

Semplificare il complesso: l'approccio CLIL alle biotecnologie



Dott.ssa Paola Priore

12 maggio 2017

Scientific research & English



Semplificare il complesso: l'approccio CLIL alle biotecnologie

What's wrong with us?

LA STAMPA SOCIETA' SEGUICI SU    ACCEDI 

Meloblocco, la grande festa dell'arrampicata sui massi
Tamara Chalabi: "Per il mio Iraq la sopravvivenza passa dall'arte"
Così le voci di Cartoona danno anima alla fantasia
La Madonna del Latte nella chiesetta censurata
Cleo Toms: "Vi racconto non siete soli ad affrontare la vita"

Troppa grammatica, poca conversazione e tv in italiano: ecco perché non parliamo (ancora) inglese

Peggio di noi in Europa fanno solo i francesi, ma studiamo la lingua fin dall'asilo e spendiamo migliaia di euro in vacanze studio e corsi



Aprile 2017

CORRIERE DELLA SERA / SCUOLE ELEMENTARI



Impara l'inglese con i film!

LO STUDIO EUROSTAT

Film tradotti e prof impreparati Ecco perché non impariamo l'inglese

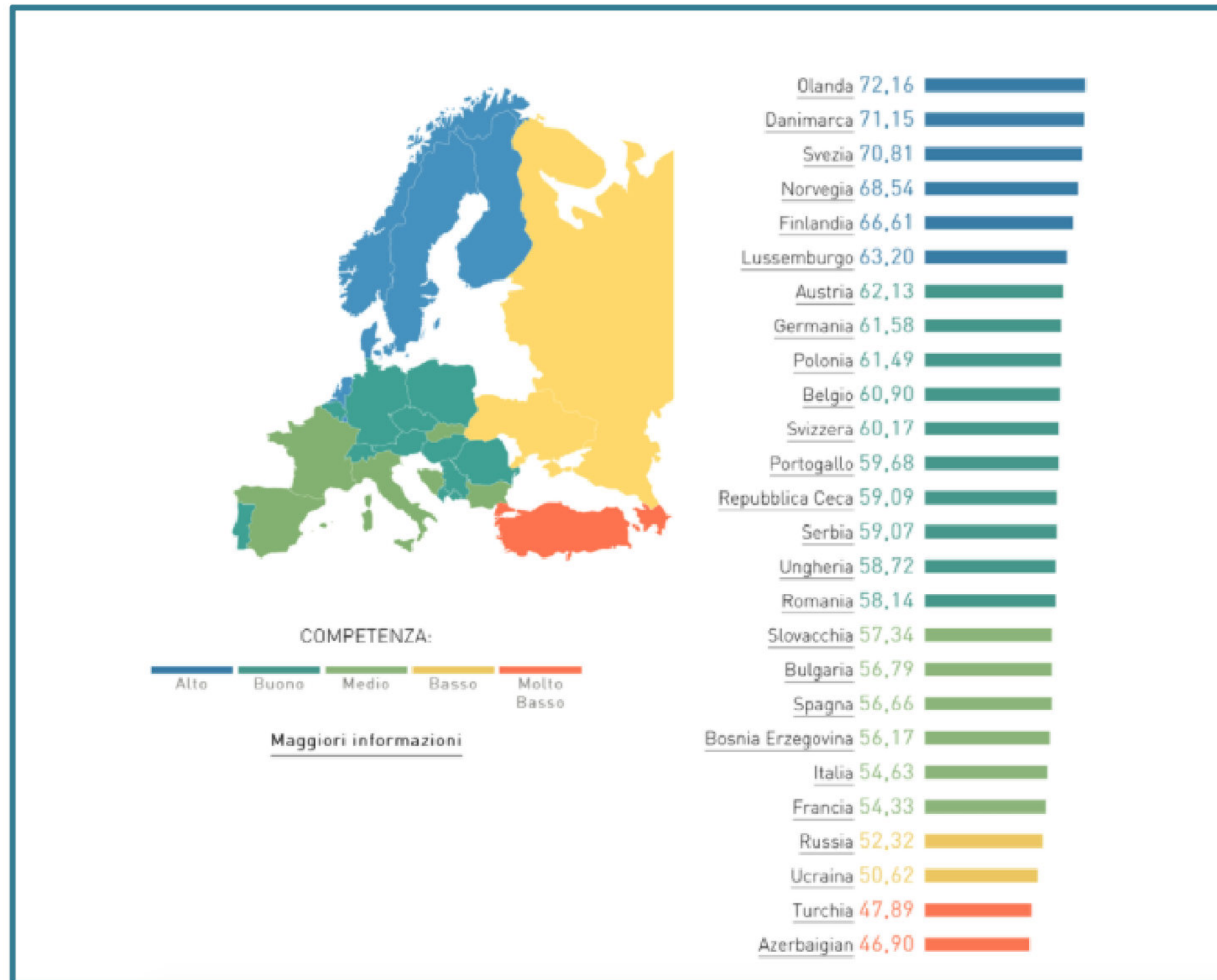
Italia al top per numero di lingue insegnate alle medie: 98% degli adolescenti ne studia due, ma solo 16 su 100 poi le sanno usare. I pedagogisti: «Non vanno abbandonate alle superiori». E per impararle bene, video e testi in originale

di Antonella De Gregorio

14
4880

Febbraio 2016

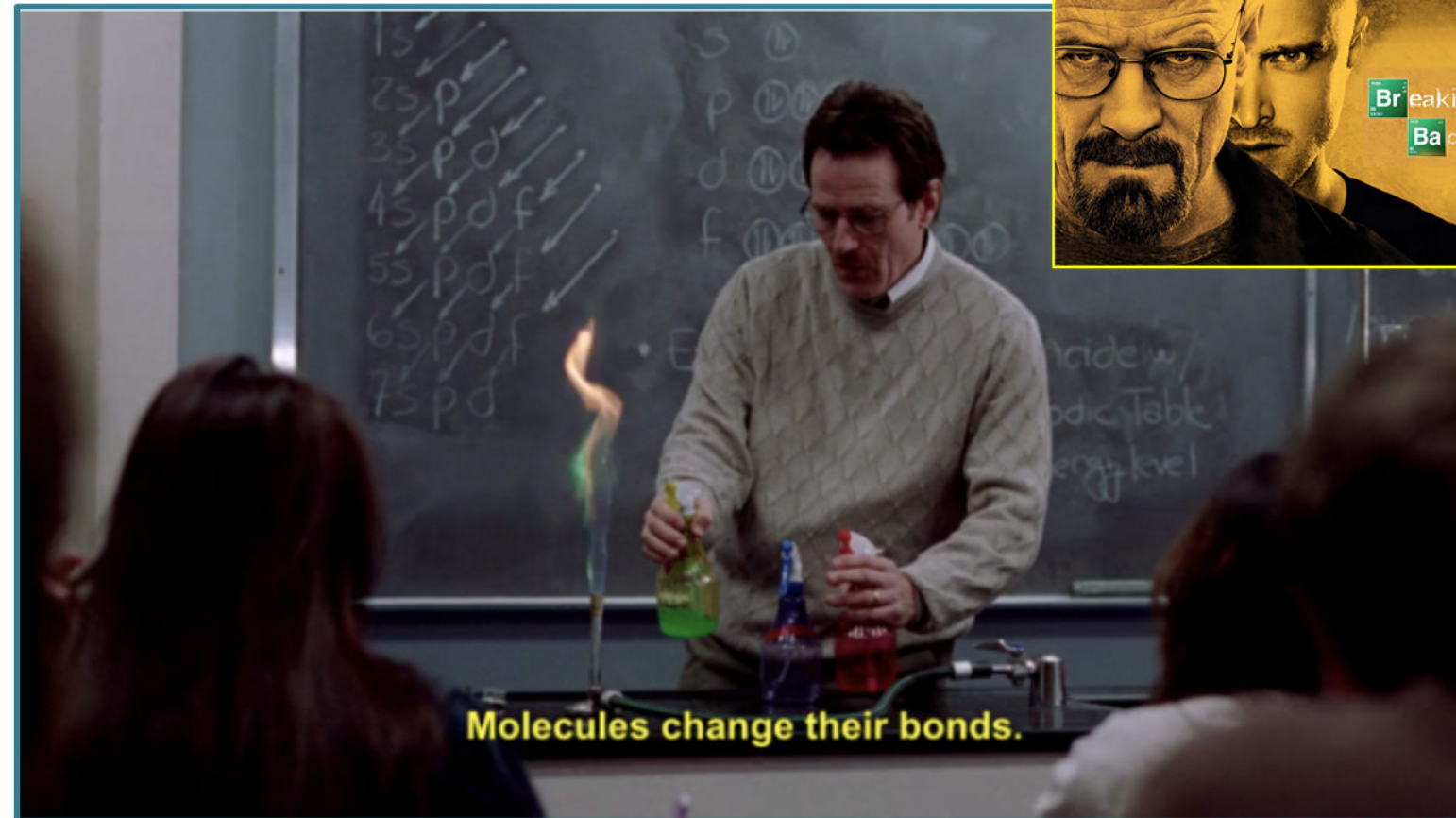
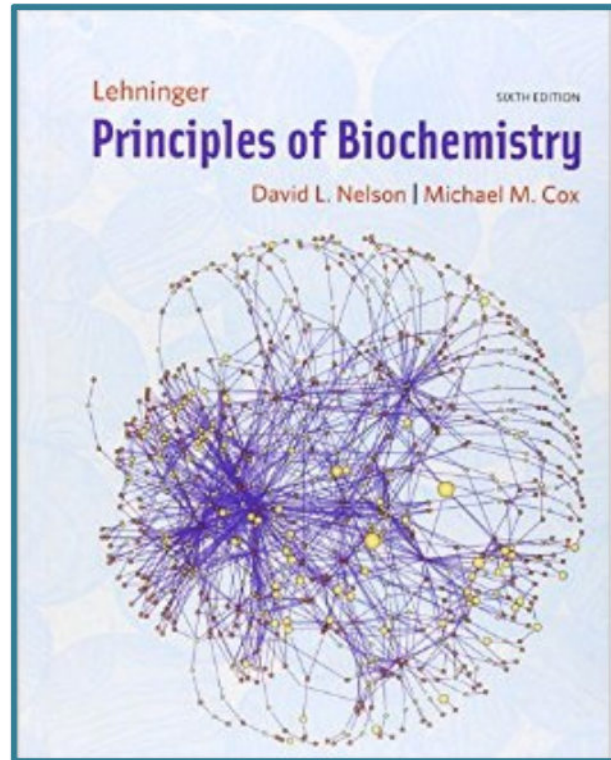
What's wrong with us?



What's wrong with us?

“Se confrontiamo il nostro Paese con Svezia, Olanda e Danimarca – le regine della classifica EF EPI, che da dieci anni misura la competenza dell’inglese degli adulti nel mondo – usciamo dal confronto appiattiti nella mediocrità: 28esimi su 70, tra la Corea del Sud e il Vietnam, e tra i più scarsi del Continente. **Le ore scolastiche dedicate all’insegnamento delle lingue straniere sono simili, ma i paesi nordici eccellono perché l’immersione nell’idioma inizia fin da piccoli, con i cartoni animati non doppiati.** Poi arrivano i film in lingua originale, i siti web consultati in inglese, i viaggi. Anche il contesto familiare fa la sua parte: se sono papà e mamma a dare l’esempio, ascoltando in originale tutto ciò che si può, leggendo libri in inglese, nei piccoli si sviluppa una sensibilità diversa alle lingue. «I ragazzi italiani brillano tutt’al più per la grammatica, ma sono indietro nell’orale: conversazione e ascolto», dice Natalia Anguas, amministratore delegato di EF Italia. **Il metodo pedagogico incide: i danesi, per dire, imparano soprattutto a parlare, applicando la lingua a situazioni reali.**”

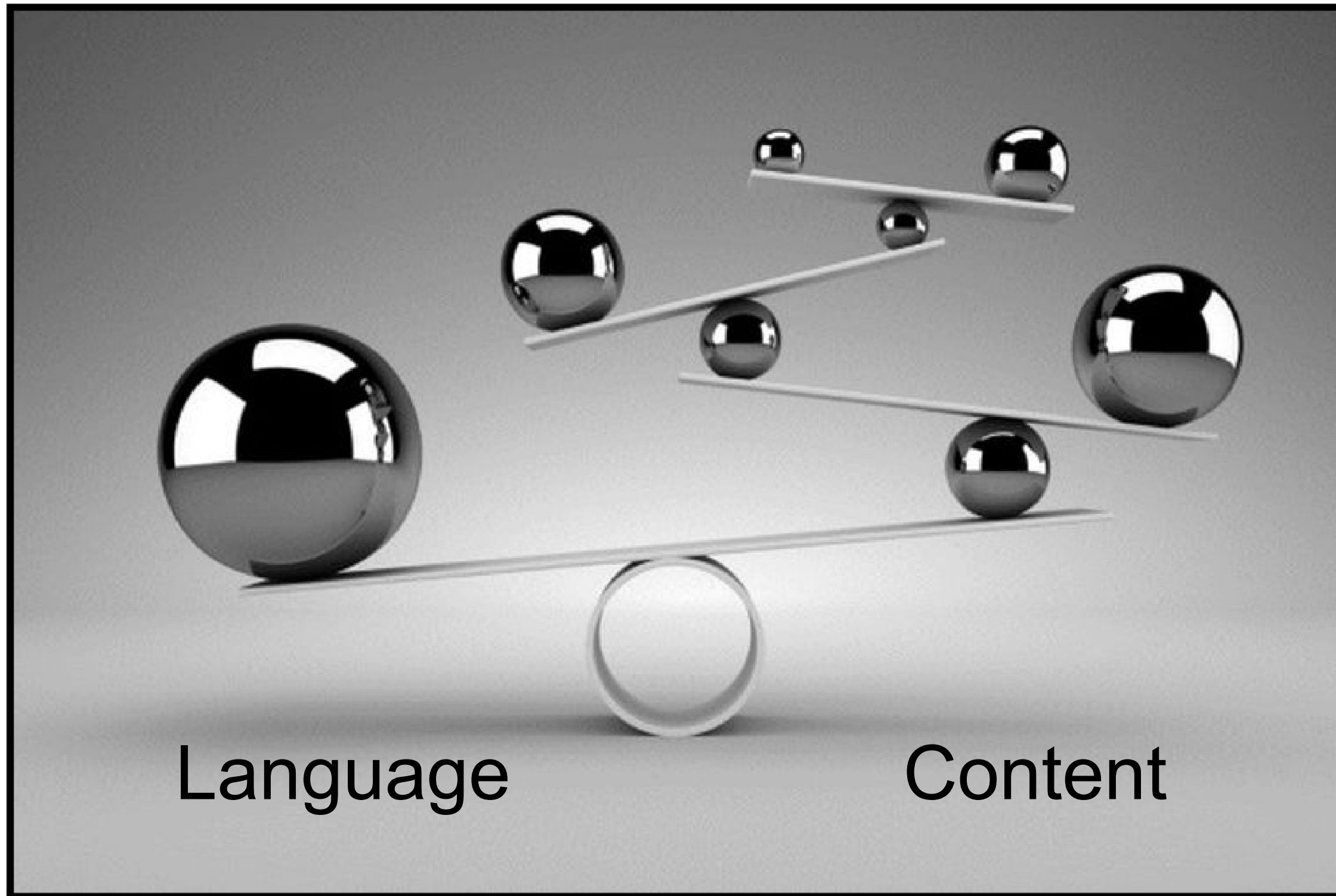
What's wrong with us?



CLIL is the answer



A matter of equilibrium: CLIL

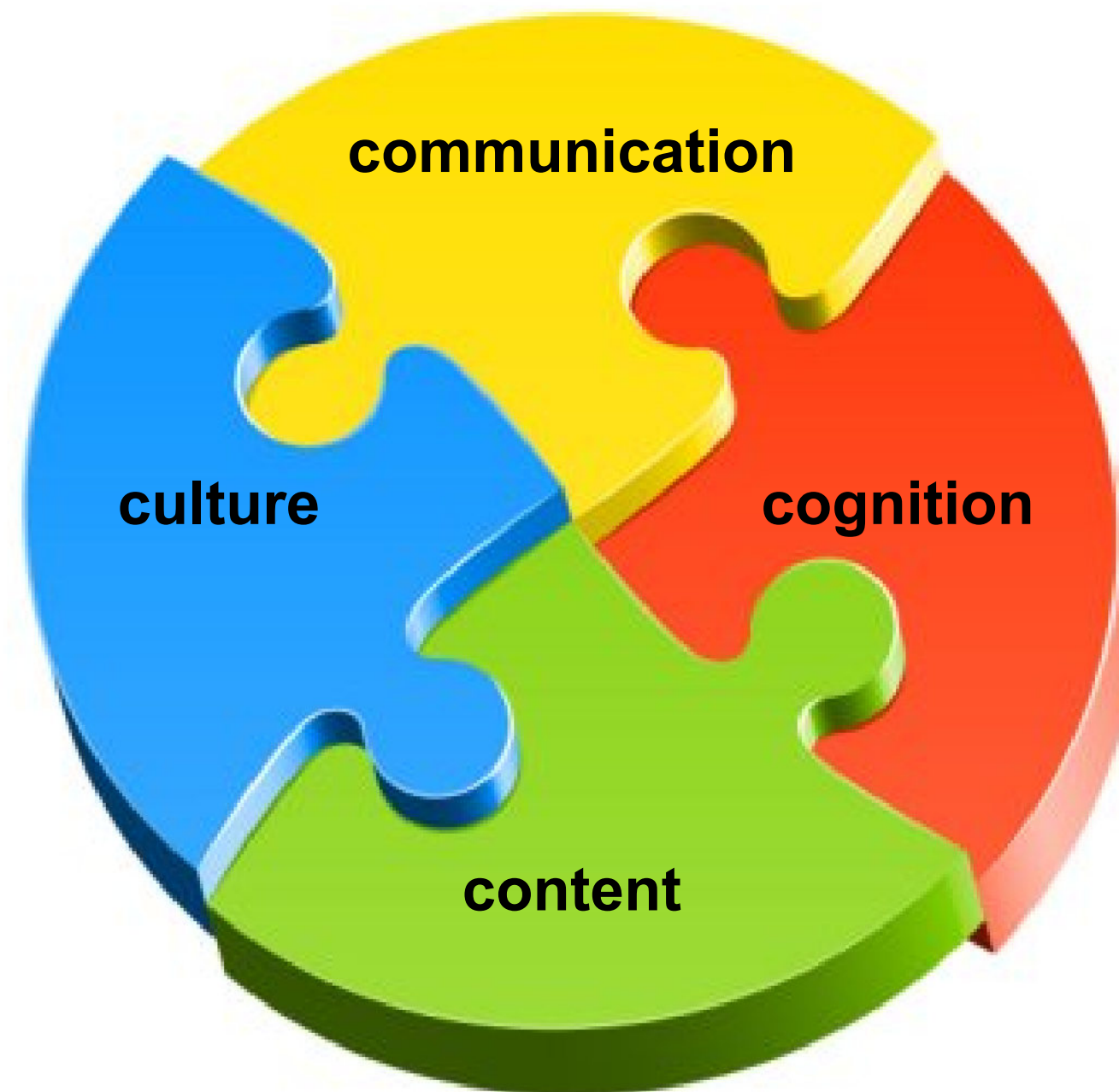


Keep in mind!

- Effectiveness more than correctness.
- L2 interaction.
- Dual focused lessons.
- Authentic communication.
- Fluency more than grammar.
- Active learning.




The 4 C's model



CLIL: lesson planning

To Do List



- 1.) Make a to do list
- 2.) Check off first item
- 3.) Realize you already did 2 things on the list
- 4.) Reward yourself with a nice, long nap

CLIL: lesson planning

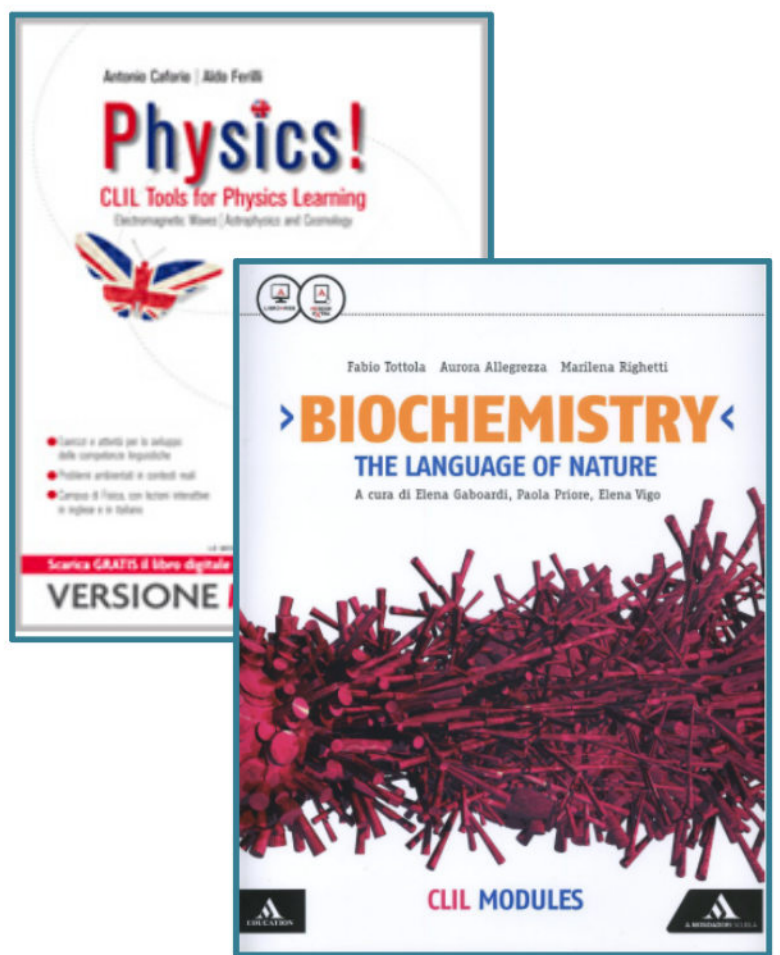
To Do List

- q Contenuti
- q Obbiettivi
- q Profilo della classe
- q Criteri di valutazione
- q Articolazione delle 4C
- q Procedure e interazioni
- q Risultati osservabili
- q Tempistica
- q Problemi e soluzioni previste
- q Risorse
- q Attività

CLIL: lesson planning

1 Selezionare un argomento del curricolo in base alle risorse disponibili

libri



articoli



multimedia



Semplificare il complesso: l'approccio CLIL alle biotecnologie



Un po' di risorse online



Semplificare il complesso: l'approccio CLIL alle biotecnologie

CLIL: lesson planning

- 2 Realizzare una presentazione che rappresenti una guida e su cui tenere traccia della scansione degli argomenti



Prezi



Creazione Video e Presentazioni Animate



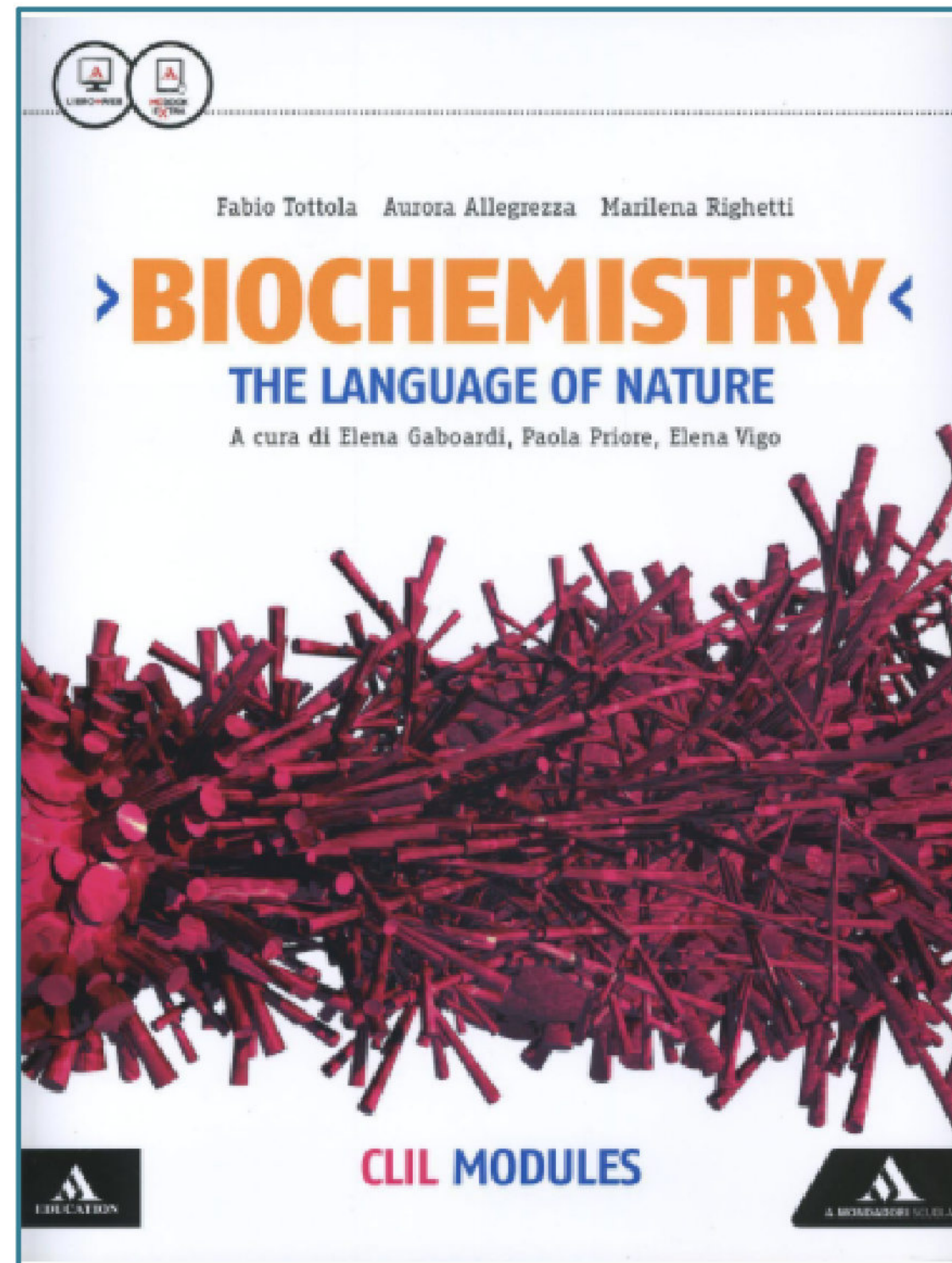
Flipping CLIL



"This isn't what I imagined when they said 'flipped classroom'!"

Proposta indecente? Dipende dalla classe

CLIL modules



Semplificare il complesso: l'approccio CLIL alle biotecnologie

CLIL & Biotech: a perfect marriage

UNIT 3

From the double helix to the genome

› **Knowledge**

- plasmids
- recombinant DNA
- genetic sequencing
- genomic libraries
- genomics and epigenomics

› **Skills**

- know the role of restriction enzymes
- explain how DNA is duplicated using PCR
- illustrate the new methods used for the isolation and identification of genes
- know how the study of gene function is determined
- describe what gene silencing consists of

CLIL: always take a look around

Spesso la realtà fornisce spunti interessanti...

The screenshot shows the top portion of a New York Times article. The navigation bar includes 'SECTIONS', 'HOME', 'SEARCH', 'The New York Times', 'SUBSCRIBE NOW', and 'LOG IN'. The article is categorized under 'U.S.' and has the headline 'Stop Bashing G.M.O. Foods, More Than 100 Nobel Laureates Say' by NIRAJ CHOKSHI, dated JUNE 30, 2016. Social media sharing icons for Facebook, Twitter, Email, and Print are visible. The main image shows a person in a pink shirt and white hat working in a field of green cabbages. To the right of the main image is an advertisement for I23RF with the text 'Le immagini di cui hai bisogno, al prezzo che ami!' and a 'Scopri Ora' button.

CLIL: always take a look around

Spesso la realtà fornisce spunti interessanti...

Laureates Letter Supporting Precision Agriculture (GMOs)



To the Leaders of Greenpeace, the United Nations and Governments around the world

The United Nations Food & Agriculture Program has noted that global production of food, feed and fiber will need approximately to double by 2050 to meet the demands of a growing global population. Organizations opposed to modern plant breeding, with Greenpeace at their lead, have repeatedly denied these facts and opposed biotechnological innovations in agriculture. They have misrepresented their risks, benefits, and impacts, and supported the criminal destruction of approved field trials and research projects.

We urge Greenpeace and its supporters to re-examine the experience of farmers and consumers worldwide with crops and foods improved through biotechnology, recognize the findings of authoritative scientific bodies and regulatory agencies, and abandon their campaign against "GMOs" in general and Golden Rice in particular.

Scientific and regulatory agencies around the world have repeatedly and consistently found crops and foods improved through biotechnology to be as safe as, if not safer than those derived from any other method of production. There has never been a single confirmed case of a negative health outcome for humans or animals from their consumption. Their environmental impacts have been shown repeatedly to be less damaging to the environment, and a boon to global biodiversity.

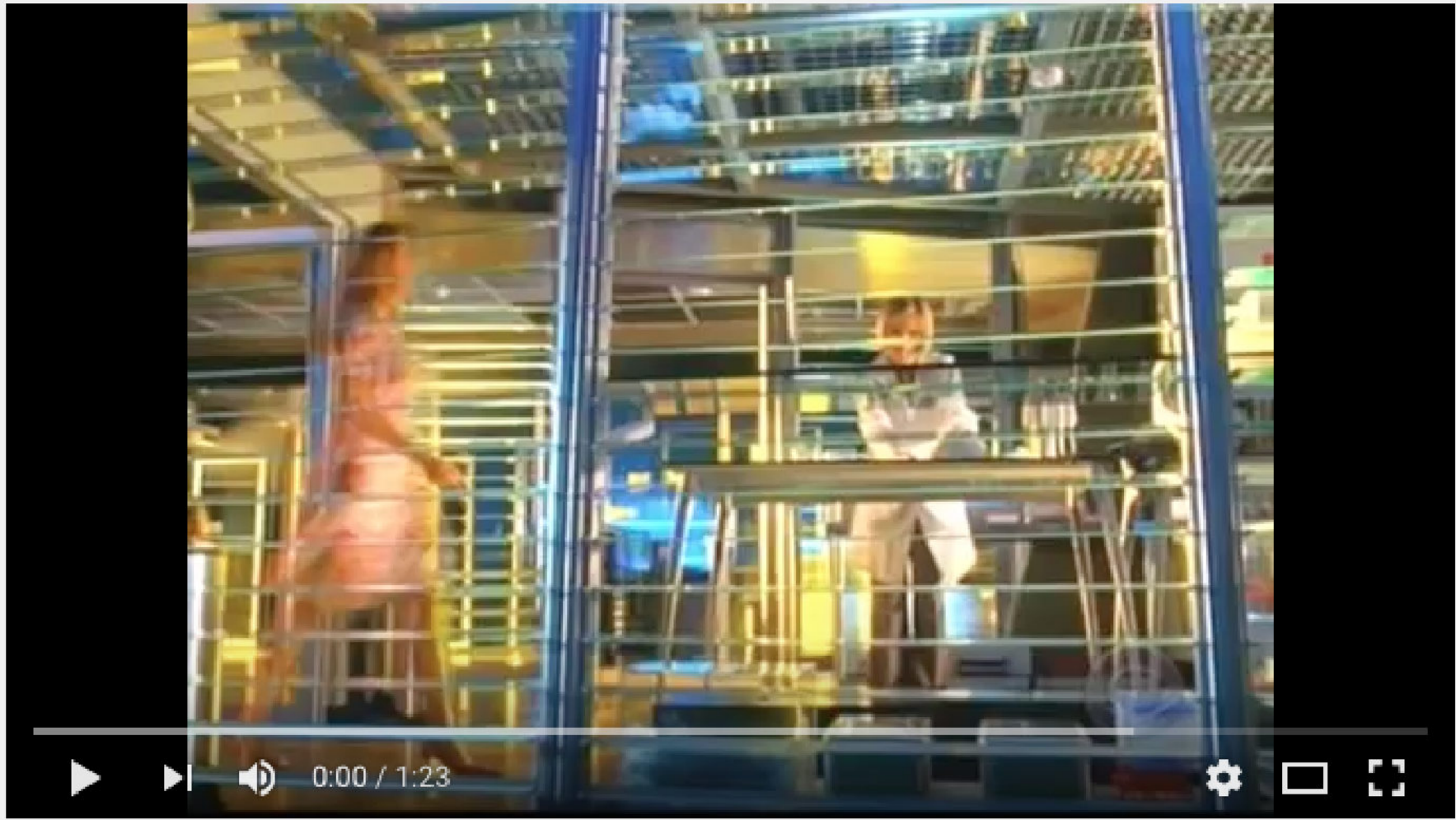
Greenpeace has spearheaded opposition to Golden Rice, which has the potential to reduce or eliminate much of the death and disease caused by a vitamin A deficiency (VAD), which has the greatest impact on the poorest people in Africa and Southeast Asia.

The World Health Organization estimates that 250 million people, suffer from VAD, including 40 percent of the children under five in the developing world. Based on UNICEF statistics, a total of one to two million preventable deaths occur annually as a result of VAD, because it compromises the immune system, putting babies and children at great risk. VAD itself is the leading cause of childhood blindness globally affecting 250,000 - 500,000 children each year. Half die within 12 months of losing their eyesight.

WE CALL UPON GREENPEACE to cease and desist in its campaign against Golden Rice specifically, and crops and foods improved through biotechnology in general;

CLIL: always take a look around

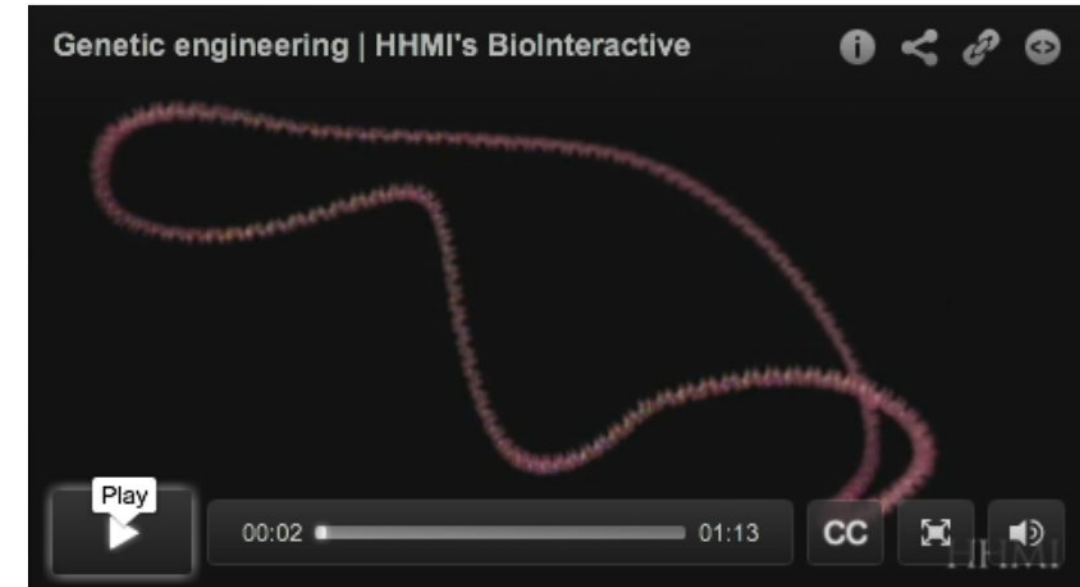
Spesso la realtà fornisce spunti interessanti...



The image shows a screenshot of a YouTube video player. At the top left, there is a menu icon and the YouTube logo. To the right is a search bar with the text 'Cerca'. The video player itself shows a scene from the TV show CSI: PCR. The scene is set in a modern, brightly lit laboratory or office environment. A person in a white lab coat is standing behind a counter, looking towards the camera. Another person in a pink dress is standing to the left, looking away. The video player has a progress bar at the bottom showing '0:00 / 1:23' and various control icons like play, volume, settings, and full screen.

CSI PCR in 60 seconds: BS

Recombinant DNA: video



ACTIVITY 2 LISTENING SPEAKING

Watch this short video on genetic engineering:

 <http://goo.gl/OD8K62>

Then, working in groups of three or four, complete the sentences below with the correct option explaining the reason for your choice.

1. Recombinant DNA is DNA that...
 - a. is made from two or more sources.
 - b. is likely to combine with other DNA sequences.
 - c. has been copied artificially for use in the laboratory.
 - d. has repetitive sequences that can be used to locate a particular gene.
2. A plasmid is...
 - a. a type of enzyme that is used in cloning.
 - b. a small, linear segment of DNA.
 - c. a small ring of DNA that is usually found in bacteria.
 - d. a gene from another organism that is targeted for cloning.
3. Restriction enzymes...
 - a. restrict all DNA sequences except those that are desired for combination, which are then "glued" together with different enzymes.
 - b. create new sequences of nucleotides that are used to "glue" two different strands together.
 - c. cut specific sequences on different DNA strands in a way that produces "sticky ends", which are complementary.
 - d. make a copy of one of the two different DNA strands. Special ends are then made and attached to the two DNA strands to stick the two strands together.

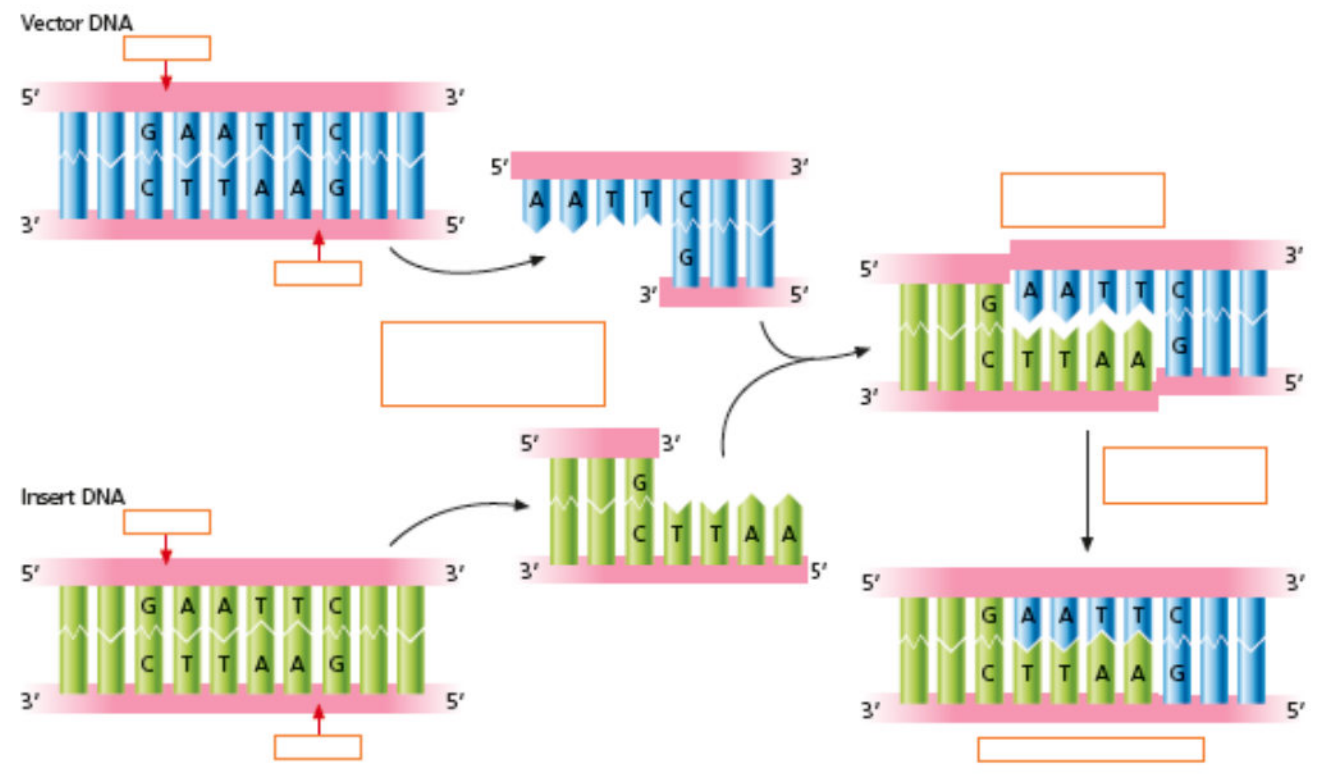
Recombinant DNA: interactive presentation

ACTIVITY 5 VOCABULARY

Watch this interactive presentation on cutting and pasting DNA:

<https://goo.gl/zRpFUu>

Then, working in pairs complete the figure below with the correct labels and captions.



CSH Cold Spring Harbor Laboratory | CSHL Home | About CSHL | Research | Education | News & Features | Campus & Public Events | Careers | Giving

DNA Learning Center

Home | Preparing students and families to thrive in the gene age

PROGRAMS | WEBSITES | RESOURCES | ABOUT | Search this site & DNALC media...

Website Search

ID 15917

Cutting and pasting DNA

Restriction enzymes are sequence specific. They recognize and bind to specific DNA sequences. *EcoRI* for example, binds to the sequence GAATTC.

Click to continue

DNA-interactive

Description: The discovery of enzymes that could cut and paste DNA made genetic engineering possible. Restriction enzymes, found naturally in bacteria, can be used to cut DNA fragments at specific sequences, while another enzyme, DNA ligase, can attach or rejoin DNA fragments with complementary ends.

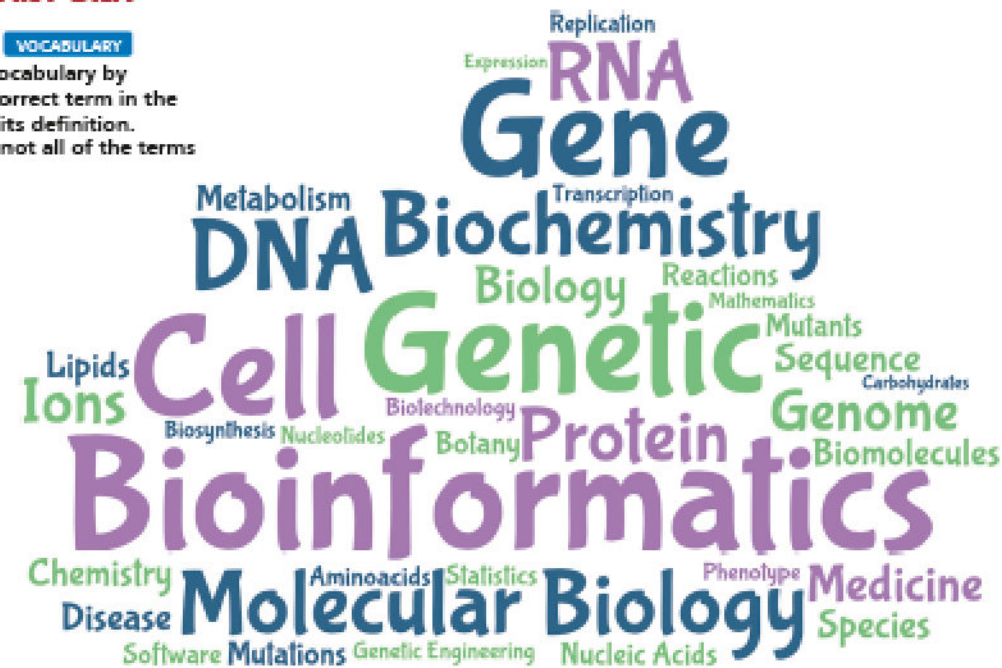
Recombinant DNA: Mind map & Tag cloud

CLIL activities

RECOMBINANT DNA

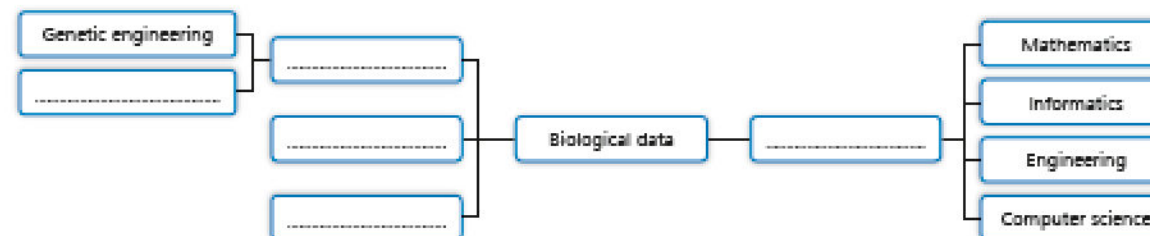
ACTIVITY 1 VOCABULARY

■ A Test your vocabulary by matching the correct term in the tag cloud with its definition. But be careful, not all of the terms are matched!



1. investigates the molecular basis of the processes of DNA replication, RNA transcription and protein translation.
2. focuses on the study of the role, function, and structure of biomolecules.
3. is the study of the effect of genetic differences on organisms.
4. is a computational science using the datasets obtained by other biological disciplines to study e.g. gene function.
5. is a set of technologies used to change the genetic makeup of cells.
6. is the use of biological processes, organisms, or systems to manufacture products intended to improve the quality of human life.
7. is a union of genomic sequences encoding a coherent set of potentially overlapping functional products.
8. is an organism's complete set of genetic instructions.

■ B In pairs, complete the gaps in the mind map using the key terms defined in A. Can you insert in the mind map additional key terms of the tag cloud?



CLIL activities

Recombinant DNA: Tables

ACTIVITY 3 **LEARNING BY DOING**

The table below shows some restriction enzymes and their cutting sequences. Complete the missing information following these instructions:

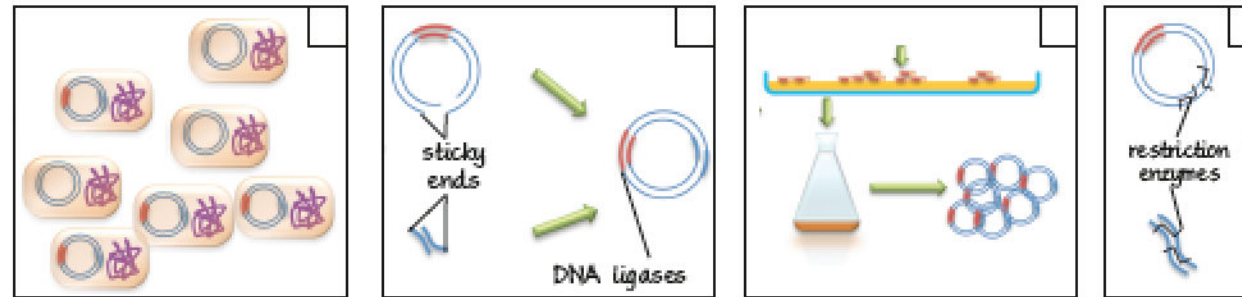
1. do an Internet search to find the microorganisms the enzymes were isolated from;
2. complete the palindromic sequence of each restriction site;
3. specify the type of ends obtained by the restriction cut (sticky/blunt).

Microrganism							
Enzyme	TaqI	HhaI	HindIII	EcoRI	EcoRV	SmaI	NotI
Restiction site	5' T 3' AGC	5' GCG 3' C	5' A 3' TTCGA	5' G 3' CTTAA	5' GAT 3' CTA	5' CCC 3' GGG	5' GC 3' CGCCGG
End type							

Recombinant DNA: Visual Flow Diagrams

ACTIVITY 10 PROBLEM SOLVING SPEAKING

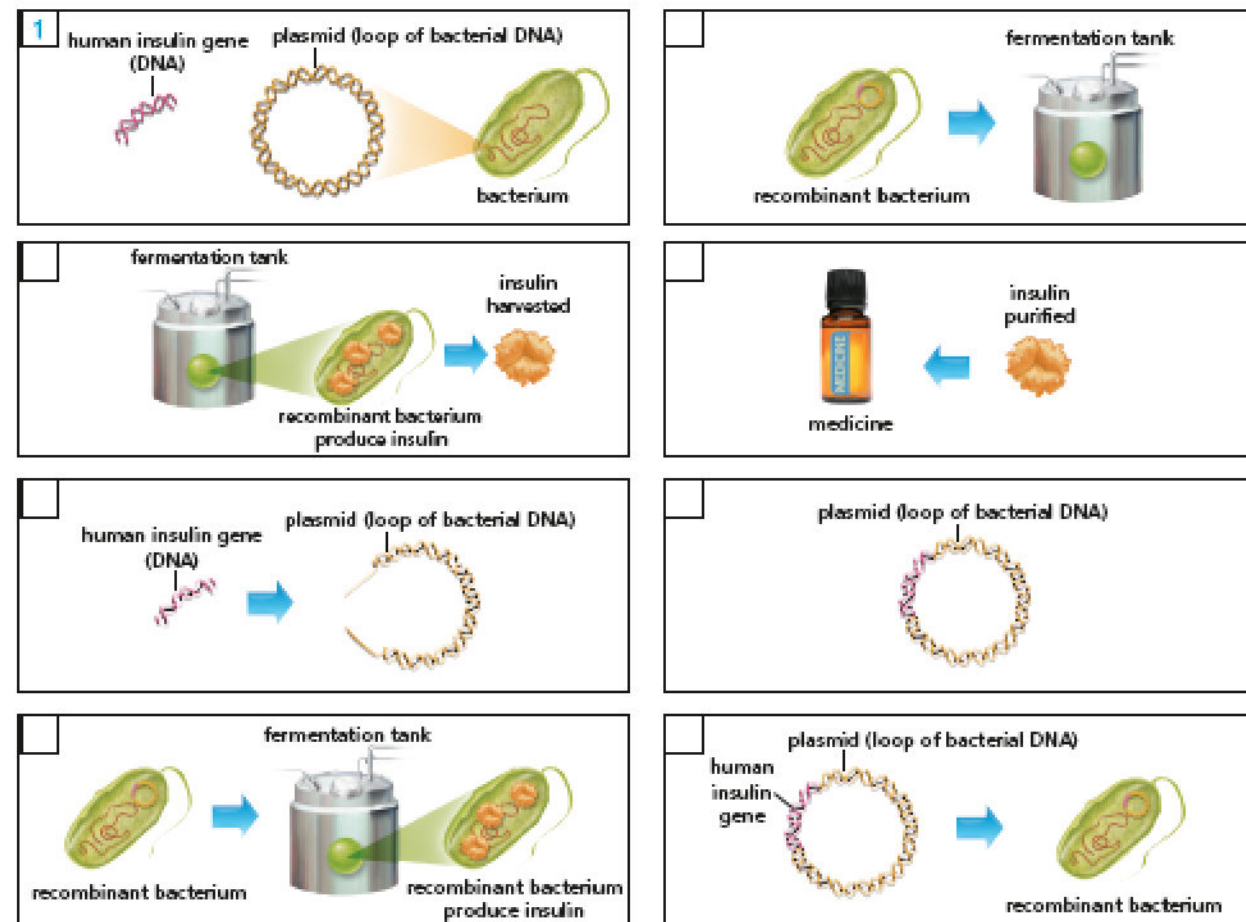
A Look at the drawings below. Working in small groups put each box in the right sequence to create a flow chart on cloning, then complete each step with a caption to explain the process.



B Read the following example of applied DNA recombinant technology. Then, working in groups, formulate one or more hypotheses to explain how this was achieved.

Synthetic human insulin was the first golden molecule of the biotech industry and the direct result of recombinant DNA technology. Currently, millions of diabetics worldwide use synthetic insulin to regulate their blood sugar levels.

C After having formulated your hypotheses, put the following panels in the correct sequence to obtain the correct explanation.



Recombinant DNA: debate

ACTIVITY 11 DEBATE

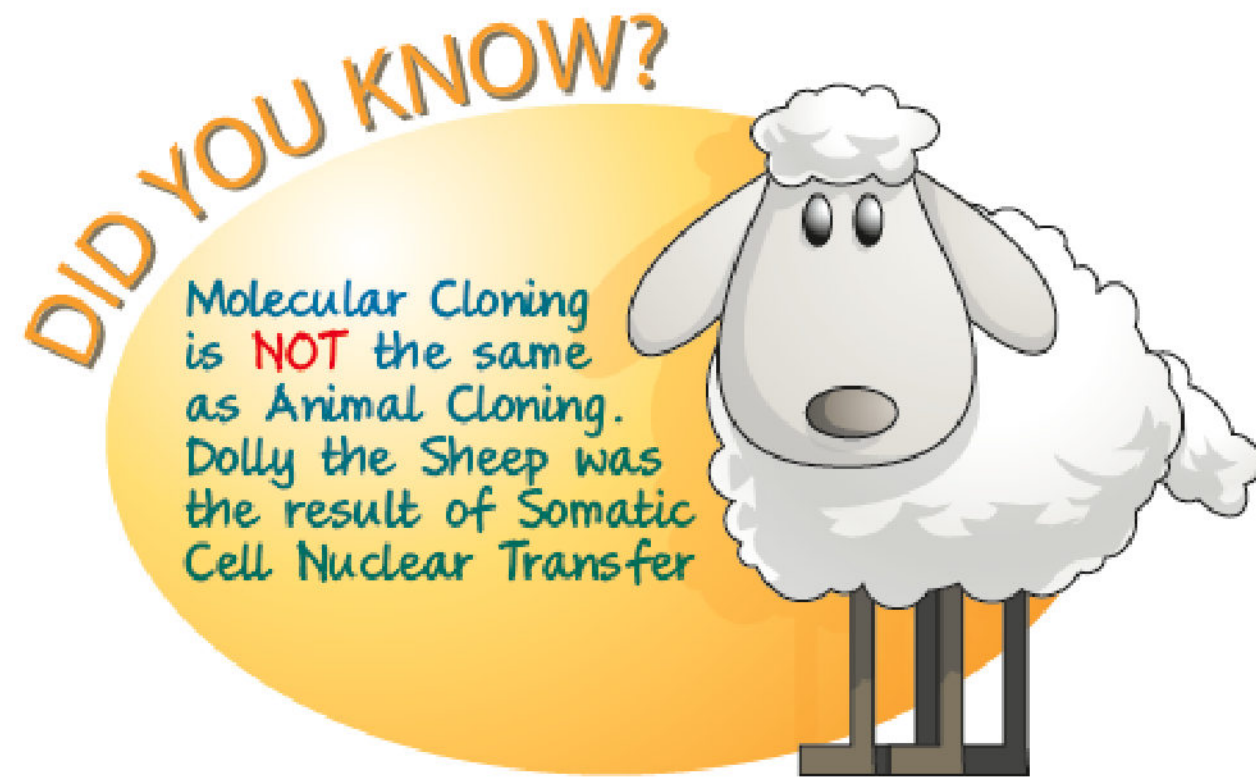
Working in groups of three or four, reflect on the meaning of this sentence that appeared in an educational infographic on cloning:

“Molecular cloning IS NOT the same as animal cloning...”

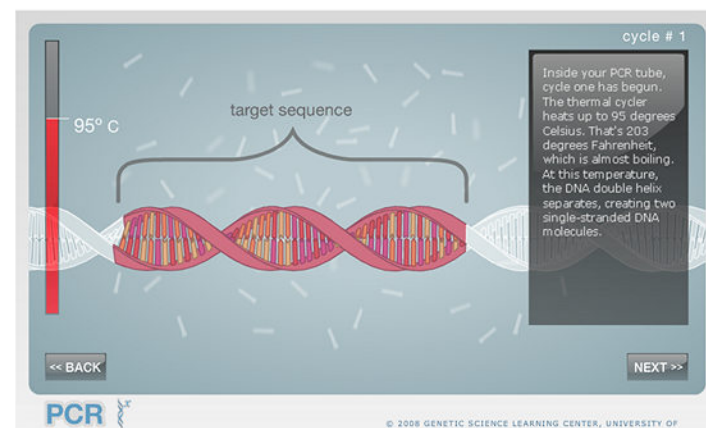
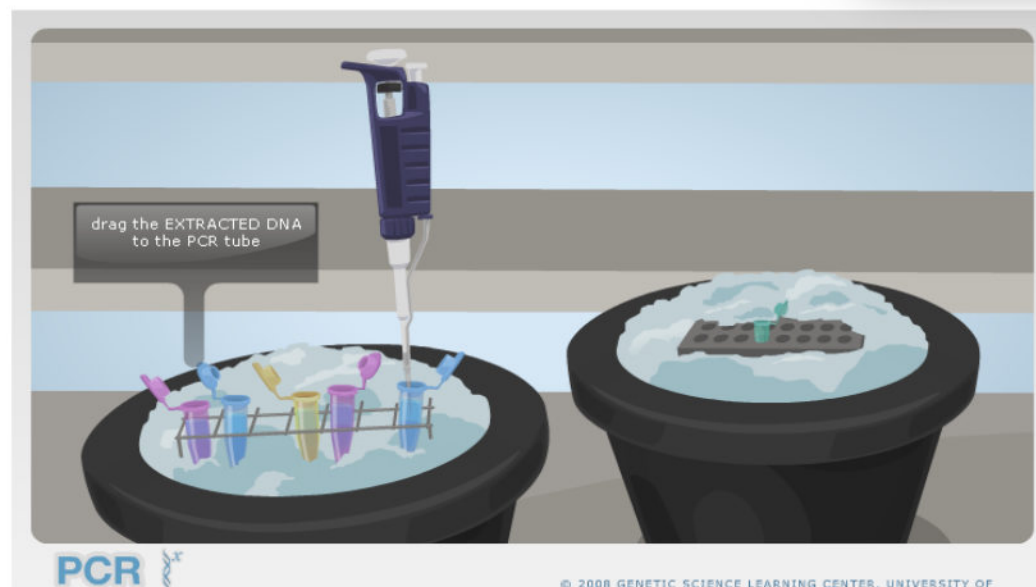
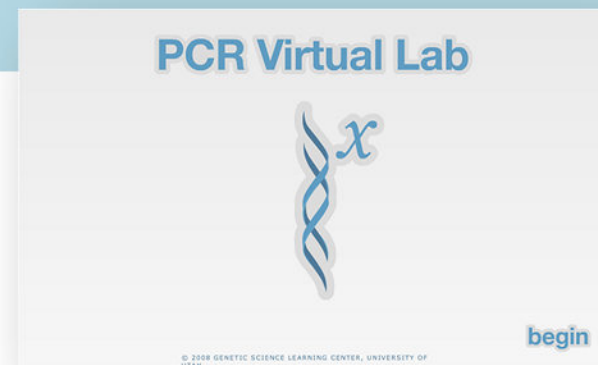
Think about:

- the meaning of cloning (ask different people “what does cloning mean”? What is the most common opinion?);
- animal cloning vs molecular cloning;
- the number of clones that a transformed bacterium could yield in 24h;
- the representation of cloning in films.

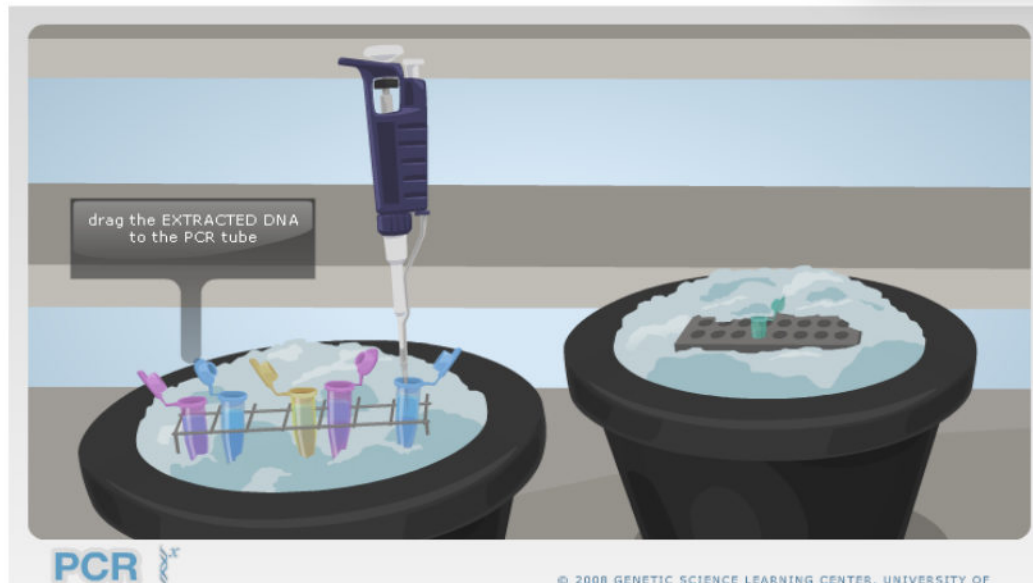
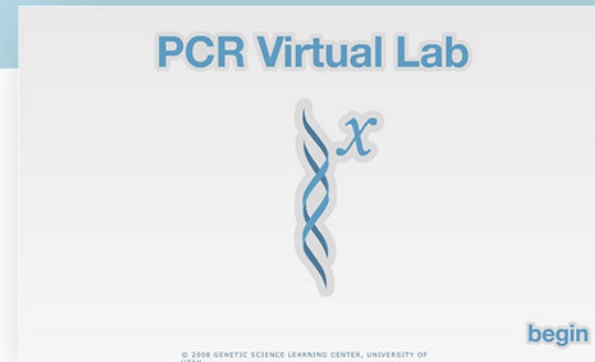
Use the school library and the Internet to gather further information, distributing tasks among group members. Then start a plenary discussion in the classroom to share your research.



PCR: virtual lab



PCR: virtual lab



ACTIVITY 2 LEARNING BY DOING

Play the virtual lab on PCR:

 <http://goo.gl/25Fdko>

Then decide if the following statements are true or false. If false, correct them.

1. Primers are target DNA for PCR amplification. TF
2. To perform a PCR a very big amount of template DNA is needed. TF
3. Test tubes for PCR are heat-sensitive. TF
4. Two primers are necessary to amplify the target region. TF
5. The thermocycler is essential for PCR automation. TF
6. In the first PCR cycle only the target region is doubled. TF
7. In the fifth PCR cycle the desired fragment is amplified into 25 copies. TF

PCR: Tag Cloud & Word Puzzle

CLIL activities

PCR

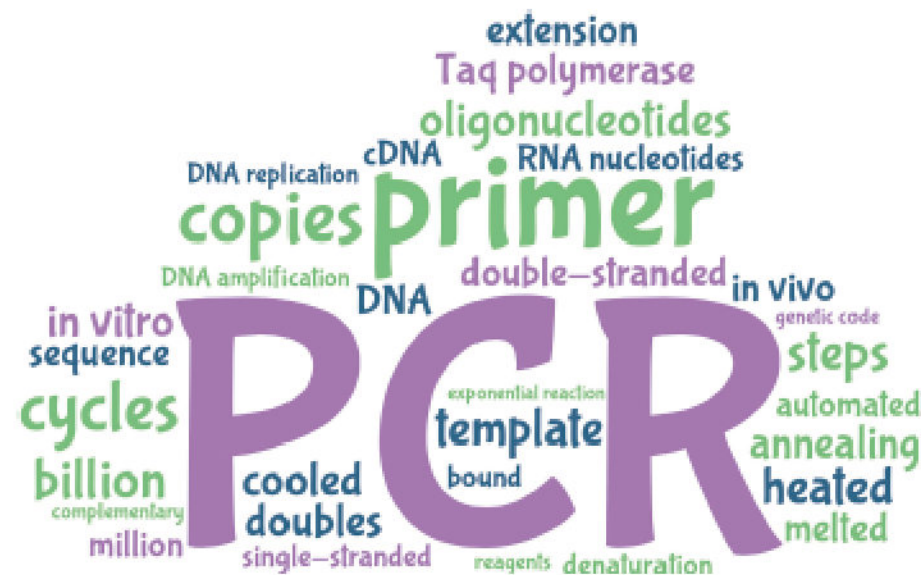
ACTIVITY 1 VOCABULARY

A Test your vocabulary by matching the correct term, hidden in the word puzzle, with its definition.

- is the second step of a PCR cycle in which the two primers bind the appropriate complementary strand.
- is the first step of a PCR cycle in which the double-stranded DNA is separated into two DNA chains.
- is the monomer, or single unit, of DNA.
- is the third step of a PCR cycle in which the polymerase extends the primer to form a nascent DNA strand.
- is a method to rapidly amplify sequences of DNA.

S G A E J B O B A Y O D W Z L L K S O
 B Y R C V T F V O L E M S F T N B H J
 D E O X Y R I B O N U C L E O T I D E
 S U C I T A U Q A S U M R E H T Z C G
 S R M T A B V T I M M C E X H N Y X Q
 L C D O H B U Z S R L M L T P T C A F
 B U K S X R W O I D A N N E A L I N G
 E H U S A A J G X F V A H N O N Y W D
 J C M T L L E M U N Z F O S U T D U J
 C T I X B C V R A N Q I A I T T I S Z
 H O A N X P C R R I O I Y O S K H D W
 N D E A B D H S A E L O V N V K H E E

B Working in pairs, fill the gaps with the words that you can find in the tag cloud.



..... is an efficient and cost-effective way to amplify small segments of DNA or RNA. Using PCR, millions of of a section of DNA are made in just a few hours, yielding enough DNA required for analysis. Though PCR occurs, it is based on the natural process of

There are three clear in each PCR that approximately doubles the amount of target DNA. This is an so more

than one copies of the DNA are generated in 30 to 40 PCR cycles. The first step of PCR is called, the second phase is the and the third one is called

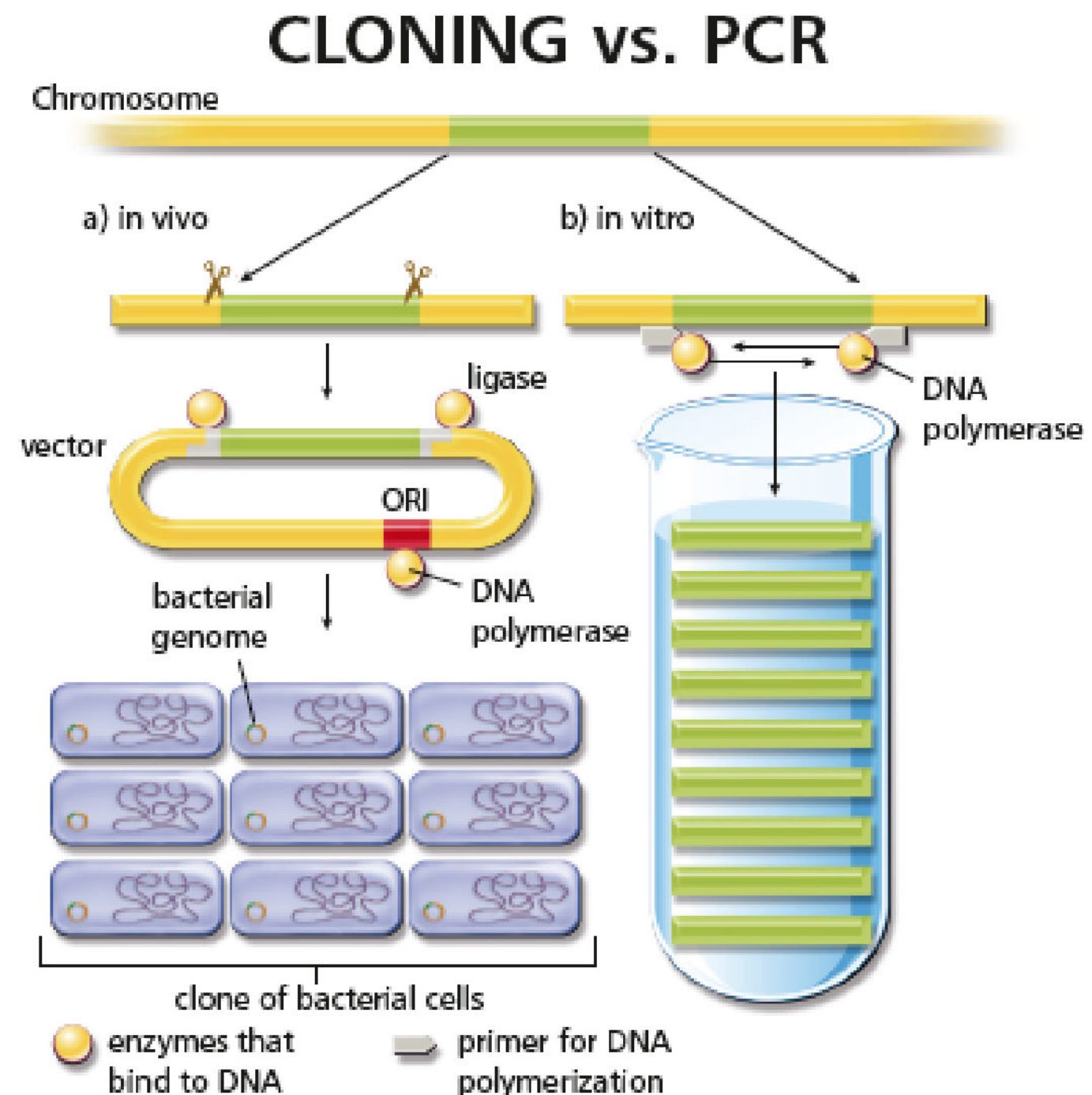
After making two copies of the DNA through PCR, the cycle begins again, this time using the new duplicated DNA. Because the PCR process is, it can be completed in just a few hours.

CLIL activities

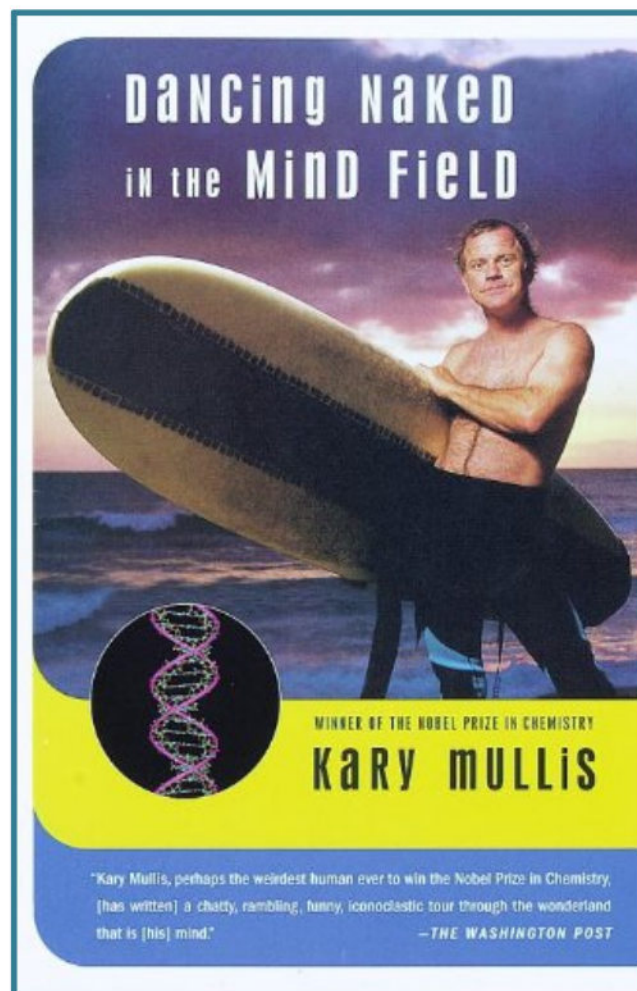
PCR: picture analysis

ACTIVITY 6 COOPERATIVE LEARNING

Working in pairs, look at the picture and, with the help of the school library and the Internet, try to find similarities and differences between the two molecular techniques (also in terms of technical application). Compare your findings with those of your classmates.



PCR: science, technology & scientists



ACTIVITY 8 READING WRITING LISTENING

■ **A** Read the following text from *History of PCR*, where Paul Rabinow quotes Kary Mullis as saying:

«The thing that was the “Aha!”, the “Eureka!” thing about PCR wasn’t just putting those [things] together... the remarkable part is that you will pull out a little piece of DNA from its context, and that’s what you will get amplified. That was the thing that said, “you could use this to isolate a fragment of DNA from a complex piece of DNA.” That was what I think of as the genius thing... In a sense, I put together elements that were already there... You can’t make up new elements, usually. The new element, if any, was the combination, the way they were used... The fact that I would do it over and over again, and the fact that I would do it in just the way I did, that made it an invention... the legal wording is “presents an unanticipated solution to a long-standing problem,” that’s an invention and that was clearly PCR.»

■ **B** Then, watch this video where Kary Mullis explain his concept of scientific research:

 <https://goo.gl/ldBwpg>

■ **C** From these starting points, working in small groups do an Internet search and find out more about:

- the birth of the scientific method;
- the difference between “invention” and “discovery”;
- the relationship between philosophy and science;
- the role of scientists in our society.

Write a short text on your findings and give a brief presentation to the classroom.

Assessment

- Si dovrebbe porre attenzione alla valutazione sia della lingua che del contenuto considerando tutti gli obiettivi della lezione CLIL che coinvolgono competenze, conoscenze, abilità, atteggiamenti e comportamenti.
- Utilizzare una griglia che elenchi i criteri da valutare suddivisi in colonne per ogni grado. In ogni cella si trovano degli indicatori che quantificano ciò che lo studente deve fare per raggiungere il livello richiesto.
- La struttura dello schema dipende da come l'insegnante vuole usarlo per motivare gli studenti e aiutarli a raggiungere gli obiettivi con successo.

Assessment

Dalla guida CLIL (in italiano!) di Clil4U
www.languages.dk



Assessment



CREATIVITA'

Criteria	4 - eccellente	3 - buono	2 - sufficiente	1- insufficiente
Originalità nella preparazione ed esecuzione di grafici e di altri materiali visivi	Lo studente ha almeno tre idee di progetto originali ed è in grado di preparare il relativo materiale visivo	Lo studente ha almeno due idee di progetto originali ed è in grado di preparare il relativo materiale visivo	Lo studente ha almeno un'idea di progetto originale ed è in grado di preparare il relativo materiale visivo	Lo studente dà qualche contributo per la progettazione e la preparazione del relativo materiale visivo

Assessment



COLLABORAZIONE

Criteria	4 - eccellente	3 - buono	2 - sufficiente	1 - insufficiente
Capacità di collaborare in un'attività di gruppo	Lo studente si comporta costantemente come buon membro del gruppo, mostrando iniziativa, organizzando le attività e sostenendo tutti gli altri membri del gruppo	Lo studente si comporta spesso come buon membro del gruppo, mostrando iniziativa, organizzando le attività e sostenendo tutti gli altri membri del gruppo	Lo studente si comporta a volte come buon membro del gruppo, mostrando iniziativa, organizzando le attività e sostenendo tutti gli altri membri del gruppo	Lo studente riconosce l'appartenenza al gruppo ma si impegna poco per contribuire a realizzare il successo di gruppo

Assessment



CONTENUTO

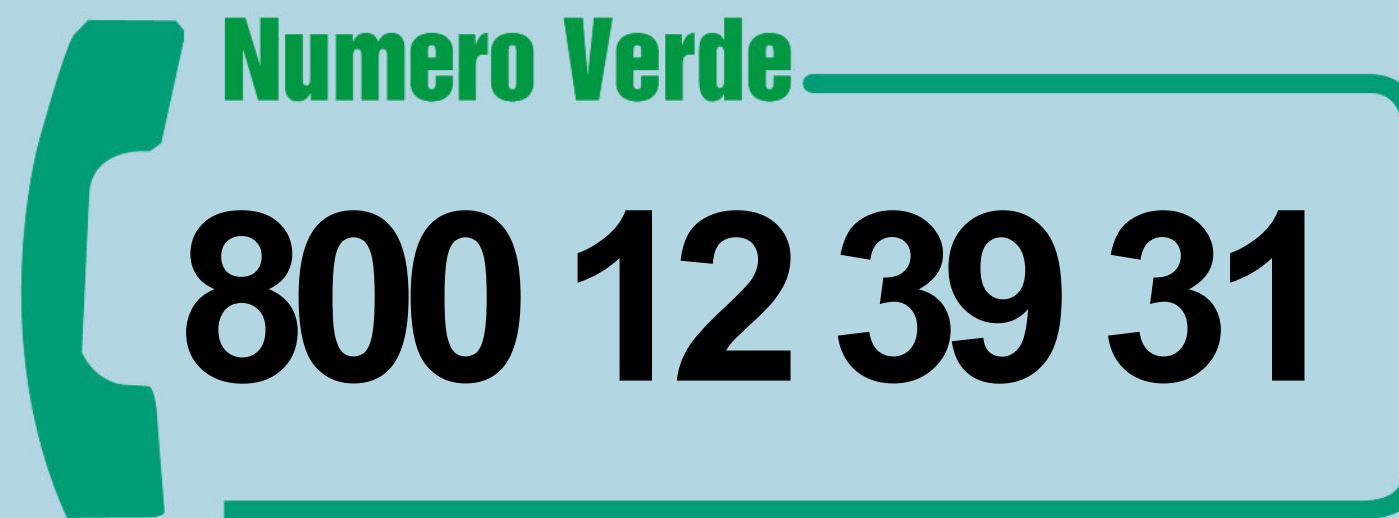
Criteria	4 - eccellente	3 - buono	2 - sufficiente	1 - insufficiente
Uso dei termini specifici nei lavori scritti	Tutti i nuovi termini sono utilizzati in modo appropriato in frasi semplici	15 nuovi termini sono utilizzati in modo appropriato in frasi semplici	10 nuovi termini sono utilizzati in modo appropriato in frasi semplici	meno di 5 nuovi termini sono utilizzati in modo appropriato in frasi semplici
Identificazione di informazioni rilevanti da diversi siti web	Identificazione di informazioni rilevanti da almeno 3 siti web	Identificazione di informazioni rilevanti da almeno 2 siti web	Identificazione di informazioni rilevanti da almeno 1 sito web	Accesso a più di un sito web ma nessuna identificazione di informazioni rilevanti

Thank you for your attention

“Tell me and I forget,
teach me and I may remember,
involve me and I learn.”

Benjamin Franklin





webinar@mondadorieducation.it

www.mondadorieducation.it