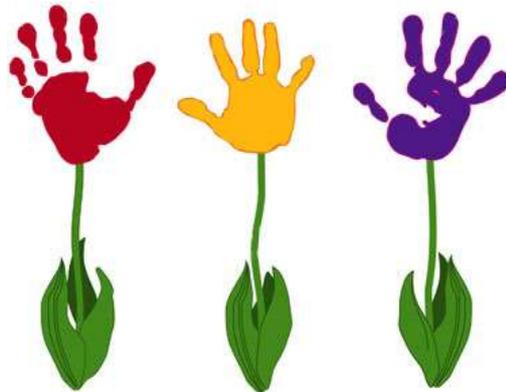




Embedding Creative and Critical Thinking into the Curriculum: A Whole College Approach

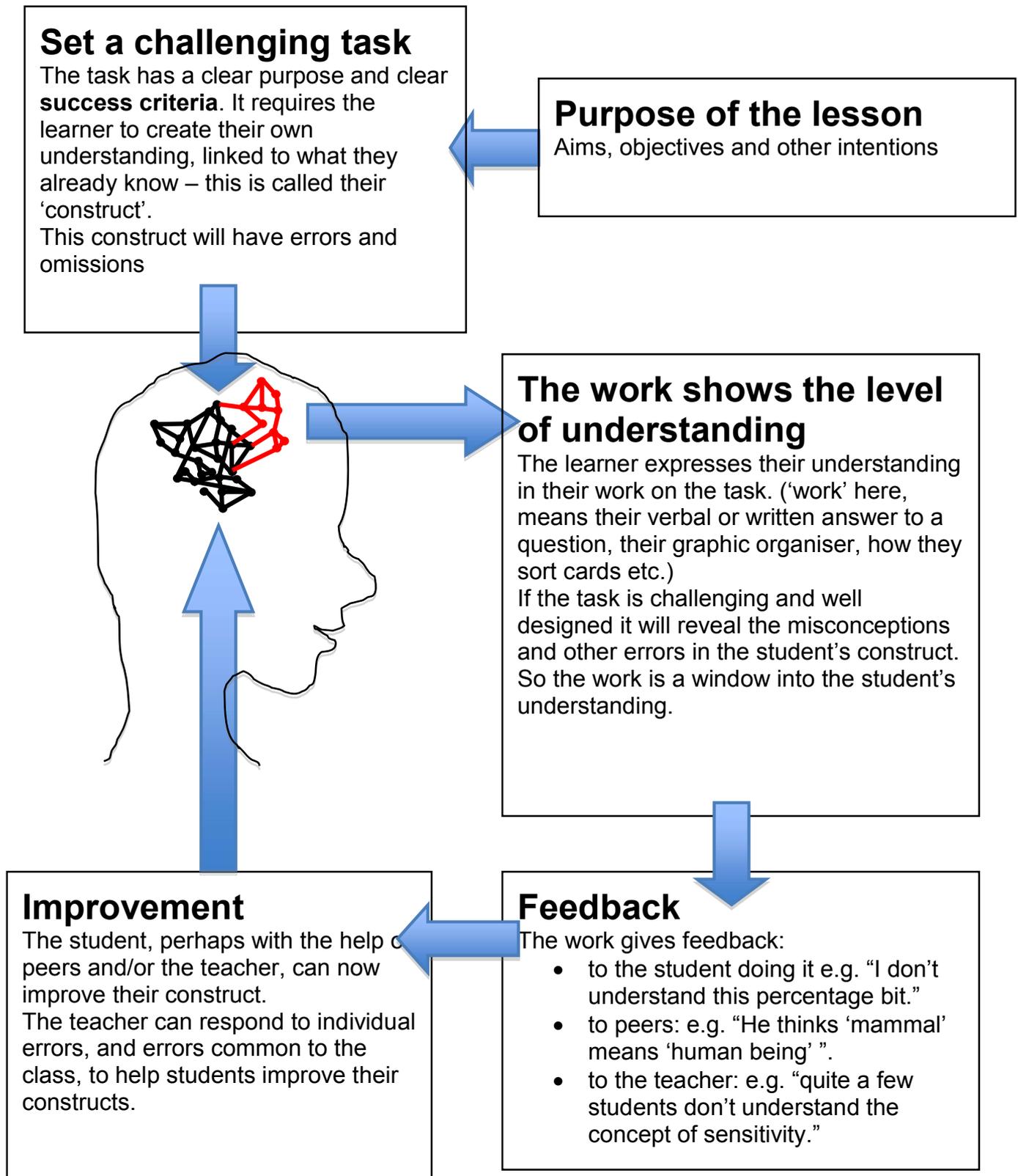


**Leading Further Education
A National Conference, 21st March 2014**

GEOFF PETTY

How to Create High Quality Learning

This diagram summarises what we can learn from qualitative, quantitative, and field research, and the education literature. see 'Evidence Based Teaching' 2nd Edition by Geoff Petty 2009.



Bloom's Taxonomy and Task Design

Reasoning required!

Evaluation

(judge, critically appraise)

- strengths and weaknesses
- advantages and disadvantages
- give arguments for and against
- fitness for purpose value for money & value for effort
- compare and contrast
- consider evidence, bias etc
- evaluate my own work



Synthesis

(create, design, invent)

- solve a problem
- write an essay, report, criticism ...
- design a leaflet, poster, presentation etc.
- give constructive suggestions for improvement in a given situation
- design a policy or strategy or device
- do a survey (eg with a questionnaire etc.)



Analysis

(consider the parts separately)

- analyse a situation, experiment, case study etc and describe what is happening.
- classify
- compare
- give reasons,
- give causes and effects
- categorise
- deduce



Application

(Doing after being shown how)

- apply
- use
- calculate
- punctuate



Comprehension

- explain
- interpret
- classify
- reorganise



Knowledge

- state
- recall
- define
- describe

No reasoning required

A mix of reproduction and reasoning tasks is required

reproduction so that weaker students can succeed

reasoning to stretch the more able, and to ensure deep understanding for all students

Set a mix of these tasks for Q&A; lesson tasks; worksheets; assignments; etc

Reasoning: 'Developmental Tasks'

E.g.

Evaluate the importance of full to high employment.

Report on the leisure time opportunities in Worcester City.

Characteristics.:

- CAN be difficult
- they are highly dependent on prior learning
- development is slow and requires considerable effort
- they create transferable learning of important thinking skills
- they are more interesting, even to weak students
- they are vocationally and academically relevant
- they create deep learning

Reproduction: 'Mastery Tasks'

E.g. Recognise and name the main constituents of a cell.

Copy and label a diagram of a power station

Characteristics:

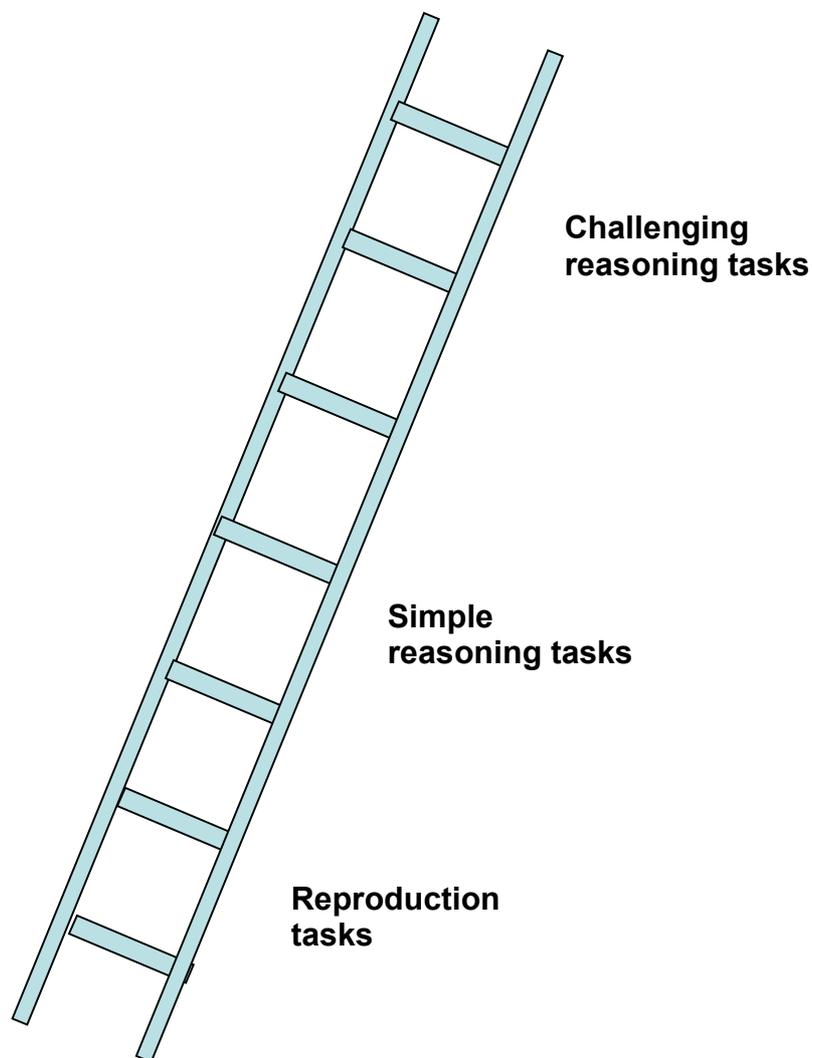
- They are easy. 100% of students can get them 100% right!
- they are not dependent on prior learning
- They can be attained in a short time, perhaps minutes

Creating Ladders of tasks

A classic approach to teaching a topic is to climb a ladder of tasks so every student attempts an open, challenging reasoning task near the top of Bloom's taxonomy towards the end of the topic. This differentiates well (differentiation by outcome).

This approach used by the very best teachers according to research by Ayers, see the chapter on expert teachers in Geoff's 'Evidence based Teaching'.

Later versions of Bloom's Taxonomy have swapped over creative and evaluative tasks, putting creative tasks at the top.



Creative Classrooms: Teaching any content using creative tasks.

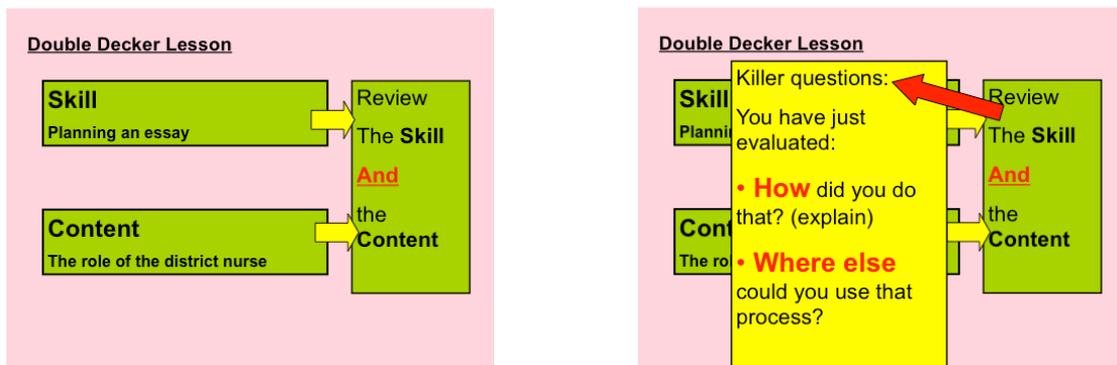
Research shows that students become more creative the more creativity is required of them. Creativity is a skill that improves with corrected practice like all other skills.

Set creative tasks because:

- High quality learning requires challenging tasks so creative (and critical thinking) tasks are the only ways to get students to deeply understand the content you must teach. More routine tasks lead to poorer quality understanding and to quicker forgetting of the content
- Creative tasks are greatly enjoyed by students leading to greater engagement and motivation, and a more positive view of your subject
- Creativity is a vital 21st century skill: work requires it. Jobs that are repetitive and routine work are increasingly being done by robot, outsourced to other countries, or done by computer. The jobs left require adaptability, initiative-taking and creativity.
- Creativity is a way of getting to students to find out what really interests them, and so what subjects or careers they would like to follow.

Double Decker Lessons

Creative tasks make excellent 'double decker' lessons which teach content, by setting a creative task.



In the lesson above students learn about the role of the district nurse, but also how to plan an essay. Any creative task can be used like this, as a vehicle for learning content and creativity.

Creative tasks that teachers can set their students

It is quite impossible to write a comprehensive list, but what follows I hope will give you ideas. The list can seem rather overwhelming. It might be best to read through it with a particular lesson, topic, sub-topic or lesson objective in mind, and mark the creative tasks that would most assist this learning. Then try it again with another topic and so on. In other words, use it as a brainstorming aid.

Use tasks that occur naturally in the subject.

Some of these tasks are indigenous to the subject (naturally occurring in the real world). E.g. 'write a business plan'. Others are not e.g. 'write a rap about a business plan'. The advantage of indigenous tasks is that they develop real world skills. Some tasks don't look indigenous, e.g. 'debate this business plan'. While there are no formal debates in business meetings, there are often informal debates. So formal debates could help students develop debating skills, and so help develop business skills.

There needs to be a balance between creative tasks that develop real world skills, and tasks that are pure fun. Of course one never knows for certain which will be which for any given individual in the class.

In most cases teachers have developed particularly powerful ways of managing these activities. It is well worth reading Teaching Today and Evidence Based Teaching for the detail.

A list of Creative Tasks

There is some overlap between some of these tasks and tasks can of course be combined

Writing

Write an essay, report, assignment, etc

Write an argument for or against a position or statement or policy etc.

Just plan an essay report or etc, (but don't fully write it).

Creative writing: poem, short story, children's story, play, film, parable, etc or a longer piece.

Write a song, rap, or poem or parable that explains some content being learned

Create a metaphor: metaphors are a very powerful means of explaining. Students can be asked to think of metaphors or similes for, say, stock-taking in a shop. Then they compare the metaphor with the real thing, identifying what is the same, and what is different.

Rewrite in a different style. For example create a comic strip for a chapter of Pride and Prejudice, or a mock Sun newspaper article on drugs used for dieting or whatever is being studied.

Create a checklist for example to diagnose faults in a hot water system

Composing questions, tests, and quizzes

Write a test with answers: students in groups create questions with answers and a mark scheme. The test/quiz/questions are answered by the other groups in the class. Each group marks the answers to their own questions. Alternatively the students can mark their own work, using the mark scheme provided.

(Dylan William in 'Embedded Formative Assessment' quotes experimental evidence that this to be the best revision activity yet discovered)

Tv games such as 'Blockbusters', 'Wheel of Fortune', or 'Who wants to be a Millionaire' etc can be used with these questions

Creating and disseminating writing on the internet or VLE

If you are not sure how to do any of the following there will be people in your college who can explain it to you. They are mostly easy to do if you know how, and impossible if you don't. Don't be scared of asking for help as many colleagues will value helping you. Students are often 'digital natives' and so enjoy these tasks, to the point of being prepared to work on them at home.

In each case below the VLE will allow students to critique or improve each other's work.

Students can create a:

Web page explaining content, different groups could do different pages.

Podcast of an explanation (this is a sound recording)

Facebook page for a person being studied, either real or fake. E.g. a page for Carl Marx (Facebook allows pages for 'public figures')

Handout explaining a subtopic or all the content being learned. (This can be uploaded to the VLE for peer comment)

Wiki style summary handout this is a collaboratively written document created by a group, or the whole class. Groups, can take on different roles of writing; critiquing; or of asking for references and evidence like real Wikipedia editors. Most VLEs have a built in Wiki function. Groups can be writers for one topic, critics for others and editors for yet others and so on.

Twitter summaries. Each student can take responsibility for twittering a summary of a different part of a topic. Students can take on the role of a character in a novel or play, and twitter in character

Blog. Students can write blogs explaining or arguing about what they are studying. You might give them questions or positions to blog upon.

See the free e-learning download on www.geoffpetty.com for more uses of technology using high effect size methods.

Speaking

Peer explaining: students in pairs each have a different concept, sub-topic, or example of good practice to explain to the other. They prepare before they explain. See 'Evidence Based Teaching' for some powerful, structured ways of doing this.

Role-play in pairs or small groups: students can create a newscast, a 'radio' show, a panel game, an interview with an important character.

Create a role-play or short drama for performance to the class, expressing what they have learned. This is useful for social learning, e.g. role-play how to turn down drugs offered by an older friend.

Students take on identities. Eg. Cards give each student or group of students a role such as you are a Marxist, Feminist, Capitalist, Business leader, Advertiser etc. Role players then have to respond to questions on how women are portrayed in advertisements. These roles might be made clear to all, but alternatively they may be kept from the rest of the class who must guess the role being played. Some teachers use a 'fishbowl' discussion, where half the class play roles, and the other half observe, and have to decide which person is playing which role, and why they believe this. Then the role-playing half and the observing half of the class swap. See 'Teaching Today'

Hot seating: where students take on personas personalities or positions and are asked questions by the rest of the class. This can also be done in pairs or threes etc. eg. Groups of students take on the role of a character in a book, and must answer questions about their motives, actions etc from the rest of the class. Questions may be given in advance, or may be responded to in 'real time'.

Debate, with proposers seconders and a questioning and voting audience. E.g. debate whether the UK is taking climate change seriously enough.

Role playing Debate. E.g. Students take on roles in the novel 'Bleak House' and debate '*this house believes the law is an ass*' on line or in twitter like responses. Students are less shy at role-play on-line than in the classroom.

Hustings, 'Candidates' for an imaginary election are given positions to take on a particular topic, for example 'in favour of more bobbies on the beat' other candidates take on opposing positions. There can be a class vote after the hustings.

Mock Parliamentary debate. Similar to the above, where students take positions in relation to a debatable issue such as whether more money should be spend on Youth Services.

Mock trial or "J'accuse" Put on trial an idea. E.g. "Prisons are accused of creating more crime than they prevent" See 'Teaching Today' for the detail.

Presentation: students can give their presentation to the whole class or to a group. You could video this so it can be used later for revision. Limit the time and/or number of slides, and the number of words on the slide so that students are forced to summarise.

Drawing.Create a:

Graphic organiser (mind-map, flow diagram, Venn diagram etc) which summarises important aspects of the content students have been learning. Students create their diagram, leave it on their desk and observe the diagrams of others in order to see how to improve their own diagram. Then they self assess against the teacher's criteria or the teacher's diagram. See Teaching Today or Evidence Based Teaching as there are many more graphic organisers than most teachers realise. This teaching method has been shown to be particularly powerful.

Poster: e.g. design a poster on half a sheet of flipchart paper explaining the role of the District Nurse. Teachers often set a maximum number of words for the poster, or even forbid words altogether.

Exhibition: this could be an exhibition of photographs, with text for each photograph. The exhibition could be uploaded onto the VLE. E.g. an exhibition of tools used in the workshop, with attendant text on use and safety.

'Advertisement' E.g. an advertisement for Caesarean sections, business plans, or antibiotics, or whatever is being studied

Learning

Independent learning: students can be set tasks to learn independently. See the chapter on Independent Learning in my 'Teaching Today'

Cooperative learning: student can be set tasks to learn fairly independently in groups. 'Cooperative Learning' is a collection of some highly structured ways of doing this such as 'jigsaw'. These hold all students accountable for their learning, and ensure there are no passengers. See the chapter on Cooperative Learning in my 'Evidence Based Teaching'.

Creating with video, film or other media,

Modern video cameras and phones are very easy to use. Ask for help if you are not sure how to upload the video on to a VLE or Youtube, though this may not be necessary.

Presentation: students can create a presentation on PowerPoint slides, though they don't necessarily need to give this presentation.

Video a talking head: Students explain some content that is being learned, give an opinion, or carry out a demonstration etc. Many can do this on their phones.

Video a student presentation: if students are going to the trouble of creating a presentation then it might be worth videoing it.

Video a conversation or interview with students playing roles of experts.

Presentation: students can create a presentation on PowerPoint slides, though they don't necessarily need to give this presentation.

Case studies and problems

This is very popular in vocational education of course

Case studies: students are given a scenario or case study and are asked questions about it, usually concluding with a question about what should be done in this circumstance.

Problem solving: Students can be given problems in most subjects, vocational or traditional. Students can attempt to solve these alone or in groups. A useful approach is to get students to solve them alone, then to share ideas in pairs, then pairs combine to form fours where the best solution is decided. This is a 'snowball'; see 'Evidence Based Teaching'.

Design

Physical Design: design a device, electronic circuit, experiment, item of clothing, textile, wallpaper design, hairstyle, packaging etc. Design tasks are usually done to a 'brief' which explains the end to be achieved by the design. This is obviously useful for art and design, hairdressing, engineering etc. But is also useful for most vocational subjects. See 'Teaching Today'

Intellectual Design: design a policy, strategy, tactic, manifesto, proposal for a new business, research proposal, menu, work schedule for a plumbing job, corporate identity etc
Useful for business studies, health studies, and other vocational subjects.

Improve an existing design. Students are given an existing design to critique and improve.

The following are obvious creative tasks, but the first in each section you may not think of.

Making

Students can make a model out of cards paper, card and common household containers etc of something they are studying, e.g. an oxygen atom, mitosis in a cell, the skin's subcutaneous layers. Making something glues paper, but it also glues it in memory. Once made, the model can be labelled to show names and functions.

More obvious tasks that are usually subject specific include: Making in metal, wood, ceramics, plastics etc.
Making clothing, food, electronic circuits, computer equipment, etc

Directing

While doing group work students can be given specific roles such as 'director', time-keeper, vocabulary chief, scribe, etc. See the chapter on cooperative learning in 'Evidence Based Teaching'

More obvious tasks that are usually subject specific include: Direct a play, a group of musicians, a group of problem solvers, etc

Art-work:

Student can create a visual representation of what they are studying e.g how cells divide

More obvious tasks are usually subject specific: Two or three dimensional visual design, music, theatre, dance, etc

Playing games some games involve students in creative thinking and critical thinking. Beware though, some games are fun, but they don't teach.

Can you offer students choice?

You can provide students with a choice of creative tasks perhaps classified on different coloured cards. Each students must choose, say, two green (easy) tasks; One orange (harder task) and one Blue (longer and more challenging) task. Students might be asked to choose a friend to monitor, assess, or help them with one of the tasks.

Notes: (some tasks available in my own subject):

Checking the learning as well as the task: two case studies

Creative tasks are no different to any other task in that the task does not guarantee learning for every student. So the learning still needs to be checked. Creative tasks may engage students more than routine tasks, but they are not infallible. Lets look at some different approaches.

For each of these scenarios ask yourself:

1. Will every student participate? Why?
2. Does **every student** get their learning checked and corrected? How?
3. Will the **teacher** discover any common errors and omissions in students' learning? How?

Direct Check: Making a model of a hair follicle

You can of course itemise what students should learn from the task, make this clear to learners in advance, and then test it after the creative task has been completed. This is not enough though. You should also require learners to improve weaknesses identified by the test. Here is an example:

Hairdressing students are asked to make a rough model of a hair follicle much larger than life size, out of card, paper, string, and glue etc and label and annotate it. Before they start, the teacher gives students an outline of the topic and a simple handout, part of which lists some important facts about hair follicles. The teacher makes clear that students should know these by the end of the lesson, and there will be a quiz to check. The teacher suggests that while making their model they should:

- Discuss these facts together and check recall
- Label their model with these facts
- Check each other's understanding in small groups before the quiz. There is a challenge to see which group gets the best total mark in the quiz.

After students have made their models, and have prepared for the quiz in small groups, the quiz is taken. Students mark their own papers. The teacher goes over questions the class found difficult. Each student is asked to explain to their group, the correct answer to any quiz question they got wrong. (This makes the quiz 'formative' rather than 'summative'). See Evidence Based Teaching for similar formative approaches.

The teacher photographs the models, and the photos are uploaded onto the VLE for revision purposes, and for a later peer assessment. Students are encouraged to log on at home, and show their model to friends and family.

Checking learning with Class discussion: suggesting alternative solutions to a mathematical problem

A maths teacher has given students a problem to find the area of a complex shape by calculation. She asks groups to find as many different methods of solving the problem as they can. The students work in groups of three. Students know that any member of their group might be asked to explain and justify any of their group's methods. The groups prepare all their members to explain all their methods. As the teacher expected, some of the solutions suggested by some groups are not valid.

When the groups have finished working, most have three or four methods. The teacher has seen each group's work, and chooses a relatively weak member of a group to explain a simple method that most groups have thought of. The student explains the solution on the board, explaining also why the method is valid. The teacher asks questions of the student. *However, the teacher does not evaluate the method in any way, as this undermines class discussion.* Instead the teachers asks the class who agrees with the method and why, and who disagrees and why.

Students chosen by the teacher present other solutions to the class in the same way. When most possible solutions have been considered she asks the class which is the neatest method.

She then asks the students to work individually to find the area of a new shape. Not all students complete this in class and must finish it for homework.

The Creative Process: Model 3 "icedip"

Inspiration.

In which you research and generate a large number of ideas

deeply engrossed, fearless and free

Clarification

In which you focus on your goals or brief. What am I trying to do? strategic, unhurried and free thinking

Distillation

In which you look through the ideas you have generated and try to determine which ones to work on.

positive, strategic, and intrepid

Perspiration

In which you work determinedly on your best ideas.

uncritical, enthusiastic, and responsive to your evaluations

Incubation

In which you leave the work alone, though you still ponder about it occasionally, leaving it 'on the surface of your mind'.

unhurried, trusting, and forgetful

Evaluation

This is a review phase in which you look back over your work in progress and try to see how to improve it.

critical, positive, and willing to learn

Draft and redraft



Creativity involves the six phases described above, each of which will be visited many times when doing a single piece of work.

1. The phases will not be visited in any particular order.
2. You may visit a phase for hours or for just a few seconds.
3. Each phase has its own mind-set given in bold above
4. You can increase your creativity by making sure that you use the phase and mindset appropriate at that time.
5. For more detail on how to use each phase appropriately see *How to be Better at Creativity* by Geoffrey Petty (Kogan Page) 1996. See: www.greenfields.u-net.com

Developing your Creativity by Self-Assessment

The phases and their mindsets:	Self assessment
<p>Inspiration. <i>In which you generate a large number of ideas</i> <i>deeply engrossed, fearless and free</i></p>	
<p>Clarification <i>In which you focus on your goals.</i> <i>strategic, unhurried and free thinking</i></p>	
<p>Distillation <i>In which you look through the ideas you have generated and try to determine which ones to work on.</i> <i>positive, strategic, and intrepid</i></p>	
<p>Perspiration <i>In which you work determinedly on your best ideas.</i> <i>uncritical, enthusiastic, and responsive</i></p>	
<p>Evaluation <i>This is a review phase in which you look back over your work in progress and think how to improve it.</i> <i>critical, positive, and willing to learn</i></p>	
<p>Incubation <i>In which you leave the work alone, though you still ponder about it occasionally , leaving it 'on the surface of your mind'.</i> <i>unhurried, trusting, and forgetful</i></p>	

General comments: (Including whether you adopted the right phase at the right time)

Development points for next assignment:

Managing a task that requires students to be creative

START HERE

1 Orientation

Students remind themselves of targets from previous creative tasks and set themselves goals or targets

Process targets: e.g. 'I need to allow more time for incubation'

Product targets: e.g. 'Must think more about my use of colour'

Checks of students understanding of relevant prior learning



2 Preparation

Students study the task or brief and, if given, the assessment criteria. They highlight key points, break the task down, discuss with peers, generate questions for the teacher.

Students may draw up their own assessment criteria for the task, or personal goals to achieve while doing the task. 'I'm going to make the visual aspects really simple'



3 Studying exemplars

Students study or critique examples of good or perhaps weaker practice. Students carry out other preparatory research.

Students have now clarified, to some extent at least:

- What the task requires
- The assessment criteria
- The nature of high quality work in this area, along with strategies and tactics that have worked well in other people's work
- Their personal development goals and targets

Spoo assessment
Competitions
Class discussion



8 Reflection

Reflection on process, product, and personal targets and goals

Reflective journal, notebooks, researching and critiquing other work in the domain in order to learn,



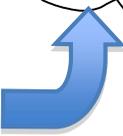
7 Assessment

Students self assess against the assessment criteria and the task requirements

Peer assessment and peer discussions about what worked well, and what didn't and why. Class criticisms, class discussions



Teacher assessment



6 Nearing completion

Work is completed, or is redrafted into a reasonably complete and finished form

5 Monitoring of work in progress: formative

Self assessment against task and criteria

Peer discussion, peer helping, and peer assessment

Teacher 'one-to-one' conversations which 'lead from behind'

Testing of prototypes

Incubation phases between perspiration phases.

The icedip phases

4 Students create draft work

To begin with there is an 'inspiration phase', so at least at first, the work is exploratory, experimental, brainstorming.

Later students begin to improve draft work

A. Consider which parts of the above cycle you would advise the teacher to use in the numbered cases below**B. Suggest some useful activities to help students produce better work:**

1. An Art and Design teacher is starting the first large design brief with level 3 students, in the form of a full assignment to design packaging for a new design of mobile phone. This will take about 8 hours of class time.
2. An engineering class have been given a task to write a piece of software to move data into various parts of the computer memory. This is to take about 20 minutes. There are important issues about the order in which the subtasks are done.
3. A Leisure and Tourism teacher has been addressing the facilities and opportunities afforded by the French Alps as a tourism destination. She is providing students with three customer profiles describing very different needs and interests, and is asking students to write a note of advice to each customer about a perfect holiday for them. This is an assignment to take about 2 hours.
4. A Performing Arts group level 2. A dance-drama is to be devised exploring the issue of the growth into adulthood of a child in Foster Care. Students have three two hour lessons to devise rehearse and present their drama.
5. Physics students have been asked to devise an experiment to measure the resistance of a bulb filament at different temperatures. The temperature of the filament is to be estimated using the colour of light emitted. There are standard procedures involving repeating readings and estimating errors that should be followed and that students have done rather badly in the past.
6. A maths project involves making estimations and approximations of extreme human capability using Olympic records. For example the fastest we can run, minimum reaction time, power of arm muscles, power of leg muscles etc. it is an open ended investigation though, and must be written up as a report. Level 2 or Level 3 to take about 3 hours class time, plus some homework.
7. 'A' level law students are given two hypothetical cases involving personal injury caused by an accident. These cases may, or may not, fall into a number of legal categories such as criminal negligence, or corporate manslaughter etc. Each legal category involves important 'case law', which consists of cases that help the judge or jury decide what law if any was broken. Students work in pairs to make a case for the prosecution in one hypothetical case, and for the defence in the other. The aim is get students to understand criminal negligence, corporate manslaughter, and their case law well.

Lesson Objectives, tasks or outcomes

What creative or critical thinking activity would best achieve the following objectives or learning outcomes? Warning, these objectives etc were collected pretty much at random and some of them may not be best met by a creative or critical thinking task.

Please add objectives that might appear in our own teaching and tackle these instead or as well.

Your task can be used to address just part of an aim/objective it doesn't have to cover it all necessarily.

Objectives and learning outcomes etc

- 1 Students should be able to recall and use technical vocabulary associated with tiling and slating roofs.
- 2 Demonstrate proficiency in the use of presentation applications.
- 3 Given a scenario of a community with a number of discarded tyres, suggest a means of disposing of them with minimal cost and environmental damage.
- 4 Recall the main features of the skin and its subcutaneous layers
- 5 Analyse the process of applying for planning permission and state the purpose and difficulties associated with each part of the process.
- 6 Distinguish, in outline, between criminal and civil law.
- 7 Explain verbally a plan for a November flower arrangement suitable for a Hotel Foyer. The arrangement should cost as little as possible.
- 8 Explore the range of digital media types, and where they are used.
- 9 Identify the tools and techniques in image editing software, and their value in editing and repurposing images and graphics.
- 10 To understand why different file types are used on computers: pdf, doc, ppt, etc
- 11 What is meant by an effective customer services provision?
- 12 Describe lifestyle choices which impact on individuals' health and wellbeing and identify reasons why individuals make particular lifestyle choices
- 13 Evaluate the following Leadership styles appropriate to managing diverse situations: autocratic; democratic; and laissez-faire
- 14 understand the relationship between the sports and leisure industry and government policies and initiatives

- 15 Consider the ethical issues that might impact on achieving success in sport. Including doping, misuse of sponsorship and issues related to the sport and celebrity culture.
- 16 (Adult numeracy Level 1)
An adult will be expected to use whole numbers to read, write, order and compare numbers, including large numbers:
to recognise negative numbers in practical contexts, eg temperatures
to choose and use appropriate units and instruments to measure length, weight, capacity, time and temperature,
- 17 (Level 3 Manufacturing and product design)

Describe the following business structures in a manufacturing business: a hierarchical or pyramidal structure, and a flat structure

Explain how the following business functions would be carried out by the above structures :
marketing; sales; product development; human resources
- 18 Define basic literary terms and apply them to _____ (a specific text or work)
- 19 Explore allegory in various works of children's literature . . .
- 20 Acquire data by measuring with a ruler or metre rule
- 21 Interpret the results of the calculations . . .
- 22 Develop a basic knowledge of the solar system
- 23 Understand the basic structures and functions of Health and Safety legislation
- 24 Demonstrate an understand of centre of gravity

Or write your own objectives or learning outcomes:

Evaluation or critical thinking

(This is an extract from Evidence Based Teaching 2nd Ed Geoff Petty)

The main problem with evaluation or critical thinking etc, is that students often don't know what it means to evaluate, let alone how to do it. This is no surprise; accomplished politicians have trouble, and if we are honest, so do we all.

“Everyone thinks; it is our nature to do so. But much of our thinking, left to itself, is biased, distorted, partial, uninformed or down-right prejudiced. Yet the quality of our life and that of what we produce, make, or build depends precisely on the quality of our thought. Shoddy thinking is costly, both in money and in quality of life. Excellence in thought, however, must be systematically cultivated.”

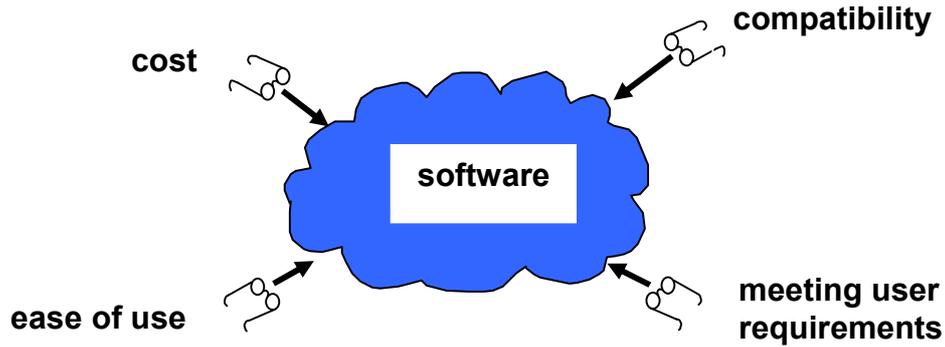
www.criticalthinking.org

Students should evaluate on any course whatever its academic level, it improves their understanding of content, and so their grades, and it prepares a vital thinking skill for educational progression, and life. Students need to be taught all the terms in your subject that may require this sort of thinking such as ‘to what extent’ or ‘appraise’ and any differences between these. I will use the term ‘evaluate’ below, but the ideas apply to any critical thinking or reflection. What do your students need to evaluate?

- an argument, point of view or theory e.g. in history or sociology
- an action, procedure, proposal, policy etc., e.g. on a vocational course from the pragmatic and/or the ethical point of view.
- a poem, novel, painting or sculpture, characterisation etc.
- the solution to a design problem e.g. in engineering, computer programming
- their own work or practice
- etc.

There are 4 models, but the early ones are weak. Very weak students often think evaluation means ‘*do I like it?*’, or ‘*what’s wrong with it?*’ and give answers like ‘I think it’s very good’ with no justification and with no prior analysis of what they are evaluating. This is model zero and is never satisfactory. Students should be taught to use one of the following models of evaluation, after analysing what they are to evaluate. Encourage students to climb towards more sophisticated models as they progress. A chapter 6 approach is best, integrating the use of this skill into their content learning.

Model 1 Using specific evaluation criteria



Evaluating with criteria

Evaluation frame	strengths	weaknesses
user requirements		
ease of use		
costs		
compatibility		
CONCLUSION		

You can teach students to evaluate something specific, for example, care plans, software, a piece of literature, or menus, using appropriate criteria. They use criteria as ‘spectacles’ to look at what they are evaluating, and to decide to what extent each has been achieved, they then draw a balanced conclusion. This requires students to memorise many sets of criteria even for one subject, e.g. one set for poems, another for novels, characterisation, etc.

You will not be starting from scratch, so the aim is to improve students’ existing use of criteria, as described in chapter 6: So:

- snowball the criteria themselves, and make sure students understand them
- snowball the students’ use of these criteria, perhaps after spoof, peer or self-assessment
- use bridging to ensure transfer.

Students can rough out their evaluations on graphic organisers like that above, either drawn up in rough or duplicated. These have an effect size of 1.2 and are called evaluation frames; see chapter 4c. Once criteria and frames are established, ask them to do an evaluation without reminding them of the process, leave

them for a minute or two, then praise those using the criteria, and shoot those who aren't! Discuss how one knows when to use the criteria, and why they help.

The main problem with specific criteria is that they don't transfer outside a very narrow domain. More fundamentally this model does not consider alternatives or goals. Take the software example: however good it is, there might be another better. However bad, there may be none better, so you still need to recommend it.

Model 2: Using general evaluation criteria

Here the same criteria are used to evaluate different things, say care plans and healthy eating policies. Strengths and weaknesses is the simplest model, opportunities and threats can be added to create the 'SWOT analysis' often used in business studies. Simple graphic organisers can be created to brainstorm ideas or to present conclusions.

Strengths	Weaknesses
Opportunities	Threats

If used literally these models are astonishingly weak despite their widespread use. It is fun to get students to see the weaknesses of the SWOT and other evaluation models, and get them to improve the model with 'cognitive conflict' questions such as:

Question: *Which is best, a Ferrari or a Ford Transit van? (student: 'a Ferrari')*

Answer: *No, a Ford Transit van because I'm moving furniture.*

Moral: we need to consider goals when we evaluate and then consider fitness for purpose. (instead of 'goals' you might prefer, objectives, purpose, aims, intended outcomes, intention etc.)

Question: *Is a bus or a car the cheapest vehicle for everyday transport? (student: 'a bus'.)*

Answer: *No, a bicycle!*

Moral: we need to consider all alternatives for a really meaningful evaluation.

These are not trick questions irrelevant to everyday life. We considered in chapter 1 a teaching strategy being advocated because it had many strengths and few weaknesses compared to common practice. But

what if there is another method that has even more strengths, and even fewer weaknesses? And in any case, what are our goals?

‘Alternatives’ must usually include the status quo. For example a business may consider the alternatives of spending money on computer training, or on buying more office space, ignoring the status quo and therefore the costs and benefits of not training and not increasing office space. Not training might be expensive if staff make errors on a system they don’t understand.

You probably don’t use SWOT and other models literally, you will intuitively consider goals and alternatives, but will your students? We need a model that teaches good practice explicitly, but what is it?

Model 3: fitness for purpose or ‘means to ends’

You can ask your students to improve the SWOT approach to evaluation, perhaps by asking them to devise an evaluation frame. These can be sketched out in rough when needed, and then students ‘bullet point’ their views into the boxes. There is hardly a better way to come to understand something than to evaluate it, so this is a great activity to learn new content, especially if students work in groups and then present their views to the class.

Don’t forget to bridge the evaluation procedure with ‘*how did we do that?*’ and ‘*where else could we use that process?*’ The last question can be helped by giving them a range of tasks, and by asking them if the ‘evaluation’ process they have just used would help with. For example:

Describe...

Analyse the....

Suggest improvement to...

To what extent...

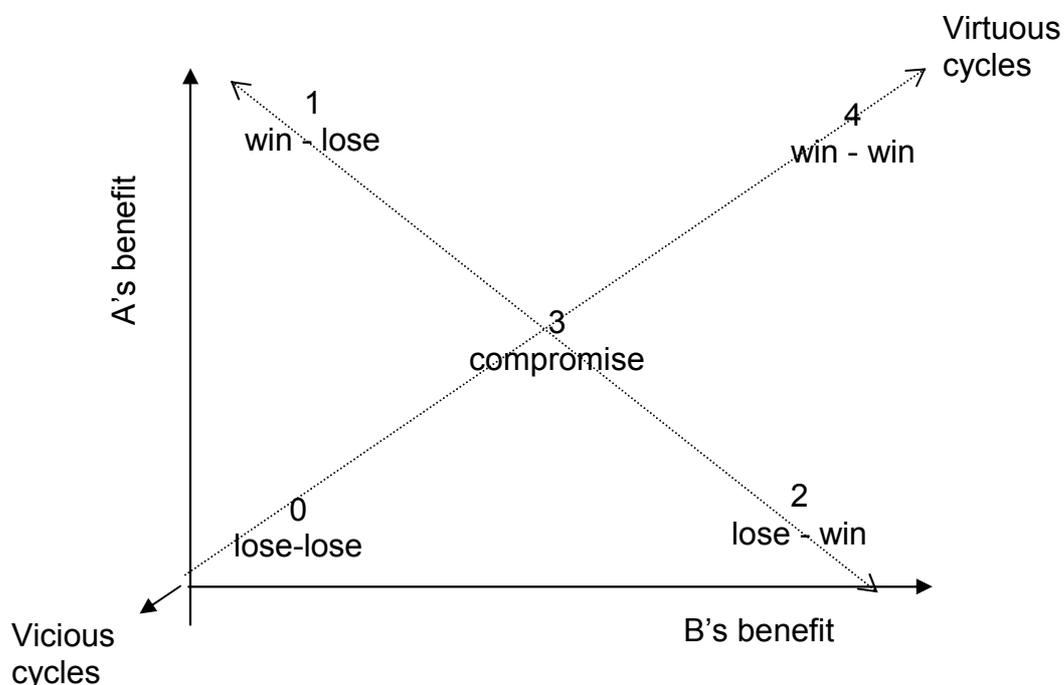
A

		<u>Evaluation Frame</u>
Goals: 1. <i>.....</i>		
2. <i>.....</i>		
	Strengths: how does it meet the goals?	Weaknesses in relation to goals
Subject of this evaluation <i>.....</i>	<ul style="list-style-type: none"> ● <i>.....</i> ● <i>.....</i> 	<ul style="list-style-type: none"> ● <i>.....</i>
Best Alternative <i>.....</i>	<ul style="list-style-type: none"> ● <i>.....</i> ● <i>.....</i> 	<ul style="list-style-type: none"> ● <i>.....</i>

Unfortunately models 0 to 3 do not consider the points of view of everyone affected by the subject of the evaluation. For example when evaluating a marketing strategy one should consider the points of view of the management, customers, workers, and investors. They will not agree. The model might cause students to miss other important 'spectacles' such as training.

It is possible to develop more complex evaluation frames to accommodate these extra criteria, see www.geoffpetty.com for some examples, but they soon get complex and cumbersome.

Win-Win Outcomes



People involved in the conflict tend to see the situation as win or lose, so they only consider outcomes along the line 1 3 2. This is called zero-sum reasoning, where one side only gains if the other loses. It is ideal to resolve the conflict with a win – win situation, by concentrating on the line 0 3 4. Students can use the graph above as a graphic organiser to write possible outcomes and to consider others.

In negotiating a conflict it helps not to focus on the *positions* of the parties, 'I want the car' but to ask 'why' and step up towards *desires* or values: "I enjoy playing with the car". It is then easier to find compromises and win-win solutions.

Conflicts are not necessarily between people or groups. One individual can encounter conflict, for example a designer may have to cope with a conflict between the functionality of a piece of electronics and its cost, the models considered here can help with that too.

Vicious and virtuous cycles.

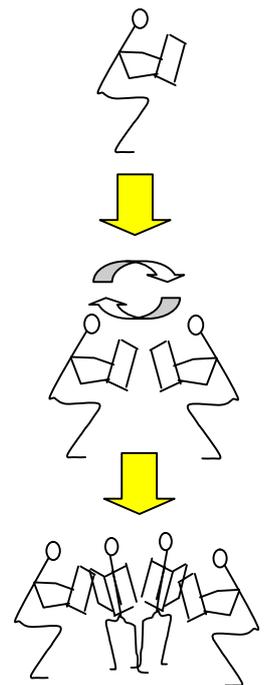
The best win-win outcome is a virtuous cycle: e.g. good learning increases motivation increased motivation creates even better learning and so on

The worst lose-lose outcome is a vicious cycle e.g. poor learning reduces motivation lower motivation makes learning poorer still and so on.

Snowballing: a method to improve evaluative thinking

Having taught students how to evaluate, using whichever model you prefer, you set a task to evaluate:

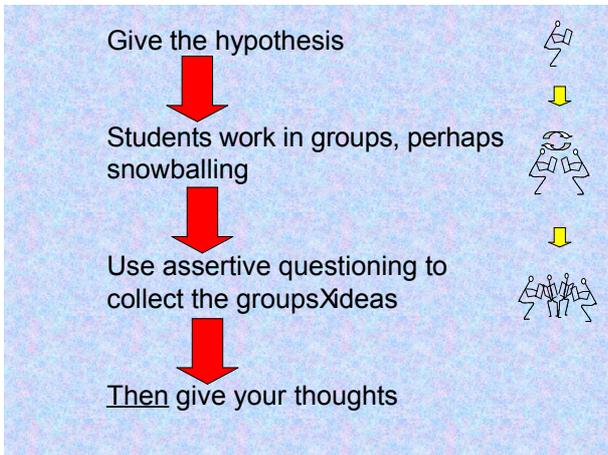
1. Students to do an evaluation working alone
2. In pairs, students look at each other's evaluation. They combine ideas to create the best evaluation they can. They will peer tutor each other in how to evaluate.
3. Pairs combine into fours, and compare their evaluations. Again they combine ideas to produce the best evaluation they can.
4. The teacher hears feedback from each group of four on what is best practice in evaluating.
5. The teacher corrects any misconceptions or bad practice and summarises best practice
6. Students as individuals use this model of best practice to set themselves action plans for improvement
7. Students do some more evaluating soon, implementing their action plans. They review their notes against best practice and set themselves another target and so on.



Hypothesis testing: effect size 0.79

A hypothesis is a statement that apparently claims to be true. They work best with what follows if they are not clearly true, or clearly false, so there are arguments both for and against them. This makes students think harder. E.g.

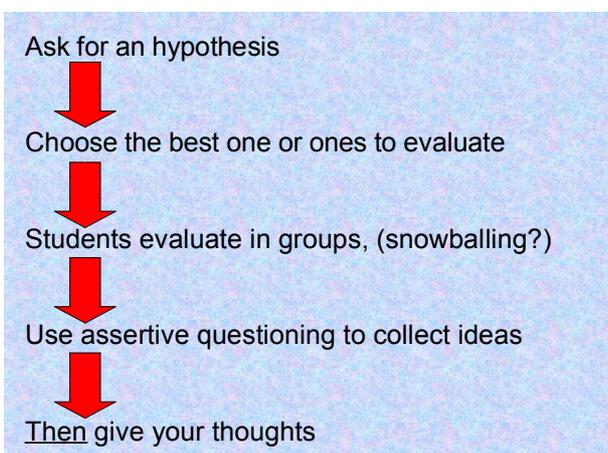
Oliver Cromwell's main motivations were religious
The recent Iraq war was about oil, not flouting the declarations of the United Nations.
This is the best work plan to rewire a ring main in a small bungalow.



Hypothesis testing often involves the following reasoning:

1. If the hypothesis were **true**: what would be the consequences?
2. Do those consequences actually exist?
3. If the hypothesis were **not true** what would be the consequences?
4. Do these consequences actually exist?

When students are practised at this they can test their own hypotheses:



Educationalists make a strong case for this teaching method that goes way beyond the fact that it has a high effect size. It helps students to 'think like a historian' or 'think like a business studies scholar'. This sort of thinking is necessary to develop and monitor ones own understanding. In short it helps students learn how to learn.

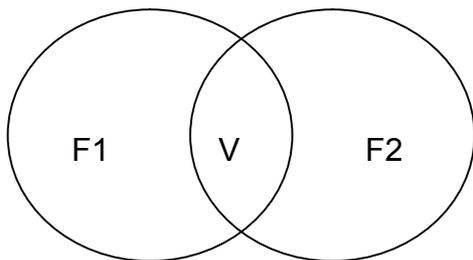
Hypothesis testing with Venn diagrams

Venn diagrams are helpful in testing hypotheses, or planning responses to 'to what extent questions' such as:

To what extent did the Treaty of Versailles cause the Second World War?

To what extent was the use of force responsible for their rise to power?

Prisons do work



In the first case the circle on the left could be the Treaty of Versailles, the circle on the right the causes of the Second World War. The overlap 'V' are causes of the War due to the Treaty. This verifies the hypothesis. 'F1' is aspects of the Treaty that did not cause the War. 'F2' is causes of the War not due to the Treaty.

With 'Prisons do Work', the circle on the left describes the nature of prisons, and the right hand circle describes what it means to 'work'. The extent to which Prisons work is shown by the overlap. The hypothesis is verified by this overlap 'V'. Aspects of prisons that don't work is 'F1'. Aspects of 'working' not provided by prisons is 'F2'. Both these falsify the hypothesis. The diagram helps direct thinking towards any evidence that confirms, buy also any evidence that denies the hypothesis. Great for assertive questioning style class discussion, based on an interactive whiteboard diagram.

Horizontal lines can be drawn across the diagram to create rows. Each row can represent a particular point of view or 'spectacle'. So in the 'Prisons do Work' case, the rows can represent the views of the prisoner, society, and the government for example. Each 'spectacle' will

