Oliver Caviglioli continues his column on visual tools with an explanation of the concepts behind concept maps

Concept maps

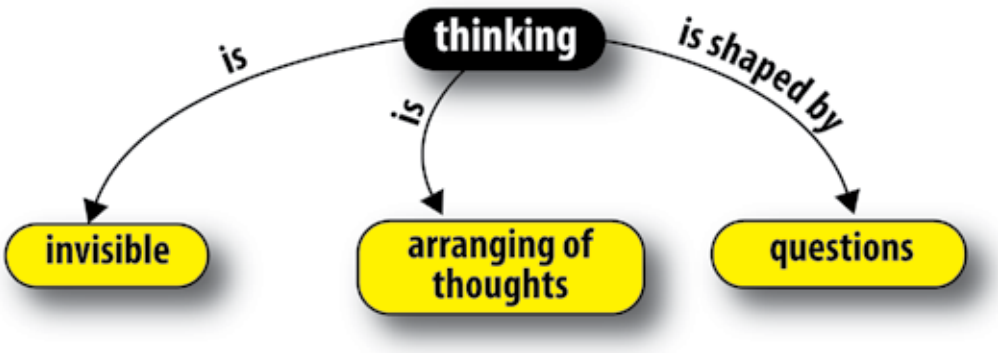
Concept maps are often confused with MindMaps. In fact, they pre-date mind maps by nearly a decade, having been invented in the States by Professor Joseph Novak in the 1960s. But don't let that date put you off. They're not a vague, hippy, new age 'brain–tool'. Just the opposite! They are a rigorous and demanding representation of knowledge. And don't let that term knowledge put you off either.

In concept maps, elements of a topic are broken down and connected to show their relationships. That's achieved by forming, in effect, simple sentences between the elements. Take the concept map on thinking (below). The term 'thinking' is one of that concept map's elements. It directly relates to three other elements. An arrow connects each element. Significantly, each arrow has a word on it that represents the nature of the connection. In the case of the element 'questions', it's the verb phrase 'is shaped by'. Because of this verb link, a sentence with a simple 'subject–verb–object' structure emerges that explains the relationship: 'thinking is shaped by questions'.

These simple sentences form the basic building block of a concept map. Their use is unique among visual tools. While all visual tools combine graphics with words, concept maps do it to an advanced degree. The benefit is that conceptual understanding is more rigorously organised and explained in more detail.

What is the purpose of a concept map?

Joseph Novak considers concept maps to be the best tool for developing and checking the accuracy of, knowledge and understanding. Unlike Benjamin Bloom's famous taxonomy, Novak places knowledge at the top of our list of thinking endeavours, not the bottom. Because Novak has not been dragged into the false dilemma of 'understanding versus knowledge' he promotes concept maps as the bridge between the two. How? By the way in which concept maps represent both what you know and how you understand it. As this is a primary goal of classroom activity, concept maps are excellent tools to enhance teacher explanation and deepen pupil understanding.



How is a concept map made?

It's best to start by pointing out that there are two formats used for concept maps. Novak insists that concept maps should be drawn in a 'top down' conceptual hierarchy. Others, from ignorance or disagreement, draw them in radiant fashion around the central topic. It's probably because of this graphic similarity that concept maps and MindMaps are confused. For pupils, I highly recommend using Novak's preferred format. Why? Because when visual tools have their own unique visual format, it's easier for pupils to identify them with specific types of thinking.

Even within Novak's top–down format, there are two ways to build a concept map. One is deductive and the other inductive. With both methods it's hard to achieve success immediately and so using Post–It notes is a good idea.

Let's start with the deductive process. Placing the topic title at the top, identify below it the main, most direct elements. Join them with arrows. Then, thinking about the nature of the relationship between top and lower elements, write a verb along the arrow to create a simple subject–verb–object sentence. Simply continue this process as you work downwards. Novak says that no arrowhead is needed as it can be assumed that all connecting lines point downward. If there are connecting lines that point upwards or sideways, then place an arrowhead on those only. I prefer to play safe, in terms of clarity, and put arrowheads on all connecting lines.

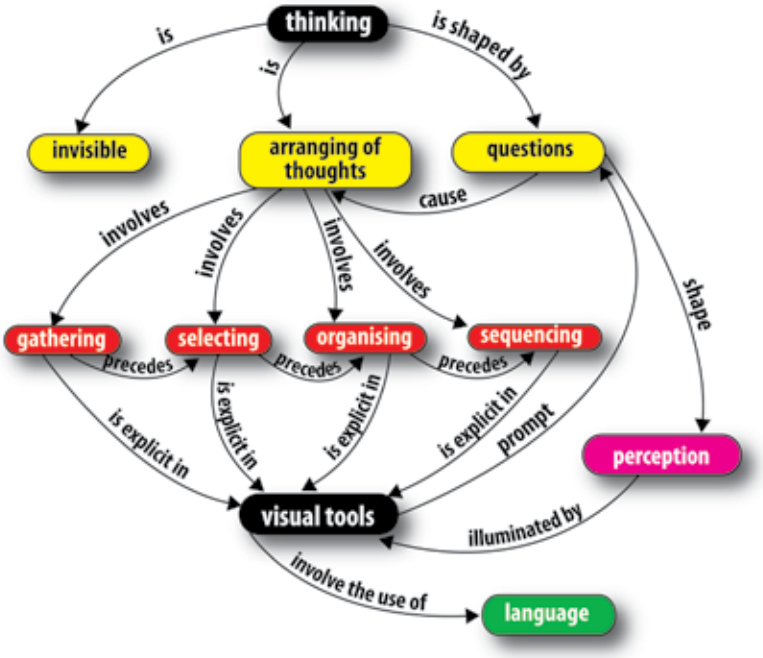
The inductive process is rather more involved but easier for pupils. On Post-It notes write keywords of all elements related to a topic. This gathering of terms is a sort of brainstorming and so might need editing down. Once a final list is arrived at, the Post–It notes are arranged as pairs. This will involve much moving around of notes with accompanying discussion. It will, very probably, be the most significant aspect in terms of learning activity. The pairs of notes are then arranged in a top-down conceptual hierarchy. Again learning conversations will happen. This is intensified as verbs are chosen to link the notes and define their conceptual relationships. When completed, the concept map can be recorded with pencil or computer, using software such as *Thinking With Pictures* from Logotron.

When is it useful to do a concept map?

As concept maps so directly represent personal understanding, they are very powerful tools to enhance assessment for learning. The fact that understanding is normally invisible, abstract and private but can be transformed into being visible, concrete and public provides wonderful opportunities for teacher, pupil and self-assessment.

Use concept maps to provide the 'big picture' before embarking on anything as large as a module to anything as small as a part of a lesson. Use them to clarify your explanations. Design collaborative group work around the construction of concept maps and you'll develop collaboration and communication as well as better thinking. Make them part of the review process and you'll naturally develop the aim of all assessment strategies – self-assessment.

Above all, learn to be proficient yourself with concept maps in order to provide your pupils with a specific method to develop understanding. A great way to start is by examining the concept map on thinking and having a discussion with a colleague about it. Simply linking words with an array of arrows may look like a concept map to most, but such a sloppy approach will not develop rigour or conceptual clarity.



How can I find out more about visual tools?

The book *Thinking Skills and Eye Q* by Oliver Caviglioli and Ian Harris contains 39 visual tools, all with detailed instructions on how to construct them in classroom situations. Better still, you can attend one of Model Learning courses, MapWise, Eye Q or iThink. Book online at www.modellearning.com, email info@modellearning.com, telephone 01277 202812, or fax 01277 200019.