

MAKALAH II
(Dr. Riza Arief Putranto)



"Seluruh gambar diatas adalah **BIOTEKNOLOGI**"

"Apakah mempelajarinya **sulit**? Ilmu langit?"

Syarat utama: **latar belakang ilmu pengetahuan biologi harus baik**

Two small images are shown at the bottom. The left one shows a person in a lab coat working in a laboratory. The right one shows people playing a game on a field.

Bioteknologi

➤ Bios (Biologi), Teuchos (Alat), Logos (Ilmu)


“Seperangkat teknik yang memanfaatkan organisme hidup atau bagian dari organisme hidup, untuk menghasilkan atau memodifikasi produk, meningkatkan kemampuan tumbuhan dan hewan, mengembangkan mikroorganisme untuk penggunaan khusus yang berguna bagi kehidupan manusia”.




Biotechnology Learning

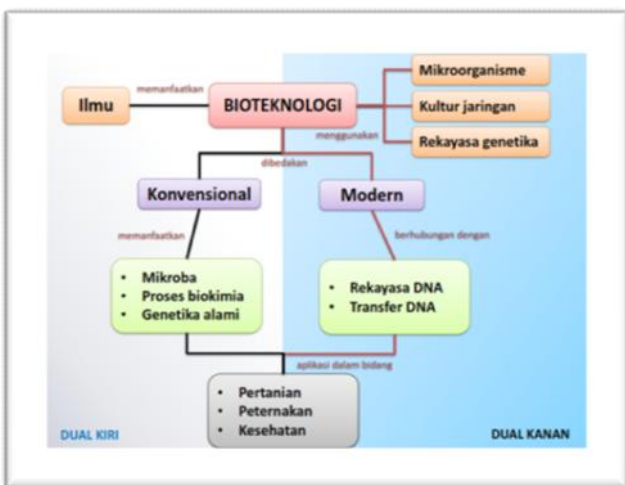
Tiga metode yang lazim digunakan pada masa sekarang ini:

1. Dual Konsep Pembelajaran
2. Pembelajaran berbasis Internet
3. Praktek lapangan



Dual Konsep Pembelajaran

“Konsep pembelajaran dengan memisahkan atau mengelompokkan dalam dua atau lebih grup. Konsep ini biasanya banyak menggunakan skema atau gambar”.

Bioteknologi Konvensional vs Modern

Konvensional	Modern
1. Memakai makhluk hidup secara langsung	1. Memakai makhluk hidup dan komponennya secara langsung
2. Tanpa didasari prinsip ilmiah	2. Menggunakan prinsip-prinsip ilmiah
3. Berdasarkan keterampilan yg diwariskan turun temurun	3. Hasil pengkajian berbagi disiplin ilmu yg mendalam
4. Tidak diproduksi secara masal	4. Diproduksi secara masal

DUAL KIRI | DUAL KANAN

Internet-based Learning

“Other good sources of information and ideas can be found on the **Internet**, using the World Wide Web and other services. ... as the main areas of study in **biotechnology**: **bioprocessing**, **foundations**, **genetic engineering**, **agriculture**, **biochemistry**, **medicine**, **environment**, and **bioethics**”.

Biotechnology Learning Hub

➤ <http://legacy.biotechlearn.org.nz/>

“The New Zealand Biotechnology Learning Hub provides **teaching resources for primary and secondary schools**. We link modern biotechnology in New Zealand to the school curriculum. The Biotechnology Learning Hub is funded by the Ministry of Business, Innovation and Employment (MBIE), and managed by the University of Waikato”.

Bioteknologi Konvensional: Cara membuat keju

- Dasar-dasar ilmu pembuatan keju
- Cara pengajaran/pembelajaran – praktik langsung membedakan beberapa macam keju, proses pembuatan

Bioteknologi Konvensional: Cara membuat keju

Home > Focus stories > Cheesemaking > Student activity: Identifying cheese characteristics

What to do

1. Start by discussing with students what they know about cheese. What is cheese? What ingredients is it made from? How is it made in base form? What are curds and whey, and how are they formed? How many different types of cheese can they name or describe?
2. Show the video clip *Characteristics of Gouda cheese* and have students list the characteristics mentioned to introduce types of characteristics and words they might use. Ask the students to describe other characteristics they have experienced in cheeses they have seen or tasted. Discuss appropriate words to use to reflect the descriptions given by the students and compile a list to display for reference.
3. Working in small groups, have students look at the different cheese samples and identify characteristics that make them different from each other, such as colour, firmness, texture, aroma and so on. Ask them to examine their characteristics closely, taste each of the different cheeses, discuss and record the characteristics on the student handout *Cheese characteristics*. Adapt the chart as required for more or fewer cheese samples and types of characteristics.
4. Supplement the cheese samples with the student handout *Matching cheeses with characteristics*, which contains images of cheeses to match with their characteristics for students to match up. Use [useful links](#) for research to support the activity if needed.

Caerphilly	Aged Gouda	Gruyere	Mascarpone	Edam
Manchego	Gorgonzola	Jack cheese	Cream cheese	Alpenport

Bioteknologi Modern: DNA Forensik dalam kasus kejahatan

- Dasar-dasar ilmu DNA profiling
- Cara pembelajaran – praktik isolasi DNA, teknik DNA profiling

Bioteknologi Modern: DNA Forensik dalam kasus kejahatan

The diversity of evidence collected provides	Developing Expertise Organise the class into groups (four groups of six students). Explain that each member of the group will not	Develop the criteria for reliable evidence. For example collection
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Introduction: For the accurate analysis and interpretation of DNA. For example, fingerprints, old footprints, statements, microscopic examination of hair and fibres provide evidence to narrow down the list of suspects that could be used to provide blood or DNA samples.

only be responsible for collecting one component of the evidence but also will become the expert for that area. The person will make sure that the rest of the group understands the information and significance of the evidence and will contribute their information to the group solution. (Diverse and Area covered). Provide packs of information for identified groups, e.g. Blood typing, fingerprints, etc.

Methods: range of collection methods and why, storage and tracking. Organise these criteria for inclusion into the total brief specifications (template).

Analysing the scenario for the clues that have been indicated. Introduce the range of data-gathering techniques that are available. The class into specialist groups who read the information and plan how they will collect the evidence.

Science Learning Hub

➤ <https://www.sciencelearn.org.nz/topics/biotechnology>

“Welcome to the Science Learning Hub, 7,059 New Zealand science education resources, collected by topic and concept”.

Bioteknologi Modern: Kloning DNA

- Penjelasan dalam konsep tulisan populer

DNA cloning is the starting point for many genetic engineering applications.

Large amounts of DNA are needed for genetic engineering. Multiple copies of a piece of DNA can be made either by using polymerase chain reaction (PCR) or by cloning DNA in cells.

How is DNA cloned in cells?

Bioteknologi Modern: Kloning DNA

- Penjelasan dalam konsep tulisan populer

Step 1. The chosen piece of DNA is 'cut' from the source organism using restriction enzymes.

Step 2. The piece of DNA is 'inserted' into a vector and the ends of the DNA are joined with the vector DNA by ligation.

Step 3. The vector is introduced into a host cell, often a bacterium or yeast, by a process called transformation. The host cells copy the vector DNA along with their own DNA, creating multiple copies of the inserted DNA.

Step 4. The vector DNA is isolated (or separated) from the host cells' DNA and purified.

DNA that has been 'cut' and 'glued' from an organism into a vector is called recombinant DNA. Because of this, DNA cloning is also called recombinant DNA technology.

What is cloned DNA used for?

DNA cloning is used to create a large number of copies of a gene or other piece of

Bioteknologi Konvensional: Pemuliaan Tanaman

- Bioteknologi dikemas dalam konsep artikel sederhana
- Aplikasi pada hampir seluruh tanaman hortikultura

Grafting and budding

This method involves joining a stem piece (as in grafting) or a single bud (as in budding) onto the stem of a plant that has roots. The stem piece or bud is called the scion, and the plant with roots is called the rootstock. Grafting is commonly used to produce fruit trees sometimes with more than one variety of the same fruit species growing from the same stem.

Bioteknologi Konvensional: Biologi Molekuler Kesehatan

- Bioteknologi dikemas dalam konsep artikel sederhana
- Teknik elektroforesis untuk identifikasi gen terkait penyakit

Gel electrophoresis can be used to find genes associated with a disease

In this simulated case, the researchers found in patients who have inheritance

Gene screening diagnostic test for premature myocardial

Ingin ahli dalam bidang bioteknologi?

Harus **praktek** di dalam laboratorium atau tempat produksi



Kesimpulan

- ❑ Bioteknologi = ilmu momok karena tidak dikenal secara lebih **"asyik"**
- ❑ Tiga sistem pembelajaran: (1) **dual konsep pembelajaran**, (2) **pembelajaran berbasis internet**, (3) **praktik lapang**
- ❑ Biotechnology Learning Hub dan Science Learning Hub – portal pembelajaran berbasis internet yang **"mudah"** dan **"praktis"**

Terima kasih atas perhatiannya

*"The rewards for biotechnology are **tremendous** - to solve disease, eliminate poverty, age gracefully. It sounds **so much cooler than Facebook.**" – George M. Curch*

