Improving the Quality of Teaching & Learning

Every Journey is Made Up of Many Small Steps

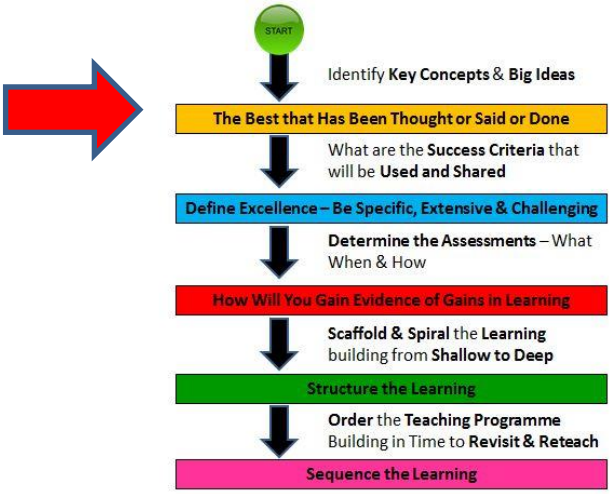
What's Your Next Step?

Lesson Planning

Focus On the Learning

Focus On the Learning

The Big Ideas



Planning Learning

Teaching is an unusual profession in so much as you need to be both the architect of the learning and its builder. Architects start with a vision or concept of what a house or building should be. Builders start with the foundations and work upwards from solid ground. Planning the learning and lesson planning shouldn't be confused. Planning learning starts with the end point whereas lesson planning ends at the starting point.

Starting with then end in mind is key to making good decisions about what should be in a subject's curriculum, schemes of learning and ultimately your lesson.

What is *"the best that has been thought and said"* that is worthy of passing onto the next generation?

There isn't time for aimless classroom journeys. The potential factual & conceptual knowledge and procedural skills (habits of mind) in every subject area are so vast that hard choices have to be made – these can be made either explicitly or haphazardly. If you are not clear about this your lessons are likely to be meandering wanderings to nowhere in particular and everywhere in general.

Determining the cultural capital we wish to share with the next generation is always contentious. Cultural capital is not fixed and we all tend to have our own views on what constitutes the best. It is a bit of a challenge in the more objective subjects of Science or Mathematics but by the time you hit the more subjective Arts or Literature you could spend ages actually debating what the best is and never actually agree.
As the national curriculum becomes slimmed down, not available in your subject or no longer compulsory:

- ✓ What would you identify as the core concepts, big ideas and best works that constitute or exemplify your subject?
- ✓ Would your *"list"* withstand the passage of time as well as the inevitable changes to the national curriculum or examination syllabi.

You cannot teach everything. Teach what is central and important not what is superfluous and peripheral.

You Don't Say, Sherlock

Curriculum Time is Limited …

… You Can't Teach Everything …

… So Teach the Best That Has Been Thought or Said or Done

Planning Learning

The following is taken from the Principles and Big Ideas of Science Education edited by Wynne Harlen (2010). It identifies big ideas of science and the big ideas about science. Both are important – factual & conceptual knowledge pertinent to Science and the scientific way of thinking or habits of mind that scientists have.

Ensure you Understanding the Big Ideas of a Subject. Plan the Learning from them and then Teach Towards them.

Fourteen big ideas in science

Ideas *of* science

1. All material in the Universe is made of very small particles.
2. Objects can affect other objects at a distance.
3. Changing the movement of an object requires a net force to be acting on it.
4. The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.
5. The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.
6. The solar system is a very small part of one of millions of galaxies in the Universe.
7. Organisms are organised on a cellular basis.
8. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.
9. Genetic information is passed down from one generation of organisms to another.
10. The diversity of organisms, living and extinct, is the result of evolution.

Ideas *about* science

11. Science assumes that for every effect there is one or more causes.
12. Scientific explanations, theories and models are those that best fit the facts known at a particular time.
13. The knowledge produced by science is used in some technologies to create products to serve human ends.
14. Applications of science often have ethical, social, economic and political implications.

Reference: *Principles & Ideas of Science Education (2010)*

Planning Learning

In an INSET a few years ago the challenge was set for staff to tweet their subject. Here are a few tweets staff came up with:

English is all about communicating effectively and accurately through reading, writing, speaking & listening for specific audience & purpose

Maths is the study of patterns and connections from which generalisations may be made and applied to solve problems

Art is the use of skill and imagination in the creation of aesthetic objects, environments or experiences that can be shared with others

Biology is all about how organisms adapt to the environment for survival of a species

Physics is how matter & energy interact, at a length scale from atoms to planets, to understand how the universe is formed and evolving

It is important to have a simple yet deep understanding of your subject as a starting point to plan the learning. This can then be converted into key concepts and ideas and then linked to key factual knowledge. In seeing chemistry about "relationships between particles and the factors affecting them" I had a focus for my teaching.

Chemistry hasn't fundamentally changed over the years.

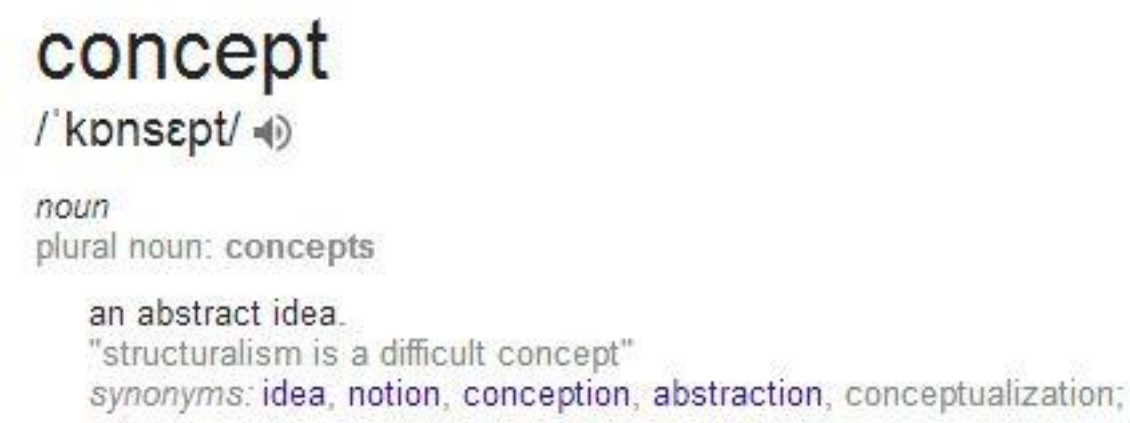
Understanding atomic theory; how elements arrangement in the Periodic Table, with its repeating patterns and various trends; particle theory and states of matter; reactions in terms of structure and bonding, endothermic and exothermic reactions: rates of reactions with some dynamic equilibrium thrown in; not forgetting the mole as a bit of good old quantitative chemistry that makes you think all washed down with lashings of inorganic and organic chemistry. It is pretty much the same now as when I started teaching decades ago.

By focussing on the learning within your subject your planning will be useful throughout your career.

Planning Learning

My Tweet

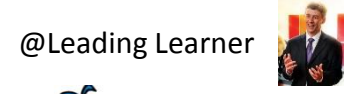
"Chemistry is all about the relationship between particles and the factors affecting them".



The above (in red) was my attempt to tweet my main teaching subject – Chemistry. Hence, when I taught dynamic equilibrium to my students I would get the students (reactants) to mill around before linking up a few boys and girls (the new product), only for them to break up (become reactants again) and new partnerships (products formed).

Students were familiar with the idea of relationships and what might affect them so it was a concrete example from which I could construct more conceptual understanding about reversible reactions, equilibrium and then their dynamic nature.

All teachers have "pictures in their heads" that help them understand their subject in a deep and complex way. The magic in teaching is how you help learners develop pictures in their heads so they too can understand the subject.



What's the Next Step?

ACTIVITY:

Reflection

Can You Tweet Your Subject or summarise it in a short sentence? (140 characters maximum)

What are the big ideas of and about your subject that students should learn?

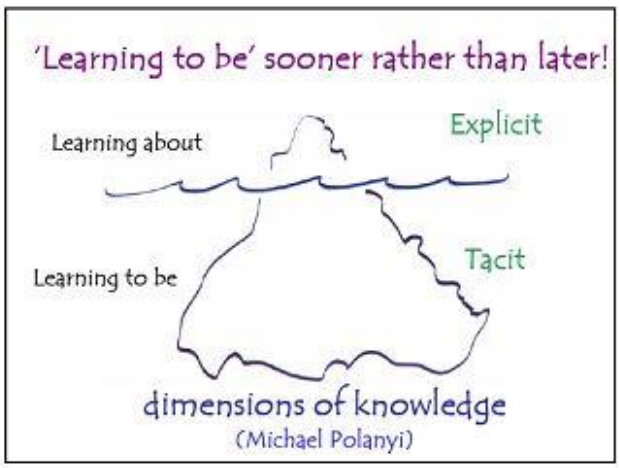
Dimensions of Knowledge

I was introduced to the Bloom Taxonomy as a student teacher. I have found the knowledge dimensions useful – Factual, Conceptual, Procedural and Metacognitive. The last one was added as part of a revision of Bloom's Taxonomy in 2000. These dimensions mutually are supportive of each other.

Factual Knowledge is the essential facts, terminology or details students must know to develop a deeper understanding of a subject.

Conceptual Knowledge is the grouping of ideas into a higher level of organisation which may include classifications, principles, theories or models. They provide the structure and scaffolds which allow for and facilitate a deeper understanding.

Procedural Knowledge refers to information or knowledge that helps students to do something specific within a discipline or subject. These particular methodologies and habits of minds, ways of working in a subject or discipline, are demonstrated through actions.



Acknowledgement: Seeley Brown, J (2005) New Learning Environments for the 21st Century

Metacognitive Knowledge is sometimes termed learning to learn. It is the aspect which is potentially transferable across subjects and disciplines. It is the knowledge about how to go about solving problems or cognitive tasks - planning, reflection and associated attributes. Growth Mindset (Carol Dweck, 2012) fits quite neatly.

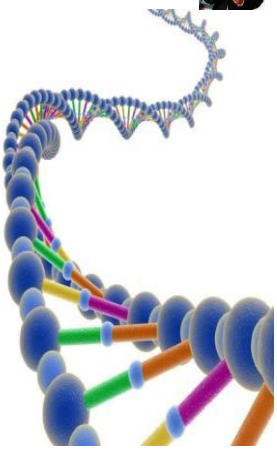
You Don't Say, Sherlock

It's All About the Learning …

… Factual, Conceptual, Procedural & Metacognitive …

… Build Across the Dimensions

The DNA of Learning



- A subject's factual knowledge and the understanding derived from it, forms one strand of the DNA of teaching and learning
- The other strand of the DNA double helix is the procedural skills and habits of mind we utilise in our subject's teaching and students' learning.
- The cross links that hold the helix together represent the explicit development of the learner.

The whole structure is important: factual knowledge & conceptual understanding, subject procedural skills and learner skills.

Some Knowledge About Knowledge

Knowledge can be thoughts of as **procedural** (identified through our actions) or **declarative** (expressed through words – written, spoken or signed).

Declarative Knowledge is divided into five types by cognitive psychologists: (Hattie & Yates 2014)

- ✓ Sensory: This is the knowledge you hold in your visual memory. Faces of people, places & buildings, names of objects etc. Over time our ability to make increasingly precise and fine judgements about what we see improves. This affects what we can subsequently describe.

- ✓ Sequences: These are short strings and associations of information that help us function in our everyday life – PIN for cards, telephone numbers, addresses etc. We need the right information in the right order. In our academic work there are time tables, number bonds and short literary quotes. There is no real requirement to elaborate this type of knowledge, it just is.

- ✓ Ideas: This is a new level of complexity as we gain knowledge that links together "discreet entities". We begin to have a more conceptual understanding of our World but it is built on factual information. If we can link our developing ideas to our prior learning the acquisition of new knowledge is easier.

- ✓ Concepts: These are also referred to as schemas. This is where sequences and ideas become linked together into structures or frameworks of learning – the Big Picture. In time a number of concepts can be linked together to form an even greater schema allowing a deeper understanding of the subject to develop.

- ✓ Mental Models: These are like the software programmes in the brain that allow us to do "what if" hypothetical type thinking and solve problems. It is how we extend our knowledge and engage in more original thinking. Concepts and schemas are the pathways which facilitate this type of knowledge development.

Learning builds on learning.
Link new knowledge to that which is already known.

Knowledge & Learning

There are different names used for these stages and a fuller explanation can be found in Hattie & Yates (2014).

The challenge is now finding our own schema for how we can organise knowledge within the class room. It is this structuring and sequencing of the knowledge, for our students, that is key to planning the learning.

Try as I might the "cognitive processes" within Bloom's Taxonomy – *remember, understand, apply, analyse, evaluate and create* – never really helped me in the class room. The processes don't have a direct relationship to how we learn. Bloom's Theory is a theory about knowledge not learning.

The most useful taxonomy I know is the SOLO Taxonomy. This relates directly to the types of declarative knowledge previously described. SOLO is quick and easy to learn for teachers and students. It provides a robust and reliable means of planning learning and assessing students' work. Once used you soon become a SOLO convert as the taxonomy allows you to explicitly plan for and assess increased complexity in the learning.

"In SOLO Taxonomy, learning outcomes are classified into five levels of increasing structural complexity – from prestructural (no idea) to unistructural (one idea), multistructural (many loose ideas), relational (related ideas) and extended abstract (extended ideas).

The levels represent both an increase in understanding (knowing more, moving from unistructural to multistructural outcomes) and a deepening of understanding (moving from multistructural to relational to extended abstract outcomes)."

Reference: Hook, P. (In press). SOLO taksonomi.
In Vinther, A. M. (Ed.), Målstyret undervisning og taksonomier
(English: Goaloriented Teaching and Taxonomies). Dafolo Forlag

SOLO Taxonomy

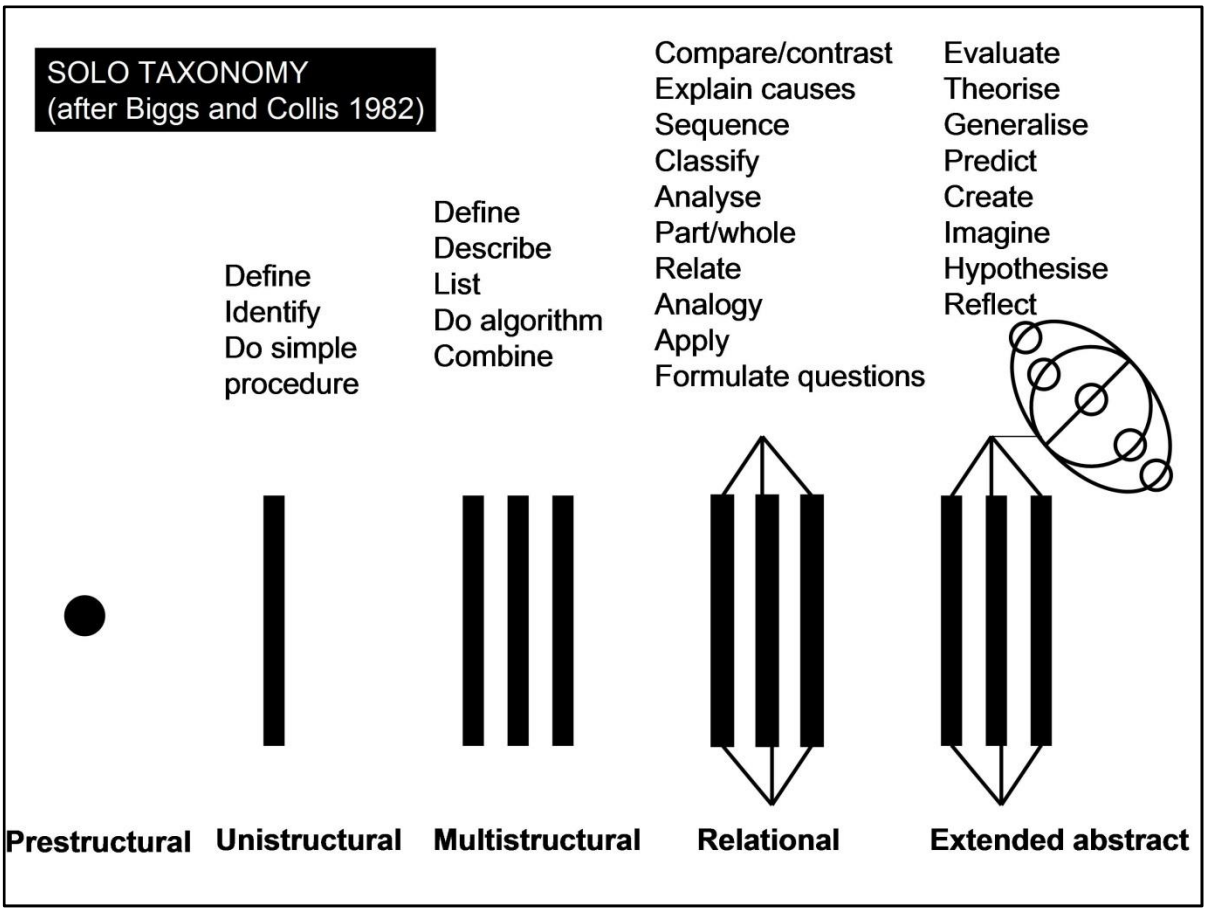
(Structure of the Observed Learning Outcome)

SOLO Taxonomy

The SOLO Taxonomy was devised by Biggs & Collis (1982). It categorises students' work into one of five different levels dependant on the level of learning it demonstrates. These "stages of learning" were found to be replicated, with remarkable similarity, across students' work in different subjects and age groups. Students and teachers have been found to both be able to use the SOLO Taxonomy to assess students' work with a high level of accuracy and consistency.

The great thing about the SOLO Taxonomy is that it is rooted in class room practice and students' outcomes. Both of these are a part of everyday life for a teacher.

The SOLO Taxonomy is a critical tool for ***structuring and sequencing*** the learning – I know of nothing better to help do this.



Acknowledgement: Produced by Pam Hook @arti_choke) http://pamhook.com/wiki/The_Learning_Process

You Don't Say, Sherlock

If you Want Clarity About ...

... the Learning in the Classroom ...

...You Need it in the Staffroom First

SOLO Taxonomy

"When teachers use SOLO it provides a powerful framework for determining prior knowledge, setting goals, planning learning intentions and learning experiences for deep, surface and conceptual understanding … and designing formative and summative assessment of student learning.

When teachers share SOLO with students, it provides them with a powerfully explicit model of learning (and a common language of learning) for what to do when you don't know what to do next and for supporting student relationships.

It shows students that their learning outcome is due to something they did to bring in ideas, connect ideas or extend ideas – their learning outcome is the result of their effort and use of strategies, not luck or fixed ability."

Reference: Hook, P. (In press). SOLO taksonomi. In Vinther, A. M. (Ed.), Målstyret undervisning og taksonomier (English: Goaloriented Teaching and Taxonomies). Dafolo Forlag.

If you would like a full copy of the paper please contact Pam Hook (@arti_ckoke) via:

http://pamhook.com/2014/06/11/malstyret-undervisning-og-taksonomier-goal-oriented-teaching-and-taxonomies/

Planning Learning

In our teaching, we should seek to enable students to learn the mental models upon which our subjects are built. Also of importance are the ways of learning associated with how we learn. Developing these models moves students towards a greater independence and eventually interdependence in their learning. In both these knowledge dimensions there is a need to build the foundations of the learning before giving our students the wings to fly.

"There was a period when teachers were encouraged to believe that rote learning stood in antagonism to deeper understanding. This notion is misleading since all indices of knowledge display positive associations.

There is no meaningful cleft between 'mere surface knowledge' and 'deep understanding'. On the other hand, the notion of automaticity implies that when basic skills are automated, mental space becomes available for deeper levels of thinking and understanding through acquiring knowledge. Knowledge literally provides the mind with room to move, to develop, and to change.

Repetition and consolidation are vehicles enabling knowledge to be stored within retrievable units thereby accelerating mental growth through conceptual mastery and deeper understanding."

Hattie & Yates (2014) – Taken from Chapter 7

How we engage students in the different phases of their learning journey is crucial. Helping them develop the conceptual framework of a subject will enhance current and future learning.

"It has been repeatedly shown, through both classroom and laboratory studies, that students who arrive at high school with misconceptions about phenomena will not alter their misconceptions as a result of directive instruction or simply listening to 'correct' explanations."

Hattie & Yates (2014) – Taken from Chapter 6

You Don't Say, Sherlock

Learning Builds on Learning ...

... Revise, Reteach, Revisit ...

... Easy Recall Aids Deeper Learning

References

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Hattie, J (2012). Visible Learning for Teachers. London: Routledge

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Some Background Reading

Education for Wisdom

Vision 2040: Learners at the Centre I

Vision 2040: Learners at the Centre II

Vision 2040: Learners at the Centre III

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