

Research

Do teachers continue to teach in the old fashioned way or do we move to a 21st century paradigm for teaching and learning.

This is believed to be a false truth. To be innovative we need to remind ourselves to stand on the shoulders of past scientists, mathematicians, historians etc as we don't invent new ways of thinking without a deep understanding of how the world around us works today. We need to creatively *transfer* what we have learnt to complex situations. Jerome Bruner (1977) wrote "Grasping the structure of a subject is understanding it in a way that permits many other things to be related to it meaningfully" (p7) and concluded working with others, that in order to achieve the goal of producing innovation for learning, we need to teach for conceptual understanding.

Analyst Teresa Amabile (1998) explained – "Within every individual, creativity is a function of three components: expertise, creative thinking skills and motivation" (p81). This means that students still need a depth of knowledge in order to innovate. As such it echoes Bruner who posted – It would be unwise to throw out the academic disciplines and replace them with the goal of innovation without the support of a deep knowledge base.

The revised Bloom's taxonomy – *A Taxonomy for Learning, Teaching and Assessing* (Anderson & Krathwohl, 2001) asked – "Is mathematics, for example, a discrete body of knowledge to be memorised or an organised, coherent, conceptual system to be understood?" (p6). The answer is clearly the latter, but too often we teach mathematics as if it is a list of unrelated operations, a series of steps to be learned and applied with limited understanding.

Education researchers Fisher, Frey and Hattie (2016) recognised the importance of conceptual thinking in order to transfer learning to complex situations. "As students deepen their learning, we look for them to think in increasingly conceptual ways" (p112) This clearly demonstrates that organising conceptual knowledge is a particularly powerful strategy with enormous potential impact on student learning.

THIS MEANS WE NEED KNOWLEDGE IN ORDER TO INNOVATE – but facts alone are not sufficient. This factual knowledge must not be disorganised, for to create expertise we need knowledge that is organised in the brain in order to create something new. This then leads to a question. How can we expect students to solve multifaceted problems like international conflict over scarce resources without deep understanding of concepts such as power, scarcity and conflict.

The great thing about conceptual learning is that it makes visible and concrete the process by which we turn our knowledge of facts into transferable, conceptual understanding. For example if students use their reading of *Charlie and the chocolate Factory* to investigate the relationship between the concept of free will and fate, spending considerable time refining their generalisation about these concepts, they will more readily recognise their generalisation at work when they read *James and the Giant Peach*. Or when young math students use their study of fractions to investigate the relationship between multiplication and division, rather than just memorizing the algorithms, they are more capable of attacking a tough word problem where the appropriate algorithm is not obvious.

For this to happen it is crucial to establish a positive classroom community:

1. Encourage group problem solving

2. Teach active listening
3. Share research with students
4. Consider the layout of the classroom
5. Allow children to describe their ideal classroom environment

Building blocks for concept based learning

1. We need to expose students' **pre-instructional understanding** of the concepts and conceptual relationships.
2. A deep understanding of **each concept by itself** is necessary for a sophisticated understanding of the relationship among several concepts.
3. Students must **uncover** the conceptual relationships for themselves
4. **Transfer** is both a means to and an end of conceptual learning.

Concept based teaching in two words – **Uncover** and **Transfer**.

Step 1 – Uncover: The biggest pitfall for teachers is that they “cover” the concept by telling children what the relationship between two concepts is. EG- Teacher tells group – “Some people hold more power in society than others” meaning that the relationship between power and identity has not been explored.

Step 2 – Transfer: Once students have uncovered or discovered the relationship between two or more concepts, they can use this knowledge to unlock new situations. This is the goal of conceptual learning: transfer.

This means that after students uncover a relationship, they need to practice transfer – Students can read articles, watch clips or conduct interviews related to a specific topic. Teacher asks a question - relate this to concepts – that enables an opportunity for transfer to happen. The tricky part is to avoid being sucked into topical extensions rather than conceptual transfer.

Example: Topical extension is when you study ancient Egypt and the Romans and then asking students to identify how these civilisations influence society today. In this case students use their knowledge of facts but they don't actually have to use concepts at all and as such you have not asked them to apply any insights about conceptual relationships.

A transfer task could have been to ask students to find a current example of say religion and society today that is influenced by those of the Egyptians or Romans. This means it would be possible to make meaningful performance assessment for conceptual understanding. Meaning that it is impossible for students to succeed in this task simply by memorising facts or something that the teacher may have said. You would see right away if their conceptual understanding or application of this is weak.

Based on Conceptual Understanding – Julie Stern 2018