NANOWARE Educators Guide

MODULE 5: NANOTECHNOLOGY IN OUR LIVES

DELIVERABLE: R1/T1.3

NANOWARE

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Contents

1. Introduction Part

Grade Level: 9-12

Subject Area: Nanotechnology in Our Lives

Time required: 90 minutes.

Learning Objectives (LO): Students will be able to:

- Learn more about nanotechnology (LO1)
- Learn about nanotechnology's daily applications (LO2)
- Work as a team (LO3)

Summary: NANOWARE has developed an information package for teachers that includes background information and documents about nanotechnology in our lives. This information package refers to as the NANOWARE Educators Guide. Below is an overview of its content for Module 5.

2. Lesson Background Information

Nanotechnology is an inescapable part of modern everyday life and is an expanding field. The nanoscale is 1,000 times smaller than the microscopic level and a billion times smaller than the typical world of meters that we're used to measuring things in (Bernard Marr, n.d). The average person already encounters nanotechnology in a range of everyday consumer products (Dispatch, 2019). Many everyday products are made using nanotechnology. For instance, sunscreens, clothing, furniture, adhesives, tennis balls, and computers are some of the products that use nanotechnology (Bernard Marr, 2020). Moreover, the average office worker has improved display screens on desktops and portable electronic devices, products that use nanotechnology. The same goes for memory chips with increased density (Finbar Galligan, 2017).

Nanotechnology in daily activities

According to the Scientific World, nanotechnology has a great impact on our lives daily and is certainly essential in improving products, treating diseases, and serving humanity in all areas of life. Much of the normal commercial merchandise available on the market relies on nanotechnology. The obvious nanoparticles or membranes on computer monitors, cameras, glasses, home windows, and different surfaces can help make them water-resistant, anti-reflective, proof against UV or IR radiation, scratch-resistant, or conducive to power. Nanotechnology has additionally entered into purchaser products, where billions of microscopic nano whiskers - each approximately 10 nanometres long - have been molecularly connected to natural and synthetic fibres to add stain resistance to clothing and fabric (The Scientific World, 2019).

Below are some areas where we use nanotechnology in daily activities:

- Sunscreens,
- Computers,
- Medical Equipment,
- Pharmaceutical products,
- Medicines,
- Vehicle fuel efficiency,
- Fabrics,
- Water quality,
- Sports equipment,
- Cosmetics,
- Drink bottles,

- Enhanced surveillance and security systems.

Sources:

1. 10 Ways Nanotechnology Impacts Our Lives. (n.d.). ASME. https://www.asme.org/topics-resources/content/10-ways-nanotechnology-impacts-lives
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3. Dispatch. (2020, April 25). The NYU Dispatch. https://wp.nyu.edu/dispatch/author/gam409/
4. Galligan, F. (2018, March 2). Exploring Nanotechnology's Daily Applications. ACS Axial | ACS Publications. https://axial.acs.org/2018/02/28/nanotechnology-daily-applications/
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8. Tiny science, big potential. (2008, March 26). SciDev.Net. https://www.scidev.net/global/features/tiny-science-big-potential/
9. Veltema, A. (2021, June 1). Nanotechnology in everyday life and in the future. Nano4Society. https://nano4society.nl/nanotechnology-in-everyday-life-and-in-the-future/

Materials:

- Computer and Internet Access
- Printed photos (photos of objects to which nanotechnology is applied like: Sunglasses, sunscreen, clothing, furniture, tennis ball, computers, etc.)
- Everyday objects (Sunglasses, sunscreen, clothing, furniture, tennis ball, computers, etc.)

3. Suggested Teaching Strategies

The teacher can perform the following activities.

Activity 1: What Is Nanotechnology?

The teacher can show students an introductory video about what nanotechnology is. She/he can automatically add subtitles in students' mother language or help the students by explaining the video. The teacher can find the video here:

https://www.youtube.com/watch?v=DAOFpgocfrg&t=189s

Activity 1 Name	**What Is Nanotechnology?**	**Tool**
Short Description	Show students an introductory video about what nanotechnology is. Automatically add subtitles in your mother language or help the students by explaining the video.	https://www.youtube.com/watch?v=DAOFpgocfrg&t=189s
Objectives	To increase students' basic understanding of nanotechnology.	
Keywords	Nanotechnology	
Ages	14-17	

Activity 2: Let's Find It!

The teacher will divide the students into groups. She/he can print photos of objects to which nanotechnology is applied like Sunglasses, sunscreen, clothing, furniture, tennis ball, and computers. At the same time, she/he will print photos of unrelated objects. She/he will mix them up and have the children in groups choose the objects to which the nanotechnology is applied. The fastest team wins!

Activity 2 Name	**Let's Find It!**	**Tool**
Short Description	For this activity, students work in groups of 4 or 5. Print photos of objects to which nanotechnology is applied. Also, print photos of unrelated objects. Mix them up and have the children in groups choose the objects to which the nanotechnology is applied.	Photos of objects to which nanotechnology is applied (such as sunglasses, sunscreen, clothing, furniture, tennis ball, and computers) and photos of unrelated objects.
Objectives	To teach students how to identify nanotechnology-applied objects and unrelated objects	
Keywords	Nanotechnology	
Ages	14-17	

Activity 3: Run and find!

The teacher will divide the students into groups. She/he will give them a few minutes and they will have to look for the objects to which nanotechnology is applied. Examples of such objects are Sunglasses, sunscreen, clothing, furniture, tennis ball, and computers. Therefore, the teacher should bring with her/him objects that are not in the classroom. It is a simple activity, but it will help children to understand more about nanotechnology through simple everyday objects.

Activity 3 Name	**Run and find!**	**Tool**
Short Description	For this activity, students work in groups of 4 or 5. Give them a few minutes and they will have to look for the objects to which nanotechnology is applied.	Objects to which nanotechnology is applied (such as sunglasses, sunscreen, clothing, furniture, tennis ball, computers)
Objectives	To help children understand more about nanotechnology through simple everyday objects.	
Keywords	Nanotechnology	
Ages	14-17	

Pre-requisite Knowledge:

Students should have understood what nanotechnology is and how it is applied to simple everyday objects.

4. Assessment

Assessment: (Rubric for Assessment of Exploring Nanotechnology's Daily Applications)

Learning Objectives	**Exceptional 4**	**Satisfactory 3**	**Developing 2**	**Unsatisfactory 1**	**Total**
Determines nanotechnology within the environment (LO1).	Can clearly explain LO1.	Provides some explanation of LO1.	Provides less of an explanation but with details missing.	Does not explain LO1.	
Identifies nanotechnology-applied objects and unrelated objects within the environment (LO2).	Can clearly explain LO2.	Provides some explanation of LO2.	Provides less of an explanation but with details missing.	Does not explain LO2.	
Works as a team (LO3).	Can clearly explain LO3.	Provides some explanation of LO3.	Provides less of an explanation but with details missing.	Does not explain LO3.	