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IB AFRICA, EUROPE & MIDDLE EAST REGIONAL CONFERENCE 2013

THE HAGUE 24TH - 27TH OCTOBER

Effective and creative instructional strategies in delivering knowledge in Science

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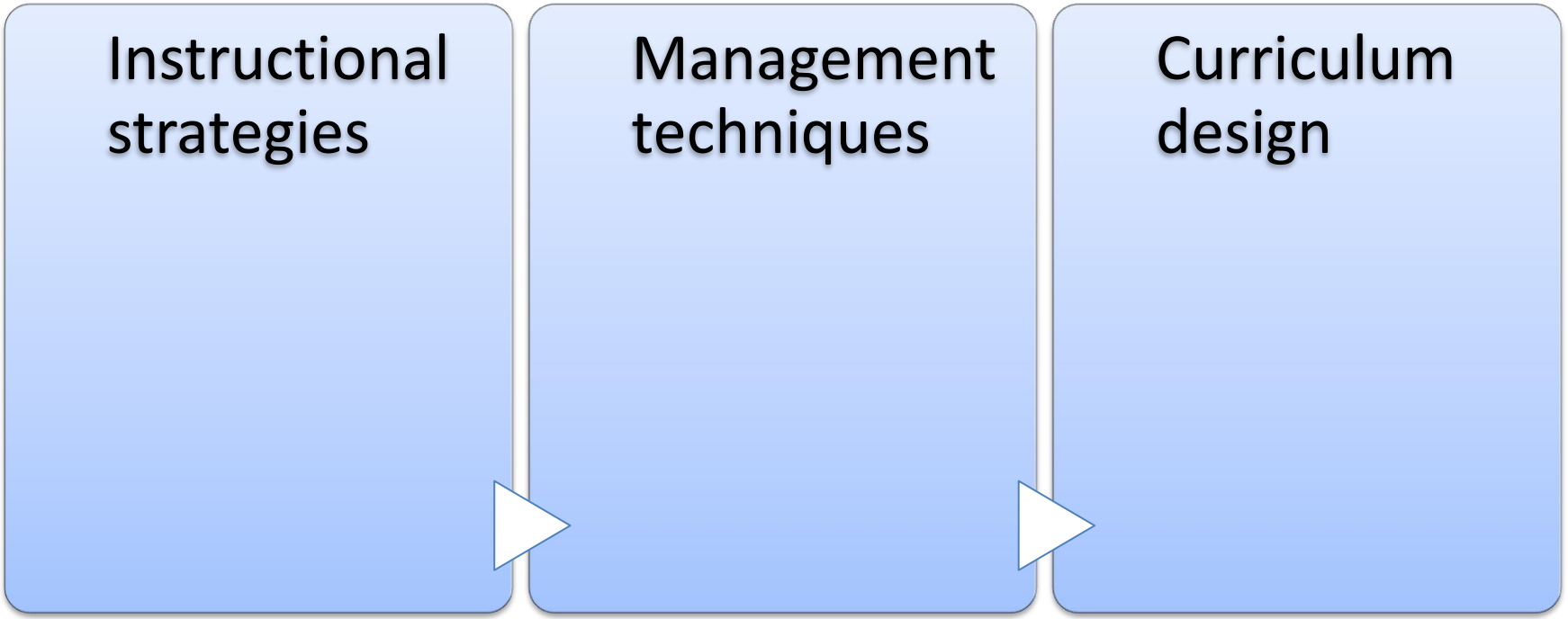
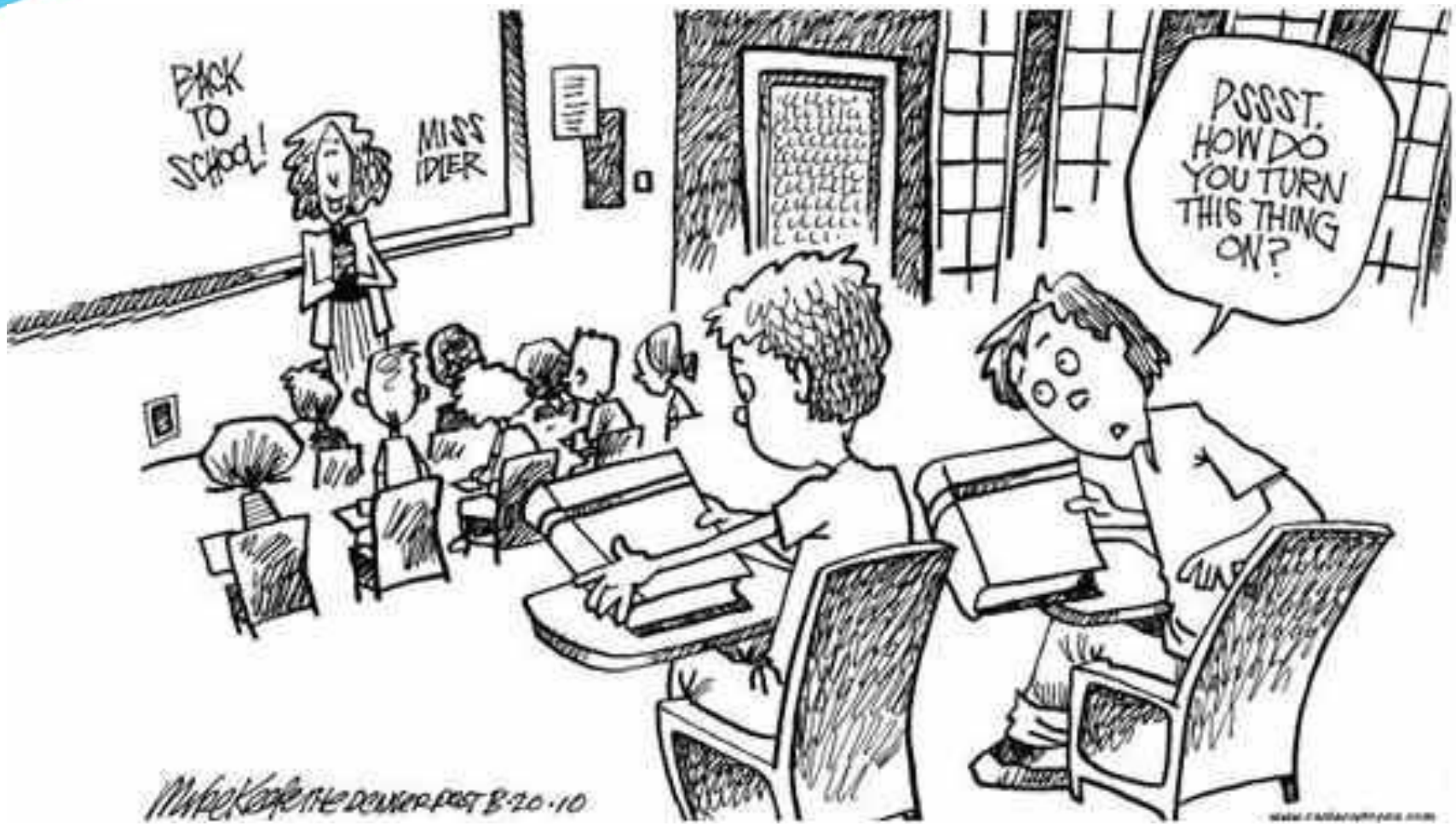
Objectives

1. Definition of creativity
2. What causes teaching effective? 3 components of successful teaching
3. How can we effectively deliver knowledge in Science?
   2.1. Note taking
   2.2. Non – linguistic representations
   2.3. Drama and physical movement in Science
   2.4. Collaboration – some creative examples
4. Conclusion and discussion

Three elements of effective pedagogy (Marzano 2001)





http://essentialeducator.org/?p=8191

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"I expect you all to be independent, innovative, critical thinkers who will do exactly as I say!"

http://www.educ.ualberta.ca

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Creativity is characterised by being imaginative, showing inventiveness and originality of thought

Riley (2006)

Creative lessons should encourage students to 'think outside the box' and come up with off the-wall ideas

Longshaw (2009)

`Creative teaching done right, will move you beyond such comfort zones into areas of teaching that are far more rewarding for you and your pupils alike`

Starbuck (2006)

`A creative attitude says that exploring towards the answer is more valuable than finding the answer itself. The learning is in the journey`

Bowkett (2006)

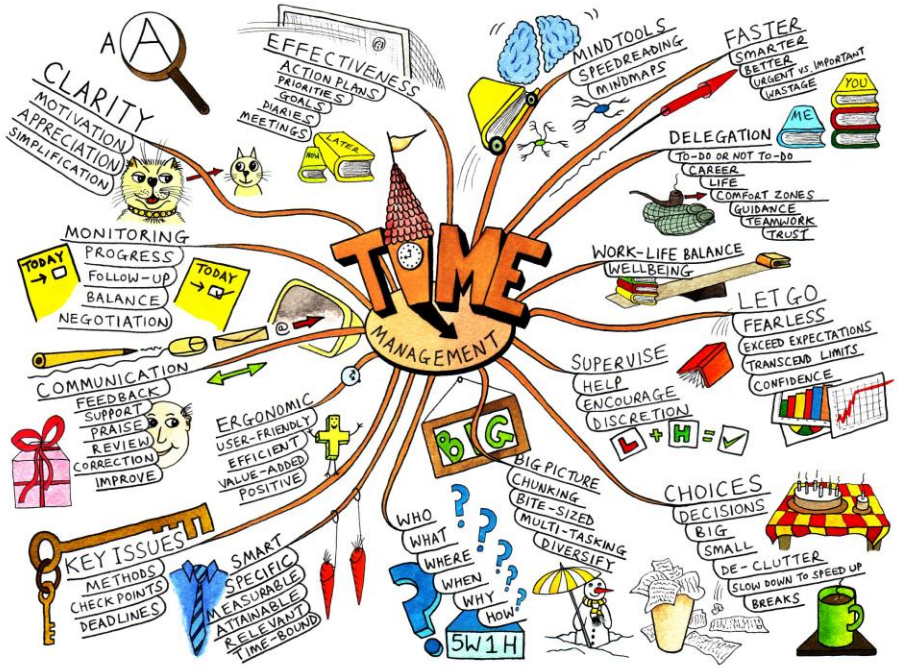
Notes taking can be fun and creative!

Research and theory:

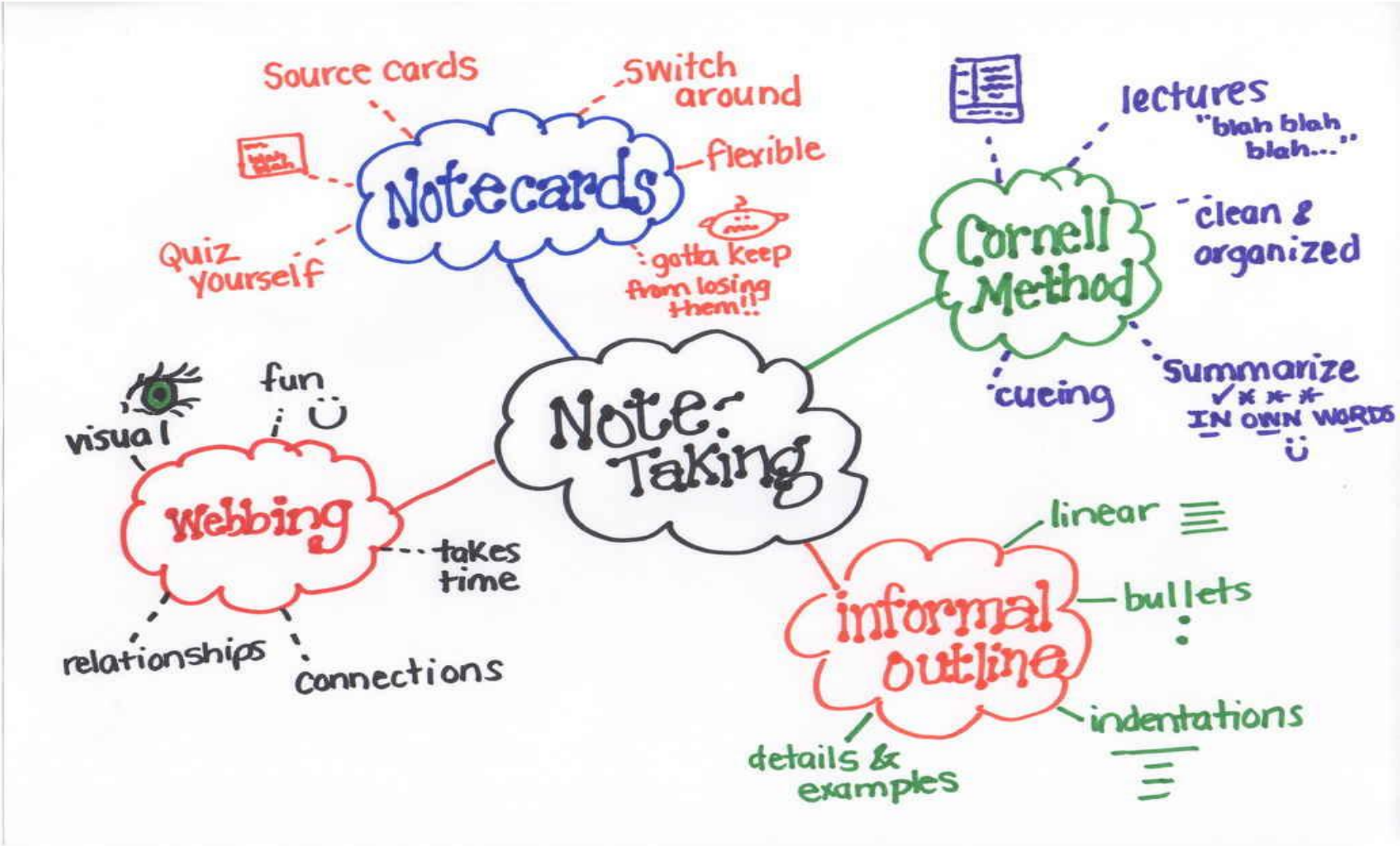
1.It is advisable to present students with a variety of note formats

2.Notes should include graphical organizers

(Nye, Crooks, Powlie and Tripp 1994)

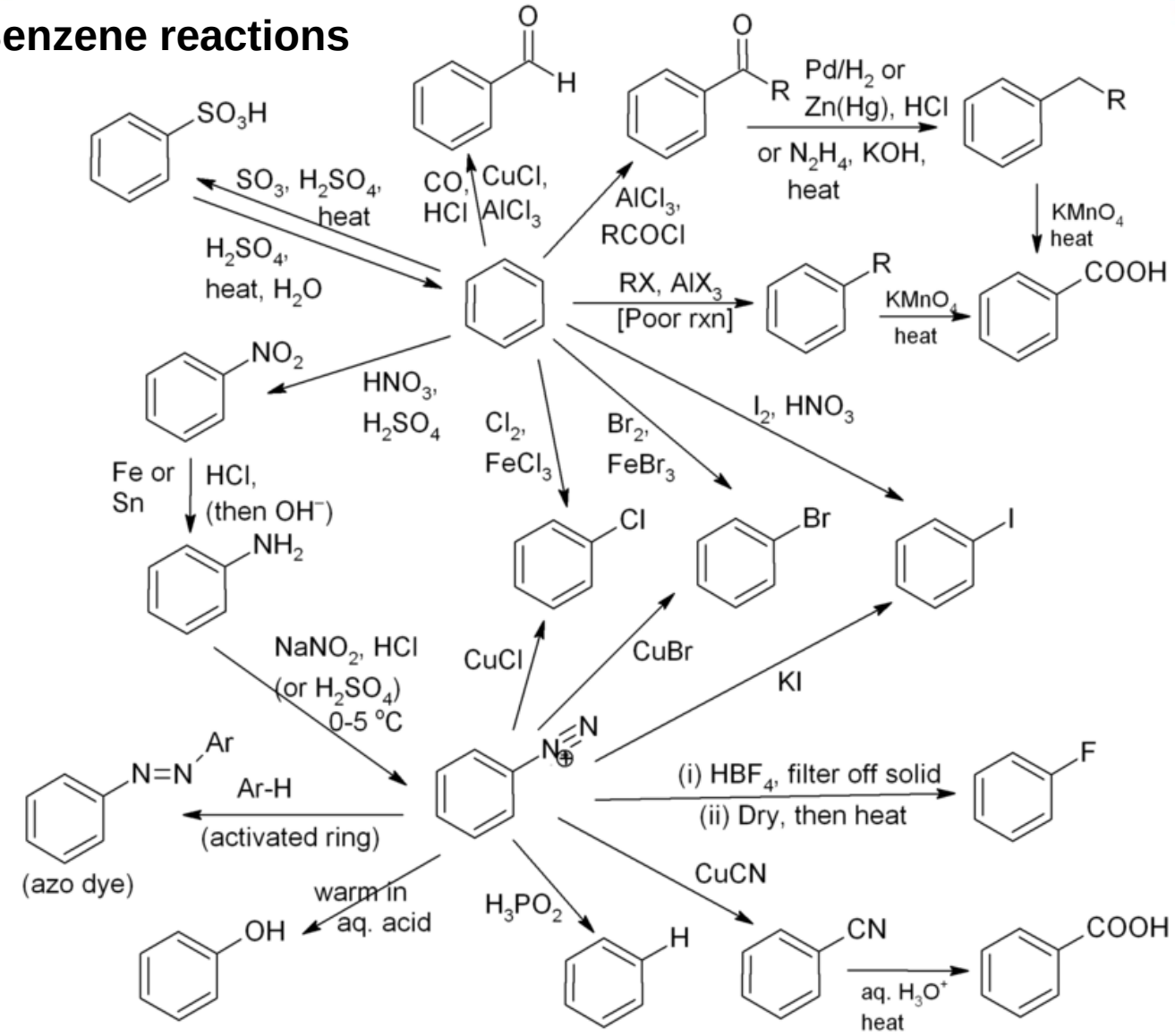


http://www.mindtools.com/pages/article/newISS_01.htm



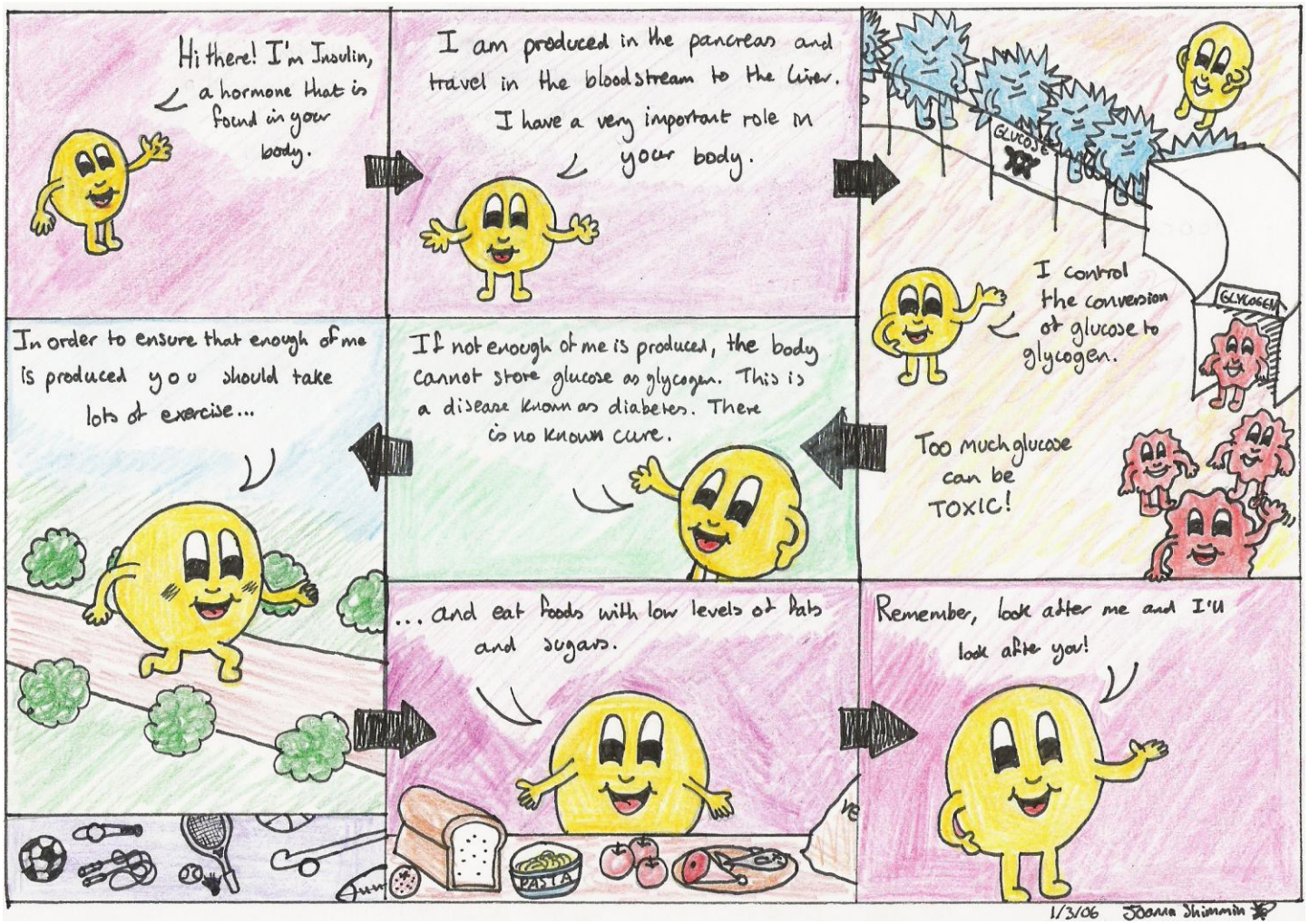
http://www.dcsomalearningcommons.org/organization-of-information.html

Benzene reactions



http://dasariramkrishna.blogspot.com/2013/03/some-mind-map-pictures-on-organic.html

Why not a cartoon?



http://embrethil.deviantart.com/art/Biology-cartoon-30040407

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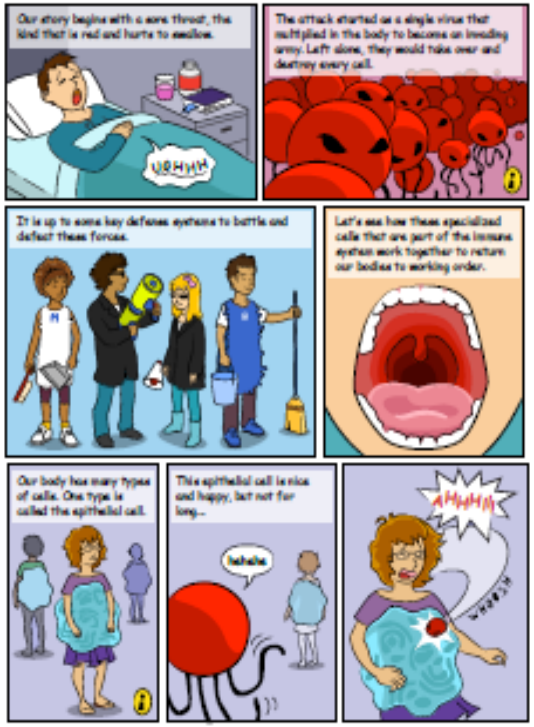

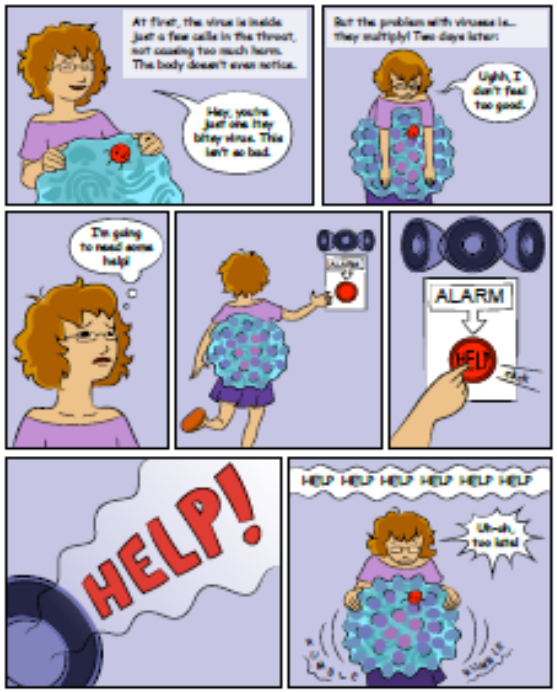

http://askabiologist.asu.edu/body-depot/viral-attack_teachers

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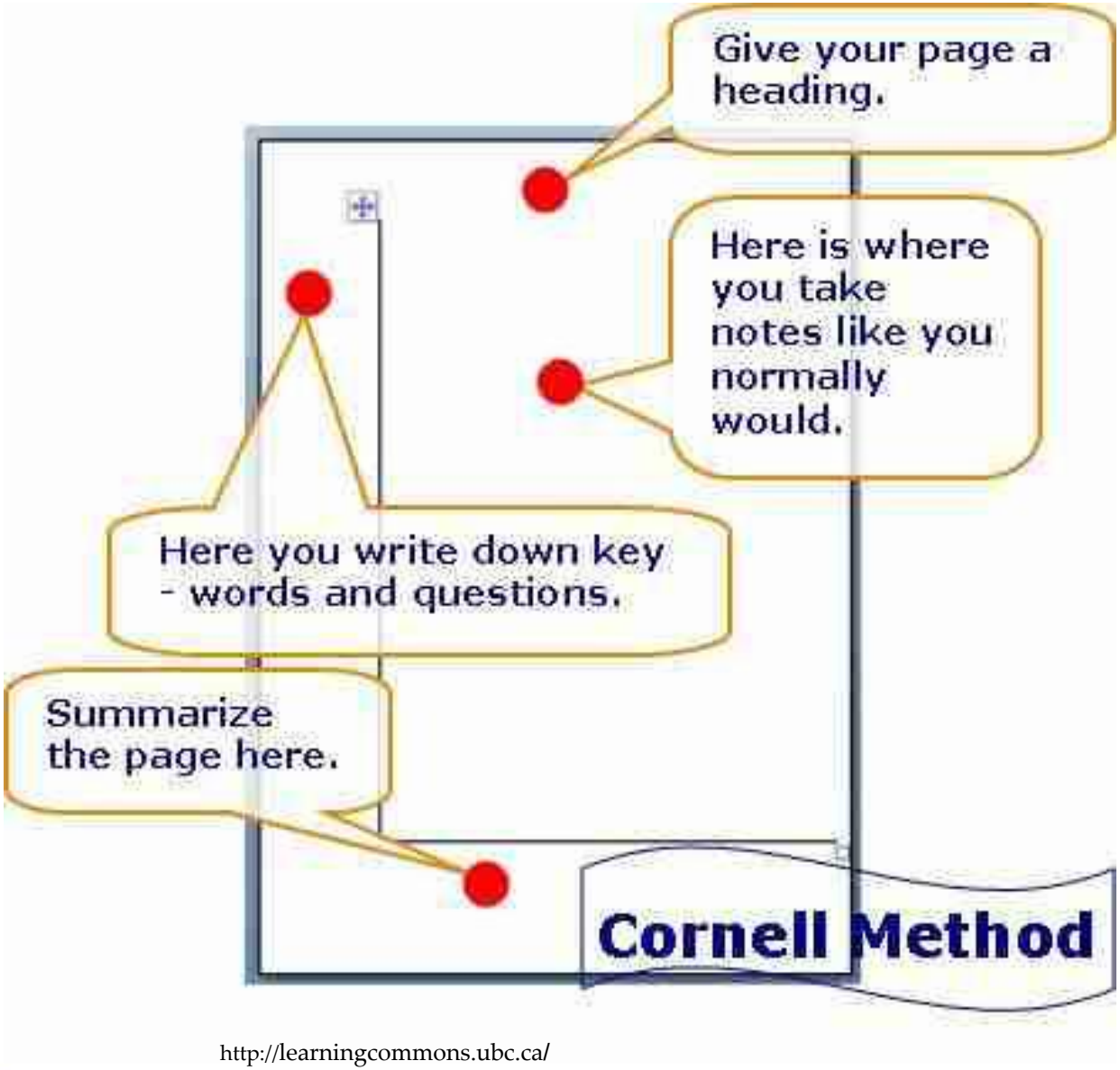

http://learningcommons.ubc.ca/

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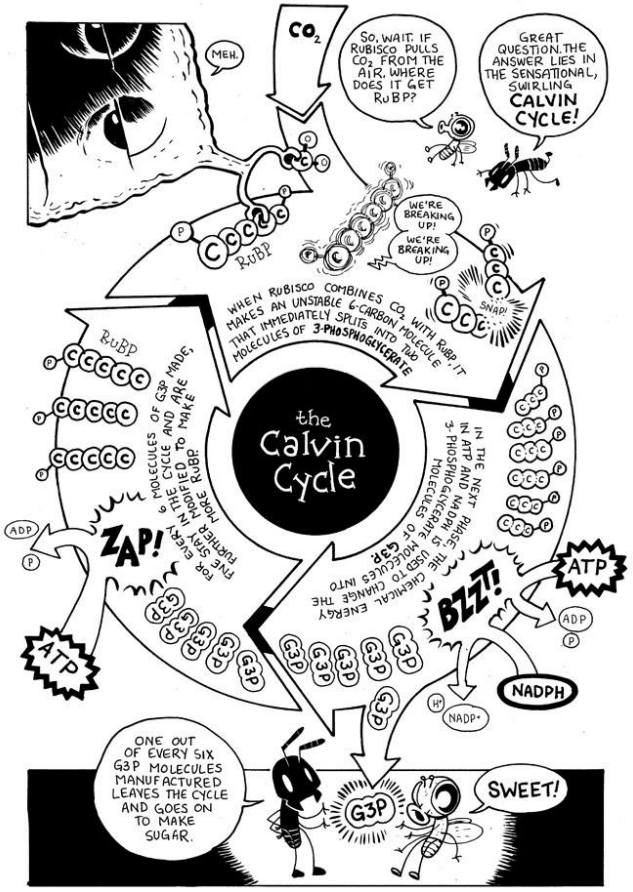
Written notes

Photosynthesis is divided into 2 stages: light dependent and independent reaction (Calvin cycle)
Calvin cycle is a process of CO_2 fixation and producing a triose…

Graphical notes



http://www.jayhosler.com/jshblog/?p=1108

Conclusions/ Daily journal

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Non – linguistic forms

Research and theory

- ✓ Knowledge is stored in two forms (linguistic and non-linguistic);
- ✓ Imaginery mode is expressed as mental pictures or physical sensations;
- ✓ Engaging students in the creation of non-linguistic representantions stimulates and increases acitivity of the brain (Gerlic & Jausovec 1999);
- ✓ Nonlinguistic representantions should be presented after linguistic form (Pressley, Symons, McDaniel, Synder 1988, Wood and Pressley 1990)

Types of non-linguistic representations

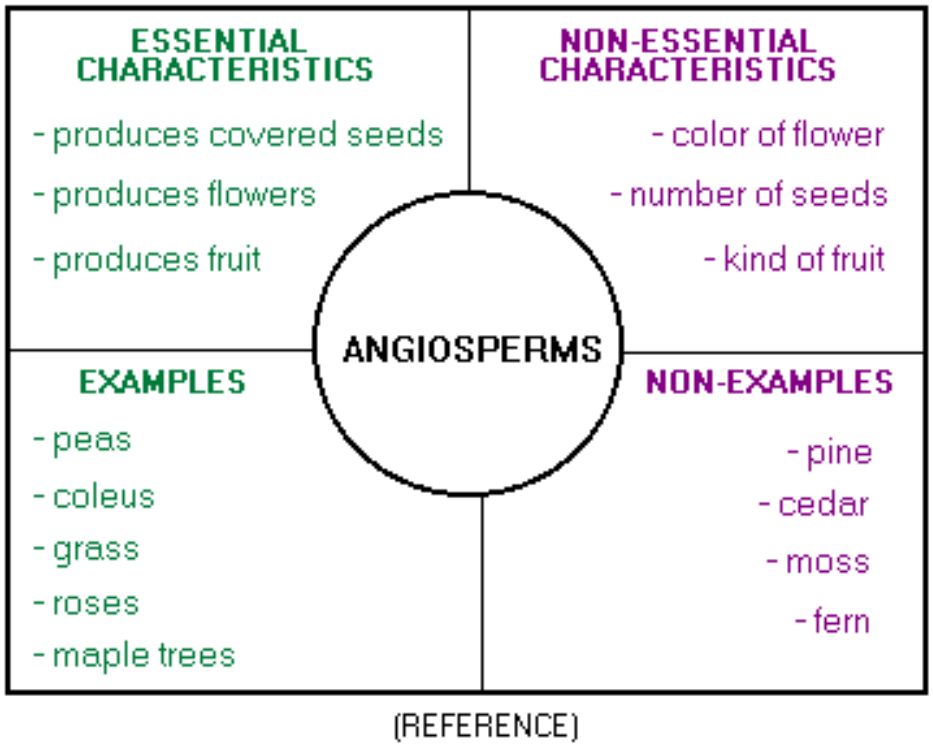
- *Graphic representations*
- *Physical models*
- *Drawing pictures and pictograms*
- *Kinesthetic activity*

Generating mental pictures

http://www.nuffieldfoundation.org/

The most direct way to generate non-linguistic representations is to simply construct models and pictures of knowledge being learned

Introduction to new terminology Frayer model



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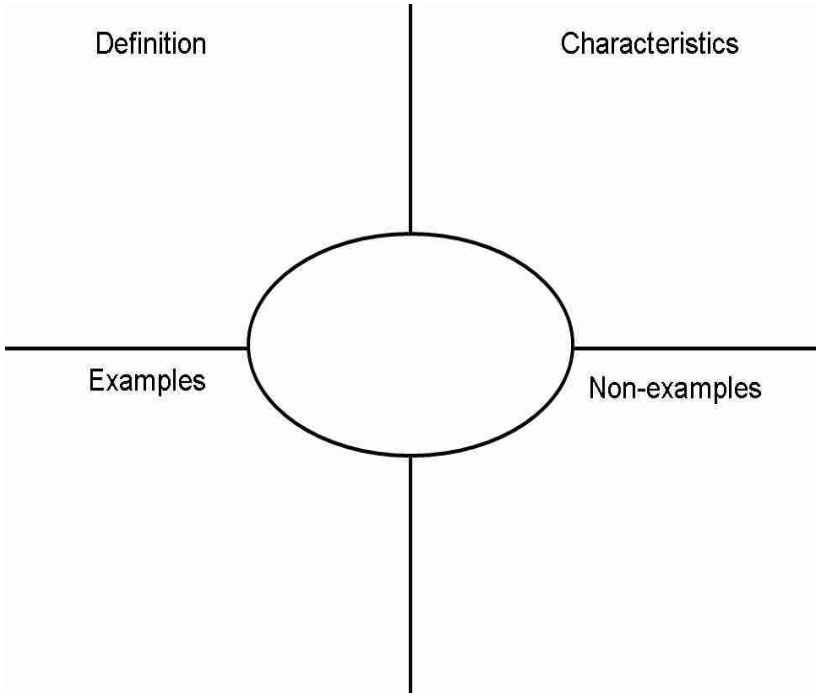

http://www.muskingum.edu/

Art and movement in Science

Research and theory:

✓Several studies have found that as teachers become more experienced, they improvise more
(Berliner & Tikunoff, 1976; Borko & Livingston,1989; Moore, 1993; Yinger, 1987)

✓Kinesthetic activities are those that involve physical movement associated with a specific knowledge

✓Most children find this both a natural and enjoyable way to express their knowledge (Marzano 2001)

- ✓ **Sketch and performance** (body performance – mitosis or meiosis, atom structure – students performing processes, reactions)
- ✓ **Songs/Rap** (photosynthesis songs)
- ✓ **Designing board games** (digestive system, nervous system board game)

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- ✓ **Trail court** (Darwin as an accused person, in-vitro followers versus opponents)
- ✓ **Students as doctors/detectives (role playing)** analyzing blood tests/criminal evidences/X-rays images
- ✓ **Story telling** (students designing a short science-fiction/horror story about a process/reaction)

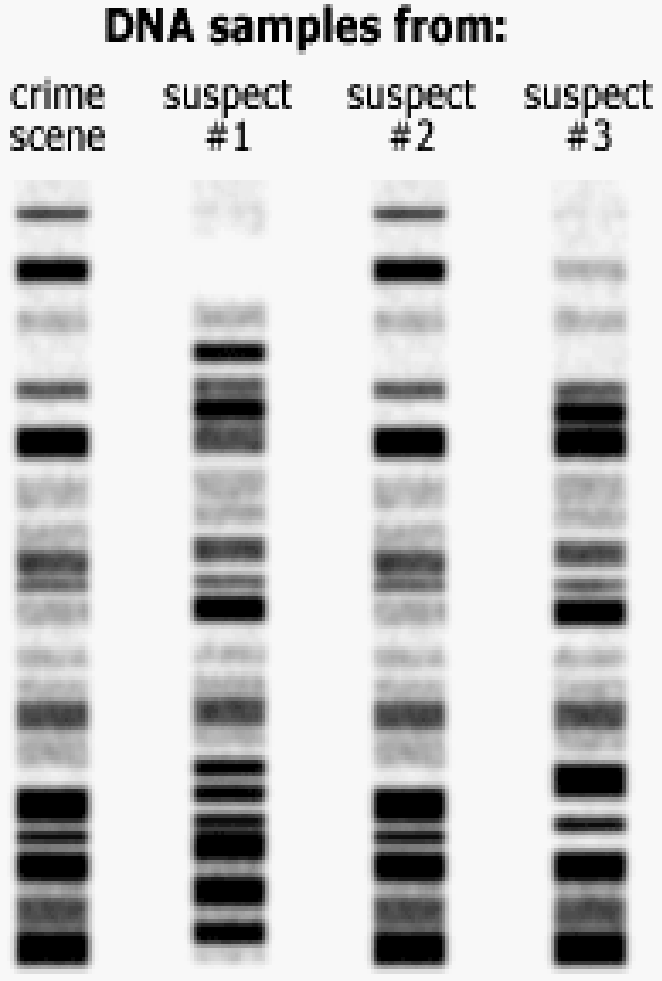
Exercise 1. Using the ranges of blood components listed above analyze the blood test of 5 patients giving feedback. In your diagnosis you should include:

- Which components have too high or too low values?
- Is patient healthy or she/he needs a further consultation?
- Can you diagnose any symptoms of diseases?
- What are your recommendations for examined patients?

Patient 1 age: 25 year-old, weight: 120 kg Gender: Man

Ph	6,5
Bilirubin	1,2
Glucose	140
Hematocrit	43
Cholesterol	314
Platelet count	190 000
RBC	4.7
WBC	7600
Neutrophils	55%
Eosinophils	1%
Basophils	0.2%
Lymphocytes	26%
Monocytes	5%

Author: Piotr Mazowiecki-Kocyk



http://evolution.berkeley.edu/evolibrary/news/060301_crime

Who is lying? Who is a murderer? Evolution at the scene of the crime

Students prepare a report to Police based on a description and materials given by a teacher. They use a prepared form to give an answer.

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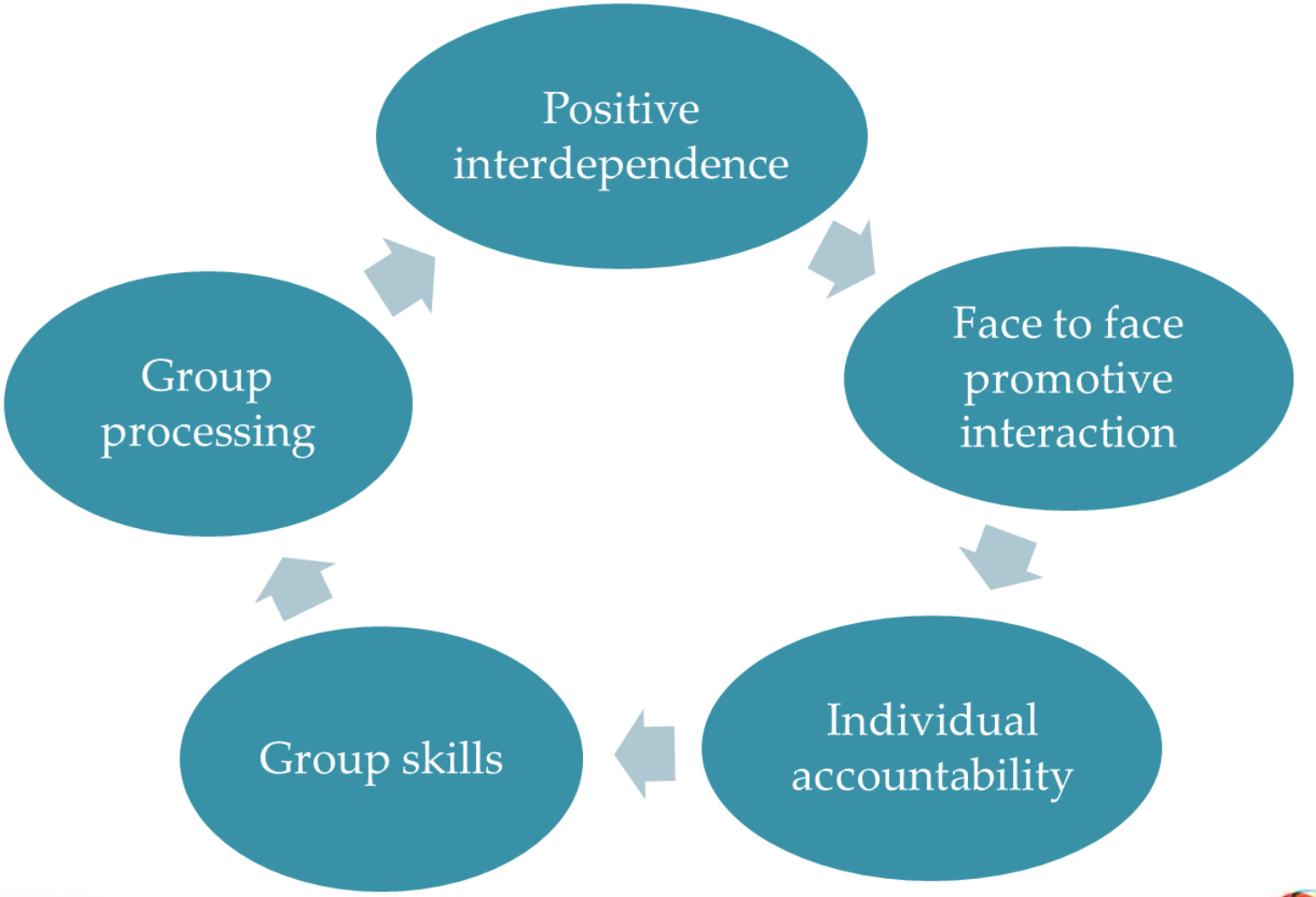
Why cooperative learning is important?



‚Snowball game' – students teaching students

1. A new word with a brief description is given to every student;

2. Students move in a classroom and teach each other new words;

3. After every mini-lesson with a classmate, they exchange their words and continue the game till they get their first word back.

‚Interview with the blood cell'

One student from each pair is a journalist who has to guess the name of a cell. Before the interview journalists collect key words related to functions, features, properties of cells. They are allowed to ask about places, jobs, size, life span of the cell.

‚Cells' receive only their names.

Pairs can swap after journalists identify cells.

‚Designing flashcards'

1. Each student in the group prepares 20 key words on the slip of paper
2. The flashcards are given to another students
3. All students have to write definitions for the given key words
4. The flashcards are given to another student
5. Each student checks definitions. If something is wrong, he/she corrects mistakes
6. The flascards are given to another student
7. All students are asked to draw a picture next to the key word
8. The flascards are given back to the student who had listed the key words

‚Learning wall'

A learning wall can be used throughout the learning of a topic as a place where students are allowed to reflect on their learning process.

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Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world.

A. Einstein

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Bibliography

1. Best and Thomas. 2007. Creative teaching and learning tooklit.
2. Bowkett. 2006. 100+ ideas for teaching creativity.
3. Feldman and McPhee2007. The Science of Learning and the Art of Teaching. CENGAGE
4. Gilbreth. 2012. The effects of kinesthetic activity on Secondary Science students achievement
5. Longshaw. 2009. Creativity in science teaching. SSR March 2009.
6. Marzano. 2007. The Art And Science of teaching.
7. Marzano 2001. Classroom instruction that works.
8. Riley. 2006. So it is creativity – what research says. Education in Science 216.
9. Starbuck. 2006. Creative teaching: getting it right
10. Sprenger 2003. Differentiation Through Learning Styles and Memory. Corwin Press.