The Making of the Video Guide to Sustainability Intelligence

Our Production Values:

The proposed Video Guide seeks to be informative, inspirational and instructional.

The Guide exists not only to inform but to encourage and persuade individuals and institutions to learn differently in order to act differently. The effectiveness of the project will be judged by outcomes - not the process - and these outcomes will relate to the shaping of a new 21st century learning landscape.

The Guide's principal function is to help users learn about learning; specifically about those higher order cognitive skills that the authors believe are essential for making the transition to a fairer, more sustainable future. And, in the case of policy makers, administrators, consultants and teachers, to use that knowledge and awareness to bring about essential change in learning systems and processes.

To be credible as well as effective, we believe that the Guide needs to embody the very same learning philosophy and methodology as it seeks to promote. The learning that takes place should be of a high order and aim for understanding and retention. This needs to apply at both the **strategic** level (and apply to the overall conceptualisation and structure of the Guide) and at the **tactical** level (and apply to the detailed design of each "frame" of each production).

In developing the core production values of the Guide we have drawn upon what we consider to be the best "best practice" advice available, contained in a careful selection of authoritative sources, outlined in the Appendix.

Summary

The **Video Guide to Sustainability Intelligence** will be:

An informative, inspirational and instructional multimedia presentation with an absolutely clear overall message, segmented into a total of 10-20 short, concise parts, each of no more than five minutes duration and each focusing on a single "big idea" conveying a single "sub" message, combined with a reinforcement of the overall message.

For maximum impact and contribution to learning, each video in the series follows a similar template which in effect acts to "brand" the video as a member of the series.

Telling a Story

Each video is structured and sequenced **to tell a story** with the following "classical" story components:

- **An Exposition** - in which the scene is set, the "situation" is outlined (the situation being what the user already knows, should know or needs to know about the theme/concept/topic/issue under investigation) the status quo described and the key "actors" introduced. In the case of later videos, tells the "story-so-far".
- **A Conflict –** the change to a "before-stable" situation, introducing the forces bringing about change and complication, disrupting order, threatening danger and chaos, compromising the welfare of some or all of the key actors.

- **A Climax -** maximising the tension, bringing the user "to the edge of their seat", nearing a point of no-return
- **A Resolution** – releasing the tension by offering a way out of the danger, setting out the steps that can be taken to pull back from the edge.
- **A Post Script.** Setting out the next steps. Engaging the viewer by making the resolution specific and individual to them, suggesting what the viewer can do to be part of the solution rather than part of the problem. Encouragement and motivation to view the next video in the series – and to engage others in the learning process. Spreading the word. Producing the "You must see … !" factor.

Pyramid Principle

Each of the five story components – and the preface which in each case reinforces the "master message" of the whole series is presented following the **pyramid principle,** so that early "frames" are summaries of the group of linked ideas that follow.

Ideas in each category are of the same kind and need to be recognised by such, through not just the **logic** but also the **style** applied. So style and logic reinforce.

The whole is intended to provide an easy-to-follow cognitive framework or structure that acts as a **scaffold** whilst the viewer constructs and applies their own **mental model** to the material provided.

Maximising Effectiveness

- Each video will be presented as a "channelled" multimedia presentation - i.e. contains spatially and temporarily aligned words *and* pictures but where the words are predominantly spoken so as to be channelled directly to the auditory channel and pictures channelled directly to the visual channel.

- Superfluous, extraneous words, sound and pictures are eliminated and only essential material is highlighted and reinforced. Colour and graphics are used for design not for decoration.

- Text is used as sparingly as possible when the words are also being spoken.

- The exposition is used to ensure the viewer is aware from the outset of the names and characteristics of the key concepts introduced.

- A voice over narration is used which will seek to be conversational and viewer-friendly.

The Design

Transformative learning requires a critical assimilation and integration of a wide range of different mindsets and perspectives. The focus is very much upon the power of "social" learning so ideas and concepts are presented not in the abstract but through the (carefully and critically selected) words of named and identifiable individuals (writers/researchers/opinion formers/ etc) who first (or best) conceived and gave a compelling voice to the idea.

Preface

Each video will start with a short "to camera" piece by the series producer (Roger), introducing the series as a whole, conveying the key master message of the Guide ("Sustainability demands a radical transformation of education and learning and a new kind of sustainability intelligence") and directing users to supplementary online resources.

I have proposed to design, script, light, shoot and edit this short piece with advice and guidance from the City College's Media Studies professionals (Iain) but deliberately using very low cost equipment such as:
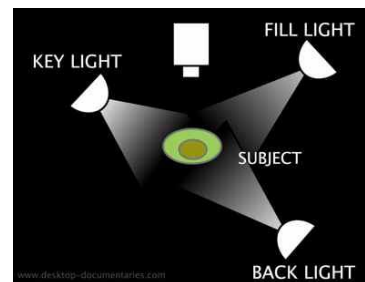
- Cisco Flip Video Camera

- Samson "Go Mic" Portable USB Microphone for recording

- Three point lighting, with available equipment

- CyberLink, PowerDirector 10 Ultra Video Editing Software.

Main Body

The main body of the Video Guide is then conceived as a sort of **forum** in which the ideas of different named and identified people are given voice – and placed into the context of the unfolding story - by the narrator.

Each idea or concept is simultaneously reinforced by an appropriate image or graphic on the screen after which that graphic is added on to an onscreen "whiteboard "as if a piece of a jig-saw.   The jig saw analogy may not necessarily be taken literally but indicated parts (ideas) fitted piece by piece together to form a whole
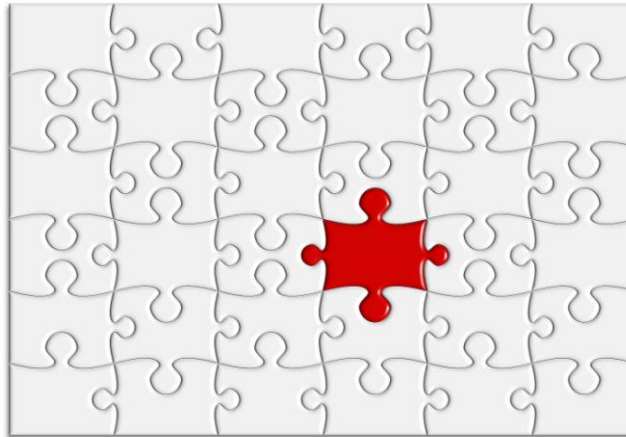
In each video I was thinking initially of something rather like a 5 x 5 structure – i.e. five grouped idea/image pieces for each of the five stages of the "story" though the 6 x 6 format shown may allow for more flexibility and for inclusion of the preface.

So as the **exposition – conflict – climax – resolution – postscript** progresses, the jig-saw is progressively built up, as additional pieces are added.   So the viewer is able to see the big picture and the component detail at the same time and also – through the preface – have a clear sense of the direction in which the production is heading.

I propose that the main part of each short video is composed of an automated sequence of subtly animated **PowerPoint** slides, each carrying the key reinforcing graphic message supplementing the words simultaneously spoken by the narrator (with some on screen text only if necessary).   This sequence would be captured in video format using free open-source screencasting software such as **CamStudio** or **Debut Video Capture** Software.
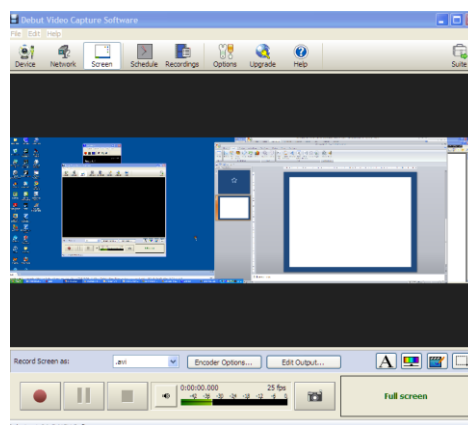
The main body of the story would thus flow in the sequence:

Exposition: Idea 1 – Big Picture – Idea 2 – Big Picture – Idea 3 – Big Picture – Idea 4 – Big Picture – Idea 5 – Big Picture –

Conflict: Idea 1 – Big Picture – Idea 2 – Big Picture – Idea 3 – Big Picture – Idea 4 – Big Picture – Idea 5 – Big Picture –

Climax: Idea 1 – Big Picture – Idea 2 – Big Picture – Idea 3 – Big Picture – Idea 4 – Big Picture – Idea 5 – Big Picture –

Resolution: Idea 1 – Big Picture – Idea 2 – Big Picture – Idea 3 – Big Picture – Idea 4 – Big Picture – Idea 5 – Big Picture –

Postscript

Ending

I like the idea of adding an element of surprise as part of the post script to each video as the completed jig saw is "turned over" to reveal a completed reinforcing big picture – combined with a reminder of the next video in the series and directing the user to the online resource of further reading etc.

Exemplars

I have at least in part been inspired by the work of Salman Khan and the Khan Academy (http://www.khanacademy.org/) using a Wacom tablet and Springboard storyboarding software:
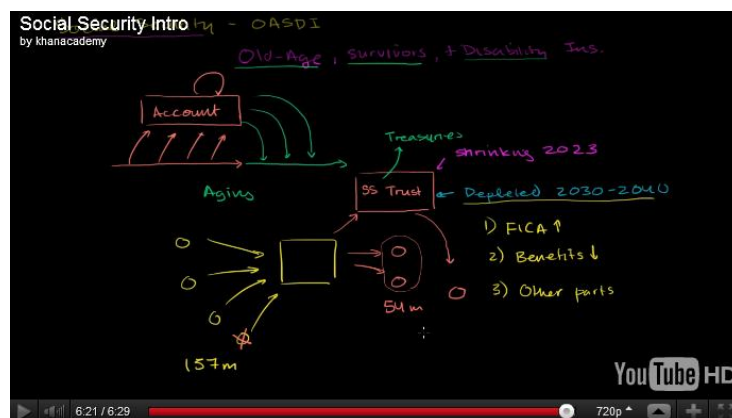
and this animated video http://www.youtube.com/watch?v=zDZFcDGpL4U of a talk by the brilliant Ken Robinson with wonderful simultaneous animated drawings by the RSA Animate and Cognitive Media teams. At the end the camera draws back to reveal the complete drawing – itself a work of art.

The downside of this latter approach – and I know this because a talk by a close friend and colleague of mine, Scottish educationalist and Chair of the recently formed Commission on School Reform in Scotland, Keir Bloomer, is receiving the same treatment - is that the cost of each video runs into five figures – probably around £12,000.

We need to calibrate our production values just a little bit differently but seek the same level of impact (the Ken Robinson video has been viewed millions of times).   With this in mind the work of Professor Martyn Poliakoff http://www.periodicvideos.com/videos/006.htm at the University of Nottingham deserves serious attention – again the recipient of tens of millions of views (wish I had the hair!).

The Storyboard Template (Graphics are indicative only)
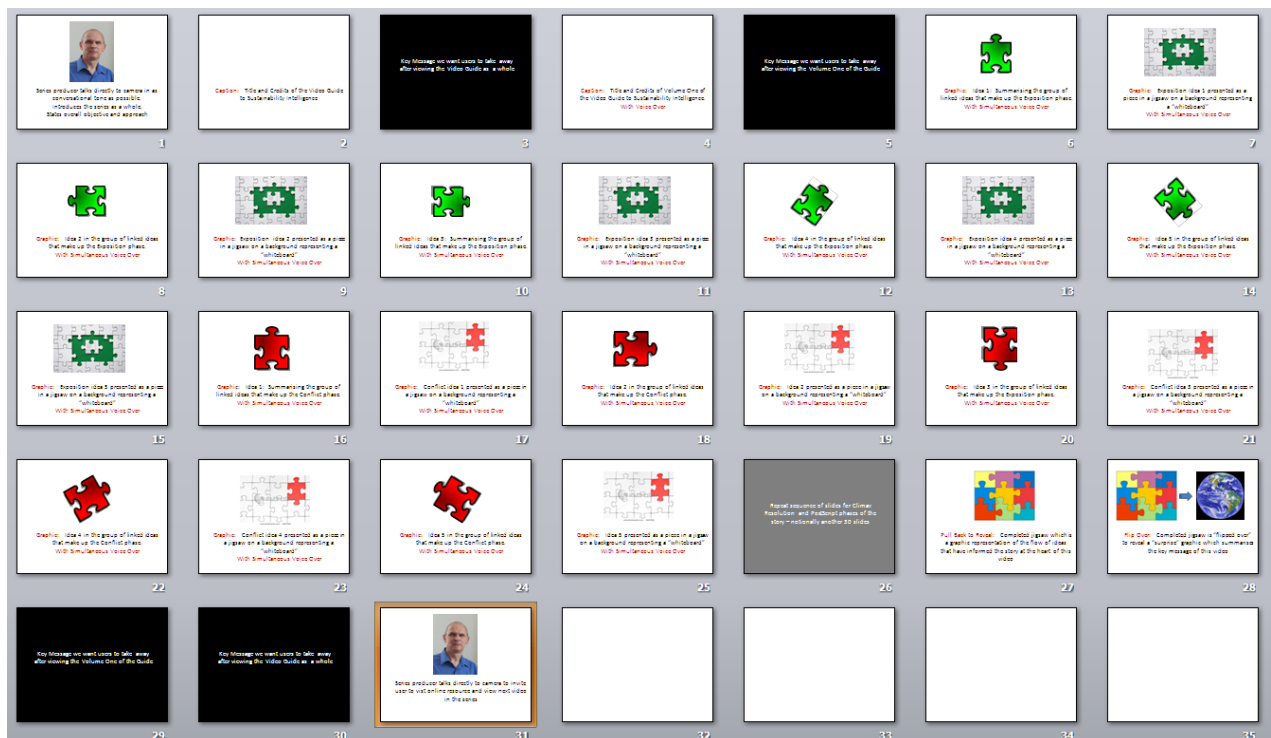
APPENDIX

The key guidance elicited from a range of important sources and embodied in the development of the Guide is summarised below:

Richard Mayer. Multimedia Learning, 2009

An alternative to purely verbal presentations is to use multimedia presentations in which people learn from both words and pictures; more specifically from **coordinated** verbal and pictorial messages (pix).

Research clearly shows that multimedia works – students perform better - when they learn from words and pictures than when they learn from words alone (p274).

Mayer argues that multimedia learning works most effectively when these next **ten principles** are followed (p274):

(a) **Coherence**: when extraneous words, sounds and pictures are minimised. (Extraneous colours, sounds and animation that do not convey or emphasise key information should be ruthlessly eliminated)

(b) **Signalling**: when the essential material is highlighted

(c) **Redundancy**: when words are presented as speech rather than as speech and text in multimedia presentations

(d) **Spatial contiguity**: when corresponding words and pictures are presented near rather than far from each other on the page or screen

(e) **Temporal contiguity**: when corresponding words and pictures are presented simultaneously rather than successively in time.

(f) **Segmenting** – when a fast-paced, complex multimedia lesson is presented in user-paced segments rather than as a continuous presentation

(g) **Pre-training** – when the learner knows the names and characteristics of the key concepts

(h) **Modality** – when words are presented as speech rather than as printed text in multimedia presentations

(i) **Personalisation** – when the words are presented in conversational style rather than in formal style

(j) **Voice** – when the words are spoken by a friendly human voice rather than by a machine voice.

Mayer states that each of these design principles is consistent with the **cognitive theory of multimedia learning** (p275).

Mayer concludes on the basis of his research that the most effective (computer-based) multimedia presentation is therefore a concise, narrated animation in which the presentation is channelled , i.e. words are directed towards the auditory channel and pictures directed towards the visual channel (p278).

Andrew Abela. Creating Communication that Drives Action 2008

Abela's main contention is that the five essential elements of an effective presentation designed to evoke **action for change** are (location 405):

1. **Logic**: to make sure there is a solid logic in the presentation and that recommendations/call to action are robust

2. **Rhetoric**: to tell an interesting story in a compelling way

3. **Graphics**: to ensure you are using the most effective visual elements and overall layout

4. **Politics**: to apply the right influence skills to get your audience/users to take recommended action

5. **Metrics**: to be clear on what the specific objective is for the presentation and how success will be measured.

There are two steps in each of the five elements, for a total of ten steps: (location 420)

1. **Audience**: identify the communication preferences of the different personality types in your audience

2. **Objectives**: set specific objectives for what you want your audience to think and do differently after the presentation

3. **Problem/Solution**: identify a problem your audience has that the presentation will contribute to solving

4. **Evidence**: list all the information that you think may need to be included in the presentation. Use both quantitative and qualitative evidence

5. **Anecdotes**: identify brief anecdotes that highlight the most important points

6. **Sequencing**: sequence the information so that is tells a compelling story

7. **Graphics**: identify the most effective graphical elements to use in your presentation

8. **Layout**: create "frames" that communicate the information concisely and most effectively and focus on a single key message in each case. Layout should support this message. If it does not – leave it out

9. **Stakeholders**: ask if you have addressed the concerns of each stakeholder? Do you have a plan for overcoming "roadblocks" to action in any case?

10. **Measurement**: decide how you will measure the success of your presentation

Abela proposes an approach in which both the "big picture" and details are communicated to the user simultaneously (location 712). He is an advocate of the "From-To/Think-Do" matrix to define precisely the changes being sought in user's attitudes and behaviour and their thoughts and actions (location 744)

He identifies the following five parts of an effective presentation (location 1213):

- The idea (proposal or proposition)
- Background
- How it works
- Key benefits
- Next steps

He argues that presentations should appeal to **emotions** as well as **intellect** and that presenters/producers need to have a powerful understanding of the importance of

storytelling. He proposes a **sequencing** (location 1663) which embodies a situation, a set of complications, a resolution and an example.

He advocates the use of storyboarding, of avoiding what he calls forking and the application of the "squint test" (location 2389) to test the innate communicative ability of any frame. To apply the squint test, squint at the frame so that all text is blurred and illegible. Do you understand anything about the slide, without having to read the text?

Gene Zelazny, Say it with Presentations, 2006

Zelazny begins with a focus upon setting clear objectives of the presentation and being able to express in one clear sentence what you want to achieve from the Guide.   He urges that the objective be realistic and that it leads to clear action. He then asks what does the audience need to see and hear in order to ensure that the objective be met?

He cites and commends the work of Barbara Minto – the author of the **Pyramid Principle** in crafting an effective storyline.   The Minto Pyramid Principle concentrates on the thinking process that should precede writing. It explains how to think through the unique Situation-Complication-Question structure (SCQ Framework™) to identify your reader's question – i.e., the purpose of the document – and then how to work down the pyramid, applying the pyramid rules to determine precisely the points necessary to answer that question. The result should be a clear, concise message – grasped quickly by the reader/viewer.

The technique is intended to apply to every type of "document" in which the purpose is to offer your thinking to a reader – email, 1-page memo, multi-page report, or formal slide presentation or presumably , video. It is supposed to work equally for internal or external audiences, and regardless of medium or language. For this reason the Minto Pyramid Principle has become the de facto standard for all major consulting firms and professional organisations worldwide.

Minto argues that

- Ideas at any level in the pyramid must be summaries of the ideas grouped below them
- Ideas in each grouping must always be of the same kind of idea
- Ideas in each grouping must always be logically ordered.

In any introduction you should follow the classic narrative pattern of story-telling - taking the audience by the hand and start with the situation description, then you introduce the complication which gives rise to a number of questions and then you lead the audience through a line of thinking towards an answer.

- **Situation** - telling the listener in story form what he already knows or ought to know
- **Complication** – describes the reason for your engagement, a change to a before stable situation.
- **Question** – defines the scope and goal of your engagement.
- **Answer** – is the goal of your engagement, e.g. your finding, conclusion or recommendation. The answer is your first key line point.

In the main part you start with the answer at the top of the pyramid and answer all logical questions in the lines below. The technique forces you to provide only the information relevant to the question.

When you are at the bottom of the pyramid you best pause and make summary before going on. Then you get back to the original question and you move horizontally from the first key line which you just summarised to the next key line.

Some useful guidance

- Sort out the introductory information first so that you leave yourself free to concentrate solely on ideas at the lower levels.
- Always put historical chronology in the introduction. You cannot tell the listener what happened in the main part.
- Limit the introduction to what the listener will agree is true.
- Key lines must be expressed as ideas or statement and not as single words.
- Even if not always all elements of Situation-Complication-Solution need to be included in the introduction, the author should be aware of them.
- Don't give findings that do not lead to conclusions.
- Don't state conclusions that are not based on findings

Zelazny proposes that an effective ending will cover the following points:

1. Summarise the main points
2. Spell out any recommendations
3. Present an action programme
4. Seek agreement and commitment
5. Close off with next steps

Chip and Dan Heath. Making Your Presentation Stick, 2008

These authors argue that **stories and examples** are the best building blocks of a presentation.   A presentation is a sequence of concrete examples and stories that fit together to form a compelling argument. They propose xix principles of "stickiness": that a presentation/production should be **S**imple, **U**nexpected, **C**oncrete, **C**redible, **E**motional and about **S**tories.

Adobe. Script Writing Tips for Digital Video, 2010.

This publication makes the case that writing for video is different from writing for print. Essential guidance it offers is summarised as:

1. Write factually and accurately
2. Write in the active voice
3. Write in the present or present perfect tense.
4. Keep your writing simple
5. Be complete and clear
6. Develop your own style (within the rules)
7. Write to be heard
8. Avoid interruptives (e.g. split infinitives). Put modifiers next to what they modify
9. Use commas sparingly
10. Use numbers sparingly
11. Avoid ambiguous pronoun references.
12. Let the pictures tell as much of the story as they can

Olivia Mitchell, How to Make Effective PowerPoint Presentations, 2010

Mitchell argues that each presentation/production should ideally have just one clear and simple key message (proposition) and that all the rest of the presentation plays the role of serving and supporting this key message. If a piece of information serves and supports your key message it can stay in your presentation. If a piece of information doesn't serve or support the key message is should stay out. Your key message acts as a filter for what stays in your presentation and what stays out. Express the key message in spoken rather than written language.

Richard Felder and Linda Silverman, Learning Styles, 2002.

One of the most widely used models of learning styles is the Index of Learning Styles developed by Richard Felder and Linda Silverman in the late 1980s. According to this model (which Felder revised in 2002) there are four dimensions of learning styles. Think of these dimensions (see diagram below) as a continuum with one learning preference on the far left and the other on the far right:

Sensory   ---   **Intuitive**

> Sensory learners prefer concrete, practical, and procedural information. They look for the facts.   Intuitive learners prefer conceptual, innovative, and theoretical information. They look for the meaning.

Visual   ---   **Verbal**

> Visual learners prefer graphs, pictures, and diagrams. They look for visual representations of information. Verbal learners prefer to hear or read information. They look for explanations with words.

Active   ---   **Reflective**

> Active learners prefer to manipulate objects, do physical experiments, and learn by trying. They enjoy working in groups to figure out problems.   Reflective learners prefer to think things through, to evaluate options, and learn by analysis. They enjoy figuring out a problem on their own.

Sequential ---   **Global**

> Sequential learners prefer to have information presented linearly and in an orderly manner. They put together the details in order to understand the big picture emerges. Global learners prefer a holistic and systematic approach. They see the big picture first and then fill in the details.

Presentations should then ideally provide a **balanced learning experience**:

- **Sensory – Intuitive**: Provide both hard facts and general concepts.
- **Visual – Verbal**: Incorporate both visual and verbal cues.
- **Active – Reflective**: Allow both experiential learning and time for evaluation and analysis.
- **Sequential – Global**: Provide detail in a structured way, as well as the big picture.

An alternative approach is provided by the 4MAT tool which is a 12-step learning cycle that learners go through as they learn new skills. Effective instructors work with this cycle, seeking to engage the learner; provide information, knowledge and theory; deliver the skills being taught; and cement the knowledge learned.

This process is shown below:
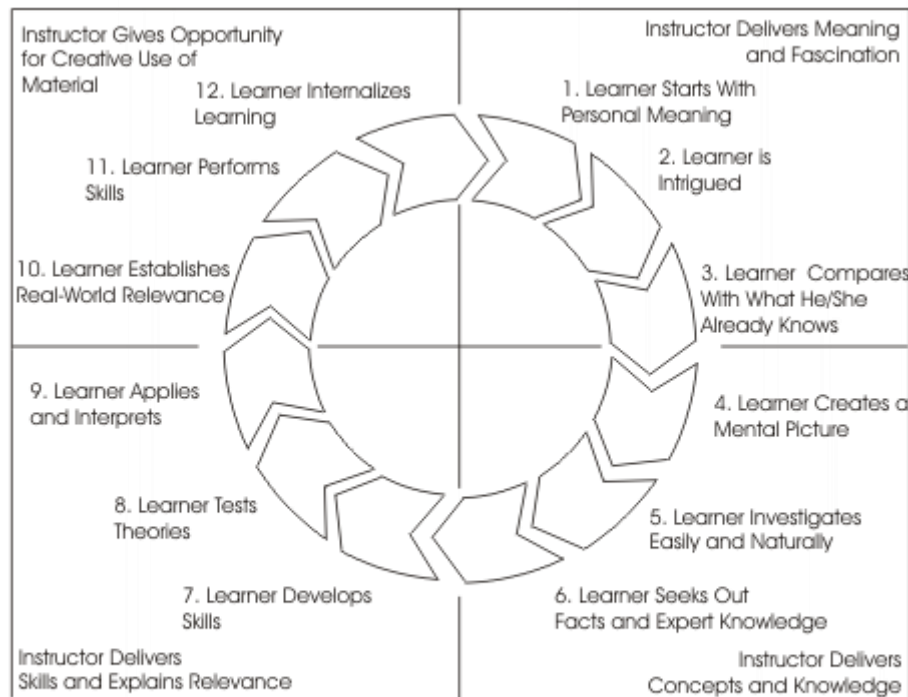
The 4Mat Process Reproduced with thanks to Bernice McCarthy of www.aboutlearning.com.

Nancy Duarte. Slideology: The Art and Science of Creating Great Presentations, 2008.

Duarte argues the case for "knowing your audience", and poses seven key questions:

1. What are they like?
2. Why are they watching the presentation?
3. What keeps them up at night?
4. How can you solve their problems?
5. What do you want them to do?
6. How might they resist?
7. How can you best reach then?

She makes the case that a good presentation should transcend linguistic, geographic and cultural boundaries which places great emphasis on images – which "translate" – rather than words, which do not.

Effective "frame" design depends upon mastery of three things:

1. Arrangement; i.e. contrast, hierarchy, unity, space, proximity, flow
2. Visual elements; i.e. background, colour, text, images
3. Movement; i.e. timing, pace, distance, direction, eye flow.

She ends with five theses of an effective production:

- Treat your audience as king
- Spread ideas and move people
- Help them see what you are saying
- Practice design not decoration
- Cultivate healthy relationships

Bruce Block. The Visual Story, Creating the Visual Structure of Film, TV and Digital Media, 2008

Block identifies the basic visual components of a picture as space, line and shape, tone, colour, movement and rhythm.

He proposes (and note that this is an common theme of many of the references) that every "story" no matter how brief or long, has an exposition, a conflict, a climax and a resolution. He argues that there should be a matching or complementary visual structure.

He propose that the visual structure should relate to what he calls the presentation's "point-of-view" by which he means the way the author wants the audience to feel emotionally about the subject or story.

He strongly advocates the value of storyboards to visualise frames before actual production.

Steven Mintz. The Fundamentals of College and University Teaching, 2010

Mintz provides a valuable summarisation of the science of learning of value in planning the Guide. Of specific value in the context of the Guide are the following concepts and definitions:

Active learning - learning that actively engages participants in learning.

Alignment – ensuring that activities and assessment meet the learning goals

Blooms' Taxonomy – a hierarchy of six levels of cognition; cognition, comprehension, application, analysis and evaluation

Constructivism – a theory developed by David Ausubel that people learn by constructing conceptual frameworks

Learning goals – what learners should know, understand and be able to do

Learning outcomes – specific, measurable learning goals

Metacognition - the process through which students monitor and assess their own understanding

Prior knowledge – the skills and understandings that learners bring to a specific learning situation

Problem-based learning – an approach to teaching driven by a question or problem, which uses a variety of methods of inquiry to research and address the question

Scaffolding – supporting a student's learning just beyond the level the learner could do alone

In recent years models of education that emphasised the transmission of knowledge and skills has given way to a new paradigm which shifts the focus from the instructor towards the learner. This is a shift from transactional to transformative teaching.

Transformational teaching adopts a learner centred approach. It makes the learner aware of the instructor's larger goals and expectations. It prepares learners and cultivates reflective learning by giving students opportunities to reflect upon the learning process.

Several key principles underlie the transformational learning paradigm:

1. It is not enough for students to master certain facts and procedures; learning is enhanced if students develop a deep conceptual understanding of a topic

2. Instructors must build upon student's preconceptions and prior knowledge

3. Instructors must teach key concepts and skills in multiple ways

4. Students need to develop a capacity to assess and reflect upon their own learning

5. Students will acquire deeper knowledge when they engage in "authentic practice" a process of enquiry using attested and demanding methods of research, analysis and reporting.

Mintz discusses different theories of learning including social learning theory which stresses the importance of observation, imitation and modelling and cognitivism which shifts attention to the mental maps or schema that individuals acquire or create and which can be revised as learners acquire new information.

Some commonplace ideas first advanced by the cognitivists are that:

- Information that is relevant and meaningful is easier to retain than information that isn't

- Practice or rehearsal makes it easier to retain an idea

- Prior knowledge or preconceptions can advance or hinder future learning

- Memory is improved when a learner categorises ideas or concepts (e.g. by using mnemonics)

- Memory is context-dependent – i.e. it is easier to remember an idea in a particular context than outside of that context

A more recent development is constructivism which argues that learning is an active process in which individuals construct their own frameworks of conceptual understanding.

Mintz stresses the importance to learning of factors beyond the cognitive domain – such as the affective domain (importance of motivation and emotions), learning style preferences and the learning environment.

He identifies a range of factors that – recent research suggests – either enhance or inhibit student learning, influencing student's motivation, memory, attention and higher order thinking skills, including the ability to synthesise and evaluate information, apply concepts and skills on multiple contexts and to create generalisations and predictions.

Cognitive flexibility

A student's cognitive flexibility increases when the student is aware of multiple viewpoints, perspectives and points of view about a topic

Deliver information in multiple ways

Information is better remembered when it is delivered in multiple ways (verbally, visually, etc) that when delivered in a single medium

Grounded cognition

Whenever concepts are introduced it is essential to ground them in real-world experiences

Higher order questions

Deeper understanding is elicited by questions such as why, how, what-if and what-if-not as opposed to shallow questions that require the learner to simply fill in missing words

Mental modelling

Explanations that consist of causal analysis of events, logical justification of claims and functional rationales for actions provide coherence to the material and justify why information is relevant and important

Metacognition

Metacognition refers to one's self-awareness of one's own thought processes

Narrative

Stories and other forms of narrative are easier to read, comprehend and remember than other types of learning

Mintz reminds us that there is an affective as well as a cognitive dimension to learning - motivation, attention and persistence are strongly influenced by emotional factors. A key issue is the influence of learning styles or preferences. Rather than placing students in rigid categories it appears that most students learn in multiple ways (reference the work of Howard Gardner on multiple intelligences) and that it is best to present information in multiple ways.

Partnership for 21st Century Skills, The Intellectual and Policy Foundations of the 21st Century Skills Framework, 2009

What learning is needed for the 21st century?

 Three themes – education and society, education and learning science, and education and learning tools – are all converging to form a new educational framework – one built around the acquisition of 21st century knowledge and skills.

 While today's schools show the influence of industrial and information age models, the 21st century modern school must appropriately employ both individualized and large scale approaches to assessment. It must bring together rigorous content and real world relevance. It must focus on cognitive skills as well as those in affective and aesthetic domains. It must be attentive to the needs of the individual child and to society as a whole. In order to prepare students for 21st century life, we can build on educational goals that have long been a part of our global heritage.

At the same time, we can reinvigorate our schools in light of new opportunities in our world, and new understandings of how people learn. By combining the wisdom of the past with the insights and technologies of today, the 21st Century Skills Framework provides schools with a pathway to ensure the promise of tomorrow.

"To be playful and serious at the same time is possible, and it defines the ideal mental condition."   John Dewey, How We Think

We all know that learning doesn"t stop when school does, but now more than ever, learning must be a lifelong pursuit. The rapidity of change, the relentless advance of technology, the diminishing half-life of knowledge, the far-reaching effects of globalization – all these factors contribute to a growing conviction that the best thing we can teach our children is how to teach themselves. The Learning and Innovation Skills section of the Framework is focused on the higher order cognitive competencies students need to be effective and self-reliant lifelong learners. By promoting the capacity to learn and grow, learning and innovation skills facilitate the mastery of other 21st century skills. Such higher order skills include

- Critical Thinking and Problem Solving

- Creativity and Innovation

- Communication and Collaboration

and must provide the foundation of any strategy which seeks to move society along the path to a low carbon future.

Robert Sternberg, of Tufts University, has described "successful intelligence" as having three main components: practical, analytical, and creative (plus a fourth "layer" of wisdom). In his view, successful individuals are those who have "creative skills, to produce a vision for how they intend to make the world a better place for everyone; analytical intellectual skills, to assess their vision and those of others; practical intellectual skills, to carry out their vision and persuade people of its value; and wisdom, to ensure that their vision is not a selfish one."

The power of modern media and the ubiquity of communication technologies in all spheres of life suggest a renewed emphasis on the teaching of communication and collaboration skills. Further evidence of the importance of communication and collaboration in today's workplace can be found in the work of economists Frank and Richard Murnane.

Because complex communication involves explanation, negotiation, and other forms of intense human interaction, jobs which require these skills are not as likely to be automated.

Communication skills are especially critical in the expanding service economy – estimated to be 81% of jobs by 2014 – where relationships with customers and fellow employees are of vital importance. And as technology gives rise to global work teams that span time zones, nations, and cultures, it is more imperative than ever that tomorrow's graduates be clear and effective communicators. Leading experts

David and Roger Johnson have shown that students who work together co-operatively show dramatic increases in academic achievement, self-esteem, and positive social skills.

As represented in the 21st Century Skills Framework, communication competencies such as clearly articulating ideas through speaking and writing are related to collaboration skills, such as working effectively with diverse teams, making necessary compromises to accomplish a common goal, and assuming shared responsibility for collaborative work. In doing so, the Framework emphasizes the social dimension of communication. We cannot be said to have communicated effectively unless our message is heard by another who responds.

For Daniel Pink, collaborative, empathic, and social skills – what he calls "high touch" aptitudes – along with the high concept ones listed earlier, represent the "whole mind" that the future will prize.

Many of the skills in the Life and Career category of the framework are encompassed in the concept of Emotional Intelligence, popularized by author and speaker Daniel Goleman. Research on schools that provide emotional literacy programs shows its positive effects on students, such as reductions in violent and disruptive behaviour, better self-control, enhanced productivity, and more harmonious interactions among students and teachers. What is especially important here is the finding that emotional intelligence contributes to academic success.

Institute for the Future, Knowledge Tools of the Future, 2008

The high-margin, cutting edge of the knowledge economy is less about knowledge management than about knowledge creation - creativity and innovation. Creativity is fast becoming the competitive advantage for leading-edge companies. it's not just the lone human brain working on its own that creates the best innovation these days, but the human brain in collaboration with other human brains, sometimes with many thousands or millions of others, in social networks enabled by the Internet. In other words, there's a social aspect to knowledge, creativity, and innovation that we are just learning to tap. It is this social aspect of knowledge that the new knowledge tools are designed to leverage.

World Wildlife Fund, Learning for Sustainability in Schools: Effective Pedagogies, 2010

Achieving sustainability – where we live within the environmental limits of our planet in a just and equitable society – will require new knowledge, skills, values and attitudes. Learning for sustainability is the process of developing the knowledge, skills, values and attitudes needed to move from where we are now to a state of sustainability.

It is important to note that learning which simply develops knowledge, understanding and skills is not enough. The values that learners attach to this knowledge and their attitudes to applying these skills are of huge importance. Learning about sustainability in ways that do not address values and attitudes is not considered either learning for sustainability or effective practice.

Arjen Wals, Message in a Bottle: Learning our Way out of Unsustainability, 2010

In addition to much needed suitable forms of governance, legislation and regulation, we need to turn to alternative forms of education and learning that can help develop such the capacities and qualities individual, groups and communities need to meet the challenge of sustainability. There is a whole range of forms of learning emerging that all have promise in doing so: transdisciplinary learning, transformative learning, anticipatory learning, collaborative learning and, indeed, social learning are just a few of those. These forms of learning show a high family resemblance in that they:

- Consider learning as more than merely knowledge-based,

- Maintain that the quality of interaction with others and of the environment in which learning takes place as crucial,

- Focus on existentially relevant or 'real' issues essential for engaging learners,

- View learning as inevitably transdisciplinary and even 'transperspectival' in that it cannot be captured by a single discipline or by any single perspective,

- Regard indeterminacy a central feature of the learning process in that it is not and cannot be known exactly what will be learnt ahead of time and that learning goals are likely to shift as learning progresses,

- Consider such learning as cross-boundary in nature in that it cannot be confined to the dominant structures and spaces that have shaped education for centuries.

The above characteristics make clear that the search for sustainability cannot be limited to classrooms, the corporate boardroom, a local environmental education centre, a regional government authority, etc. Instead, learning in the context of sustainability requires 'hybridity' and synergy between multiple actors in society and the blurring of formal, non-formal and informal education. Opportunities for this type of learning expand with an increased permeability between units, disciplines, generations, cultures, institutions, sectors and so on.

Currently we are witnessing an avalanche of interactive methods and new forms of knowledge co-creation involving a wide range of societal actors with different interests, perspectives and values but with similar challenges. As sustainability and sustainable development are increasingly seen as emerging properties of collaborative learning, the creation of a more sustainable world above all requires learning, and not just any learning, but learning that leads to a new kind of thinking, alternative values and co-created, creative solutions, co-owned by more reflexive citizens, living in a more reflexive and resilient society. Transformative social learning towards sustainability requires the integrative switching back and forth between a variety of mind-sets or perspectives.

At the same time (learning) experiences, which are shared with others, are likely to gain importance. This is not to say that personal experiences, which are kept to oneself, are insignificant. But shared viewpoints or ways of thinking and feeling give the learner a sense of competence and belonging to the community of learners.

Another component of sustainability competence is the ability to cope with uncertainty. This is a major challenge for higher education as traditionally many scientists consider minimizing uncertainty and maximizing predictability one of their key quests.

The emergent uncertainty paradigm however holds that it is an illusion to think that we will ever be able to achieve zero uncertainty or even get close to that. Instead this uncertainty paradigm suggests that more science, information, knowledge might not necessarily lead to less uncertainty, it may actually lead to more as new complexities and questions arise. Instead of putting our academic minds towards minimizing uncertainty and maximizing predictability it might be more fruitful to put our energy towards living with uncertainty: seeing it as a given, something that cannot be conquered.

The question of the place of sustainability in the curriculum of higher education and of education in general is not one of integration but rather one of innovation and systemic change within our institutions that will allow for more transformative learning to take place. Such learning emphasises 'learning for being', alongside learning for knowing and learning for doing. It requires permeability between disciplines, university and the wider community, and between cultures, along with the competence to integrate, connect, confront and reconcile multiple ways of looking at the world. At present most of our universities are still leading the way in advancing the kind of thinking, teaching and research that only accelerates un-sustainability. In order to break this pattern we need to question and reform deeply entrenched routines, structures and practices by taking advantage of the privileged position universities have in our society and utilizing some of the brightest minds on the planet in finding ways to preserve, rather than to destroy, that very same planet.

New Basics Project, New Basics: The Why, What, How and When of Rich Tasks, 2001

Dewey's theory of learning is that optimal learning and human development and growth occur when people are confronted with substantive, real problems to solve. His argument is that curriculum and instruction based on integrated, community-based tasks and activities engage learners in forms of pragmatic social action that have real value in the world.

The focus on the teacher as expert is central to Vygotsky's learning theory. He proposes that cognitive development does not proceed through innate, age-based developmental thresholds, but is the product of social and cultural interaction around the development and use of tools of a cognitive, linguistic and physical nature (and, more recently, of an electronic nature). Pedagogy occurs in a zone of proximal development where authoritative tool users – teachers acting as mentors – initiate and lead students as novices into the use of technologies. This structured introduction into using tools is called 'scaffolding'.

It has been shown that structured pedagogy can be used to enhance considerably the achievement of the most at-risk learners. This pedagogy could involve teacher-led, structured introduction to uses of technologies for print and oral language. Work could be structured around projects that demand students engage in the solution of a particular community-based, school-based or regional problem of significance and relevance to their worlds. It could involve training students to become social scientists, with a high premium placed on the collection, analysis and presentation of data.

Freire's work is premised on the assumption that the most authentic and powerful pedagogy is one that focuses on the identification, analysis and resolution of immediate problems in learners' worlds. Hence, his approach is referred to as problem-posing and problem-solving pedagogy. For Freire, students' learning to read and write is about learning to analyse the world around them, while the principal task of teachers is to facilitate an analysis of that world and the analysis of specific community problems. Freire argues that any pedagogy

must be of demonstrable relevance to the immediate worlds of the students and it must enable them to analyse, theorise and intellectually engage with those worlds.

A Rich Task:

- Is an integrated intellectual and linguistic, social and cultural practice
- Represents an educational outcome of demonstrable and substantive intellectual substance and educational value
- Is transdisciplinary
- Draws on a range of operational fields of knowledge
- Engages knowledges and skills from at least two of the New Basics clusters
- Is problem-based
- Connects to the world beyond the classroom
- Has face value for educators, parents and community stakeholders
- Has sufficient intellectual, cognitive and developmental depth and breadth to guide curriculum planning across a significant span of schooling
- Enables flexibility for schools to address the local context
- Has reasonable workload expectations for teachers.

Keir Bloomer, Jim Goodall and Roger Talbot, Preparing for a Low Carbon Future: A Feasibility Study for Learning and Teaching Scotland, 2011

The ultimate objective of active learning is to develop deep learning, understanding and the capacity to apply learning in new situations. The main role of teachers is facilitative rather than directive.

Jason MacVaugh, Problem Based Learning, 2009

Active Learning is a generic term for teaching pedagogies that require the educator to privilege the learner's participation over his or her own declarative knowledge of the subject. I believe that Problem Based Learning is a very suitable 'active' pedagogy for sustainability education because it focuses the learner on problematisation, problem investigation, problem solving and critical reflection.

Problematisation asks the learner to consider what they already know about a specific issue, what is problematic about this knowledge, and, most importantly, what is not known. This process is suited to sustainability education as it takes into account the learners existing ability, asks them to problematise the issue for themselves, and in doing so begins a shift in attitude with a bias toward action.

Problem investigation requires the learner to consider the elements of the problem as currently understood and seek out knowledge leading to an understanding of the dimension, content, location and known solutions to the problem.

Given what is already known about sustainability issues, it is important that learners cross disciplinary boundaries in their search for knowledge, to locate the problems within frameworks of current understanding, and to seek trans-disciplinary solutions yet to discovered.

Problem solving provides the learner with an opportunity to act, and to show that their learning is more than rumination on unbounded ideas. This is probably the most important element of education for sustainability because success can only come through a significant change in behaviour, not just understanding.

Finally, critical reflection asks the learner to evaluate the processes used to solve the problem and to reflect on the significance of the suggested action in light of current understanding. At the same time the learner may also come to understand that their solution may not resolve the problem, thus prompting a better conceptualisation of sustainability.

Active Consultants, Deep and Surface Learning, 2011

Deep learning involves the critical analysis of new ideas, linking them to already known concepts and principles and leads to understanding and long-term retention of concepts so that they can be used for problem solving in unfamiliar contexts. Deep learning promotes understanding and application for life.

RTAL

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