NANOWARE Lesson Plans

MODULE 6: APPLICATIONS OF NANOTECHNOLOGY

DELIVERABLE: R1/T1.3 LESSON PLANS

NANOWARE

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HeartHands Solutions

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Contents

1. Lesson Information

Title: Applications of Nanotechnology

Subject: Familiarization with nanotechnology applications.

Grades: 9-12

Brief Description: With this module, learners will learn about various nanotechnology applications. They will also understand the vast potential of this kind of technology in numerous different fields.

Objectives: Students will be able to

- Understand how nanotechnology is applied in [Electronic Engineering]
- Understand how nanotechnology is applied in [Environmental Science]
- Understand how nanotechnology is applied in [Medicine]
- Understand how nanotechnology is applied in [Consumer Products]
- Understand the benefits of manipulating matter in the nanoscale for the advancement of various fields.

Duration: 3 lessons in total (2 lessons for theory and video watching, 1 lesson for desktop research activity). Each lesson=40 minutes.

2. Lesson Procedure

This lesson recaps basic knowledge of nanoscience and nanotechnology reminding students of nanomaterials properties and expanding into nanotechnology applications in various fields.

First, give students 1 minute to brainstorm a list of nanomaterials and their properties.

Then, give them another minute to think about possible nanotechnology applications (imaginary or real).

Proceed with the videos.

Upon completion, ask students to write a paragraph explaining which application they find more interesting and why.

Activity 1: “What Exactly is Nanotechnology” video

Students will watch a video explaining why nanotechnology is part of our daily lives.

Materials Needed

- Internet connection, YouTube access

Activity Procedure

Show this video to your students: https://www.youtube.com/watch?v=Mr7IEvlflnI

Pause video frequently to spark conversation. The students will eventually realize that nanotechnology has far-reaching applications in various fields including the food, health/medicine, energy, agriculture, electronics, and environment

Activity 2: “How Nanotechnology Can Change Your Life” video

Students will watch a video that will refresh their newly acquired knowledge about the basics of nanotechnology as well as show them numerous of its applications in modern life and science through relatable examples.

Materials Needed

- Internet connection, YouTube access

Activity Procedure

Show this video to your students: https://www.youtube.com/watch?v=IGjCOJqINPA

Pause video in each slide for “potential uses of graphene” (5:44’ to 7:41’) to discuss the wide variety of nanotechnology applications.

Activity 3: Find nanotechnology applications on the Web!

Students will perform desktop research to find nanotechnology applications and case studies or companies that use nanotechnology for their products.

Materials Needed

- Computer, Internet connection

Activity Procedure

Students will be divided into groups of 4 or 5 (depending on the classroom's total number). They will be asked to find nanotechnology applications/case studies in the following fields:

- Electronic Engineering (guide them towards nano-sized electronic devices, like microchips)
- Environmental Science (guide them towards alternative energy sources and/or pollution)
- Medicine (guide them towards therapy/drug delivery methods)
- Consumer Products (discover nanomaterials' properties and existing solutions for better clothing manufacturing, car safety, athletics, etc.)

Discuss students' findings and use, if necessary, the following case studies:

1. 'Smart bandage'
   https://www.uri.edu/news/2021/01/smart-bandage-detects-could-prevent-infections/
2. Wilson's 'double-core' tennis ball
   https://www.wilson.com/en-us/tennis
3. Hydrophobic coating
   https://kriya-materials.com
4. Bridgerstone's NanoPro-Tech for car tires
   https://www.bridgestone.com/technology_innovation/nanopro-tech/