

Future Classroom Energy



Authors: Mariella Brunazzi (English Teacher), Maria Angela Cerri (Food Science Teacher), Margarita Saborido (Technology), Javier Seoane Bascoy (Mathematics), J. Luis Martín (Physics Teacher), Donatella Cortese (Science Teacher).

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Subjects

English, Technology, ICT, Mathematics, Physics, Ecology.

Aim of the lesson

To make students conscious about energy problem, climate change, impact of CO2 emission reduction. How to produce energy with wind, and its advantages in real life. Design and print a wind turbine, choosing the best design from the options proposed by the different groups.

Age of students

14-15 (9th grade)

Time

Preparation time: 4 hours to get them used with the 3D Design tool.

Teaching: 4 lessons

Building: 10 lessons

Teaching material

Online:

[Tinkercad](#) or [BlockSCAD](#)

[OpenSCAD Tutorial](#) [Tinkercad Tutorial](#) [Crocodile Tutorial](#)

[Wind energy](#)

[Wind turbines: video](#)

Offline:

[Openscad](#) [Crocodile](#)

Activities

Non-classroom activity (e.g. industry visit). we decided to visit an eolic park

21st century skills:

Communication - students will share information about wind energy and discuss it

Collaboration - students will work in groups to analyse present issues related to sustainable energy sources.

Critical Thinking and Problem Solving - students will think about how to best design and make a wind turbine using a 3D printer.

Creativity and Innovation - students will create alternative types of wind turbines.

21st century interdisciplinary themes woven into key subjects (Chemistry, Physics, Maths, Technology)

· Lesson Plan

Describe here in detail all the activities during the lesson and the time they require. Remember, that your lesson plan needs to correspond to real-world problems in STEM education.

Reference:

Name of activity	Procedure	Time
		1h

Assessment

Describe here the assessment method of the lesson, if any. For example, if you plan on assessing your students with a quiz, include here questions and answer options with color-coding the correct answers.

Formative assessment

Debate

<https://anh-academy.org/sustainable-diets-game-diet-dimensions> 1h

Self-assessment

Name:

Class:

date:

Self-Assessment Read and tick where appropriate	Y E S	N O T Y E T	N O T S U R E
I can recognize spoken and written words and expressions related to the content of the module			
I can report information from this module both orally and in writing			
I can speak about different aspects of this module providing my own opinion or views			
I can speak about some of the relevant themes in the module			
I can plan a healthy sustainable meal			
I can work in groups including all group members equally, listening to others and finishing tasks on time			

Peer-assessment:

	10 / 9	8 / 7	6 / 5	4 / 3
OVERALL APPEARANCE	<ul style="list-style-type: none"> - theme consistent - generally inviting -high degree of creativity 	<ul style="list-style-type: none"> - theme consistent - generally good - creative 	<ul style="list-style-type: none"> - theme inconsistent - generally adequate - somewhat creative 	<ul style="list-style-type: none"> - no theme evident - poorly done - shows little creativity
CONTENT	<ul style="list-style-type: none"> - all components are completed as assigned - excellent variety of topics - an illustration included with each component - well written 	<ul style="list-style-type: none"> - most components completed as assigned - good variety of topics - most components are illustrated. - well written - fewer than minimum of five components. 	<ul style="list-style-type: none"> - did not include one of the assigned components - adequate variety of topics - most components are illustrated - writing sufficiently adequate 	<ul style="list-style-type: none"> - some components completed as assigned - some illustrations - writing not adequate
ILLUSTRATIONS	<ul style="list-style-type: none"> - all graphics are connected to theme - excellent colour and composition. 	<ul style="list-style-type: none"> - most graphics connected to theme - good colour and composition 	<ul style="list-style-type: none"> - artwork not always connected to theme - lacks originality - some colour and graphics elements used 	<ul style="list-style-type: none"> - seldom connected to theme - few or no graphic elements

PRESENTATION	<ul style="list-style-type: none"> - use of writing process evident - correct spelling - correct grammar -correct sentence, paragraph and essay structure 	<ul style="list-style-type: none"> - use of writing process evident - minor spelling errors - minor grammatical errors - minor errors in construction of sentences, paragraphs and essays 	<ul style="list-style-type: none"> - careless use of writing process - minor spelling errors - minor grammatical errors - written work lacks organization 	<ul style="list-style-type: none"> - first draft is only draft - major spelling errors - major grammatical errors - lacks organization, disjoint, and lacks unity
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Group work assessment

	Criteria				Points
	4	3	2	1	
Level of engagement in class	student actively contributes to the lessons by offering ideas and asking questions frequently	student actively contributes to class by sometimes offering ideas and asking questions	student seldom contributes to class by offering ideas and asking questions	student never contributes to class by offering ideas and asking questions	
Listening, questioning, discussing	student listens, discusses and asks questions and guides the group in problem-solving activities	student listens, discusses and asks questions	student doesn't always listen with respect and monopolises discussions	student doesn't listen with respect, argues with mates and doesn't respect their ideas	
Behaviour	student never has disruptive behaviour during	student rarely has disruptive behaviour during	student sometimes has disruptive behaviour during	student always has disruptive behaviour during discussions and group activities	

	discussions and group activities	discussions and group activities	discussions and group activities		
Preparation	student always does homework, studies and has the required material	student usually does homework, studies and has the required material	student rarely does homework, studies and has the required material	student never does homework, studies and has the required material	
Problem-solving	student actively looks for and finds or suggests solutions to problems	student usually improves solutions suggested by others	student is willing to try solutions suggested by others	student neither tries to solve problems nor to help others solve them	
Group / partner teamwork	student works to complete all group goals, has a positive attitude towards the tasks and work of others and does all duties related to the assigned role	student usually helps complete all group goals, has a positive attitude towards the tasks and work of others and does nearly all duties related to the assigned role	student occasionally helps complete all group goals, sometimes has a negative attitude towards the tasks and work of others and does some of the duties related to the assigned role	student doesn't work well with others, shows no interest in completing group goals, has a negative attitude towards the tasks and work of others and doesn't do the duties related to the assigned role	
				Total	

Summative assessment

Each group will have to plan a sustainable lunch menu starting from traditional local recipes which will be innovated to make them correspond to current needs that is the menu will have to be healthy and sustainable.

As a final test each group will have to analyze the results.

Student feedback

Add here the method with which your students will be able to give you feedback and discuss the lesson.

CLIL MODULE

	NOT AT ALL	NOT MUCH	SUFFICIENTLY	ENOUGH	A LOT
1. Do you like the module?					
2. Can you understand the texts in English?					

3. Is the topic explained clearly?					
4. Do the images help you understand?					
5. Do you like the activities?					
6. Do you have time to ask questions?					
7. Do you have enough time to answer questions?					
8. Are you given examples to help you use the English language?					
9. Are you afraid of making mistakes when you speak English?					
10. Are you corrected when you speak English?					
11. When you speak English are you given enough time to self-correct your mistakes?					
12. Do you like working in groups?					
13. Do you like being assessed by your classmates?					

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DIFFERENT TYPES OF WIND TURBINES



Wind turbine from a small scale wind power scheme in Peru



In development is an idea for wind turbines that can be placed over roads to capture wind generated from passing cars

Wind turbine used to pump ground water in Kenya



Roof top turbine which sends the electricity it produces straight into the house to be used

Vertical axis wind turbine which takes wind from any direction and can be used in areas where there are buildings and trees



Wind farm turbines that have blades which turn at six times the speed of the wind



Traditional windmill used to grind flour

practicalaction.org/STEM