

Seminar 3

Critical Thinking and Creative Thinking

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In the previous seminars we tried to defined Critical Thinking. We tried to understand what it means to be 'critical', and why it is so important. We also reflected on how to become 'critical' and assessed a number of different strategies for teaching critical thinking to students. We also talked about whether critical thinking is a universal or culture specific skill.

Today, we will do something different; we will try to explore the relations between critical thinking and creative thinking

Main Source:

http://staff.mq.edu.au/teaching/curriculum_assessment/critical_creative/differences/

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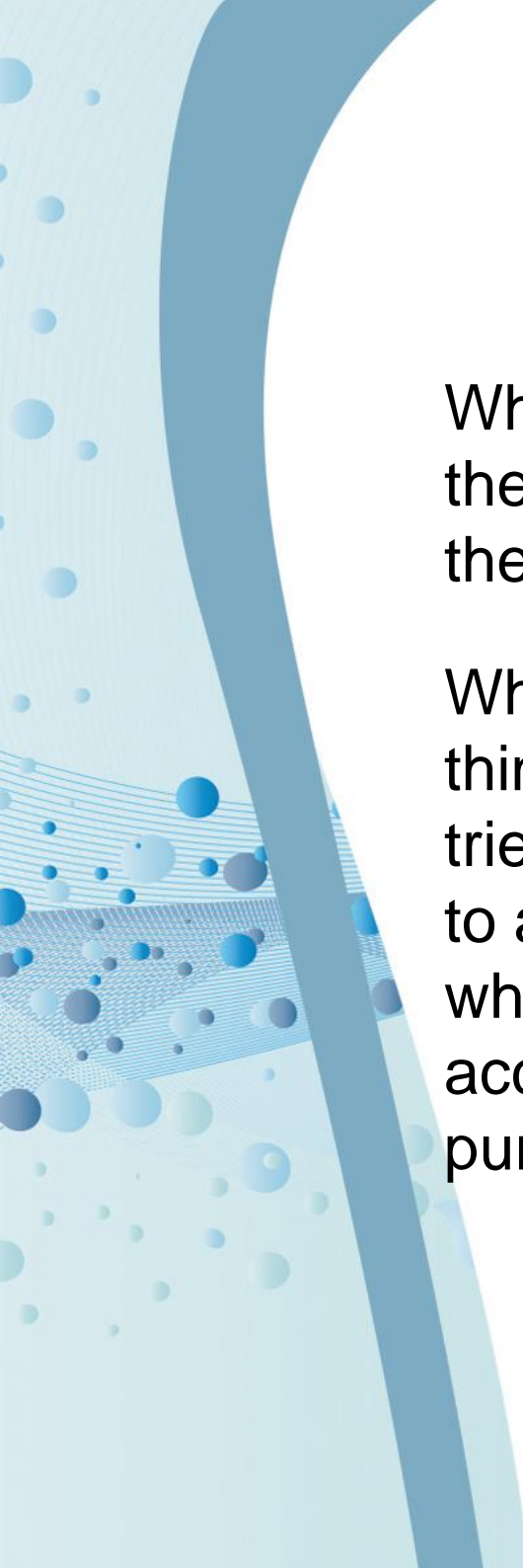
1. Critical and Creative Thinking...

The relation between critical and creative thinking is difficult to spell out mostly because of the lack of a universally agreed definition for both critical and creative thinking

Creative thinking is conceptualised differently across disciplines, i.e. it is often referred to as 'innovation' in education, 'entrepreneurship' in business, or 'problem solving' in mathematics, law and engineering

A further complication lie in the diverse way in which the relationship between critical and creative thinking can be conceptualised.

For example some educators view them as divergent skills (Baker & Rudd, 2001), some as part of the same skill (e.g. Paul and Elder, 2005, who argue that creative thinking is one dimension of critical thinking), others as complementary skills that both encourage independent and student-centred learning (Fisher, 2001).



While there is no commonly shared understanding of these terms, different authors have tried to identify the dimensions of each of these constructs

Whereas creative thinking is divergent, critical thinking is convergent; whereas creative thinking tries to create something new, critical thinking seeks to assess worth or validity in something that exists; whereas creative thinking is carried on by violating accepted principles, critical thinking is typically pursued by applying accepted principles.

Table 1. Critical vs. creative thinking

CRITICAL THINKING	CREATIVE THINKING
Analytic	Generative
Convergent	Divergent
Vertical	Lateral
Probability	Possibility
Judgement	Suspended judgement
Hypothesis testing	Hypothesis forming
Objective	Subjective
Answer	An answer
Closed	Open-ended
Linear	Associative
Reasoning	Speculating
Logic	Intuition
Yes but	Yes and

Adapted from Fisher, R. (2002). Creative minds: Building communities of learning in the creative age. Paper presented at the Teaching Qualities Initiative Conference, Hong Kong.

Critical Thinking ...

As we have seen in the previous seminar critical thinking can be defined as self-regulatory judgment; a human cognitive process, involving the use of a core set of cognitive skills - interpretation, analysis, evaluation, explanation, and self-regulation.

The ideal critical thinker is considered to be:



'Habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgements, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit' (Facione, 1990, p.2).

Critical thinking

Critical thinking is applying well-known criteria to a problem, turning the handle and producing an answer

Critical thinking is when you set out to find faults

What do you think?



Critical thinking is when you balance everything in question to reach a judgement

Critical thinking is when you examine the 'item' in question to find its good and bad points

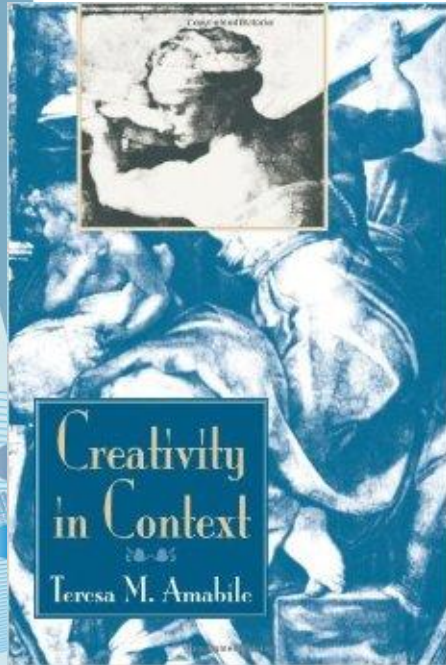
Creative Thinking...



Creative thinking by contrast, is the ability to generate new, varied and unique ideas (Forrester, 2008). It involves the skills of flexibility, originality, fluency, elaboration, brainstorming, modification, imagery, associative thinking, metaphorical thinking, with the aim being to stimulate curiosity and promote divergence

The terms creativity and creative thinking are often used interchangeably in the literature. They are surely interconnected in the sense that creative thinking is a process that contributes to fostering creativity; however creative thinking can be viewed as part of a broader interaction of elements





Amabile (1996) views creative thinking, or creativity-relevant skills, as part of the process that contributes to creativity (alongside domain-relevant skills and task-motivation).

Thus creative thinking is used to refer to the more cognitive and definable aspect of the creative process (i.e. skills).

Some definitions of creativity:

Creativity requires a balance among synthetic, analytic, and practical abilities (Sternberg & Williams, 1996, p.3).

Creativity...involves departing from the facts, finding new ways, making unusual associations, or seeing unexpected solutions (Cropley, 2001, p. 23).

Creativity is the process of sensing difficulties, problems, gaps in information, missing elements; making guesses and formulating hypotheses about these deficiencies; evaluating and testing these guesses and hypotheses; possibly revising and retesting them; and, last, communicating the results (Torrance, 1993, p.233).

Creativity and Innovation...

While creativity is typically used to refer to the act of producing new ideas, approaches or actions, innovation is thought to be the process of generating and applying such creative ideas within a specific context.

Creativity can thus be conceptualised as the "starting point for innovation" and innovation the successful implementation of creative ideas (Amabile, Conti, Coon, Lazenby, & Herron, 1996, p.1155).

Creative thinking

Creative thinking happens when you come up with something no-one else has ever thought about

Creative thinking is finding a new application of existing knowledge and understanding

What do you think?



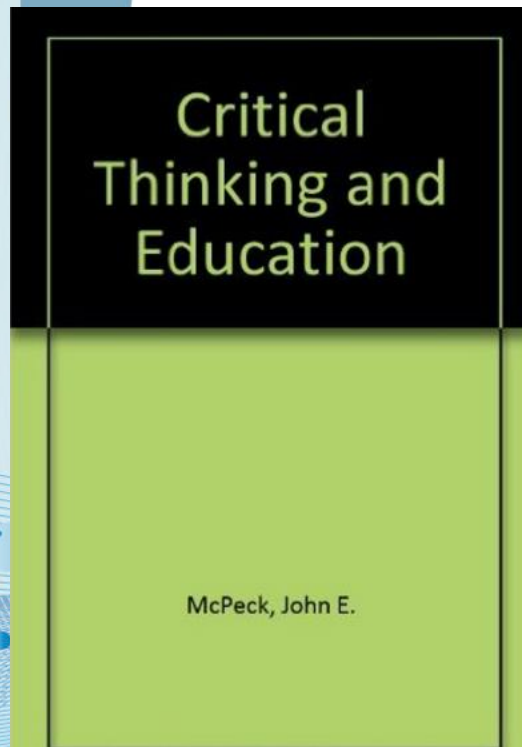
Creative thinking is about linking existing ideas together to form a new idea

Creative thinking is being inventive, expressive and showing imagination as well as routine skills

2. Pedagogical Perspectives of Critical and Creative Thinking

Pedagogical perspectives on critical thinking have changed over the last two decades,

While there is consensus that the main purpose of higher education is to teach students how to think critically (Garrison, 1991), there are a number of theoretical issues which remain unresolved. The most important one, as we have seen in the previous seminar, is probably whether critical thinking is a universal 'generic skill' or inseparable from the discipline in which it is being taught (Jones, 2009; Moore, 2004).



Ennis believes that critical skills may be applied to different situations, he maintains that they exist as a set of independent cognitive abilities which can be taught in relation to any disciplinary content.

McPeck instead argues that critical thinking is "the appropriate use of reflective scepticism within the problem area under consideration" (1981, cited in Moore, 2004). According to this view, the practice of critical thinking cannot be separated from the discipline to which it is applied.

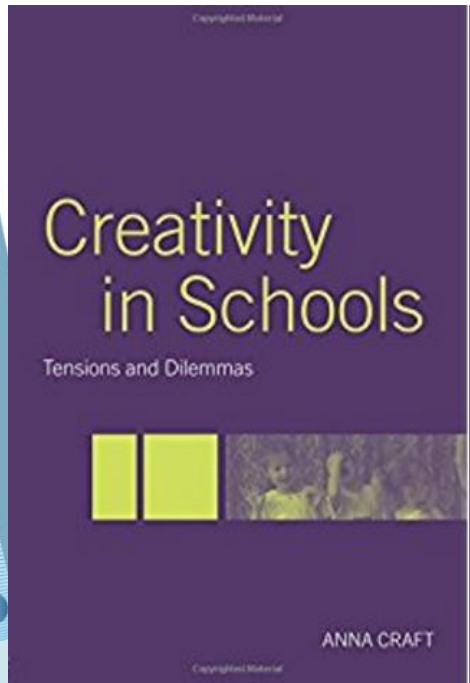
Critical thinking has also been conceptualised in a variety of other ways. For example, according to Moon (2008, p. 130), the purpose of critical thinking is to enable learners to:

- (i). Shift from an absolute conception of knowledge towards contextual knowing;*
- (ii). Shift from superficial or descriptive responses to critical issues, towards depth in response;*
- (iii). Understand the context in which critical thinking is required, and to respond at the appropriate depth;*
- (iv). Display flexibility in thinking;*
- (v). Display metacognition;*
- (vi). Use creativity in an appropriate manner;*
- (vii). Discuss issues of objectivity and subjectivity with respect to thinking processes*

Within the traditional view, creativity was viewed as individual genius, which could not be taught.

More recently, however, it is being conceptualised as a skill to be developed and recognised in all students, and important in the development of self-efficacy (for a review refer to Spendlove, 2008).

Creativity is thus located within the processes and products of collaborative and purposeful activity (McWilliam & Dawson, 2008).



As a consequence, the emerging focus on creativity in education is now on (Craft, 2003):

- 1. Ordinary creativity rather than genius*
- 2. Characterising rather than measuring it*
- 3. The social system that drives it rather than the individual*

Also, creativity is now economically valued and often said to be team based (Craft, 2003; McWilliam & Dawson, 2008; Spendlove, 2008; Swirski, et al., 2008).

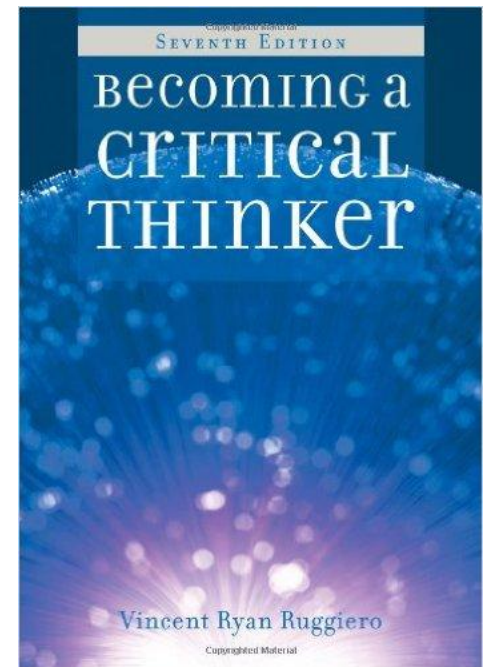
This means that the focus for educators should be on the attributes of an individual and their work relative to the environmental context (Sternberg, 2006).

In summary, creativity ought to be understood as an attitude, a way of thinking or a component of workplace skills no longer as a genetically-inherited ability or attribute

3. Cognitive Dimensions of Critical and Creative Thought...

The philosophy of critical thinking has increasingly focused on promoting an understanding of critical thinking as encompassing various cognitive and affective processes and abilities, attitudes, and dispositions.

This is partly a result of Ruggiero's (1988) holistic model, where there is a connection made between dispositions, skills and processes.



Several authors emphasise the cognitive ability of self-regulation as an essential part of critical thinking (Facione, Facione & Giancarlo, 1997)

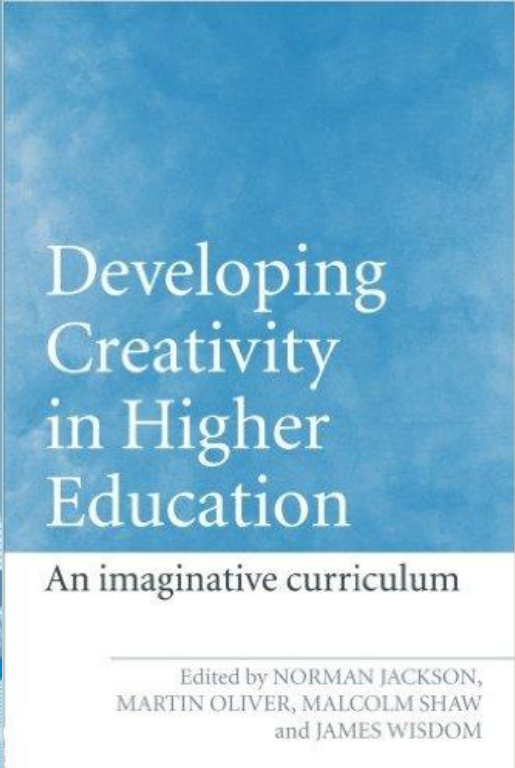
Few other authors, for instance, van der Wal (1999, p. 4), have argued that when developing critical thinking skills in university students, teachers need to identify between two different types of critical thinking:

Situational critical thinking needed for decision-making and used in practical situations.

Epistemological critical thinking used in disciplines where critical thinking is primarily applied to epistemological/theoretical positions and arguments.

Educators have also offered numerous dimensions of creativity (Cropley, 2001), which include:

(i). creating new developments and challenging established ideas. (ii). developing new approaches that are appropriate to a particular problem. (iii). achieving some purpose whether it is to solve a problem or to make a profit. (iv). identifying new solutions to problems ("thinking outside the box") and risking failure.




Developing Creativity in Higher Education

An imaginative curriculum

Edited by NORMAN JACKSON,
MARTIN OLIVER, MALCOLM SHAW
and JAMES WISDOM

Jackson and Shaw (2006) expanded on Cropley's view and identified the following meanings of creativity via surveys with academic staff in diverse disciplines: originality, imagination, story-telling and resourcefulness, willingness to explore, making sense of complexity, thinking outside of the disciplinary box, synthesising (making connections and seeing relationships), communicating and so on.



Sternberg's propulsion theory of creative contributions proposes that creativity can be of different kinds, depending on how it propels existing ideas forward. These are:

- 1. Types of creativity that accept current paradigms and attempt to extend them (replication, redefinition, forward incrementation)*
- 2. Types of creativity that reject current paradigms and attempt to replace them (redirection, reconstruction, reinitiation), and*
- 3. Types of creativity that synthesise current paradigms.*



According to Csikszentmihalyi (1990), creativity is the result of interactions between three sub systems: a domain (curriculum), a person and a field (discipline). It occurs when people integrate these different things into a new and unique form or paradigm

Some view the disposition to use critical thinking skills as vital to the meaning of critical thinking. For example, Halpern (1996) argues that an essential part of critical thinking is developing the attitude and dispositions of a critical thinker.

The majority of educators, however, agree that the skills and process of critical thinking are distinguishable from the disposition to use them (Facione, 1990). As Facione (2000) notes, being skilled does not guarantee that a student is disposed towards use critical thinking, and having a disposition towards critical thinking does not ensure that a student has well developed critical thinking skills.

According to Sternberg (Sternberg, 2006) creativity involves the confluence of six distinct and interrelated resources: intellectual skills, knowledge, thinking styles, personality, motivation and environment.


Having 'creative' skills however, is not sufficient to creativity: in order to be creative, a student must first make the decision to use the skill/s to think creatively, i.e. they must make a decision to generate new ideas, analyse and sell them to others.

If students are reluctant to make such decisions is because 'creative' ideas are often rejected in conventional educational environments. Hence, it is important that teachers foster an environment that is conducive to creative thinking.

5. How to articulate critical and creative thinking within different disciplines


Being a critical and creative thinker means different things across disciplinary contexts; the skills valued highly in one discipline may differ from the skills valued in another.

For example critical thinking in history is about examining evidence and content, discussing complexities and ambiguities; in physics it is about examining assumptions(Jones, 2009).



In terms of creative thinking skills, humanities' disciplines tend to value students' ability to discover and articulate new meanings, and their openness to new ideas and experiences.

By contrast, business related disciplines focus on skills such entrepreneurship, the process of making the most out of opportunities and acting upon them in the face of risk.



As Sternberg (1987, cited in Pithers, 2000) notes; there is no 'correct program' to teach critical and creative thinking skills - it depends on the program goals and content, the context or culture in which the learner's thinking is to be situated.

However, we can identify a set of attributes necessary for critical and creative thinking in various disciplines...

Critical attributes

1. Demonstrates an understanding of the different theoretical approaches to psychology (Psychology)
2. Demonstrates clarity and rigour in reasoning and in the critical assessment of arguments (Philosophy)
3. Reaches well-reasoned conclusions and solutions, testing them against relevant precedent including the use of case law and legislation (Law)
4. Assesses the consistency, inconsistency, logical implications and equivalence among statements (Accounting)
5. Identifies recurring patterns in field observations and synthesises the information to make inductions about processes (Geology)

Creative attributes

1. Finds new ways of extending, modifying or contesting existing arguments (*Humanities*)
2. Competently locates, synthesises, and applies accounting information and data for decision making (*Accounting*)
3. Demonstrates a willingness to take risks (*Business*)
4. Solves problems by thinking outside the square to solve complex issues (*Engineering*)
5. Responds flexibly to changing and uncertain situations (*Medicine*)

6. *Strategies for developing Creative Thinking*

Source 1: *'Developing Critical and Creative Thinking in Science'*.

Available at:

<http://webarchive.nationalarchives.gov.uk/20130401151715/https://www.education.gov.uk/publications/eOrderingDownload/Developing%20critical%20and%20creative%20thinking%20-%20in%20science.pdf>





Source 2 : *'Creative and Innovation Toolkit'* ,

Available at:

https://www.griffith.edu.au/__data/assets/pdf_file/0005/290669/Creativity-innovation.pdf


Is it possible to teach students “how” to be creative? By providing a learning climate in which creative thinking is encouraged and valued, academic staff can definitely foster creativity and innovation in their students.

“A talent, or gift for creativity can be inherited by some people, and learned or developed by others. It is not true to say that people just are creative, while others aren’t – rather that some people find it easier to recognise their creativity and run with it, while others are more hesitant. Recent research shows that the ability to think and act creatively can indeed be fostered in the classroom and transferred or applied in different learning contexts.”

Brainstorming: We Can Teach “Creativity”:
<http://lamer.colostate.edu/~aejmcpr/28berger.htm>

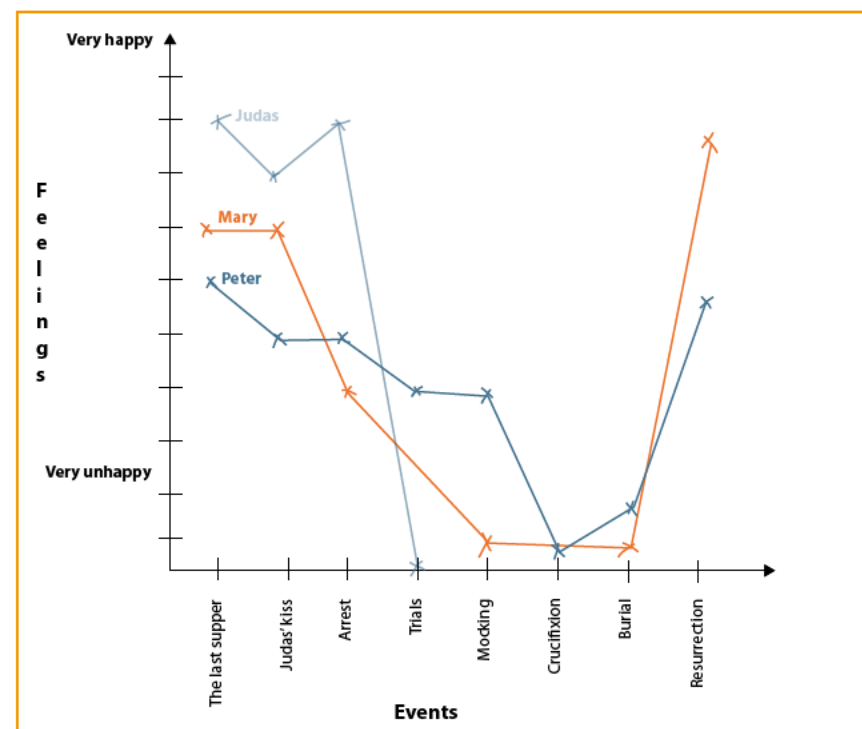
Creative thinking is fostered in classrooms that:

- focus on inquiry teaching;
- encourage questioning;
- deal with controversies thereby encouraging discussion, debate and discourse;
- bring students in to contact with real world problem solving;
- allow students to take risks, make connections and see relationships;
- allow for quiet reflection;
- make the most of unexpected events;
- allow students to 'take a lead';
- help students to develop criteria to make informed judgements;
- help students value different ways of working




But the role of teachers is also important as they need to identify strategies that can help fostering creative thinking.

Next I want to review some of these strategies



1. Living graphs



In 'Living graphs' a line graph is presented together with a set of related statements. Students have to position the statements on the graph and give reasons to justify their decisions. They are encouraged to suggest hypotheses and to give reasons for opinions or deductions based on what they think the graph represents.

It reinforces the importance of explanation and reasoning and encourages students to realise that a variety of answers may be possible, thus boosting creative thought.

2. Role play and debate...

Teachers can foster critical and creative thinking by involving students in role-play or simulations of historical events where people held conflicting views.

Example: the Scopes trial in 1925. This was an American legal case in which a substitute high school teacher, John Scopes, was accused of violating Tennessee's Butler Act, which had made it unlawful to teach human evolution in any state-funded school

Starter activity

- The teacher provides an explanation of the background to the Scopes trial in 1925.
- Students are given a brief written background on the trial. There are several websites with student-friendly information:

www.law.umkc.edu/faculty/projects/ftrials/scopes/evolut.htm

www.bradburyac.mistral.co.uk/tennesse.html

http://en.wikipedia.org/wiki/Scopes_Trial



Students read through the information and answer the following questions.

- Where and when did the Scopes trial take place?
- Who was John Scopes?
- What was the trial about?
- Who were the main opponents in the trial?

Main activity

- Ask students to write a brief paragraph about the reason for the trial, the key events of the trial and the outcome of the trial.
- Ask a few of the students to read out one of the paragraphs.

Plenary activity

- Remind students of the key arguments of the trial and ask the following questions and have them discuss opposing views that arise.
 - What was the verdict at the end of the trial?
 - What happened to William Jennings Bryan shortly after the trial finished?
 - What happened to the verdict a year later?
 - Do you agree with the verdict? Explain your answer.

3. Use a thinking grid

	typophilia	Various forms of dysfunction appear among populations exposed to typography for long periods of time. Listed here are a number of frequently observed afflictions.	
An excessive attachment to and fascination with the shape of letters, often to the exclusion of other interests and object choices. Typophiliacs usually die penniless and alone.			
	typophobia	The irrational dislike of letterforms, often marked by a preference for icons, dingbats, and—in fatal cases—bullets and daggers. The fears of the typophobe can often be quieted (but not cured) by steady doses of Helvetica and Times Roman.	
		typochondria	A persistent anxiety that one has selected the wrong typeface. This condition is often paired with okd (optical kerning disorder), the need to constantly adjust and readjust the spaces between letters.
Common typographic disorders			

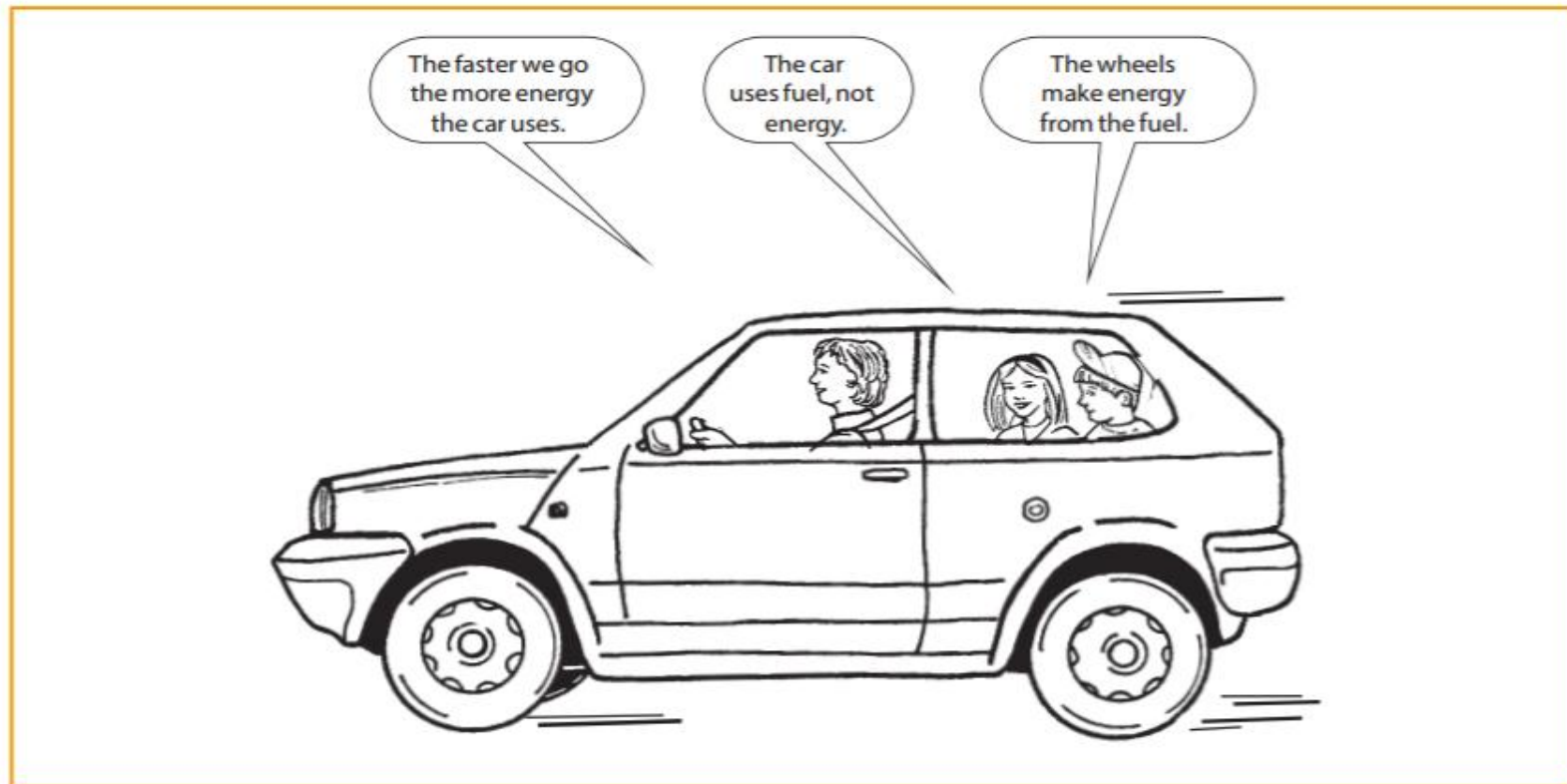
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You make students discuss the risks, benefits and consequences of a scientific development, for example, space exploration

4a. Concept Cartoons

Concept cartoons™

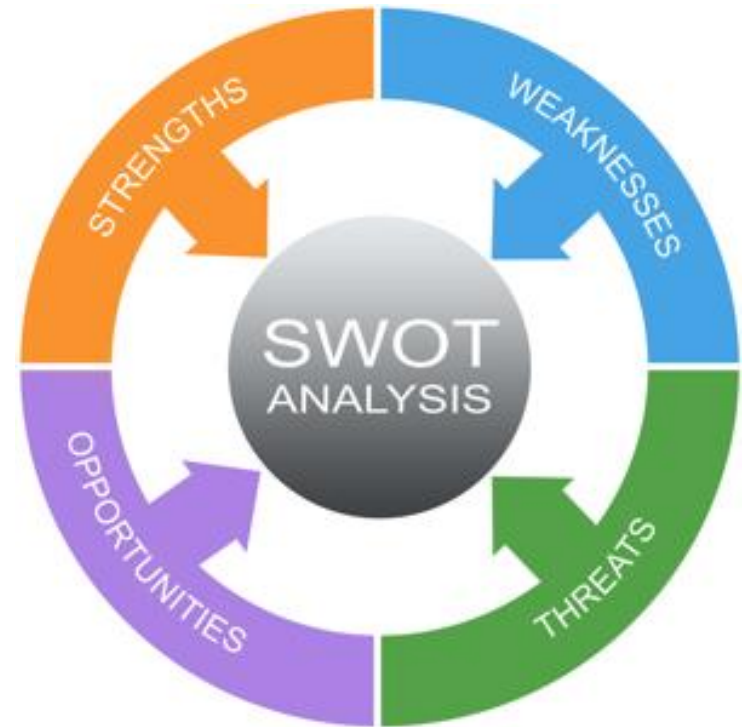
Concept cartoons™ are cartoon-style drawings that offer a range of viewpoints about the science in everyday situations. This new way of looking at a situation can make it problematic and provide a stimulus for discussion and developing ideas further.



They are available from the Association for Science Education or from the Internet (www.conceptcartoons.com) and can be used or adapted in a variety of ways. For example, asking pupils to devise their own cartoons can stimulate creative thinking; discussing alternative viewpoints can develop critical thinking.

4b. SWOT analysis

Students discuss the strengths, opportunities, weaknesses or threats of -for instance- a scientific development or issue: e.g. food irradiation



5. Fish bone Diagrams...




Originally developed by Professor Kaoru Ishikawa, is often referred to as an Ishikawa diagram. This technique is used to identify possible causes of a problem. The diagram encourages students to develop an in-depth and objective representation and to keep on track. It discourages partial or premature solutions, and shows the relative importance and inter-relationships between different parts of a problem.

The procedure is as follows:

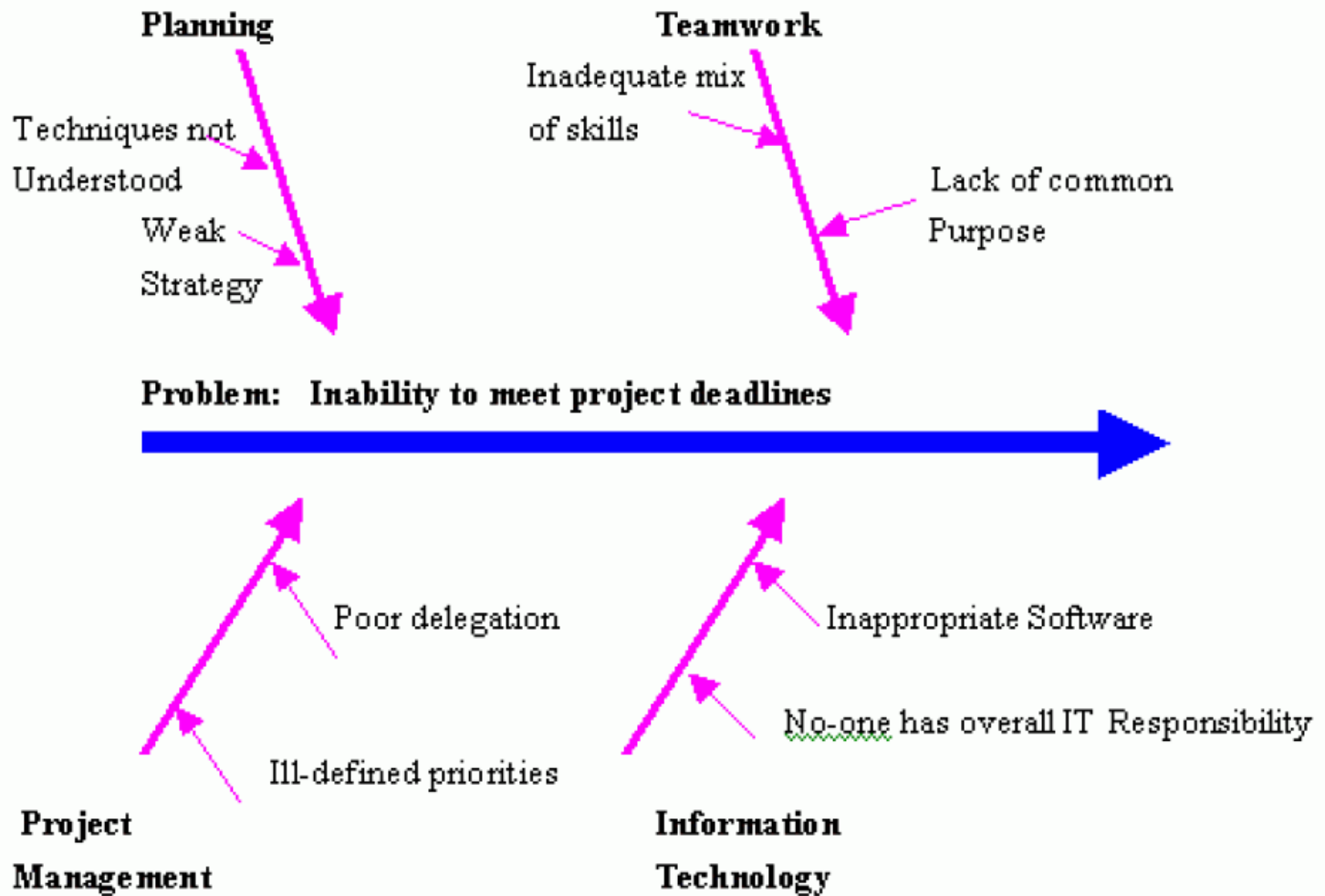
On a large sheet of paper, draw a long arrow horizontally across the middle of the page pointing to the right, and label the arrowhead with the title of the issue to be explained. This is the “backbone” of the “fish.”

Draw spurs coming off the “backbone” at about 45 degrees, one for every likely cause of the problem that the group can think of; and label each at its outer end. Add sub-spurs to represent subsidiary causes. Highlight any causes that appear more than once – they may be significant.



The group considers each spur/sub-spur, taking the simplest first, partly for clarity but also because a good simple explanation may make more complex explanations unnecessary.

Ideally, the diagram is eventually re-drawn so that position along the backbone reflects the relative importance of the different parts of the problem, with the most important at the head end.



6. *Mind Mapping...*

Mind mapping represents ideas,, information, etc., in far-reaching tree-diagrams. To draw a mind-map:

Lay out a large sheet of paper in landscape format and write a concise heading for the overall theme in the centre of the page.

For each major sub-topic or cluster of material, start a new major branch from the central theme, and label it.


Each sub-topic forms a subordinate branch to the appropriate main branch. Carry on in this way in ever finer sub-branches.



7. *Synectic Strategies*

Synectics is the process of juxtaposing (mentally or physically) dissimilar concepts, objects or experiences so that new understanding is reached – and something new is created.

The process involves the construction of analogies or metaphors, i.e., one “thing” (a concept, an object or an experience) is set against another, dissimilar “thing”, and expressed, either wholly or partially, in terms of that “thing.” The synectic process is useful to help students unlock their creative potential.



For example, you could ask students to choose and focus on a particular concept, object or experience and visualise the result if they:

Took one or more of its important elements away;

Added an entirely new element;

Repeated one or more of its elements; or

Synthesised the concept, object or experience into an entirely new context.

Take Home Message

Critical and Creative graduates are in demand! The world is changing so rapidly that graduates must be creative, critical and able to adapt to new situations.



We therefore must encourage the development of these crucial skills in our students and engineer a number of activities that work towards this goal.

Спасибо за ваше время!



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ANY
QUESTIONS
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