitch a suitable challenge level



Asking questions is natural and intuitive. Teachers ask questions from the start of the lesson until the end. Asking questions forms part of any lesson because it invites the student to think, and even within a 'lecture' style lesson, rhetorical questions are used to invite silent agreement or begin the organisation of ideas to present a response. Research suggests teachers ask over 400 questions a day.

Teachers use questions to engage the students and sustain an 'active' style to the learning. The teacher also uses questions as part of the assessment of learning in order to determine how they best structure, organise and present new learning. However, research has found that many teachers wait only for 0.9 seconds before seeking an answer. Developing questioning approaches, requires much greater emphasis on the time provided for students to think individually, collaboratively and deeply to enable them to develop answers and to share better answers. This will improve their thinking and engagement.

Historically, teachers have asked questions to check what has been learnt and understood, to help them gauge whether to further review previous learning, increase or decrease the challenge, and assess whether students are ready to move forward and learn new information (factual checks – ie 'Closed' questions). This can be structured as a simple 'teacher versus the class' approach (Bat and Ball), where the teacher asks a question and accepts an answer from a volunteer, or selects/conscripts a specific student to answer. These approaches are implicit in any pedagogy, but teachers need a range of 'Open' questioning strategies to address different learning needs and situations. Teachers must also pitch questions effectively to raise the thinking challenge, target specific students or groups within the class.

This guidance informs teachers how to pre-plan their questions and select approaches for promoting classroom talk; prepare their 'open' and 'high-challenge' questions; pre-determine the level and type of challenge they wish to set, who they will target and how they will target specific groups in the classroom.

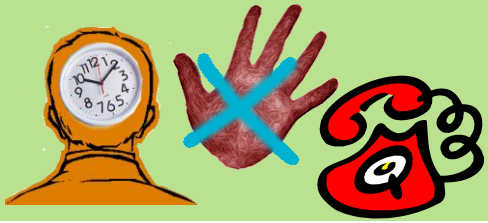
How and why do we use Questions and Talk in the classroom?

Teachers use questioning as part of their teaching for many reasons, but often to:

- **maintain the flow** of the learning within the lesson;
- **engage** students with the learning;
- **assess** what has been **learned,** and **check** that what has been **learnt** is **understood** and **applied;**
- **test** student **memory** and **comprehension;**
- to initiate **individual** and **collaborative thinking** in response to new information;
- **seek** the **views and opinions** of pupils;
- **provide an opportunity** for pupils to share their opinions/views, seeking responses from their peers;
- **encourage creative thought** and **imaginative** or **innovative thinking;**
- **foster speculation, hypothesis** and **idea/opinion forming;**
- **create** a sense of **shared learning** and avoid the feel of a 'lecture';
- **challenge** the level of thinking and possibly mark a change to a **higher order** of thinking;
- **model** higher order thinking using examples and building on the responses of students.

All the following examples and many others are useful and necessary within different classroom situations. They help teachers move students from simple responses, to engage in more developed complex thinking. This helps them apply what they understand, to bridge learning from other times and different situations, to think more actively in lessons and learn from the answers given by other students.

Questioning approaches e.g. 'thinking time', the 'no hands' rule and 'phone a friend'



Strategy/approach	Process	Gains and benefits
Thinking Time: Consciously waiting for a pupil or class to think through an answer (before you break the silence) e.g 15-30secs	Provide time between setting the question and requiring an answer. Sometimes alerting pupils to the approach and the time available to develop an answer.	Prompts depth of thought and increases levels of challenge. Ensures all pupils have a view or opinion to share before an answer is sought.
Time Out: Time for thinking and talking	Time provided for thinking and talking partners, before seeking answers.	Pupils have thinking time, actively think and collaborate to form answers.
No Hands Questioning: Using the 'no hands up' rule Ref. AfL publication - Working Inside the Black Box.	Pupils aware that those required to give an answer, will be selected by the teacher. Teachers alert them to this as questions are asked. Linked to 'thinking time'.	Improves engagement and challenges all pupils to think. When linked to Thinking Time, pupils share ideas and 'position' their own views in relation to others.
Basketball questioning: Move questions and discussions between pupils	Teacher establishes movement of ideas and responses around the class. Builds on other pupils' ideas and comments. Accepts 'half-formed' ideas. NB not 'ping-pong'	Engages more pupils. Stops teacher being focus for all questioning. Develops connected thinking and development of ideas.
Conscripts and Volunteers: Using a planned mix of 'conscripts' and 'volunteers'	Teacher selects answers from those who volunteer an answer and an equal amount of those who do not.	Enhances engagement and challenge for all.
Phone a friend: Removes stress to enable those who cannot answer to participate	Those who cannot answer are allowed to nominate a fellow pupil to suggest an answer on their behalf, but they still have to provide their own answer, perhaps building on this.	Encourages whole-class listening and participation. Removes stress and builds self-esteem.
Hot-seating:	A pupil is placed in the 'hot-seat' to take several questions from the class and teacher.	Encourages listening for detail and provides challenge
Mantle of the expert:	A wears the cloak of the expert to answer questions from the class.	Builds self-esteem through opportunity to share detailed knowledge.
Preview: Previewing questions in advance	Questions are shared/displayed before being asked, or the start of the lesson.	Signals the big concepts and learning of the lesson
Pair rehearsal: of an answer or a question	Pairs of pupils are able to discuss and agree responses to questions together.	Encourages interaction, engagement and depth
Eavesdropping: Deploying specific targeted questions	Listen in to group discussions and target specific questions to groups and individuals.	Facilitates informed differentiation.
5Ws: Modeling simple exploratory questions to gather information	Teacher models the use of Who, What, Where, When and Why to set out a simple information gathering response based on the information provided.	Encourages students to rehearse enquiry and comprehension, can extend into reasoning and hypothesis. Creates an inquisitive disposition and a thinking or self reflective approach to learning.
Eavesdropping: Deploying specific targeted questions	Listen in to group discussions and use this to target specific questions to particular groups and individuals.	Facilitates informed differentiation as teachers use what they overhear to modify planning and further questioning.

Strategy/approach	Process	Gains and benefits
High Challenge: Phrasing questions carefully to concentrate on Bloom's Taxonomy higher challenge areas	Questions must be pre-planned, as very difficult to invent during a lesson. Focus questions to address analysis, synthesis, evaluation and creativity, based on Bloom's Taxonomy.	Provides high challenge thinking, requiring more careful thought, perhaps collaborative thinking and certainly longer more detailed answers. For Able, Gifted and Talented.
Staging or sequencing: questions with increasing levels of challenge	Increasing the level of challenge with each question, moving from low to higher-order questioning	Helps pupils to recognise the range of possible responses and to select appropriately.
Big questions: The setting of a substantial and thought provoking question	Big questions cannot be easily answered by students when the question is posed. They are often set at the beginning of the lesson and can only be answered by the end of the lesson, using all of the thinking based on all of the contributions to the lesson.	These questions develop deeper and more profound thinking. Big Questions are often moral issues or speculative questions such as, Where are we from? How big is the universe? What is the meaning of life? They require extended answers and usually rely on collaborative thinking and a personal interpretation of the information provided.
Focus questioning: This will help students to answer bigger questions	When students struggle to answer bigger or more complex questioning, the teacher can model or lead the thinking by asking Focus questions to lead the student through the steps of the thinking.	Develops confidence and the sequencing of small steps in thinking and response. Allows students to reveal the stages in their thinking.
Fat questions: Seeking a minimum answer	Pupils are not allowed to answer a question using less than e.g. 15 words or using a particular word or phrase. They must give an extended answer or make a complete sentence/phrase.	Develops speaking and reasoning skills, the correct use of critical and technical language. Fosters the phrasing of more extended or complex sentences containing the correct language or terms - Essential for examination preparation.
Skinny questions A traditional approach to Q&A asking everyday questions with a fixed or specific answer Linked to 'close' questioning	In its simplest form, students can answer yes or no to a skinny question, or give a number or knowledge based response.	Challenge level is low in skinny questions that do not seek and extended answer or reasons for the answer. Mostly knowledge and comprehension based. Does not develop thinking or reasoning.
Signal questions:	Providing signals to pupils about the kind of answer that would best fit the question being asked. Teacher responds to pupils attempt to answer, by signaling and guiding the answers.	The essence of purposeful questioning, moving pupils from existing knowledge or experience (often unsorted or unordered knowledge) to organized understanding, where patterns and meaning have been established.
Seek a partial answer:	In the context of asking difficult whole class questions, deliberately ask a pupil who will provide only a partly formed answer, to promote collective engagement.	Excellent for building understanding from pupil-based language. Can be used to lead into 'Basketball questioning'. Develops self-esteem, whilst moderating the level of risk.
Developing 'Key' Questions:	Teachers encourage students to identify their own essential or 'Key' questions that should be asked.	Encourages students to form and prioritise the most essential questions to be asked when analysing information.

Many of these questioning strategies and approaches are taken from the National Secondary Strategy for School Improvement, The 'Questioning' guidance from the Pedagogy and Practice Pack materials and the Assessment for Learning Handbook, or from the work of members of the AfL team including Paul Black and Christine Harrison at King's College, London.

5xWs

Developing an independent questioning mind

The Five Ws, also known as the “Five Ws and H”, is a concept used in journalism, research and in any basic investigation or interrogation of evidence. Most consider this approach as fundamental when examining any new learning situation. It is a formula for developing speculative thinking and establishing all we can deduce from the evidence we have (text, stories, images, sound, film, conversation etc). The maxim of the Five Ws (and one H) is that any analysis of basic facts and information is only complete, when we can answer a checklist of six questions, each of which comprises an interrogative word:

Who? **W**hat? **W**here? **W**hen? **W**hy? & **H**ow?

The principle underlying the maxim is that each question should elicit a factual answer — facts that are necessary to include for a report or when new learning can be considered complete. Importantly, none of these questions can be answered with a simple "yes" or "no". This approach ‘models’ simple, good thinking and it is important for children to develop a disposition of self questioning starting with this set.

The technique uses basic question generating prompts provided by the English language. The method is useful at any level from a formal checklist to complete informality.
For example:

- For informal ‘rough-book’ use as a quick-aide checklist, as a private checklist to keep in mind when in an on going discussion, as quick points scribbled down in a lesson, to generate further questions for yourself or to raise in the lesson with your group/whole class.
- To generate data-gathering questions in any subject, during the early stages of problem solving when you are gathering data, the checklist can be useful either as an informal or systematic way of generating lists of question that you can try to find answers for.
- To generate idea-provoking questions, whilst brain-storming, brain-writing or some other such similar technique, the checklist could be used as a source of thought provoking questions to help build on existing ideas.
- To generate criteria, the checklist could help in generating criteria for evaluating options.
- To check plans, the checklist is a useful tool for planning implementation strategies.

Adding **IWWM** – In What Way Might ….

NB: The 5xWs and How ‘question words’ owe their strength to their fundamental place in the English language, and can conceal some of the assets of nature that our language copes less well with. The responses to these questions in the checklist may usually be facts, rather than conclusions. Although they may be speculations from emerging evidence or as a hypothesis forms. You may well need to link these questions to Blooms Taxonomy if you want to achieve the correct level of challenge or use IWWM.

- For example, the answer to ‘Who does X?’ in a History lesson context, the answer could be ‘King …’. To use this answer in a problem-solving or conclusion finding context you may have to take this to another level of challenge.
- For example ‘OK – if King … does X, in what way might we conclude this was a wise action by him and his court?
- This ‘in what way might’ (**IWWM**) stage is crucial if the facts are to come alive, engage all students in the thinking and contribute to an effective, creative thinking process.

Questions	Examples of Conclusions and Hypothesis
Who … ?	**I think it could be …** or **If that person is …, it must be …**
What … ?	**It could be …** or **It is likely that … happens next.**
Why … ?	**Because …** or **If … is so, then it must be that …**
When … ?	**Judging by … it probably is …** or **… tells me it must be …**
Where … ?	**This looks like …** or **By the surroundings it must be …**
How … ?	**I would think it is …** or **Because …, this probably led to …**
In What Way Might … ?	**I conclude that …** or **All the evidence would suggest that …**

Dialogic Teaching

Classroom Talk

Dialogic teaching provides a strategy for managing and assimilating many aspects of the other approaches to developing classroom talk, identified elsewhere in this paper.

"Dialogic teaching harnesses the power of talk to stimulate and extend children's thinking, and to advance their learning and understanding. It also enables the teacher to diagnose and assess. Dialogic teaching is distinct from the question-answer-tell routines of so-called 'interactive' teaching, aiming to be more consistently searching and more genuinely reciprocal and cumulative."

Robin Alexander

Dialogic teaching harnesses the power of talk to engage children, stimulate and extend their thinking, and advance the learning and understanding. Not all classroom talk secures these outcomes, and some may even discourage them. Dialogic teaching, therefore, is:

- ***Collective:*** teachers and children address learning tasks together, whether as a group or as a whole class;
- ***Reciprocal:*** teachers and children listen to each other, share ideas and consider alternative viewpoints;
- ***Supportive***: children articulate their ideas freely, without fear of embarrassment over 'wrong' answers; and they help each other to re ach common understandings;
- ***Cumulative;*** teachers and children build on their own and each others' ideas and chain them into coherent lines of thinking and enquiry;
- ***Purposeful:*** teachers plan and steer classroom talk with specific educational goals in view.

Most teachers use a basic repertoire of three kinds of classroom talk:

- ***rote***
- ***recitation***
- ***instruction/exposition***

These provide the bedrock of a repertoire of teaching by direct instruction, but some teachers also use:

- ***discussion***
- ***scaffolded dialogue***

These all have their place in a thinking classroom, but Dialogic talk is part of a larger repertoire, needed to ensure children are empowered both in their learning now and later as adult members of society.

As part of their cognitive development, children need to acquire the capacity to:

- narrate,
- explain
- instruct,
- ask different kinds of questions,
- receive, act and build upon answers
- analyse and solve problems
- speculate and imagine
- explore and evaluate ideas
- discuss
- argue, reason and justify
- negotiate

and, in order that they can do this effectively with others:

- listen
- be receptive to alternative viewpoints
- think about what they hear
- give others time to think.

As part of a comprehensive classroom approach to talk for learning and empowerment, teachers will need to engage with both of these repertoires, through:
Teacher-pupil interaction, Pupil-pupil interaction, Teacher-pupil one-to-one monitoring, Questioning, Responses to questioning, Feedback on responses, Pupil talk.

Text and principles taken from: Towards Dialogic Teaching – Rethinking classroom talk
Robin Alexander – ISBN 0-9546943-0-9 Published by Dialogos UK Ltd

The Language of Dialogic Learning

Developing the behaviours and language for classroom talk

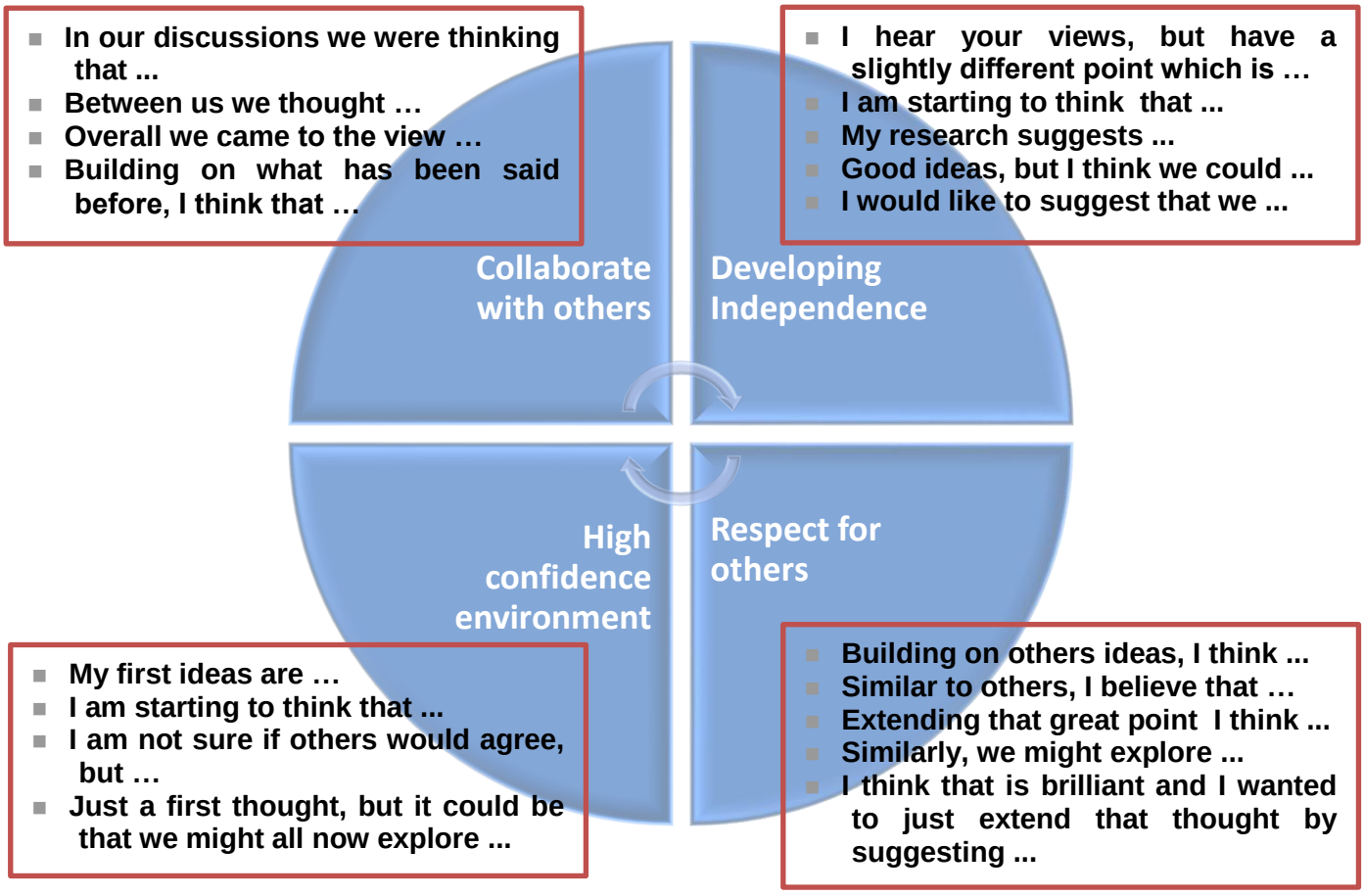
Developing appropriate Behaviour for Learning

To develop dialogic, talking and learning behaviours, teachers should set clear rules and model good thinking, learning and talking approaches. It is also important to establish suitable values for the classroom, to build confidence, enabling all to participate fully, promoting tolerance and respect for the views of others and the contributions of others.

Good learning behaviours develop as a consequence of the clarity of rules teacher set for good behaviour, the values they set for pupils regarding self-management and interactions with others, as well as promoting independent learning characteristics such as questioning, speculative thinking, the interest and motivation to learn more.

- The **Rules** for classroom talk are set out on page 29
- To **Model** good questioning, use the approaches on pages 2-4 and 7-10
- To **Model** good thinking, use the approaches set out on pages 11-18
- To **Develop stretch and challenge**, use the approaches on pages 27 and 28
- To **Develop, Respect, Listening and Interaction,** apply the principles of a Thinking Classroom on page 10
- To **Pitch** the challenge suitably, explore the resources that explain how Bloom's Taxonomy can be used to support planning for questioning and learning activities on pages 19-26

Teachers must pre-plan questions to ensure pupils know what to talk about and they are well supported and guided with information from videos, web and multi-media content, subject specific knowledge, key language, learning scaffolds, supporting stimulating and engaging collaborative activities.



Q Talk tools or mnemonics which can be used to prompt questions, sequences or blocks of questioning and self-initiated questioning

To scaffold and encourage exploration of ideas and develop specific forms of thinking, to inspire or foster more open thinking.

'BIG' QUESTIONS OR FIRST LINE QUESTIONS

This is a strategy used by teachers to introduce new topics, projects and new areas of learning. It is best to begin thinking with 2 key actions. For example, if introducing the concept of ethical dilemmas and moral choices, we might explore this with the following:

1. **Students can share and discuss what they already know about the new topic or concept e.g. "what do you know about behaviour that is right and wrong?"**
2. **Students are invited to engage with the new topic or concept in response to a Big question e.g. "How do we decide between right and wrong?"**

Big Questions promote thinking on a wide ranging scale. These are the most open questions you can ask. These are sometimes referred to as First Line Questions, because there is no 'bigger' question you can ask on such a topic e.g. "Are we alone in the universe?"

Such thinking can often be used to promote Spiritual, Moral, Social and Cultural dimensions of learning. First line questions are often associated with spiritual thinking that promotes reflection, consideration of the wider universe and profound thoughts. Such thinking can be inspirational if it enables young people to connect concepts or ideas across different topics or areas of work.

Pose, Pause, Pounce & Bounce

The most flexible teaching strategy (mnemonic) for structuring questioning in the classroom, to ensure each stage of the questioning process is carefully considered.

When teachers start to ask a series of questions, they should have a plan for how the questioning will develop, who they will target, what expectation they have for the quality of answers given by students, and how much thinking time they might need to give to enable students to reflect suitably deeply. This strategy is a questioning preparation mnemonic for teachers to improve their preparation.

Pose – Teacher poses the question as a big question for all to consider and form a response to.
Pause – Teacher gives thinking time and possibly discussions/thinking together.
Pounce – Teacher selects who will provide and answer (no hands and not hands up).
Bounce – Teacher 'bounces' the answers from student to student developing the ideas/encouraging all to add their views or extend the e.g. depth and breadth of answers.

CLAPS

CLAPS is used as a mnemonic to promote analysis thinking questions:

Each aspect is examined to build effective and complete analysis of a text, spoken presentation or media. Several questions can be planned and phrased around each of the 5 aspects to model how analysis thinking should be structured e.g. "How would you describe … ""What do you know about…"

1. Context	2. Language	3. Audience	4. Purpose	5. Style

DEAL

DEAL is often used in science as a mnemonic to form questions that explore:

- ideas about what is seen (experiments or phenomenon)
- to develop the thinking and analyse these perceptions
- make links with previous learning and convey understanding
- develop the ability to apply what has been learnt

D	**Describe**	Describe what you see, experience and can measure
E	**Explain**	Explain what you know or understand, what you experienced or think happened
A	**Analyse**	Analyse the information or evidence to draw conclusions or determine what you believe is happened and why
L	**Link**	Link with previous knowledge or make connections with other phenomenon or outcomes where these connections bring further conclusions or lead to hypothesis

SATIP

SATIP is used as a mnemonic to frame 'text reading' questions:

A strategy for beginning to engage with 'Reading' any text. This develops in the reader, further questions in order that they then form a sense of meaning from the text, to develop understanding and before the teacher might use Blooms Taxonomy to set more challenging questions.

Sense – or meaning – what is it about?
Audience – or tone – who is it intended for?
Technique – what are the techniques that have been used - what is their effect?
Intentions – What was the writer's purpose?
Personal opinion – what is your reaction? – what do you start to conclude?

Thinking Time

How much thinking time is the correct amount?

What is the right amount of wait time?

Teachers have tended to only wait for 0.7 seconds to 3 seconds. This is not long enough to enable pupils to think of a good answer.

Research carried out during the National Strategy determined that some pupils do not start to think of an answer until 10 seconds or more has elapsed. 30 seconds is commonly thought to be a suitable waiting time for a class to consider a challenging question and to prepare and think through a full answer.

More time is needed if pupils are to discuss a question and collaborate on forming an extended, detailed or 'examination' type answer.

Use Pose, Pause, Pounce and Bounce. Decide how long you will need to Pause, how you will select who answers and how you will bounce the opportunity to answer around the room to gather answers.

Creating a thinking expectation in the classroom……
Waiting after asking a question creates a slight tension in the classroom, which encourages students to think and form a better answer. Remember, the longer you wait, the more they believe you will ask **them** to answer and the higher your expectation becomes for a **high quality** answer.

C P F M Content, Process, Form and Mood:

a mnemonic to support image/artefact reading and speaking questions:

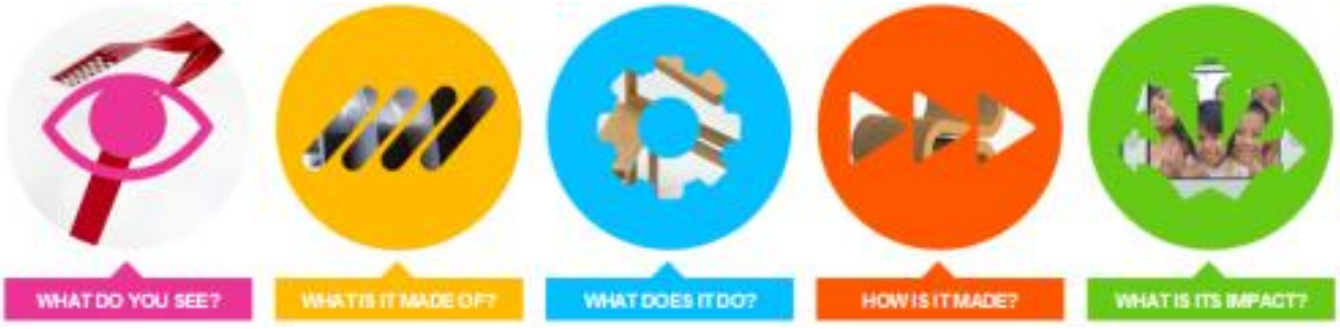
C	**Content**	**Analyse and describe the Content.** Much more than the subject matter of a work of art or historical/cultural artefact. 1. What the artefact represents or symbolises; 2. What story or event is portrayed (narrative content), and 3. What idea the creator is attempting to pursue.
P	**Process**	**Analyse and describe the Process**. The way in which media and materials have been used to create a particular piece of work. This could refer to a single process or a sequence of processes that have been combined to create the final outcome or work of art.
F	**Form**	**Analyse and describe the use of the 'formal' elements**, i.e. the building blocks for the artform, e.g in art and design:- line, tone, colour, pattern, texture, shape, form and space.
M	**Mood/ emotion**	**Analyse and describe the Mood.** This refers to the way in which the artist has handled form and subject matter to create an emotionally affective piece of work. How the piece of work makes the person experiencing the artform feel, and the viewer being able to find evidence in the piece of work to support this feeling.

Content, Process, Form and Mood can be used in any order, or one or more at a time as a prompt to visual thinking and identification while looking at an image or creative outcome. This mnemonic tool promotes enquiry, analysis, reasoning, synthesis, reflection, emotional intelligence, evaluation, meta-cognition and creative thinking. Teachers can lead and manage this process as a Q&A, classroom discussion or writing activity to phrase and/or answer questions set in response to critics, by the teacher or students.

A guide to Critical Studies and how to look at, think and talk about objects, images and works of art, craft and design.
Rod Taylor (Educating for Art -Critical Response and Development, SCDC Publications 1986)

Exploring objects and artefacts (Design Products)

Developing independent questioning when encountering objects and artefacts (Design Products)? These questions promote reasoning, analysis, synthesis, evaluation and enquiry thinking that will draw on the knowledge and understanding gained through design based study, consideration of environmental, sustainable issues, as well as experience of manufacturing processes and knowledge of the properties of materials.



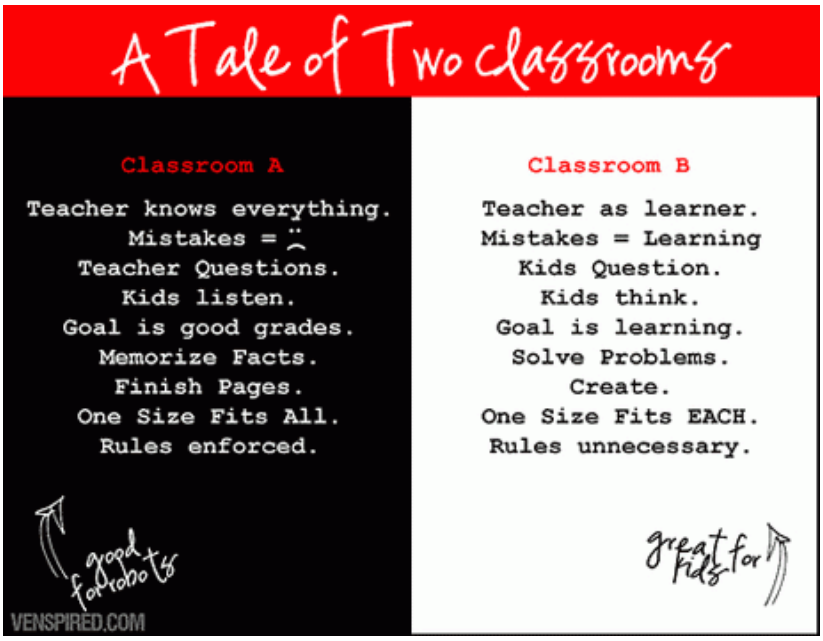
What do you see?	These questions define a process of questioning, although not all 5 questions have to be asked of each object.
What is it made of?	The questions increase in challenge and seek more thoughtful answers.
What does it do?	The questions rely either on technical knowledge or promote research and investigation.
How is it made?	As a whole, the questions provide a model for investigation and evaluation.
What is its impact?	Bloom's Taxonomy can be used to help phrase more challenging specific questions that address the concepts implied within each question focus.

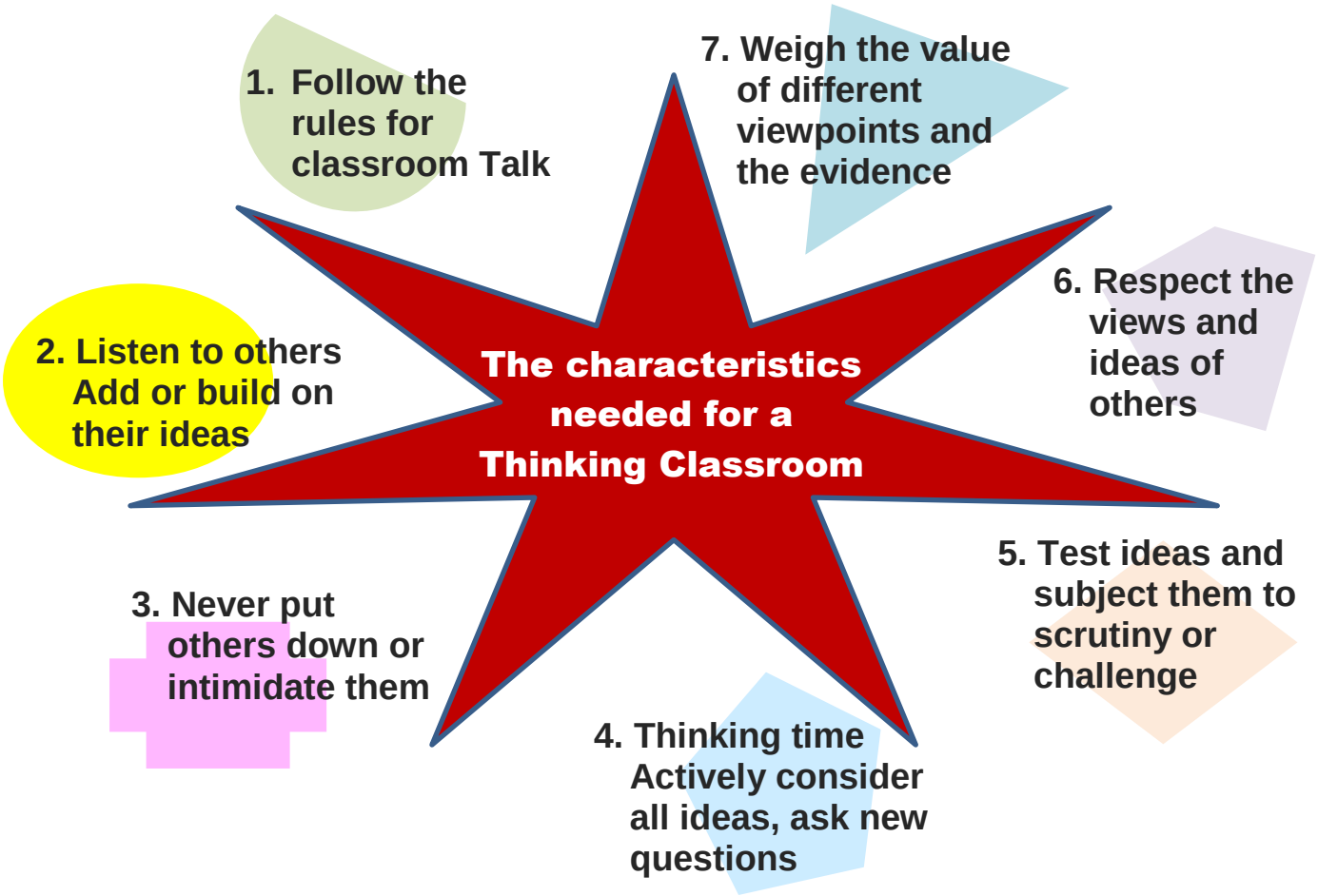
With thanks to the Education Department at The Design Museum

How do you create a questioning friendly classroom?

The purpose of questioning is to promote learning and develop thinking. By asking increasingly more challenging questions we can model more complex thinking and steer young people towards becoming an independent thinker, or developing their own perspective.

There are 7 actions you can take





When we consider the differences between Classroom A and Classroom B, we can see that Classroom B promotes better learning. In Classroom B, the teacher does not talk for too long, but asks open questions and encourages speculation and independence of thought.

In a thinking classroom, teachers plan their questioning in ways that will promote differentiation, challenge, independence of thought, alongside opportunities to think together, share views and ideas and discuss or explore the differences in their thinking. Questioning will need to be planned to promote and model such thinking and to guide the learning task.

Brainstorming & Blue Sky Thinking
developing ideas in the classroom

'Brainstorming', 'Blue Sky' and 'Out of the Box' are all descriptions of forms of thinking that invite participants to explore new ideas without restrictions, limitations or fear of criticism. This shares characteristics with Yellow and Green Hat thinking (see de Bono 6 Hats), or aspects of collective, cumulative and supportive thinking (see Dialogic talk).

This form of thinking is also essential for developing the understanding and skills of young people in response to questions and the promotion of classroom talk. It helps them learn to **list** what they know and to link their own imaginative thinking and problem solving together, so they can **share** their creative thoughts with confidence. By sharing and listing ideas and views, students can learn to think together, collaborate in developing ideas and start to frame questions that test the value or viability of these ideas.

NB Use whiteboards, paired / group thinking, jigsawing or snowballing in order to:

1. develop cognitive ability;
2. improve language development;
3. learn how to collaborate and build on the ideas and views of others.

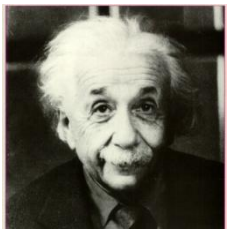
By engaging students in active learning conversations with teachers and each other, teachers are able to develop student self esteem and confidence, but also students learn how to:

- offer information, innovate on a topic or offer solutions to a problem;
- initiate topics of thinking, suggest alternatives;
- speculate about possibilities and list options for consideration by the group.

Self-esteem is a particular issue with this form of thinking and talk because students should value their own thinking, as well as the thinking and views of others. Making contributions to group and whole class shared thinking is important in forming models of collaboration as well as establishing the **rules for talk**.

Developing Speculation

Students learn how to speculate in response to their teachers modelling open-ended questions. These help students to think aloud, imagine and explore new ideas. 'Brainstorming' and 'Out of the box' thinking activities develop a shared understanding and ownership of a topic or subject, with permission given for 'risky thinking' and thinking 'out loud'. Students learn to speculate when teachers ask questions such as 'I wonder what happens if…?' or, 'In what way might…?'



For obvious reasons, it is important for speculation to have a strong element of imaginative thinking. Einstein famously suggested *"Imagination is more important than knowledge"*, confirming the value of imagination when exploring new ideas. Speculation is central to this, developing the following characteristics:

- a sense of Wonder,
- self reflection and questioning - Asking What If…? or What happens next…?
- seeking connections with what is new, what is already known and understood,
- reviewing what is known, to then develop speculative views,
- considering Consequences and Sequels, as well as imagining Prequels.

As part of this approach, it helps build understanding if students can see the Bigger Picture. Teachers can signpost connections to other areas of learning and help make links explicit, explaining why and making clear the purpose of the learning.

Seeing the Bigger Picture

Speculative Talk also resists being too specific. There is not always a need to define the measure of all outcomes. Language can suggest or hint at options or connections.

Classroom Talk and Questioning - to develop specific thinking and critical thinking skills

The importance of Hypothesis

Hypothesis forming is a higher order thinking activity, enabling students to at least guess or more usefully define a possible reason or explanation of an occurrence, an event, set of actions or outcomes. It is normally expressed as a provisional conjecture developed from the study of known evidence or facts, leading to the forming of a working hypothesis. Teachers use this approach as a means to develop students Information Processing, Reasoning, Critical and Creative Thinking Skills.
To help direct students thinking towards hypothesis forming, teachers may ask the following questions:

- What are the implications of …? What could have led to this?
- What do you think would happen next, if …? How might these people be connected?
- In what ways would you link the … evidence? How are the … linked?
- If these … are connected, what might have led to the … outcomes?

Hypothesis forming builds on speculation and can be aided by conversations and wider classroom talk. The opportunity to use thinking and talking partners will assist students in learning how to question data and information when forming a Hypothesis that makes sense of the evidence, occurrence or determines the most probable outcome in the light of the facts. Teachers can use 'Time outs', thinking time, paired and group talk to promote the sharing of partially formed ideas and for students to compare their hypothesis as they form them.

Mystery activities are often used in the classroom as a way of teaching students how to form a hypothesis by presenting evidence in the form of small pieces of text based information that can be physically grouped and re-grouped to make links in the information and help model the hypothesis. (see http://nationalstrategies.standards.dcsf.gov.uk/node/180236 or examples of Teaching Mysteries at http://www.mysterynet.com/learn/)

Inference and Deduction as outcomes of Reasoning

Students also develop inference and deduction skills as part of speculation and hypothesis forming, as they learn to make links between facts and any evidence they are examining. Inference calls for the interpretation of evidence and facts, putting them to use in framing a proposition or forming a premise. Deduction uses this information or evidence to form a more concrete interpretation.

Sherlock Holmes formed his deductions on his interpretation of the evidence he gathered. This form of thinking is also part of Critical Thinking. Particularly as students must learn how to weigh the evidence they gather or balance the views they form from this evidence, suspending judgement and considering this information from the perspective of others. See (Critical Thinking as an outcome of Classroom Talk and Questioning – see page 10).

To further develop Inference and Deduction skills and widen these to include Critical Thinking, teachers can structure opportunities for students to examine and explore evidence. They can start simply with questioning approaches such as the 5 x Ws and In What Way Might, as set out on page 4. Before then moving on to select questioning approaches from the approaches listed on Pages 2 and 3.
Creating opportunities for students to think, collaborate on their thinking to develop Partial Answers, or more extended answers to Big Questions, or Fat Questions, where a more complete answer is required.

Teachers can probe these answers from students seeking further detail, greater depth or explanation. By Eavesdropping as students collaborate in pairs or groups, teachers can start to plan new questions that test their thinking, whilst also modelling the next steps that will encourage them to develop improved independence.

Some of the major CoRT Tools:

(Cognitive Research Trust) Thinking Tools for Independent Learning - Developed by Edward de Bono

The CoRT thinking tools provide a set of simple Acrostics that help children remember specific thinking processes. Teachers introduce these one at a time to focus on a specific thinking task. Like the six hats, they prescribe a mode of thinking. Edward de Bono describes these tools as Directed Thinking.

Teachers can display these tools visually in a learning area or on a whiteboard. Focused questioning, classroom talk and paired thinking can be used to explore the focus of the tool through the learning context. For example, a PMI can be used to classify a list of information into Plus and Minus, as a paired or class discussion, to identify those with Plus/Positive characteristics. Those identified as Interesting, are worthy of more careful consideration. This tool speeds-up and makes more clear the process of classification of items in a long list or a complex set of criteria. Teachers can use these tools to provide a focus to questioning and pair/group or class discussions. By making thinking more directed, students are better able to remember these tools and use them to drive thinking for writing and speaking.

EBS – Examine Both Sides

This has an exploratory purpose – What really is the other point of view? What is the background thinking behind the other point of view?

The exploration is neutral.
Doing an EBS does not preclude holding a point of view, a value system or preference.

Classroom Talk: explore/empathise with ideas behind different viewpoints.
Questions: explore differences in viewpoint and opinion.

PMI – Plus, Minus and Interesting

Plus *= good things, advantages, positives*
Minus *= bad things, disadvantages, negatives*
Interesting *= worthy of further thought, neither plus or minus, unresolved*

The PMI is specifically designed to force us to scan in those situations where otherwise we should deem scanning unnecessary.

Classroom Talk: rapid thinking partner collaboration with criteria, think out loud.
Questions: analyse criteria for classification, define the criteria.

CAF – Consider All Factors

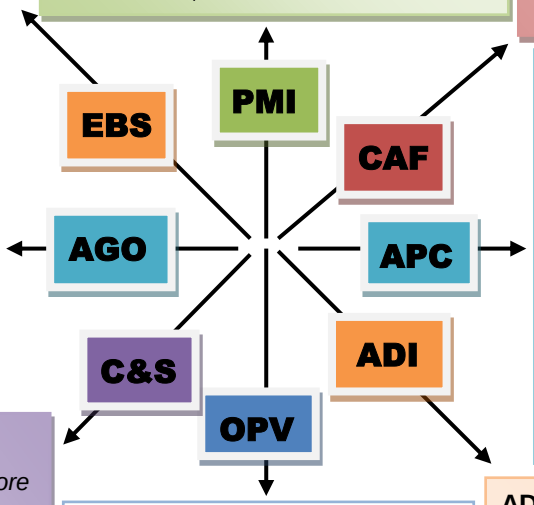
What is involved, what might matter?
This is an attention-directing tool like the PMI and APC. In other words, a device to make concrete what would otherwise remain a general intention to look broadly around an issue. 'Doing a CAF' means considering all the factors that must be considered in a situation. NB. There is no attempt to evaluate the factors.

Classroom Talk: thinking partners, brainstorming, analysis and empathy.
Questions: probe and analyse viewpoints of people and explore evidence from every perspective.

AGO – Aims, Goals and Objectives

Why am I doing this?
An attention directing thinking tool. The setting of objectives. There is not a need to address each term, but to use them broadly. NB. Targets might result from this.

Classroom Talk: to review/define learning objectives & outcomes.
Questions: self reflection and probing by teacher to foster self evaluation and target setting.



APC – Alternatives, Possibilities and Choices

What other choices and possibilities are there?
No attempt should be made to distinguish between the words. Doing an APC means making a deliberate effort to generate alternatives at that particular point.

Classroom Talk: collaborative shared thinking & brainstorming.
Questions: probe & analyse each Alternative, Possibility and Choice.

C & S – Consequence & Sequel

This attempts to make us think in a more long-term fashion.
Run events and actions forward in your mind to ask "If this were to happen, what would follow or happen next"?
The C & S thinking task is an instruction deliberately to consider consequences from an action or decision. In doing a C & S there is the usual deliberate attempt to focus on the frame of the moment, so each time frame is focused on in turn.
Four time zones are suggested:
Immediate consequences up to 1 year
Short term from 1-5 years
Medium term from 5-20 years
Long term over 20 years

Classroom Talk: thinking partners followed by jigsawing & class sharing.
Questions: challenge analysis and reasoning around each time frame.

OPV – Other People's Views

This focuses on different people and asks 'what might they be thinking'?
This overlaps with both the EBS and other tools such as the logic-bubble. The thinker tries to put themselves in the other person's shoes in order to look at the world from that position.

Classroom Talk: empathy based paired/group talk to review evidence.
Questions: probe & analyse evidence for each person at a time and what informs their viewpoint.

ADI – Agreement, Disagreement and Irrelevance

This follows EBS and the two maps are compared (from the examination of both sides) and the areas of agreement are noted. Next, the areas of disagreement are noted; finally, the areas of irrelevance.
At the end of an effective ADI both parties should be able to point directly at the area of disagreement.

Classroom Talk: Less useful in the classroom, but can explore differences in group thinking based on same evidence.
Questions: explore the reasoning and critical thinking that leads to a judgement.

Critical Thinking as an outcome of Classroom Talk and Questioning

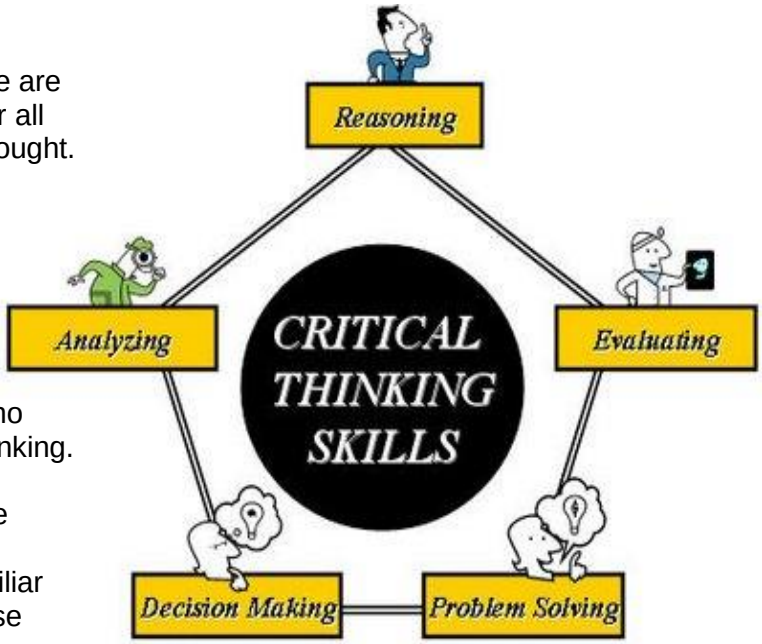
What is Critical Thinking?

Critical thinking is the process of applying reasoned and disciplined thinking to a subject. To do well in your studies you need to think 'critically' about the things you have read, seen or heard.

Acquiring critical thinking skills helps you to develop more reasoned arguments and draw out the inferences that you need to use in your assignments, projects and examination questions.

Critical Thinking Skills:
The Critical Thinking Skills as suggested here are typical of similar groups of core skills used for all activities requiring organised or conscious thought.

- **Reasoning**
- **Evaluating**
- **Analysing**
- **Problem Solving**
- **Decision Making**



These skills are used concurrently. There is no one linear process or correct sequence of thinking. The skills are applied in accordance with the nature of the thinking task. Some may well be used in a self-determined sequence, but this requires that students are independently familiar and confident in the selection and use of these skills.

From ModDB http://www.moddb.com/groups/critical-thinkers-of-moddb/images/critical-thinking-skills-explained

The 14 Characteristics of Critical Thinkers:

1. Independently ask pertinent questions.
2. Reason, analyse and weigh statements and arguments.
3. Have a sense of curiosity and wonder, being interested in finding out, new information or solutions.
4. Can define criteria for analysing ideas and problems.
5. Are willing to examine beliefs, challenge assumptions and opinions, weigh them against facts (distinguishing between fact, opinion, bias and prejudice).
6. Listen respectfully and carefully to others so that they are able to give feedback.
7. Suspend judgment until all facts have been gathered and considered.
8. looks for evidence to support assumption and beliefs.
9. Are able and flexible enough to adjust opinions when new facts are found.
10. Examines problems closely and looks for proof.
11. Able to identify and reject information that is incorrect or irrelevant.
12. Make assertions based on sound logic and solid evidence.
13. Able to admit a lack of understanding or information.
14. Recognises that critical thinking is a lifelong process of self-assessment.

Developed from: Ferrett, S. *Peak Performance* (1997).

Asking questions to model the critical thinking skills

- Teachers model critical thinking by the type of questions they ask.
- Try framing questions that explore each of the critical thinking skills, one at a time and by referring to Blooms taxonomy to help you set the correct level of challenge e.g.
- **Reasoning**
  - What do you know about …? Is there an alternative viewpoint to …?

- What evidence and information can we find that will help us understand …?
- If we know that …, then we also can assume that … How can we be sure?

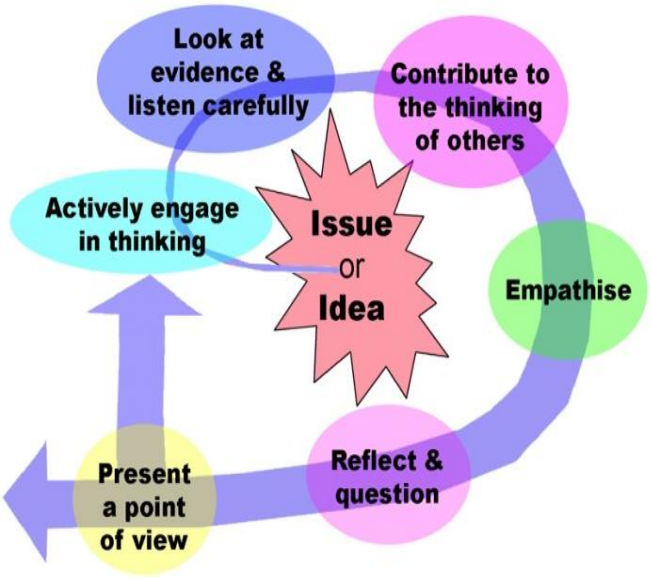
- **Problem Solving**
  - How can we identify the problem with …? What would we include in a list of questions to…?
  - Where can we go to find more information? Does this change our current understanding?

Developing Critical Thinking – 2 models

To develop Critical Thinking skills, teachers model the thinking processes necessary for the development of the skills. The thinking process is cyclical, containing several key steps, starting with an issue or focus, before then questioning and analysing the evidence, then empathising and defining possible hypothesise, before forming a view or reviewing the evidence.

Two models of critical thinking:

From ModDB
http://www.moddb.com/groups/critical-thinkers-of-moddb/images/critical-thinking-skills-explained



Questioning to develop Critical Thinking

Critical Thinking takes time and a willingness to admit that a point of view or hypothesis is not yet defined. Critical Thinking can be slow and benefit from a revisiting of what is known and understood, to help students organise their thoughts and questions. Classroom talk is essential in this process, with an emphasis on higher order questions and active learning approaches.

Teachers can develop students' critical thinking skills by:

1. Guiding them as they gather and question as much relevant information as possible/sufficient to inform thinking e.g. mind map or visual organiser, pair-share, collective memory or brainstorm;
2. Using Scaffolds to organise their thinking e.g. listing evidence For and Against;
3. Balancing views and contradictory or opposing evidence, weighing one set against another e.g. ideas on Post-It notes, living graphs and fortune lines, role play, mantle of the expert questioning;
4. Subjecting thinking to challenges and hypothesis forming e.g. carry out a CoRT Tools APC ;
5. Exploring ideas from different perspectives and empathise e.g. imagine a situation from the perspective of others or arrange a debate, CoRT Tools CAF, EBS or OPV (see page 13);
6. Ask students to justify their reasoning and the views they arrive at e.g. hot-seating or debate;
7. Avoid being judgmental e.g. empathise and continually test their own perspective;
8. Model the use of good critical thinking questions, to find out more and think problems through.

Classroom Talk - using the Six Thinking Hats

developed by Edward de Bono

"Thinking is a skill, intelligence is not enough."

"Within the information age – using the Internet to find Information is not enough, you have to think about what you find." **Edward de Bono**

The de Bono 6 Thinking Hats can be easily used to introduce children and students to the concept of dialogic classroom talk, by engaging them with modes of thought. The introduction of separate modes introduced one at a time, is helpful in establishing the viewpoint and characteristics relevant to each mode. It is a good discipline for listening and structuring a response. The six hats represent six modes of thinking and are directions to think rather than labels for thinking. That is, the hats are used proactively rather than reactively. The hats are used literally or worn metaphorically to help young children visualise and remember the mode of thinking being used. This avoids confrontation and promotes listening, tolerance and specific characteristics of collective, reciprocal. cumulative, supportive and purposeful talk.

When using the six thinking hats, we move thinking away from an emphasis on criticism and judgement, towards the direction of creative or constructive thinking. This is achieved by considering six different modes of thought, each shared by the thinkers together at the same time. They do not each consider different modes at the same time. Hence, the thinking is in parallel.

The method promotes fuller input from more people. In de Bono's words it "separates ego from performance". Everyone is able to contribute to the exploration without denting egos as they are just using the yellow hat or whatever hat. The six hats system encourages performance rather than ego defence. People can contribute under any hat even though they initially support the opposite view.

The Six Thinking Hats system has four specific uses:

1. It's a critical meeting facilitation tool,
2. It's an outstanding team productivity/communication tool,
3. It's a creativity enhancer,
4. It's a control mechanism used to maximize and organize a person's thoughts (help make decisions and solve problems).

Thinking is separated into six distinct categories. Each category is identified with its own coloured metaphorical "thinking hat." By mentally wearing and switching "hats," you can easily focus or redirect thoughts, the conversation, or the meeting. The difference between brilliant and mediocre teams and group activity lies not so much in their collective mental equipment, but in how well they use it and how well they work together. It artificially allows people to switch thinking quickly.

There is a range of methodology

- There are six metaphorical hats and the thinker can put on or take off one of these hats to indicate the type of thinking being used.
- When done in-group, everybody wears the same hat at the same time.
- The hats must never be used to categorise individuals, even though their behaviour may seem to invite this.
- This putting on and taking off is essential.
- Hats can be introduced one at a time to develop particular modes of thinking and talk.
- Hats can be used individually – as symbols to request a particular type of thinking i.e. …"I think we need some green hat thinking here."
- Hats can be used in a sequence e.g. Blue, Any, Any, Any, Any, Any, Blue – any hat can be used as often as you like, There is no need to use every hat; the sequence can be made up of two, three, four or more hats; there are two broad types of sequence: evolving and pre-set.

- Evolving – facilitator chooses first hat and when this hat is completed, the next hat is chosen and so on (but this process needs to avoid manipulation and users need to be very experienced)
- Pre-set sequences - is set up at the beginning of the meeting, under an initial blue hat. Minor variations can be permitted, depending on output.

The WHITE Hat
The White Hat calls for information known or needed.
This covers facts, figures, information and evidence needs and gaps. "I think we need some white hat thinking at this point..." means Let's drop the arguments and proposals, and look at what we know and what further information we need."

The YELLOW Hat
The Yellow hat symbolises brightness and optimism, benefits, speculates positively. This is the logical positive. Why something will work and why it will offer benefits. It can be used in looking forward to the results of some proposed action, but can also be used to find something of value in what has already happened.

The BLACK Hat
The Black hat is judgment—the devil's advocate or why something may not work, risk-assessment and caution. This is a most valuable hat, but can be over used.
It is not in any sense an inferior or negative hat. The black hat is used to point out why a suggestion does not fit the facts, the available experience, the system in use, or the policy that is being followed. The black hat must always be logical.

The RED Hat
The Red Hat signifies feelings, intuition, hunches, and emotion – gut feelings.
The red hat allows the thinker to put forward an intuition without any need to justify it. "Putting on my red hat, I think this is a terrible proposal." Usually feelings and intuition can only be introduced into a discussion if they are supported by logic. Usually the feeling is genuine but the logic is spurious. The red hat gives full permission to a thinker to put forward his or her feelings on the subject at the moment.

The GREEN Hat
The Green hat focuses on creativity, the possibilities, alternatives, and new ideas, growth, energy, hypothesis building. (Too little time is spent on this at present). This hat explores what is interesting, provocations and changes.

The BLUE Hat
The Blue Hat is used to manage the thinking process (metacognition).This is the overview or process control hat. It looks not at the subject itself but at the 'thinking' about the subject. "Putting on my blue hat, I feel we should do some more green hat thinking at this point." In technical terms, the blue hat is concerned with meta-cognition.

Using the six hats in the classroom
The six hats are used by teachers to structure a sequence of questions and discussions between small groups of students or a whole class. Teacher's best lead the discussions by wearing the blue hat and managing the sequence in the wearing of the hats. You may use the following sequence of hats to help you phrase your questions.

1. It is typical to begin the process of discussions by asking students a question that asks them to wear the red hat and share their emotional response to the issue under discussion. The question may encourage them to share their 'gut feelings' or intuition.
2. This first phase is often followed by a white hat question, which calls for the sharing of information or data that can inform the students and make them more aware of any information pertinent to the issue under discussion. This builds on their emotional response.
3. The next phase of questioning usually uses the green hat to ask students to explore creative possibilities.
4. This is then followed by either the black hat which explores potential problems with the green hat suggestions.

5. Alternatively, a yellow hat question might explore optimistic ideas or explore the value of the green hat ideas already suggested.
6. The blue hat can be called for by the students or the teacher can offer the blue hat to the students to invite them to suggest whether any of the hats should be worn again, to focus any further questions.

Developing flexible thinking for Creativity using SCAMPER

SCAMPER, devised by American Bob Eberle, is a useful technique to extend students' thinking and can provide real imaginative opportunities to all students to extend their work. The SCAMPER technique uses a set of directed questions which students answer in order to come up with new ideas. The stimulus comes from answering questions that you (as a teacher) and students (as learners) would not usually ask. It helps pupils to ask questions that require them to think creatively, helping to develop their critical thinking skills. It's a useful tool for creative writing and a stimulus for role play.

- Remember, you don't have to use **all** the steps in SCAMPER, you can just use one or several.
- Use it to spark off creative development and then let students work on their own. If they get stuck, they can return to the SCAMPER framework.

SCAMPER is reproduced from issue 14 of the Primary focus G&T Update magazine

Other uses for SCAMPER

SCAMPER makes a good starter activity for all sorts of lessons.

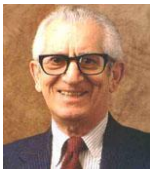
1. Show pupils an object (probably from a school or museum collection) and ask them to use the SCAMPER technique to come up with uses for the object.
2. Show or project in large scale for pupils an image (probably taken from the web or an illustration from a book) and ask them to use the SCAMPER technique to come up with descriptions of alternative images relating to the SCAMPER technique

SCAMPER An acronym that stands for a series of questions that may be asked about a familiar piece or work or process in order to encourage alternative forms of thinking, promote imagination and creative alternatives.		
S	**Substitute**	**Substitute one aspect of your product/process** What else instead? Who else instead? Other ingredients? Other material? Other power? Other place?
C	**Combine**	**Combine two or more parts with something else** How about a blend, an alloy, an ensemble? Combine purposes?
A	**Adapt**	**Adapt or alter one aspect** What else is like this? What other idea does this suggest? Does past offer parallel? What could I copy?
M	**Modify (distort or) Magnify**	**Change part/all of the current situation** Order, form, shape? What to add? More time? Greater frequency? Higher? Longer? Thicker? Rethink on a magnified or Macro scale?
P	**Put to other purpose**	**How could you put your current item/process to another use?** What else could I use this for? New ways to use as is? Other uses I modified? Other places to use?
E	**Eliminate**	**Delete one aspect** What would happen if I got rid of something? What difference would this make? What to subtract? Smaller? Condensed? Miniature? Lower? Shorter? Lighter? Omit? Streamline? Understate?
R	**Reverse**	**Reverse one thing** What if I did it the other way round? What if I reverse the order it is done or the way it is used? How would I achieve the opposite effect? Other sequence? Transpose cause and effect? Change pace? Transpose positive and negative? How about opposites? Turn it backwards? Turn it upside down? Reverse roles?

Find out more about SCAMPER at: http://www.brainstorming.co.uk/tutorials/scampertutorial.html

Bloom's Taxonomy

Developing HOTS and higher order questioning across the curriculum



In 1956, Benjamin Bloom developed a classification of levels of intellectual behaviour important in learning. Bloom identified six levels within the cognitive domain, from the simple recall or recognition of facts, as the lowest level, through increasingly more complex and abstract mental levels, to the highest order, which is classified as evaluation. Verb examples representing intellectual activity on each level are listed below.

The updated 2001 version of Bloom's Taxonomy of questions

7. Creativity: create, design, explore, imagine, invent, Innovate, investigate, originate, resolve.

6. Evaluation: appraise, argue, assess, attach, choose, compare, defend, estimate, judge, predict, rate.

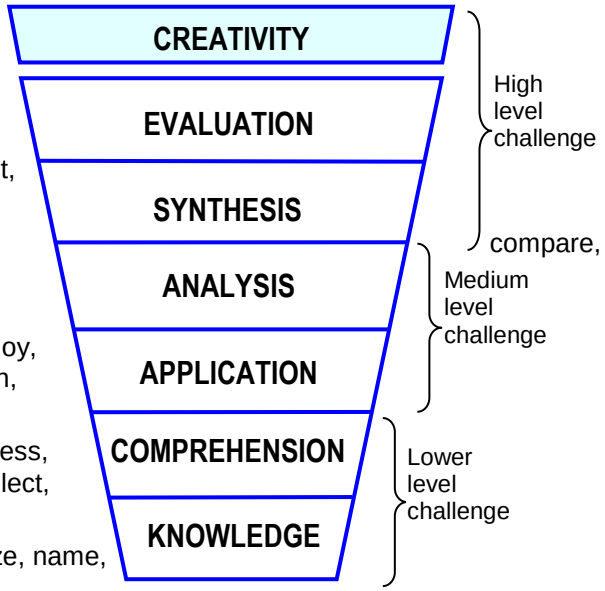
5. Synthesis: arrange, assemble, collect, compose, construct, manage, organize, plan, prepare, propose, set up, write.

4. Analysis: analyse, appraise, calculate, categorize, check, contrast, differentiate, discriminate, distinguish, experiment, examine, criticize, question, reflect, test.

3. Application: apply, choose, demonstrate, dramatize, employ, illustrate, initiate, interpret, operate, practice, schedule, sketch, solve, use.

2. Comprehension: classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate,

1. Knowledge: arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce, state.



This guidance is intended to help teachers to develop HOTS (Higher Order Thinking Skills) by phrasing suitably challenging questions, modelling the development of increasingly complex thinking to direct the quality of student responses. Since the taxonomy was first developed, some changes have been suggested and teachers may choose to use some of these suggestions in order to improve the relevance in their own subject or to focus on specific characteristics of student thinking. In the model presented here, Creativity was added in 2001 by Lorin Anderson (a student of Bloom) modelling Creativity as the highest level, building on the thinking developed through the other categories.

How does the Taxonomy work?

As teachers we tend to ask questions in the "knowledge and comprehension categories for 80% to 90% of the time. These questions are not in themselves bad, but using them all the time does not promote good thinking or challenge learners to think beyond what they know and understand. Teachers should try to use higher order categories of questioning to model and develop progressively more complex thinking, promoting links with other learning and across subjects, developing judgement focused thinking. These questions require much more 'brain power' and increase the expectation for more extensive and elaborate answers. They also promote a form of thinking that will address more complex ideas consistent with examination questions. Teachers should use Bloom's Taxonomy to help them plan learning experiences, pre-planning suitable questions and lessons in the language that shifts the focus to higher levels.

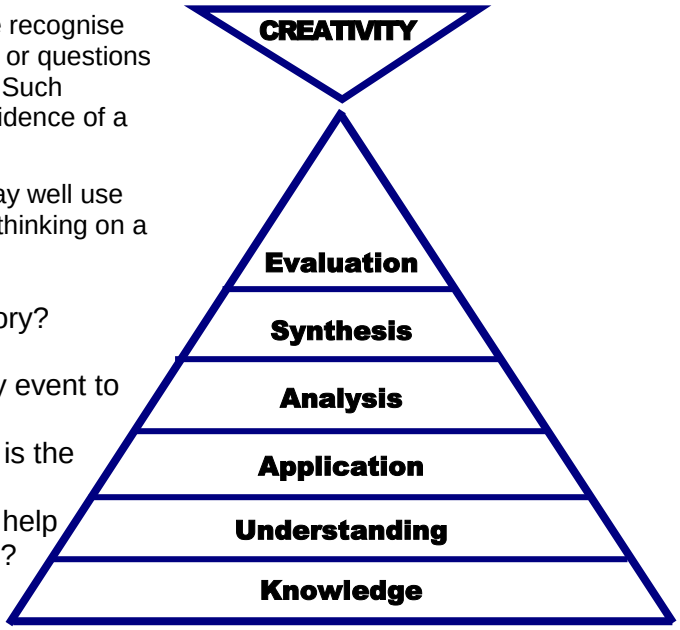
The taxonomy was originally portrayed as a pyramid, inferring that the majority of questions are asked in the lower challenge levels of knowledge and understanding or comprehension. I have inverted the pyramid above to make explicit the need to ask more questions of the type from the higher order levels, or place much greater emphasis on these higher order questions.

NB. It used to be suggested that knowledge and comprehension set levels of challenge at key stages 3 or 4, that application and analysis are A Level and undergraduate level thinking, with synthesis and evaluation being graduate level. We now understand that with careful framing, questions in each category or level can be phrased for learners as young as age 5 and above.

Bloom's Taxonomy
Higher order questioning to increase the level of challenge

By placing Creativity at the highest point of the taxonomy, we recognise that asking questions exploring creative thinking and actions, or questions that model and promote creative thinking will be challenging. Such questions should be thought provoking as well as seeking evidence of a breadth or depth of understanding.

Increasing the level of challenge requires questioning that may well use each of the questioning levels. So when developing creative thinking on a topic e.g. reviewing a play or story, we might ask:



1. **Knowledge:** Who are the main characters in the story?
2. **Comprehension:** How do they interact?
3. **Application:** Can you role play an example of a key event to explain the relationship of the main characters?
4. **Analysis:** Who are the main protagonists and what is the common factor in their purpose, driving the plot?
5. **Synthesis:** What other books have we studied that help us understand the behaviour of the main characters?
6. **Evaluation:** How would you summarise the difference in this story different?

Creativity: What do you imagine would be different in the plot, if the main characters respected, rather than disliked each other?

The taxonomy explores the Cognitive process. Asking questions develops cognitive (thinking) skills. This models and improves the development of ideas, imagination and creativity and so will require some pre-planning.
See examples of the six question categories below, which identifies some of the thinking and learning skills associated with each level of the taxonomy and introduces question cues. There are far more examples on the following page.

BLOOM'S TAXONOMY		
Competence	**Skills Demonstrated**	***Question Cues:***
Knowledge	• observation and recall of information • knowledge of dates, events, places & major ideas • mastery of subject matter	list, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
Comprehension (understanding)	• understanding information & grasp meaning • translate knowledge into new context • interpret facts, compare, contrast, order, group, infer causes & predict consequences	summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
Application	• use information • use methods, concepts, theories in new situations • solve problems using required skills or knowledge:	apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover
Analysis	• seeing patterns & organization of parts • recognition of hidden meanings • identification of components	analyse, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer
Synthesis	• use old ideas to create new ones • generalize from given facts • relate knowledge from several areas • predict, draw conclusions	combine, integrate, modify, rearrange, substitute, plan, create, design, invent, what if?, compose, formulate, prepare, generalize, rewrite
Evaluation	• compare and discriminate between ideas • assess value of theories, presentations • make choices based on reasoned argument • verify value of evidence • recognize subjectivity	assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize

Adapted from: Bloom, B.S. (Ed.) (1956) Taxonomy of educational objectives: The classification of educational goals: Handbook I, cognitive domain. New York ; Toronto: Longmans, Green.

BLOOM'S TAXONOMY : More extended examples of skills, cue words and question stems

Competence	Skills Demonstrated			Question Cues:
Knowledge	• Observation and recall of information • Knowledge of dates, events, places/major ideas • Mastery of subject matter • Factual recall			list, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc
Knowledge Question stems:	Tell me about …? Can you list …? How many …?	Where did …? Who are the …? Who said …?	When did …? Who wrote …? When was …?	What date did …? What is …? Where can you find …?
Comprehension (understanding)	• Understanding information and grasp meaning • Translate knowledge into new context • Interpret facts, compare, contrast, order, group, infer causes and predict likely consequences • Suggest connections			summarise, describe, extend, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend.
Comprehension Question stems:	Can you list the sequence …? What happened after …? How do you know …?		Who can explain …? What is the difference between …? How would you describe …?	
Application	• Use information • Use methods, concepts, theories in new situations • Solve problems using required skills or Knowledge • Visualise actions in a real life/applied situation			apply, demonstrate, change, calculate, complete, classify, illustrate, show, solve, test, examine, modify, relate, do, make, construct, discover, manufacture, make.
Application Question stems:	How could this have happened in…? What factors would you change if …? How would you react when …?		What would you do if …? What questions would you ask if …? What would you need if …?	
Analysis	• Seeing patterns & organization of parts • Recognition of hidden meanings • Identification of components • systematically consider data sets			analyse, separate, order, explain, connect, classify, arrange, divide, compare, probe, explain, deduct, infer.
Analysis Question stems:	How was this similar / different to …? What was the problem with …? What evidence proves …?		Why did … precede/follow …? What are some of the motives behind …? Do you think that …?	
Synthesis	• Use old ideas to create new ones • Generalize from given facts • Relate knowledge from several areas • Predict and draw conclusions • Redefine what is known • Reconceptualise for new situations			combine, integrate, modify, re-arrange, substitute, plan, create, design, invent, what if?, speculate, compose, formulate, prepare, rewrite, generalise, propose, model.
Synthesis Question stems:	How would you design … for …? What would happen if …?		What if we found out that …? Could you see a possible solution to …?	
Evaluation	• Compare and discriminate between ideas • Assess value of theories, presentations • Make choices based on reasoned argument • Verify value of evidence • Recognise subjectivity • Balancing evidence using criteria			assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, appraise, summarise.
Evaluation Question stems:	Do you believe …? How would you choose/assess …? What would you judge …?		Do you think … is a good or bad thing? How effective is/are …? On balance, what is the argument for…?	
Creativity	• Applies all of the previous categories to inform thinking and actions • Identifies and solves problems • Thinks independently and in new ways, able to originate and innovate • Collaborate as part of a team or be independent • Can empathise and shift perspective as needed			design, imagine, conceive, innovate, hypothesise, investigate, produce, invent, experiment, craft, fashion, generate, inspire, excite, compose, vision, wrought,
Creativity Question stems:	How would you respond to …? How could you collaborate to …?		Can you imagine how …? If you had to find a new way to …?	

Adapted from: Bloom, B.S. (Ed.) (1956) Taxonomy of educational objectives:
The classification of educational goals: Handbook I, cognitive domain. New York; Toronto: Longmans, Green.

Bloom's Taxonomy to support Critical Thinking

Suggested Verbs to Use to define the level of thinking and active challenge for Learning

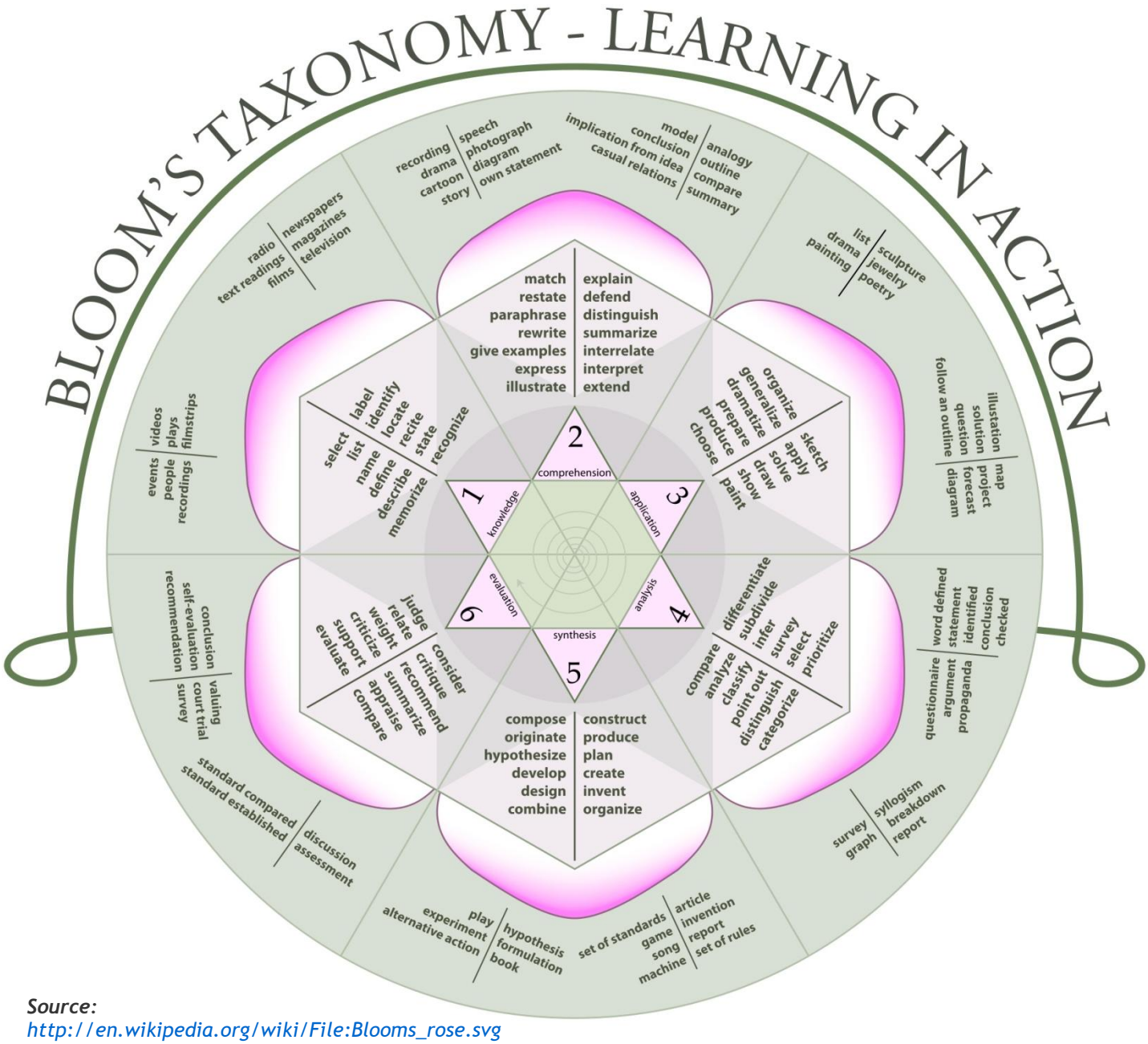
1. KNOWLEDGE **Identification and recall of information**	Define Fill in the blank List identify	Label Locate Match Memorise	Name Recall Spell	State Tell Underline
	Who ……..? What ……..? Where ……..? When ……..?		Who ……..? What ……..? Where ……..? When ……..?	
2. COMPREHENSION **Organisation and selection of facts and ideas**	Convert Describe Explain	Interpret Paraphrase Put in order	Restate Retell in your own words Rewrite	Summarise Trace Translate
	Re-tell …….. in your own words. What is the main idea of ……..?		What difference exists between …….. ? Can you write a brief outline?	
3. APPLICATION **Use of facts, rules and principles**	Apply Compute Conclude Construct	Demonstrate Determine Draw Find Out	Give an example Illustrate Make Operate	Show Solve State a rule or principle Use
	How is …….. an examples of ……..? How is ……. repeated to ……..? How is …….. significant?		Do you know of another instance where….? Could this have happened to ……..?	
4. ANALYSIS **Separating a whole into component parts**	Analyse Classify Categorise Compare	Contrast Debate Deduct Determine the factors	Diagrams Differentiate Dissect Distinguish	Examine Infer Specify
	What are the parts or features of……..? Classify …….. according to …….. Outline/diagram/web/map ……..		How does …….. compare/contrast with ……..? What evidence can you present for ……..?	
5. SYNTHESIS **Combining ideas to form a new whole**	Change Combine Compose Construct Create Design	Find an unusual way Formulate Generate Invent Originate Plan	Predict Pretend Produce Rearrange Reorganise Reconstruct	Revise Suggest Suppose Visualise Write
	What would you predict/infer from……..? What ideas can you add to ……..? How would you create/design a new…..?		What solutions would you suggest for……..? What might happen if you combined…….. with ……..?	
6. EVALUATION **Developing opinions, judgements or decisions**	Appraise Choose Compare Conclude	Decide Defend Evaluate Give your opinion	Judge Justify Prioritise Rank	Rate Select Support Value
	Do you agree that? Explain……..? What do you think about……..? What is most important?		Prioritise……..according to ……..? How would you decide about……..? What criteria would you use to assess……..?	

Find at: http://www.flickr.com/photos/vblibrary/4576825411/

Bloom's Taxonomy as a model to support active planning for learning and thinking

The following versions of the taxonomy are designed to help teachers develop HOTS (Higher Order Thinking Skills) and PLTS (Personal Learning and Thinking Skills)

The following two circular models of Bloom's taxonomy seek to avoid the problems of thinking of the taxonomy as a linear hierarchy, but instead present the verbs, actions and outcomes in a form that should help teachers plan much more challenging learning objectives, learning outcomes and activities.



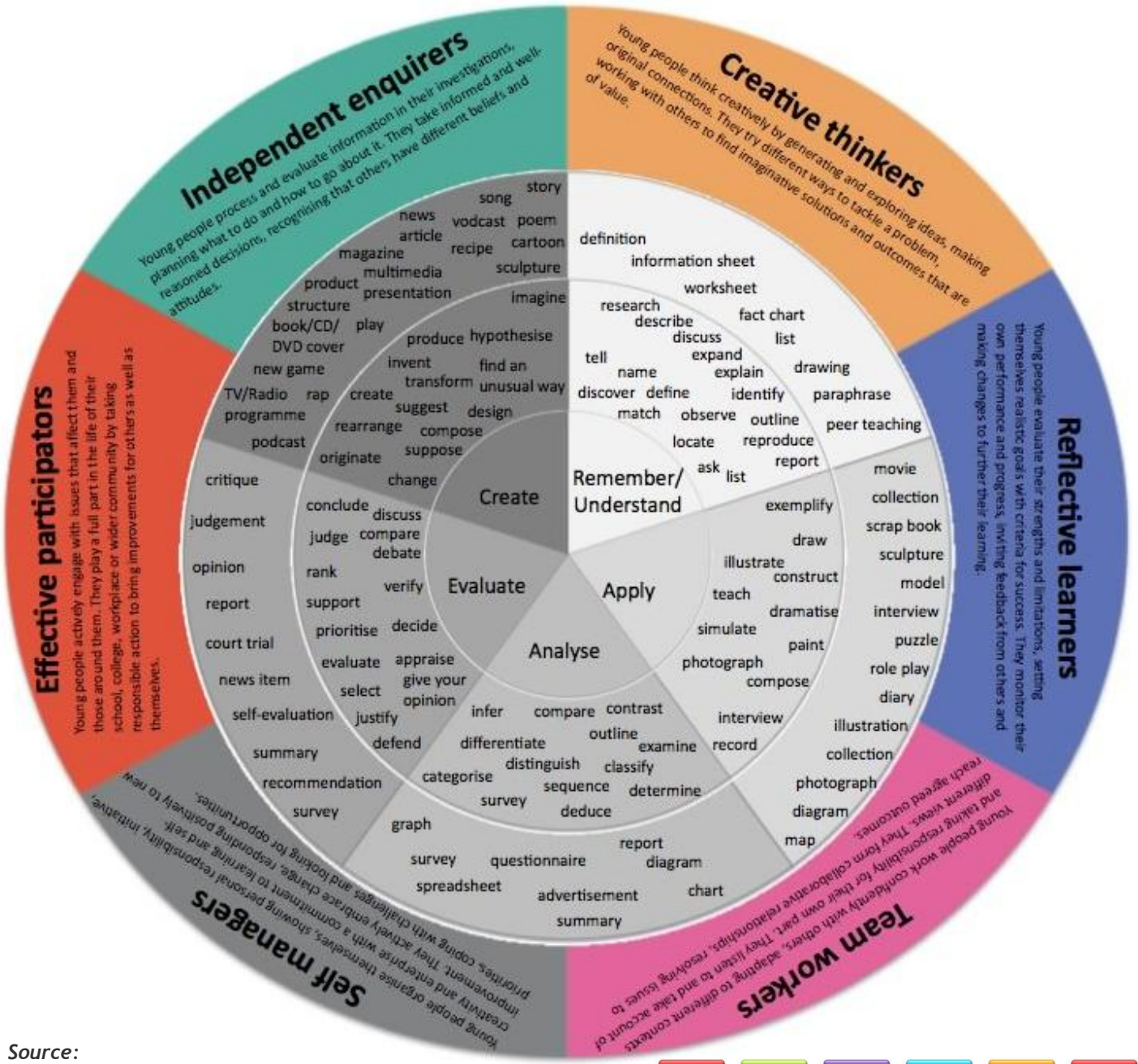
Source:
http://en.wikipedia.org/wiki/File:Blooms_rose.svg

This version of the taxonomy is often defined as the Bloom's Taxonomy Active Learning Rose.
The inner star defines the 6 categories from the original taxonomy. Each point of the star, points to the central petals which list examples of the learning actions associated with this category. As you move out to the outer circle, you will see further examples of learning outcomes.

All of these models seek to develop HOTS, by encouraging teachers to plan activities that raise the level of challenge in the learning. By improving awareness of the higher order outcomes and possible activities, it is hoped that teachers plan for my challenging contexts and find it easier to plan differentiated options.

Personal Learning and Thinking Skills (PLTS) and the taxonomy

This version of the taxonomy includes Creativity, but removes Synthesis and groups together both Knowledge and Understanding, It is useful when planning learning activities in that it encourages connections between the PLTS and the taxonomy. It is intended that teachers think of the outer PLTS ring as being able to rotate around the inner taxonomy circle, so that teachers consider the match between the activities and learning objectives/outcomes in each segment, with the context of each PLTS. From this a link and selection of a learning focus might be identified



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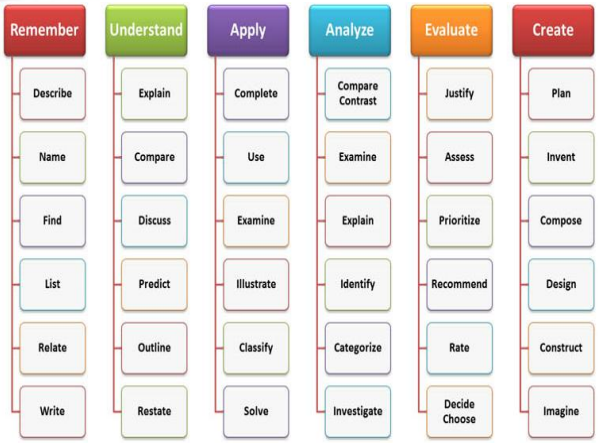
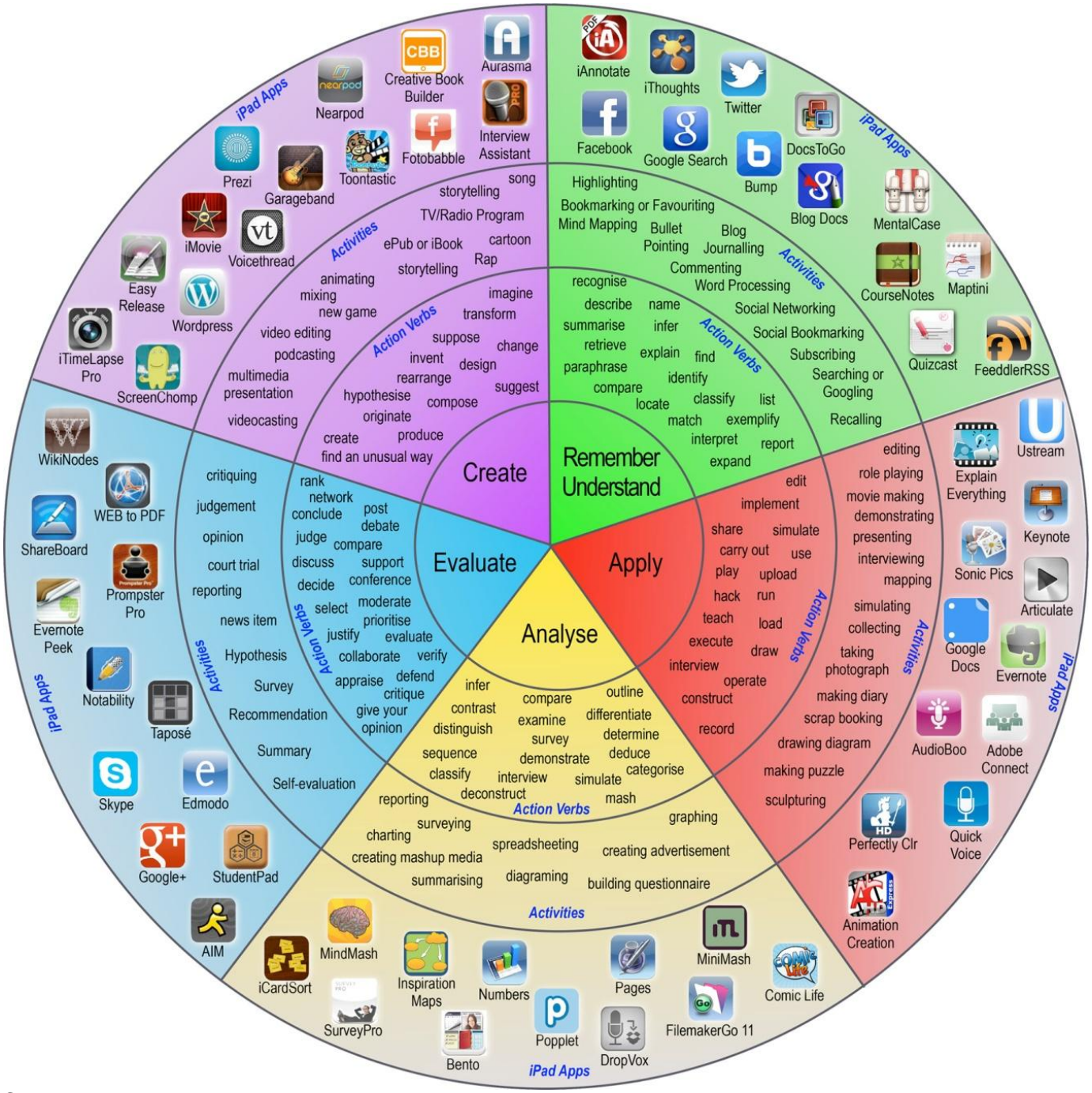


Question cues for developing questions to pitch the challenge correctly and to inform the questioning focus.

Bloom's Taxonomy Pedagogy Wheel

Suggested Verbs to Use to define the level of thinking and active challenge for Learning



Source:
http://www.tedcurran.net/2013/05/blooms-thinking-skills-%E2%89%A0-apps/

Ted Curran (May 2013)

"I've been researching Bloom's Revised Taxonomy of Cognitive Tasks, and I've been seeing a number of guides attempt to match iPad apps with each level in Bloom's hierarchy. These app guides seem built on a false assumption that using a certain app will reliably stimulate a certain mode of thinking. I think equating apps with Bloom's thinking tasks create the false impression that if you have all the right apps, your students can just click their way to critical thinking.

To be generous, you definitely *could* use many of these apps to exhibit the qualities of thinking Bloom describes, just as you could do with paper and pencil, a Word doc, a microphone, a camera, or a PowerPoint. The problem, of course, is that you can also successfully use those apps *without* exhibiting any of the desired thinking skills.

So please– think critically about your education technology choices before you implement them. If you need help, there's a great underused document called Bloom's Revised Taxonomy that can help you. It doesn't light up and it's not multi-touch-sensitive, but it's got some good ideas nonetheless.

Student Learning Objectives/Outcomes Action Verb Taxonomy

Suggested Verbs to Use to define the level of thinking and active challenge for Learning

Below are terms (verbs) that can be used when creating student learning objectives/outcomes for a lesson or project. Some words appear in more than one level or domain of the taxonomy, depending on the context for use. All verbs (and some other non-verbs) are placed with some intention governing the context for use, but teachers should interpret flexibly.

Boost the Objectives & Outcomes from the Lower Order on the left, to the Higher Order on the right

	KNOWLEDGE	COMPREHENSION	APPLICATION	ANALYSIS	SYNTHESIS	EVALUATION	CREATIVITY
COGNITIVE Reasoned, intuitive and perceptive learning	cite count define describe draw identify list match name point quote read recall recite recognise record repeat reproduce selects state write	associate compute convert defend define discuss distinguish estimate explain express extend extrapolate generalise give examples infer label locate outline paraphrase predict recognise relate rewrite summarise tell underline	add apply calculate change complete compute demonstrate divide examine graph indicate interpolate manipulate modify operate prepare produce reproduce repeat respond show solve sort subtract translate use	analyse breakdown combine deliberate design detect develop decipher diagram differentiate discriminate discover identify illustrate outline point out reason relate review select subdivide utilise	categorise classify compose convert create design devise explain exemplify extrapolate generate group integrate modify order organise plan prescribe reconstruct reorganise revise rewrite specify summarise synthesise transform translate	appraise assess compare conclude contrast criticize critique determine evaluate grade interpret judge justify measure plan prioritise rank rate support test	connect contemplate create envisage generate hypothesise imagine link picture ponder speculate think wonder
AFFECTIVE Emotional & attitudinal learning	accept accumulate ask describe follow give identify	locate name point to respond select use	affirm approve assist command comply conform describe engage exhibit follow form imitate initiate invite join practise share study subscribe work	adhere choose discuss deduce exploit infer justify	adapt change compose create defend display empathise formulate propose influence validate	assimilate integrate mediate revise solve verify	conceive conjure derive dream envision evoke evolve feel originate ideate imagine induce
PSYCHOMOTOR Physical engagement with learning	complete demonstrate distinguish hear identify locate manipulate move pick up point to practise	press pull push see select set up show sort specify touch transport	activate adjust assemble build calibrate close construct copy demonstrate disassemble disconnect duplicate execute group loosen manipulate measure open operate perform remove replace rotate select set slide use	chart check examine locate measure monitor outline observe separate	act arrange combine compile construct convert draw drive graph lead modify perform plan rearrange	fix generate illustrate organise repair service	arrange capture compose craft experiment explore hone invent investigate order make model produce research

Source: Adapted by Ged Gast from a model by Dr. Cia Verschelden (2005), originally developed from the work of Clayton R Wright (Action Words for Learning Objectives 1997), based on the Taxonomy of Questioning by Benjamin Bloom (1956)

Asking Questions - to increase challenge

Questions are an important part of your classroom discourse and can be used for a wide range of purposes as set out below. Reflect on the way in which you ask questions to ensure you do not plan all of your questioning within the basic range of challenge. Asking questions within the medium or higher zones mean that children have to engage more fully in thinking and responding. To do this, you may need to Probe or Challenge

Teachers use questioning as part of their teaching for many reasons, but often to:

Basic range of challenge

- **maintain the flow** of the learning within the lesson
- **engage all, groups or specific** students with the learning
- **assess** what has been **learned** in a previous lesson and check exist knowledge
- **check and test** that what has been **learnt** is **understood** and can be used
- **improve student participation** in the lesson
- **test** student **memory** and comprehension

Medium range of challenge

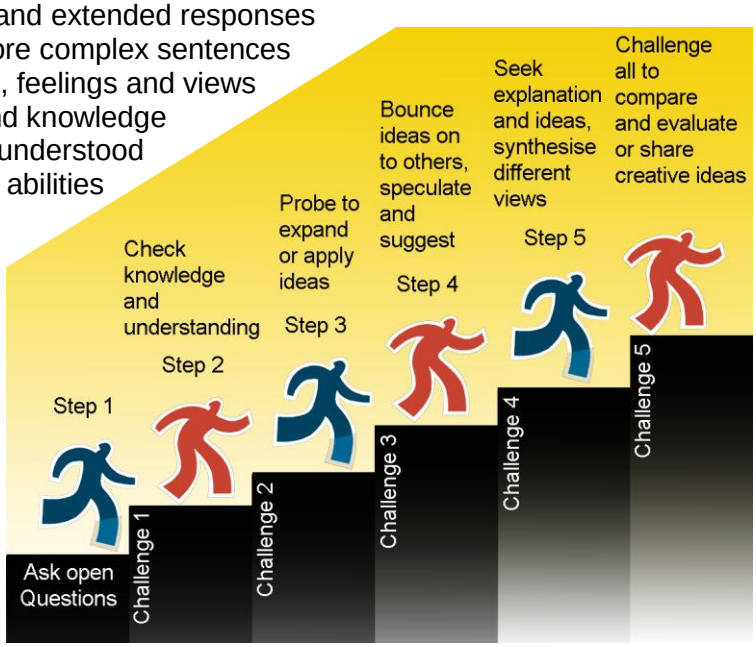
- **seek** the **views and opinions** of pupils asking students to articulate their reasoning and get more students involved by sharing their partially formed ideas
- **provide an opportunity** for students to share their opinions and views - seeking responses from their peers
- **create** a sense of **shared learning** and avoid the feel of a 'lecture'
- **differentiating** by directing specific questions to certain students
- **challenge** the level of thinking and possibly mark a change to a **higher order** of thinking

Highest range of challenge

- **Encourage collaborative thinking,** negotiating and challenge, making learning active
- **promoting focused** individual and shared **thinking** and problem-solving dispositions
- **model** higher order thinking using examples and building on the responses of students
- **foster speculation, hypothesis** and **idea/opinion forming**
- **encourage creative thought, generating ideas** & **imaginative/innovative thinking**

Planning and using progressively more complex questioning - will help to:

- to develop a shared understanding of students perceptions and thinking processes
- encourage student reflection and metacognition about their thinking and learning
- increase risk taking and make greater use of students own views and responses
- enable students to ask questions themselves and clarify their understanding
- encourage students to exchange ideas and build on the thoughts of others
- seek and probe for deeper more thoughtful and extended responses
- encourage students to speak in whole or more complex sentences
- encourage sensitive expression of emotions, feelings and views
- promote/check their understanding, skills and knowledge
- model how to reconsider what is previously understood
- offer students opportunities to show off their abilities
- encourage reticent students to participate
- Model collaboration and shared thinking
- involve more students in the learning
- encourage analysis and reasoning
- reinforce particular learning points
- help students to evaluate ideas
- focus/gain student's attention
- challenge the most able



Probe and Challenge

More on how to increase the level of challenge when asking questions

Probing Questions:

- seek to encourage students to speak and express themselves,
- say more about their learning and add more detail to a point already expressed.

Teachers can Probe a student to think and express a view in greater detail, or probe a group or class to provide more information.

- **When encouraging a student to refine a statement or an idea, teachers can ask:**
  - When does that principle apply?
  - Always? Only under certain conditions?
  - Would you say, then, that you disagree with the author?

Challenging Questions:

- **encourage students to connect and reorganise complex information.**
  - How does this article shed light on the concept we studied last week?
  - Can you develop a graph or table that organizes this information in a helpful way?
- **prompt students to support their assertions and present interpretations.**
  - How do you know that?
  - Which part of the text led you to draw that conclusion?
- **Require students to predict most likely or possible outcomes.**
  - What might happen if this practice were to be outlawed?
  - What would be the result if a different set of assumptions were used to set up this experiment?
  - Would you get a different result?
- **expect students to be able to illustrate a concept with one or more examples.**
  - Can you think of an example of this phenomenon, drawn from your research?
  - Can you point us to two specific events in the novel that led you to that conclusion?
  - Can you identify a painting or design that exemplifies that idea?

Focused Questioning:

- is used by the teacher to model how a sequence of questions can enable a student to respond correctly, where a single question or just two questions would not have resulted in as effective an answer.

Teachers use a sequence of Focused (funnel) Questions to focus in on an answer through a progressively explored set of answers.

- **To explore the depth of a student's knowledge about a topic, teachers can ask:**
  - In what date did the event take place?
  - And who was involved?
  - Can you describe the consequence of this event?
  - Whose life do you think was most affected by these events?
  - Can you summarise then, the longer term benefits to the society of the time?
  - And finally, how would you characterise the overall changes this brought to XXX society?

Stretching Questions:

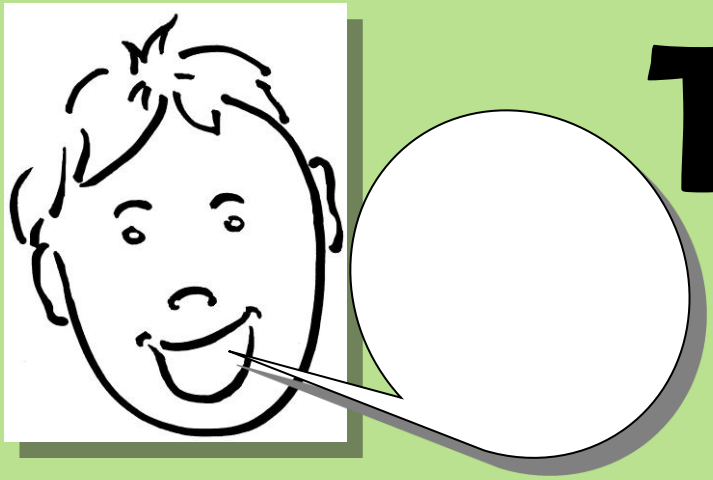
Set the bar high with expectations that seek answers at the limit of ability, knowledge or understanding. They might ask a question that requires an answer expressed as a:

- **Transformation** of information to another form (convert data graph to a narrative)
- **Metaphor** (implied comparison)
- **Analogy** (to demonstrate how well they understand or can communicate to others)

Require am extended answer that applies a principle or formula.

- How does this principle apply to an alternative situation?
- Who can suggest how we might use this new formula to solve the problems we examined at the start of class today?
- Under what conditions is this equation not valid?
- How would you explain this to someone from another culture?
- Do you agree or do you see the issue differently? Explain.
- Can you think of a completely different way to solve that problem?

RULES FOR CLASSROOM TALK



1. Respect each other's ideas, views and opinions
   - ➔ One voice at a time
   - ➔ Say what you think
   - ➔ Say why you think it
2. Listen and reflect on what others say
3. Build on what others say
4. Support and include each other
5. Confidentially share partial ideas
6. Ask when you don't understand
7. Try to reach an agreement
8. Seek clarity from each other
9. Speak calmly - be noise aware

Based on Teaching Speaking and Listening - Secondary *National Strategy*