Lesson Plan

NEUROHEADWAY

Neuroscience Into Education

Lesson objective	Introduction	Main activity	Reflection	Success criteria
What is biotechnology?	Explain to children what is biotechnology, what are the DNA, the genes and the genome	Go trough the slides	Reflect on what are the implications the biotechnologies	I understand that is important a deeper analysis when a new technology appears
What is the history of biotechnology?	Ask children when they think biotechnology was born	Go trough the slides Are there other examples of technologies important for the biotechnologies? Search on Google for other examples. Some of them could be the electrophoresis, chromatography, DNA sequencing.	The use of microorganism for human purposes is very old and recently the DNA related technologies give rise to the modern biotechnology.	I know the most important steps that brought to the modern biotechnologies and I can search for others
How many types of biotechnology are present nowadays?	Biotechnology is a sector that has grown endlessly in the last 50 years and new approaches and applications are available now	Go trough the slides Search for other fields of applications for biotechnology. I.e. Dairy products, growth hormone.	Biotechnology nowadays is literally everywhere and you can use this lesson to find out which daily life products contain biotechnological products	I can identify the different types of biotechnology: industrial, medical, agricultural, bioremediation and I know which are the hottest topics

What are the new technologies to come?	Cutting edge research is producing new products and technologies which could change our life in many ways	Go trough the slides Search for other innovative research projects in areas like exobiology, cancer, immunotherapy	Biotechnologies are evolving so fast that is difficult to keep the pace, but it's a word full of surprises	I can understand how fast biotechnologies are evolving and I can search for cutting edge projects

Power point Example

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Before to start...

Biotechnology: The exploitation of biological processes for a human benefit

DNA: The molecule that harbours the informations for Life

Gene: A set of instructions coded in the DNA referring to a single function

Genome: The ensemble of ALL the genes coded into a DNA molecule

It was here since a very long time

This illustration represents Ninkasi, the goddess of the beer. Sumerians and Babylonians were able to make beer since 6000 B.C.

Beer is made using yeasts and this is a clear example of exploiting biological processes.

A fermentation technology was also used in China in the 4000 B.C.

Tailoring the DNA

The discovery of the restriction enzymes gave rise to modern biotechnology.

They can recognize specific sequences and cut the structure of the DNA.

Thanks to them, the DNA can be modified and genes can be moved from a DNA molecule to another.

The human genome project

A first draft was announced in the 2000 while the project was definitely completed in the 2003, two years in advance on the schedule.

The public consortium and the private company used two different approaches but arrived together to the goal.

The costs for the public consortium were about 3 billion dollars.

Many types of Biotechnology

Biotechnology has now different souls.

Some of the hottest fields now are:

- Biopharma
- Biofuels
- Bioremediation
- Agricultural GMO

Biofuels

The biofuel technology is a century old and was based on the same fermentation technology used to make alcohol.

This technology recently received a biotech twist.

The latest application was the use of genetically modified algae, capable of doing photosynthesis to make sugars from CO2, light and water.

These sugars can be fermented to produce different types of fuels.