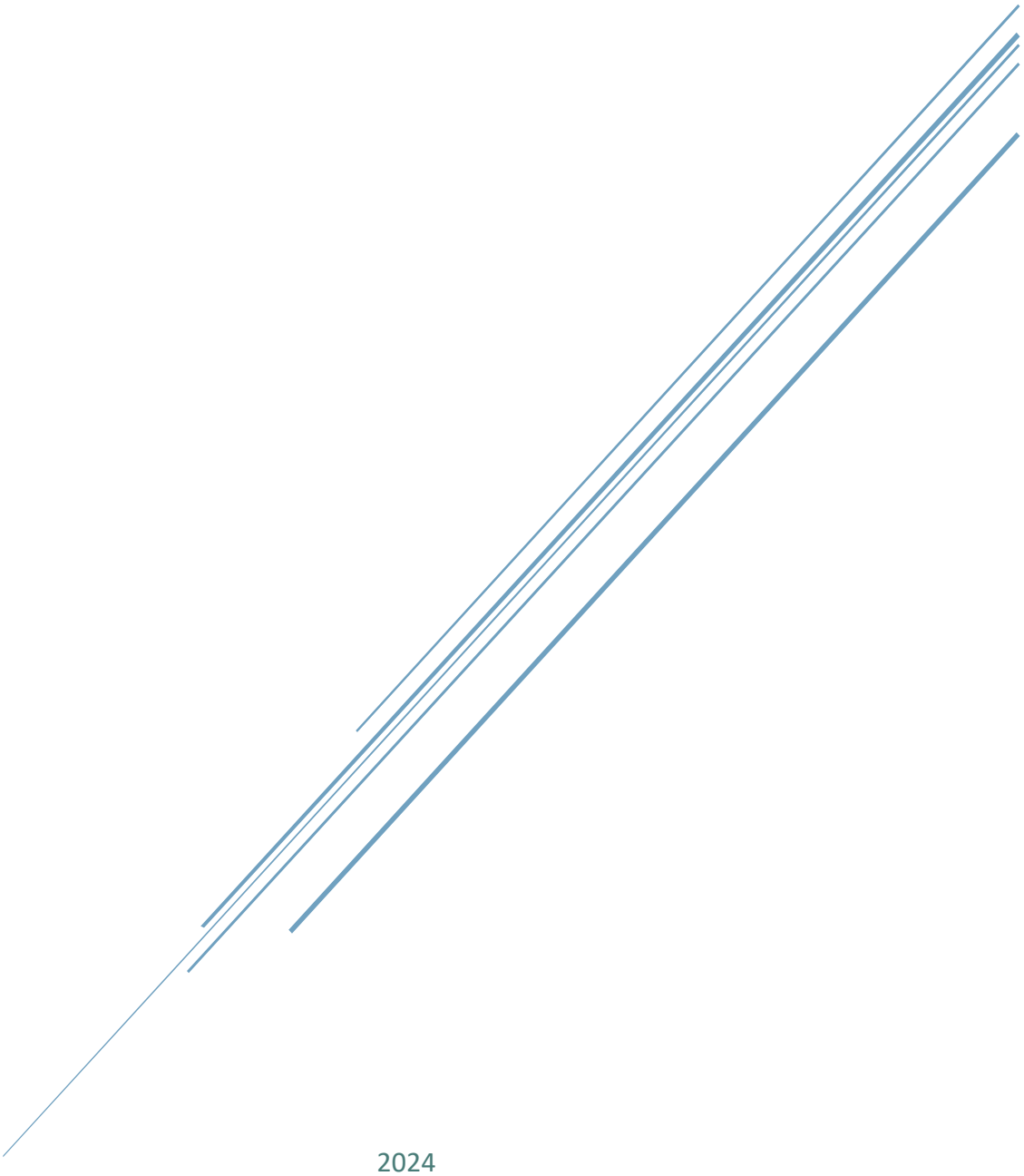
Co-funded by the European Union

ECO-TECH SKILLS CURRICULUM

Sustainable Solutions

2023-1-LV01-KA220-SCH-0001246777



2024

Co-funded by
the European Union

"Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the State Education Development Agency. Neither the European Union nor the granting authority can be held responsible for them."

TABLE OF CONTENTS

Partner Organization	Country	Author(s)	Module Title
Jaunpiebalgas Vidusskola	Latvia	Indriķis Andris Birznieks and Kārlis Krastiņš	Climate Change Education & Effective Communication
Araxa Egitim Danismanlik	Türkiye	Özkan Çam	Data Analysis and Visualization
Agrupamento De Escolas De Benavente	Portugal	Cristina Silva, Beatriz Tomé, Ana Varela	Sustainable Design and Energy
Srednja Skola Ban Josip Jelacic	Croatia	Ankica Šarić and Helga Kraljik	Green Lesson Design
Asociatia Pentru Educatie Si Formare	Romania	Mihaela Cojocaru and Muraru Crina Catalina	Digital Mapping
Asociacija Kurybines Ateities Idejos	Lithuania	Daiva Viningiene	Effective Communication about Environmental Issues
1st Vocational High School Of Vrontados	Greece	Asprouli Triantafyllia and Xenakis Andreas	Digital Tools

Co-funded by
the European Union

CURRICULUM FRAMEWORK

1. Introduction

a. Summary of goals and purposes for the Eco-Tech Skills Curriculum

b. A description of the curriculum's emphasis on imparting digital and technological skills to address environmental concerns

2. Target Groups

Identifying the target audiences, such as professionals, students, and teachers who are interested in environmental sustainability

3. Key Components

Description of the curriculum's key components:

1. Green Lesson Design
2. Climate Change Education
3. Data Analysis and Visualization
4. Effective Communication
5. Digital Mapping
6. Sustainable Design and Energy
7. Effective Communication about Environmental Issues
8. Digital Tools

4. Learning Objectives

Detailed objectives for learning for students that correspond with the topics and activities included in the curriculum

5. Curriculum Structure

Explanation of the curriculum's organization and structure, including modules, activities, and learning pathways

6. Pedagogical Approach

An explanation of the instructional approach with a focus on practical applications, hands-on learning, and interactive teaching methods

7. Integration

a. Strategies for integrating the curriculum into formal educational institutions and informal learning settings

b. Collaboration opportunities with other educational programs

8. Assessment and Evaluation

a. Methods for assessing student learning and evaluating curriculum effectiveness

b. Examples of assessment tools and criteria used for evaluating student performance

9. Resources and Support

A summary of the training materials, online support networks, and professional development options available to educators implementing the curriculum

10. Cultural Relevance

Recognition and incorporation of diverse cultural perspectives and experiences to ensure inclusivity and relevance for all learners

11. Technology Integration

Utilization of technology tools and resources to enhance learning experiences and develop digital literacy skills in the context of environmental sustainability

INTRODUCTION

People with the skills and expertise necessary to appropriately handle the escalating environmental challenges are desperately needed. The comprehensive educational framework known as the Eco-Tech Skills Curriculum was developed to give students the technical know-how they need to effectively navigate, evaluate, and create sustainable solutions in today's dynamic environmental environment.

This curriculum is an inventive attempt to bridge the gap between technology and responsibility for the environment, acknowledging the vital role that digital literacy plays in fostering eco-consciousness and enabling meaningful action. The Eco-Tech Skills Curriculum is a thorough method designed to provide students with the necessary resources to become agents of change. Its foundations are innovation and sustainability.

The curriculum is essentially an integrated strategy that addresses several facets of cultivating eco-tech skills. Each module aims to foster a comprehensive understanding of environmental issues and technology remedies, ranging from appreciating the foundations of research on climate change to applying data analysis and visualization to make well-informed decisions.

In addition, the program places a strong emphasis on the importance of moral dilemmas, collaboration, and clear communication in the context of environmental activism and sustainability—not to mention technological proficiency. Students acquire the skills they need to fight environmental issues both inside and outside of their communities by participating in hands-on activities and immersive learning experiences.

Key objectives of the Eco-Tech Skills Curriculum include:

1. Giving students a solid foundation in environmental ideas, such as energy efficiency, sustainable design, and the science behind climate change.

2. Giving students the technical know-how required to use digital tools and technologies for mapping, data analysis, and visualization of environmental issues.

3. Developing strong communication abilities and encouraging environmental stewardship, which equips students to take part in important discussions and advocacy work.

4. Assisting in the incorporation of eco-tech competencies into diverse academic and occupational environments, allowing students to utilize their understanding in practical situations.

5. Encouraging professional growth and lifelong learning in eco-tech disciplines, with an emphasis on cultivating an innovative and sustainable culture.

TARGET GROUPS

1. Teachers: The goal of this curriculum is to give educators the knowledge and tools they need to include eco-tech education in their lesson plans.

2. Students: Students of all ages and educational backgrounds stand to gain the most from this curriculum. The curriculum attempts to promote environmental consciousness and provide students with the eco-tech skills they need to become active change agents by including them in experiential learning opportunities.

3. Environmental NGOs and Organizations: By using this curriculum as a resource to train their employees and volunteers, environmental NGOs and organizations can also gain from it.

4. Government Agencies and Policy Makers: By using this curriculum, government agencies and policy makers can better understand eco-tech concepts and resources. When eco-tech solutions are included into governance and policy-making processes, they can contribute to more effective environmental management and decision-making.

5. Community Groups and Activists: By using this curriculum, environmental activists and community organizations can enhance their community outreach and advocacy initiatives. By acquiring eco-tech skills, they may engage with their communities more successfully and mobilize support for environmental initiatives.

ECO-TECH SKILLS

Topic	TIME	Skills Developed	Learning Objectives	Activities and Exercise
Green Lesson Design		- Lesson planning - Integration of environmental concepts	- Understand the principles of green lesson design - Develop skills to integrate environmental concepts into lesson planning	- Introduction to green lesson design principles - Brainstorming eco -friendly lesson ideas - Hands-on activity designing a green lesson plan
Climate Change Education		- Understanding climate change science - Effective communication	- Comprehend the science behind climate change - Develop strategies for teaching climate change education effectively	- Overview of climate change science - Discussion on the impact of climate change on ecosystems and communities - Strategies for teaching climate change education
Data Analysis and Visualization		- Data analysis - Data visualization	- Learn basic data analysis techniques - Gain proficiency in using data visualization software	- Introduction to data analysis tools and techniques - Hands-on practice with data visualization software - Application of data analysis skills to environmental datasets
Effective Communication		- Communication skills - Audience engagement - Storytelling	- Understand the principles of effective environmental communication - Develop skills to engage diverse audiences	- Principles of effective communication about environmental issues - Techniques for engaging diverse audiences - Practice in crafting persuasive environmental messages
Digital Mapping		- Geographic Information Systems (GIS) - Mapping skills	- Learn the basics of GIS for environmental mapping - Understand applications of digital mapping in environmental science	- Introduction to geographic information systems (GIS) - Mapping environmental data using GIS software - Applications of digital mapping in environmental science
Sustainable Design and Energy		- Sustainable design principles - Energy efficiency	- Comprehend principles of sustainable design - Learn strategies for energy efficiency	- Principles of sustainable design and energy efficiency - Hands-on activities designing eco-friendly solutions - Evaluation of sustainable design projects
Effective Communication		- Storytelling techniques - Collaborative skills - Creative thinking	- Develop storytelling skills for environmental advocacy - Collaborate on communication projects	- Strategies for communicating complex environmental issues - Storytelling techniques for engaging audiences - Collaborative projects to create environmental communication materials
Digital Tools		- Digital literacy - Ethical considerations - Practical application	- Discover various digital tools for environmental work - Understand ethical considerations in digital environmental activism	- Exploration of digital tools for environmental monitoring and analysis - Hands-on activities using digital tools for sustainability projects - Discussion of ethical considerations in digital environmental activism

ECO-TECH SKILLS CURRICULUM MAP

Module	Activities	Deadlines	Exams	Student Progress	Specific Instructions
Introduction to Eco-Tech Skills	- Overview presentation - Discussion on curriculum objectives	Week 1	N/A	Check attendance and engagement	- Introduce curriculum objectives and expectations
Green Lesson Design	- Lecture on green lesson design principles - Brainstorming session for lesson ideas	Weeks 2-3	Quiz on green lesson design principles	Review brainstorming results	- Assign green lesson plan creation task
Climate Change Education	- Lecture on climate change science - Group discussion on climate change impacts	Weeks 4-5	Mid-term assessment on climate change concepts	Monitor participation in group discussion	- Encourage active participation in discussions
Data Analysis and Visualization	- Workshop on data analysis tools - Hands-on practice with data visualization software	Weeks 6-7	Data analysis project submission	Provide feedback on project progress	- Ensure access to required software/tools
Effective Communication	- Seminar on effective communication techniques - Role-playing exercises for communication scenarios	Weeks 8-9	Presentation on assigned communication topic	Assess participation in role-playing exercises	- Encourage creativity in communication strategies
Digital Mapping	- Demonstration of GIS software usage - Practical mapping exercise using environmental data	Weeks 10-11	Mapping project submission	Review mapping project drafts	- Provide guidance on data selection for mapping
Sustainable Design and Energy	- Lecture on sustainable design principles - Group discussion on energy efficiency strategies	Weeks 12-13	Reflection essay on sustainability	Monitor engagement in group discussion	- Emphasize critical thinking in reflection essays
Digital Tools	- Presentation on digital tools for environmental work - Practical session on using digital tools	Weeks 14-15	Final exam on digital tools	Monitor engagement in the practical session	- Provide resources for further exploration of digital tools
Assessment and Evaluation	- Review of assessment criteria and methods - Q&A session on upcoming assessments	Week 16	N/A	Check understanding of assessment criteria	- Clarify any doubts regarding assessment methods
Resources for Further Learning	- Presentation on recommended readings and online courses - Discussion on additional resources	Week 17	N/A	Monitor engagement in discussion	- Encourage exploration of recommended resources

Integration into Educational Programs	- Workshop on integrating curriculum into educational settings - Group activity on integration strategies	Week 18	N/A	Assess participation in group activity	- Collect feedback on integration workshop
Sustainability and Continued Learning	- Seminar on lifelong learning in eco-tech fields - Action planning session for continued professional development	Week 19	Action plan submission	Review action plans for feasibility	- Provide guidance on action plan development

GUIDANCE FOR TEACHERS

IMPLEMENTING THE ECO-TECH SKILLS CURRICULUM

By implementing the Eco-Tech Skills Curriculum, educators like you have a vital role to play in raising a generation of environmentally conscious individuals who also have the digital and technological skills necessary to address environmental concerns. You can successfully integrate the curriculum into your teaching style by using the following advice:

1. Spend some time going over the course materials in detail. Become familiar with each module's learning objectives, areas for skill development, and methods of assessment.

2. The curriculum should be modified to fit the needs, interests, and classroom setting of your students Consider including examples and local environmental challenges to add interest to the content.

3. Motivate your students to participate in hands-on learning experiences actively. Apply interactive teaching methods, such as case studies, group discussions, simulations, and hands-on activities, to reinforce key concepts and skills.

4. Make use of digital tools and technologies to enhance the learning experience. Utilize Geographic Information Systems software, data visualization tools, online resources, and educational apps.

5. Foster a collaborative learning environment where students can work together on projects and activities. Encourage teamwork, communication, and peer learning to promote a deeper understanding of environmental issues.

6. Provide constructive feedback to students throughout the learning process.

7. Take advantage of opportunities to collaborate with partner organizations to enhance the learning experience. Engage guest speakers, arrange field trips, and explore online platforms for additional learning opportunities.

8. Implement a variety of assessment methods and tools to evaluate student understanding. Use a combination of quizzes, assignments, projects, presentations, and practical assessments to assess both the knowledge and skills development of your students.

9. Empower students to take action on environmental issues beyond the classroom. Encourage the students to apply their eco-tech skills to real-world challenges, participate in environmental initiatives, and advocate for sustainability in their communities.

10. Continuously reflect on your teaching practice and the effectiveness of the curriculum.

Co-funded by
the European Union

MODULE 1: GREEN LESSON DESIGN

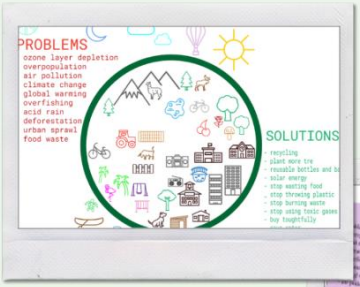
Co-funded by
the European Union

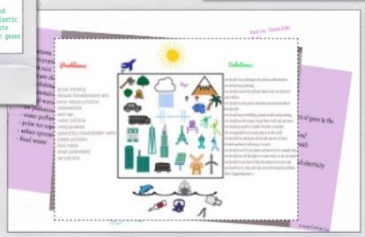
Erasmus+
SUSTAINABLE SOLUTIONS

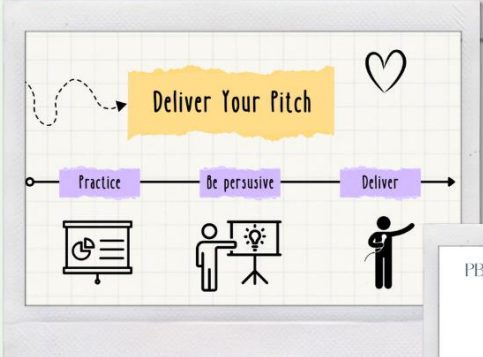
1 Eco-Footprints

Module 1: Green Lesson Design

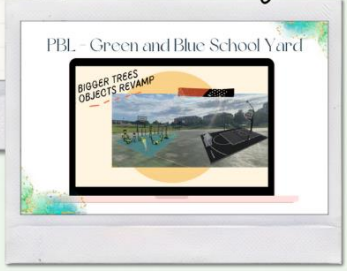
2 Environmental islands







3 Pitching Sustainable Solutions



Co-funded by
the European Union

MODULE 1: GREEN LESSON DESIGN

1. Introduction:

a. Overview of the module's purpose and objectives

b. Explanation of the importance of eco-conscious teaching practices

2. Target Audience:

a. Educators interested in integrating environmental concepts into their lesson plans

3. Key Components:

a. Principles of Green Lesson Design

b. Integration of environmental concepts into lesson planning

c. Hands-on activities designing eco-conscious lesson plans

4. Learning Objectives:

a. Understand the principles of green lesson design

b. Develop skills to integrate environmental concepts into lesson planning

c. Design eco-conscious lesson plans for diverse subject areas

5. Curriculum Structure:

a. Module divided into interactive sessions covering green lesson design principles and practical activities

6. Pedagogical Approach:

a. Emphasis on participatory learning and application of eco-conscious teaching strategies

7. Integration:

a. Strategies for integrating green lesson design principles into existing educational programs

8. Assessment and Evaluation:

a. Methods for assessing participants' understanding and application of green lesson design principles

9. Resources and Support:

a. Access to teaching materials, case studies, and online resources for further learning

10. Cultural Relevance:

a. Recognition of diverse cultural perspectives on environmental issues in lesson planning

11. Technology Integration:

a. Use of digital tools and resources to support the implementation of eco-conscious teaching strategies

Module 1: Green Lesson Design

Activity 1: Introduction to Green Lesson Design Principle

- Exploring Ecological Footprints

Learning Outcomes:

Remembering:

a. Recall the definition of ecological footprints and key factors that contribute to them.
b. Recognize different types of eco-footprints and their impact on the environment.
c. Identify methods for measuring ecological footprints.

Understanding:

d. Explain why reducing ecological footprints is important for environmental sustainability.
e. Describe how everyday activities contribute to increasing ecological footprints.
f. Interpret research findings on the components and measurement of specific eco-footprints.

Applying:

g. Demonstrate the ability to create a visually appealing word cloud that communicates a definition of ecological footprints.
h. Apply knowledge of ecological footprints to propose strategies for reducing personal and community environmental impacts.
i. Use digital tools to collaborate on an online exhibition of eco-footprint designs.

Analyzing:

j. Analyze the environmental impact of different types of eco-footprints based on researched data.
k. Compare and contrast reduction strategies for ecological footprints at personal, local, and global levels.

Evaluating:

l. Evaluate peer presentations on eco-footprints based on criteria such as clarity, depth of research, and effectiveness of visual aids.
m. Critique and provide constructive feedback on strategies proposed by peers for reducing ecological footprints.

Creating:

n. Design and present a comprehensive research project on a chosen eco-footprint, including detailed explanations of its components, measurement methods, environmental impact, and reduction strategies.
o. Develop a collaborative manifesto outlining actionable strategies for reducing ecological footprints across personal, local, and global levels.

Description of Activity:

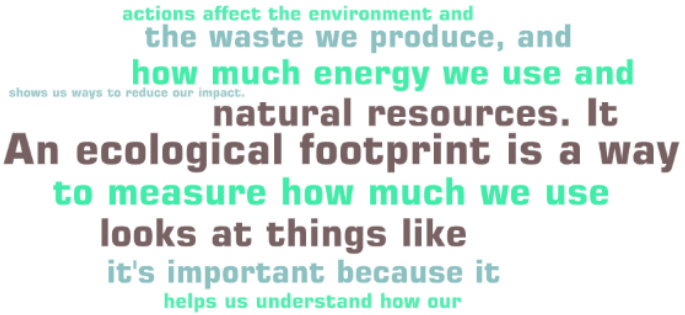
Warmup Activity: Understanding Eco Footprints

1. Instructions:

1. Think about these questions:
    a. What activities contribute to an ecological footprint?
    b. How do we measure an ecological footprint?
    c. Why is an ecological footprint important for the environment?
    d. What can people do to reduce their ecological footprint?

e. What can communities do to make ecological footprints smaller?
f. What can the whole world do to reduce ecological footprints?

2. Write your own definition (one or two sentences) of ecological footprints that covers at least 3 of the questions above. Present your definition in a word cloud following these rules:
   a. no word repetitions, mind the spelling
   b. horizontal orientation
   c. the word cloud shape: connected to the topic
   d. the style: choose the colours carefully
3. Create your design in Word.Art. Anyone looking at your word cloud should be able to reconstruct your definition.



Example: An ecological footprint is a way to measure how much we use natural resources. It looks at things like how much energy we use and the waste we produce, and it's important because it helps us understand how our actions affect the environment and shows us ways to reduce our impact.

2. Online Exhibition:

1. Add your design to the joint Lino Wall or Padlet Wall.
   Students add their word clouds to the joint end-result, Display kit in school hallway or in classrooms and have other students decipher each other's definitions, write them down, comment on them and prepare for the class discussion.

3. Discussion Points:

1. Think about these questions:
   a. What are some everyday activities that increase our ecological footprint?
   b. How can we reduce the amount of energy we use at home?
   c. What are some ways we can recycle more in our community?
   d. Why is it important to think about our ecological footprint?
   e. How can schools help in reducing ecological footprints?

Main Activity: Green Pathways: Exploring Eco-Footprints

Instructions:

1. Brainstorming Activity:

1. Students brainstorm on the different types of eco-footprints. Teachers can provide one or two examples to encourage students to take part and provide context to help them add to the brainstorming activity, eg. for travel or transport footprint: "Think about how we get from place to place, like using cars, planes, or buses. Each method uses

energy and produces emissions, which add to our footprint and impact the environment."

2. Teacher displays the word cloud with different types of Eco Footprints and encourages discussion about them.

2. Footprints of the Earth: Research and Visual Representation

1. Students decide which footprint they want to do the research on: in pairs or teams.
2. Each pair/team will research the following about the chosen footprint:
    a. What it includes: Components and activities that contribute to this footprint.
    b. Measurement: How this type of footprint is measured.
    c. Environmental impact: The significance of this footprint in terms of environmental impact.
    d. Reduction strategies: Actions that can be taken at personal, local, and global levels to reduce this footprint.
3. Teacher provides each group either with a printout of an eco-footprint outline or a link for the digital eco-footprint (template of eco-footprint outline). Students write their researched words/phrases on the footprint outline or in the digital form. Also, they add visuals (pictures, graphs, charts, tables…) to better communicate.

3. Class Presentations:

1. Each group presents their footprint to the class, bearing in mind the criteria - the guidelines for the chosen footprint presentation: What it includes; How it is measured; Its environmental impact; Ways to reduce it. Teacher presents the rubric.

Co-funded by
the European Union

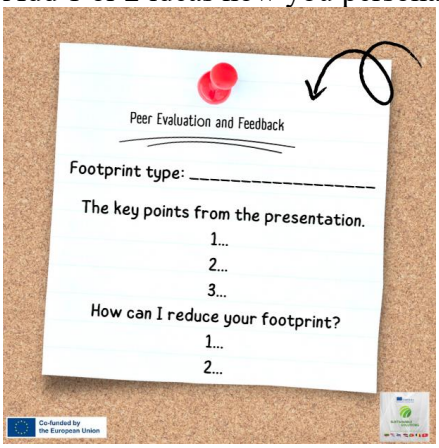
Eco-Footprint Presentation Rubric

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs Improvement (1)
Content Depth	Thoroughly covers what the footprint includes, how it is measured, its environmental impact, and provides detailed strategies for reduction.	Covers most aspects adequately with sufficient detail.	Includes basic information on most aspects but lacks depth in one or more areas.	Incomplete or inaccurate information; lacks detail and understanding of the topic.
Clarity of Presentation	Presentation is exceptionally clear and well-organized, with a logical flow of information.	Mostly clear and organized; maintains a good flow of information.	Some sections lack clarity or organization, affecting the flow of the presentation.	Presentation is confusing or disorganized; difficult to follow.
Effectiveness of Visual Aids	Visual aids (e.g., posters, slides) are highly effective, enhancing understanding and engagement.	Visual aids are mostly effective in supporting key points and engaging the audience.	Visual aids are used but may not effectively support key points or engage the audience consistently.	Visual aids are minimal, irrelevant, or distracting; do not support key points effectively.
Communication Skills	Demonstrates excellent communication skills: clear speaking, confident delivery, and engaging the audience effectively.	Communicates clearly with mostly confident delivery and engages the audience adequately.	Communication is generally clear but lacks consistent engagement with the audience.	Communication is unclear, hesitant, or lacks engagement with the audience.
Team Collaboration	Demonstrates excellent collaboration and teamwork; all members contribute effectively and knowledgeably.	Collaboration is evident with effective contributions from most team members.	Collaboration is somewhat evident but with uneven contributions from team members.	Little evidence of collaboration; one or more team members dominate or do not contribute effectively.
Overall Presentation	Exceptional presentation that exceeds expectations in all aspects.	Good presentation with solid performance across most aspects.	Adequate presentation with strengths and weaknesses balanced.	Presentation is below expectations; significant improvements needed across multiple aspects.

4. Reflect and Refine: Peer Evaluation and Feedback

   Students listen to each other's presentations of the chosen footprints using the peer-evaluation form.

   1. Summarize the key points from each group's presentation.
   2. Add 1 or 2 ideas how you personally can reduce your footprint being discussed.



5. Gallery Walk

   1. If done on printouts of eco-footprint outlines, these can be displayed on school walls to raise eco-awareness among students and teachers. If done digitally, the online exhibition can be displayed in the school hallway and used as resource material in classes.
      Example of an end-result

Conclusion:

1. Whole-Class Activity: Footprint Reduction Strategies
    1. Using the information the students wrote in their peer-evaluation forms, working together, students will create a manifesto on Footprint Reduction Strategies:
        a. strategies to reduce ecological footprints in their daily lives
        b. consider changes in transportation, diet, energy usage, waste management
        c. make a clear distinction between different levels: personal, local and global level

2. Mobile Presentation Teams: Footprint Reduction Strategies
    1. Students will form mobile teams to present their findings on eco-footprints and footprint reduction strategies, moving between classrooms to share insights on various environmental impacts. Each team will engage their peers in discussions about measuring footprints and strategies for reducing environmental impact.

3. Homework Assignment:
    1. My Footprint Reflection: students can write a short reflection on their own ecological footprint and identify three specific actions they can take to reduce it.

Training Material:

Internet access
Printouts of Eco-Footprint Outlines
WordArt tool
Canva tool
Markers, pens, and pencils
Computers/tablets for research & Digital Eco-Footprint Outlines

Peer-Evaluation Forms
Research Resources: Access to reliable sources and websites for students to conduct research on specific eco-footprints.
Digital Exhibition Platform: e.g., Padlet, Lino Wall for sharing word cloud designs and presentations
Computers/tablets for the Manifesto on Footprint Reduction Strategies
Examples and Samples: Examples of well-executed word clouds, presentations, and manifestos to inspire students.

Assessment:

Formative Assessment:
• Peer Evaluation Form: Students assess each other's presentations on eco-footprints based on criteria such as clarity of information, use of visuals, and engagement with the audience.
• Research Progress Check-ins: During the research phase, teachers act as facilitators and by conducting brief check-ins with students they review their research findings, discuss challenges, and provide guidance.
Summative Assessment:
• Final Presentation and Report: Using the explained rubric, the teacher assesses each student group's presentation of their researched eco-footprint to the class, covering what it includes, how it is measured, its environmental impact, and strategies for reduction.
• Online Exhibition Evaluation: Students contribute their word cloud designs and presentations to an online exhibition platform (e.g., Padlet or Lino Wall), where peers and teachers review and provide comments

Evaluation Criteria:

The rubric explanation:
1. Content Depth: assesses how thoroughly the presentation covers what the eco-footprint includes, how it is measured, its environmental impact, and provides detailed strategies for reducing it, demonstrating a comprehensive understanding of the topic.
2. Clarity of Presentation: evaluates how well-organized and coherent the presentation is, assessing the clarity of the information presented and the logical flow of ideas to ensure the audience can easily follow and understand the content.
3. Effectiveness of Visual Aids: measures how well the visual aids support and enhance the presentation, ensuring they are relevant, clear, and contribute to the audience's understanding and engagement.
4. Communication Skills: focuses on the presenter's ability to communicate clearly and confidently, assessing their speaking skills, engagement with the audience, and overall effectiveness in delivering key messages and maintaining audience interest.
5. Team Collaboration: evaluates the level of collaboration and teamwork among group members, considering how well they work together to prepare and deliver the presentation, ensuring equitable participation and contribution from all team members.

6. Overall Presentation: provides an overall assessment of the presentation, considering all aspects of content depth, clarity, visual aids, communication skills, and teamwork, to determine the overall effectiveness and quality of the presentation.

Resources:

- Access to Research Materials: reliable internet access for researching information
- Access to online databases, academic journals, and credible websites related to environmental science and sustainability, e.g. EU and UN sites
- Digital Tools: Word processing software (e.g., Microsoft Word, Google Docs) & Presentation software (e.g., Microsoft PowerPoint, Google Slides) for creating slideshows to accompany their presentations
- Visual Design Tools: Canva or Adobe Spark
- Collaboration Platforms
- Presentation Equipment: projectors, screens, and speakers for delivering presentations in classrooms or during the gallery walk
- Rubric and Evaluation Criteria: clear understanding of the assessment rubric and evaluation criteria provided by the teacher for preparing and self-assessing their presentations, as well as peer evaluation forms
- Teacher Guidance and Support: on research methodologies, data analysis techniques, presentation skills, and how to effectively integrate visual aids to enhance understanding and engagement.

Integration:

Integrating the activity on eco-footprints with other school subjects will enhance learning through interdisciplinary connections:

- science: students are familiarised with the scientific principles behind ecological footprints, exploring concepts of resource consumption, energy use, and environmental impact. They apply scientific methods to measure and analyze data related to different types of footprints.
- mathematics: students use mathematical skills to quantify ecological footprints, calculate carbon emissions, and interpret data in graphs or charts
- social studies: students examine the global and local implications of ecological footprints, considering economic, cultural, and political factors influencing sustainability.
- language skills: students refine communication skills by writing their definitions of ecological footprints, crafting persuasive arguments for footprint reduction strategies, and presenting their findings orally.
- Art: students create visually appealing word clouds and design presentations that effectively communicate complex environmental concepts.
- ICT skills: students utilize digital tools for research, collaboration, and presentation of their findings on eco-footprints. They learn to navigate online platforms for creating and sharing content, enhancing their digital literacy skills.

Module 1: Green Lesson Design

Activity 2: Environmental Islands

Learning Outcomes:

Remembering:

Recall key scenes and messages from "Earth Song."

List the necessary elements for their island (infrastructure, buildings, natural life, landscape, free-time activities, jobs, and industries).

Understanding:

Explain the environmental problems presented in the video.

describe the relationship between different components of their island and the environment.

Applying:

Illustrate their understanding by brainstorming words and phrases for each letter in the acrostic poem.

Construct a detailed drawing of their island including infrastructure, buildings, and natural elements.

Analyzing:

Identify the main environmental issues depicted in the song and compare them to real-world problems.

Examine the drawings of other groups to identify potential environmental problems.

Evaluating:

assess the sustainability of the proposed solutions and justify their choices.

Judge the effectiveness of each group's solutions and rate them on a scale of 1 to 3.

Creating:

Compose an acrostic poem based on the themes of "Earth Song" and design a layout for their poem.

Develop innovative solutions to the environmental problems identified and present their improved island designs.

Time:30 +45+15

Description of Activity:

Warmup Activity: Understanding Environmental Issues

1. Instructions:

1. Icebreaker: Start with a brief discussion on what students already know about the environment and human impact.
    a. What are some common environmental problems?
    b. How do human activities affect the environment?
    c. Why is it important to find solutions to these problems?

2. Earth Song by M. Jackson: Show a video clip of Michael Jackson's song Earth Song in order to illustrate environmental issues and evoke emotional responses. Students make notes before/after watching a video clip.

    Before Watching

    a. Have you heard the song or seen the video before?
    b. What do you expect the video to be about based on the title?

    After Watching

    c. What environmental problems did you notice in the video?
    d. How are humans depicted in relation to nature in the video?
    e. What emotions did the video evoke in you, and how do they relate to the environmental issues shown?
    f. What solutions or actions are suggested by the imagery or lyrics in the video?
    g. What role do you think individuals and communities can play in addressing the environmental problems depicted in the video?

3. An Acrostic Poem: In pairs, students create an acrostic poem that captures the themes and messages of Michael Jackson's "Earth Song" by using the letters in the word "EARTH." The acrostic poem uses the letters of a word to begin each line of the poem. Each line should relate to the word and reflect the themes of "Earth Song."

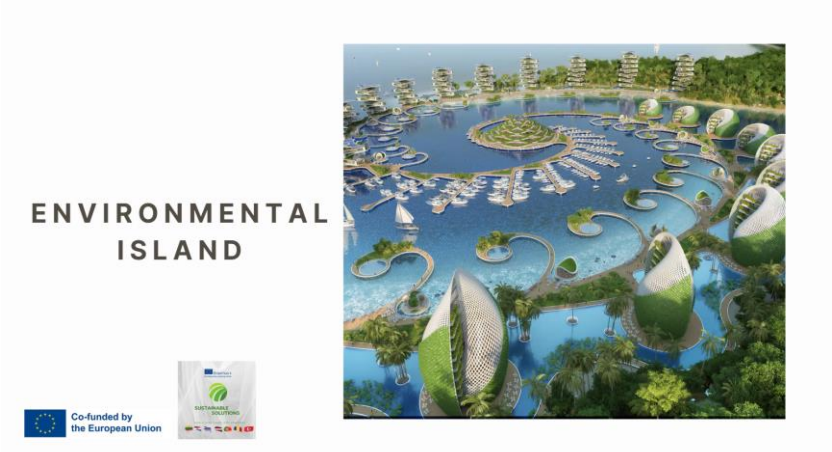
A Checklist Template

4. eBook: Students take photographs that capture environmental issues in their poems and design an eBook with their poems and the photographs. They publish their eBook and share it on the school webpage/social media to raise awareness about environmental issues.

Main Activity: Designing an environmental island

Instructions:

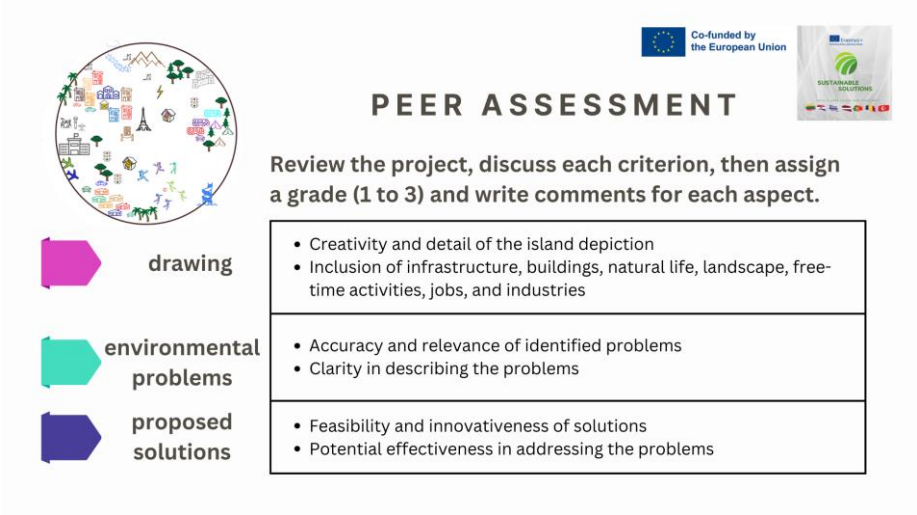
1. Icebreaker: Students discuss life on an island. They share their experience about visiting an island. They brainstorm the advantages and disadvantages of life on the island.
2. Drawing the Island: Each group draws an island that includes infrastructure, buildings, natural life, landscape, free-time activities, jobs, and industries. They should be as creative and detailed as possible. Students can use pencils and paper or digital tools such as Autodraw or Canva in order to do this task.
3. Identifying Environmental Problems: Groups exchange their drawings with another group (clockwise) and analyze the new island to identify potential environmental problems. Each group should list and describe at least four problems they have identified.
4. Suggesting Solutions: Groups exchange the drawings again (clockwise) and develop solutions for the identified environmental problems. Each group should propose solutions for each identified problem and explain how they will mitigate the issue.



Environmental Island Presentation

Conclusion: Environmental island - peer feedback

1. Peer Feedback: Display the posters around the classroom or create a digital gallery. Review the project, discuss each criterion, then assign a grade (1 to 3) and write comments for each aspect.
2. Each group reviews the assessment they have received focusing on areas of improvement and strengths.
    a. What did you learn from the feedback you received?
    b. How can you use this feedback to improve your project?
    c. What was the most helpful piece of feedback you gave or received?



Environmental Island - Peer Assessmnet template link

3. Whole-Class Reflection and Discussion: Facilitate a discussion on the entire learning scenario, asking questions such as:
    a. What were the most common environmental problems identified across all islands?
    b. What innovative solutions stood out to you?
    c. How has this activity changed your perspective on environmental issues?

Training Material:

Internet access

Laptop/Computer

A3 papers

Markers, pens, and pencils

Autodraw

Canva

A Checklist Template

Environmental Island Presentation

Environmental Island - Peer assessment template link

Assessment:

Formative Assessment

A Checklist Template

Environmental Island - Peer assessment template link

Evaluation Criteria:

Peer Assessment

Students review the project, discuss each criterion, then assign a grade (1 to 3) and write comments for each aspect.

Drawing:

- Creativity and detail of the island depiction
- Inclusion of infrastructure, buildings, natural life, landscape, free-time activities, jobs, and industries

Environmental problems:

- Accuracy and relevance of identified problems
- Clarity in describing the problems

Proposed solutions: • Feasibility and innovativeness of solutions • Potential effectiveness in addressing the problems
Resources:
• Access to YouTube video clip “Earth Song” • Digital Tools: Word processing software (e.g., Microsoft Word, Google Docs) for writing an acrostic poem • Visual Design Tools: Canva or AutoDraw • Collaboration Platforms (Google Drive) • Presentation Equipment: projectors and screens in classrooms or during the gallery walk • Formative Evaluation Criteria: clear understanding of the peer assessment and evaluation criteria provided by the teacher for preparing and self-assessing their Environmental Island analysis and Acrostic poem • Teacher Guidance and Support: facilitate a discussion on the video and key issues, support the development of sustainable solutions and encourage critical thinking, and lead a reflection session to discuss key takeaways and real-world applications
Integration:
Integrating the activity on environmental island with other school subjects will enhance learning through interdisciplinary connections:

Science: Research and present on how the environmental issues depicted in "Earth Song" (deforestation, pollution, climate change) affect ecosystems.

Study local and global ecosystems and create a sustainable model for their island based on real scientific principles.

Social Studies: Investigate how different cultures and societies are affected by and respond to the environmental problems highlighted in "Earth Song."

Music: Discuss the musical elements of "Earth Song" and create their own songs or raps that address environmental issues.

Mathematics: Calculate the island's resources, population capacity, energy needs, and environmental impact using data analysis and geometry.

Language: Write persuasive letters or speeches advocating for specific environmental solutions for their island.

Art: Create detailed drawings, paintings, or digital art of their island, highlighting environmental features and challenges.

Technology: Use digital tools to create eBooks, presentations, and interactive maps of their islands, incorporating multimedia elements.

Geography: Students draw detailed maps of their islands, including topographical features like mountains, rivers, forests, and plains.

Module 1: Green Lesson Design

Activity 3: Pitching sustainable solutions

Learning Outcomes:

Remembering

a. Recall the Sustainable Development Goals (SDGs) and their main objectives.
b. List the stakeholders involved in sustainability efforts at a chosen level (e.g., school, community).

Understanding

c. Explain why stakeholders are crucial for sustainable development.
d. Summarize the positive examples of sustainability observed during the scavenger hunt.
e. Summarize the importance of local action in achieving global sustainability targets.

Applying

f. Apply knowledge of SDGs to identify areas for improvement in local sustainability efforts.
g. Use stakeholder mapping to propose collaborative solutions to sustainability challenges.

Analyzing

h. Analyze different perspectives from stakeholders in developing sustainable solutions.

i. Compare and contrast the feasibility of various sustainability practices observed during the scavenger hunt.

Evaluating

j. Evaluate the effectiveness of sustainable solutions pitched by peers based on judging criteria.
k. Judge the impact of proposed solutions on the community and environment.

Creating:

l. Design a digital presentation for pitching a sustainable solution to a panel of judges.
m. Develop a comprehensive stakeholder map illustrating key players in sustainability efforts.
n. Develop a proposal for a new SDG-related project incorporating innovative ideas and strategies.

Time: 30 - 60 - 30 minutes

Description of Activity:

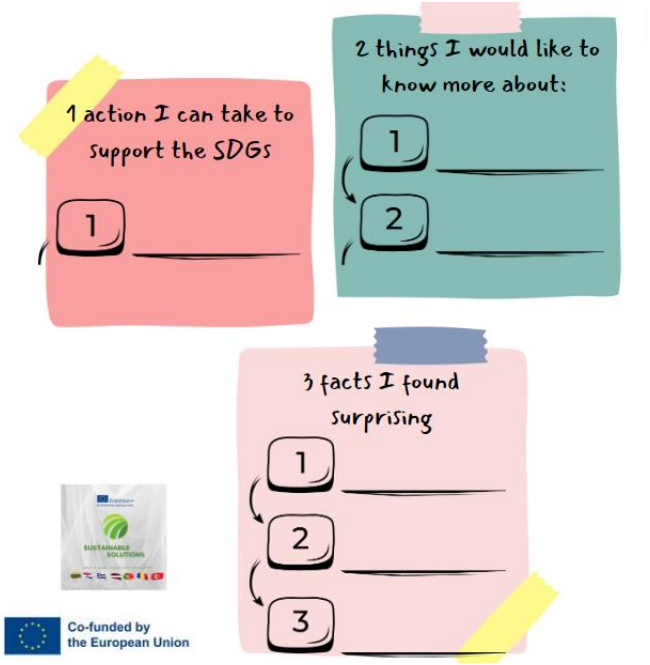
Warmup Activity

l

1. Instructions:

1. Students are given 5 minutes to browse the page and memorize as much as they can. WHAT ARE SUSTAINABLE DEVELOPMENT GOALS?
2. Students take ready-made quizzes to familiarize themselves with the SDGs. Next they comment on 3 facts they found the most surprising, 2 they would like to know more about and 1 action they can personally take to support the SDGs. (1-2-3-Activity template)

    a. Let's Learn about the SDGs - Part 1
    b. Let's Learn about the SDGs - Part 2
    c. Practical Action SDG quiz or Google Slides



3. Vocabulary exercise in English: Quizlet flashcards and test

Main Activity:

Instructions:

1. Stakeholder Mapping:

1. Teacher introduces the notion of stakeholders. In class they discuss the following questions:
    a. Why are stakeholders important?
    b. Who are they?
    c. Why are they important?
    e.g. at school level: students, teachers, school administrators, parents, local businesses, and community members - they are all important for sustainability as they give different perspectives and resources for solving problems.
2. Students work in groups and draw maps showing key people and organizations involved in sustainability efforts at the chosen level.
3. A class discussion where students share their insights, emphasizing the importance of collaboration in developing sustainable solutions.

2. Outdoor Learning Activity: Sustainability Scavenger Hunt:

1. In small groups students take part in outdoor learning activities to observe and identify either in school or local areas. Students are encouraged to take pictures:
    a. positive examples of sustainability
    b. areas where improvements can be made
2. Reporting back: Each group presents their findings to the class, highlighting the good practices they observed and areas where there is room for improvement.
3. Discussion on findings.

3. Pitching Sustainable Solutions:

1. Teacher explains the task to students using the prepared presentation for teachers (template link). They will work in pairs/small groups to pitch a well-researched and feasible sustainable solution to a panel of judges. They will create a digital design. Example of students' presentation: Pitching Sustainable Solutions in Education
2. Organising Pitch Day: Explain the judging criteria to students in advance
3. Judging and Feedback: After each pitch, judges provide feedback and ask questions to assess the feasibility and impact of the proposed solutions.

Conclusion:

1. Announcing the Best Sustainable Solution Proposal

1. Deliberation: the judges will convene to deliberate and decide on the winning group based on the announced criteria: relevance and impact, innovation, feasibility, stakeholder involvement, presentation quality, and sustainability.
2. Announcement: The judges will announce the winning group in a (semi)formal setting, such as a school Open Door Day, School Day, Earth Day…
3. Award Ceremony: The teacher makes sure that the winning pair/team receives certificates or a small prize (a gift card, an eco-friendly product…). Also, teachers may consider awarding these to other categories, such as best presentation, the most innovative solution…

2. Quiz on green lesson design principles

1. The teacher encourages students to take the quizzes again to measure their progress.
   a. Let's Learn about the SDGs - Part 1
   b. Let's Learn about the SDGs - Part 2
   c. Practical Action SDG quiz or Google Slides

Training Material:

1. Printed handouts or digital slides explaining the Sustainable Development Goals (SDGs).

2. Ready-made quizzes or quiz links related to the SDGs (e.g., Practical Action SDG quiz or Google Slides).

3. Quizlet flashcards or similar digital tools for vocabulary exercises related to sustainability and the SDGs.

4. Large sheets of paper or whiteboards for stakeholder mapping.

5. Markers, pens, and sticky notes for group work during stakeholder mapping.

6. Cameras or smartphones for taking pictures during the Sustainability Scavenger Hunt.

7. Printed or digital checklist for positive sustainability examples and areas needing improvement.

8. Computers or tablets with presentation software (e.g., PowerPoint, Google Slides) for pitching sustainable solutions.

9. Access to the internet for research purposes during preparation of presentations.

10. Evaluation sheets for judges to assess presentations and sustainable solutions.

11. Certificates or awards for winning teams (e.g., printed certificates, gift cards, eco-friendly products).

12. Post-it notes for collaborative activities.

13. Access to online resources or databases for researching sustainability topics.

14. A sufficient number of computers, tablets, or smartphones for group work and research.

15. Projector and screen for presenting materials during discussions and pitches.

Assessment:

Formative Assessment:

1. Monitoring student participation and engagement by observation, informal discussion, and review of comments/questions submitted.

2. Evaluating group participation

3. Pitching Sustainable Solutions: evaluating preparation and presentation skills during the pitch

Summative Assessment:

1. Pitching Sustainable Solutions (Final Presentation) - judging criteria

Evaluation Criteria

- Relevance and Impact: How well the solution addresses an important sustainability problem and its potential positive effects.
- Innovation: How creative and original the solution is, including new ideas or methods. Feasibility: How practical and likely it is that the solution can be successfully implemented with available resources and in the local context.
- Stakeholder Involvement: How well different groups and individuals are included in developing and carrying out the solution, encouraging teamwork and diverse perspectives.
- Presentation Quality: How well the idea is explained and communicated during the pitch, including clarity and engagement with the audience.
- Sustainability: How likely the solution is to have a lasting positive impact on the environment, society, and economy over time.

Resources:

Tools and Materials:

1. Handouts or digital slides explaining SDGs.
2. Quizlet for vocabulary exercises.
3. Practical Action SDG quiz or similar.
4. Google Slides for presentations.
5. Large sheets of paper, markers, sticky notes.
6. Cameras or smartphones for photos.
7. Checklist for a scavenger hunt.
8. Computers/tablets with presentation software.
9. Evaluation sheets for judges.
10. Stationery (pens, markers, post-it notes).
11. Projector and screen.
12. Sustainable props or examples.

Online Resources and Websites:

1. United Nations SDGs website: sdgs.un.org

2. Practical Action SDG resources: practicalaction.org/sdgs

3. Quizlet: quizlet.com

4. Google Slides: slides.google.com

5. Google Docs and Drive: docs.google.com, drive.google.com

6. TED Talks on sustainability: ted.com/topics/sustainability

7. World Bank Open Data: data.worldbank.org

8. UNEP data: unep.org

Integration:

- geography: understanding global issues (SDGs) and their impact on different regions; exploring sustainable development practices worldwide.
- biology: studying biodiversity, ecosystems, and environmental impacts; conducting field observations during the scavenger hunt.
- English Language: improving vocabulary through sustainability-related terms; writing reflections or reports on SDGs and sustainability.
- Business Studies: analyzing stakeholder roles in sustainability initiatives; exploring business strategies for sustainable development.
- STEM: developing and pitching innovative sustainable solutions; applying scientific principles to solve environmental challenges.
- Curriculum Development: integrating green lesson design principles into teaching practices; developing educational materials on sustainability.

Appendix

Module 1

1.1. Types of eco-footprints that measure the environmental impact of human activities:

1. Carbon Footprint: Measures the total greenhouse gas emissions caused by an individual, organization, or activity, expressed in carbon dioxide equivalents.
2. Water Footprint: Calculates the total volume of freshwater used directly and indirectly by an individual, community, or business.
3. Ecological Footprint: Assesses the biologically productive land and water area needed to provide resources and absorb waste for a given population or activity.
4. Energy Footprint: Measures the total energy consumption of an individual, organization, or activity, including both direct and indirect energy use.
5. Land Footprint: Represents the amount of land used for various purposes, such as agriculture, urban development, and resource extraction.
6. Material Footprint: Quantifies the total volume of raw materials (biomass, fossil fuels, metals, and non-metallic minerals) required to sustain consumption and production activities.
7. Biodiversity Footprint: Measures the impact of human activities on biodiversity, including species loss and habitat degradation.
8. Food Footprint: Evaluates the environmental impact of food production and consumption, including land use, water use, and carbon emissions associated with agriculture.
9. Waste Footprint: Assesses the amount of waste generated by individuals, businesses, or industries and its impact on the environment.
10. Chemical Footprint: Measures the use and release of harmful chemicals in products or processes, assessing their impact on human health and ecosystems.
11. Plastic Footprint: Quantifies the amount of plastic waste generated and its contribution to environmental pollution, especially in oceans.
12. Nitrogen Footprint: Assesses the amount of reactive nitrogen released into the environment through activities like agriculture, energy production, and waste management, contributing to pollution and climate change

1.2. Earth Song - key

C In Michael Jackson's *Earth Song*, several environmental problems are depicted. The video shows:

- Deforestation: Vast areas of forests are shown being destroyed, symbolizing human-caused environmental destruction.
- Pollution: The imagery of smoke and waste reflects the harmful effects of industrial pollution.
- Wildlife Extinction: The distress and death of animals in the video represent the loss of biodiversity and the impact of habitat destruction.

- War and Violence: Scenes of human conflict and suffering indicate the broader social consequences of environmental degradation, including displacement and resource scarcity.

D Humans are depicted as both the destroyers and victims of nature in the video. On one hand, people are shown causing environmental destruction through activities like deforestation, war, and industrial pollution. On the other hand, humans are also depicted as being deeply connected to nature, suffering alongside the planet when it is harmed. There's a clear plea for humans to recognize their connection to the earth and change their destructive ways.

E The video evokes powerful emotions of sorrow, anger, and hope. Watching the scenes of destruction creates a deep sense of loss and devastation, especially as it shows both the human and animal toll of environmental degradation. There is also a feeling of anger towards the inaction and harm being caused by humans. However, the imagery of the earth healing and people reconnecting with nature toward the end offers a sense of hope and the possibility of redemption, highlighting the need for change.

F The video suggests a need for awakening and reconnection with nature. The lyrics express a yearning for the world to "wake up" to the harm being done. The imagery of people mourning and pleading with the earth, combined with the reversal of environmental destruction (forests regrowing, animals reviving), suggests that healing is possible if humans change their behavior. It implies that solutions lie in stopping environmental destruction, reducing pollution, protecting wildlife, and fostering a deeper spiritual connection with nature.

G Individuals and communities play a vital role in addressing the environmental problems depicted. The video calls for people to take responsibility for their impact on the environment, highlighting the power of collective action. People can:

- Raise awareness about environmental issues.
- Advocate for policy changes to protect ecosystems and reduce pollution.
- Reduce their own environmental footprint by adopting sustainable practices, such as reducing waste, conserving resources, and supporting reforestation efforts.
- Engage in community efforts like conservation projects, environmental education, and local activism. The imagery suggests that through compassion and conscious action, humanity can reverse the damage done and heal the planet.

Example of an acrostic poem:

Earth Song

E*very breath of the wind whispers a plea,*
A*ll around, nature cries for harmony.*
R*ivers weep, and forests fall to their knees,*
T*ruth buried deep beneath dying trees.*

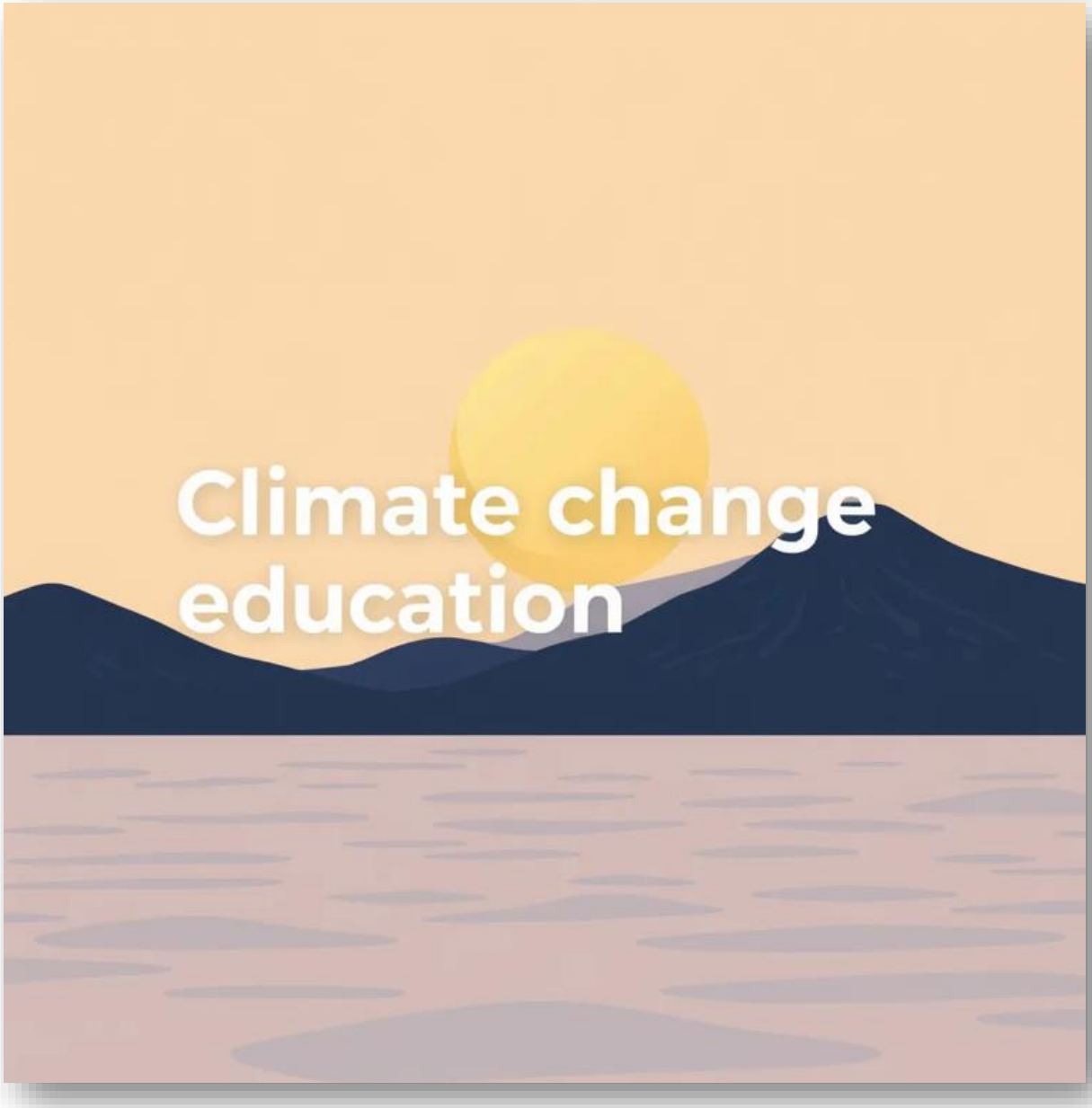
***H**ope lingers, fragile as a bird's song,*

***S**oaring for change where we've gone wrong.*
***O**pen your heart to the earth's deep pain,*
***N**urture the world; let it flourish again.*
***G**ive back the love that it's given so long.*

1.3. Sustainable Development Goals Definitions:

1. No Poverty: End poverty in all its forms everywhere.
2. Zero Hunger: Achieve food security, improve nutrition, and promote sustainable agriculture.
3. Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
4. Quality Education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
5. Gender Equality: Achieve gender equality and empower all women and girls.
6. Clean Water and Sanitation: Ensure availability and sustainable management of water and sanitation for all.
7. Affordable and Clean Energy: Ensure access to affordable, reliable, sustainable, and modern energy for all.
8. Decent Work and Economic Growth: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.
9. Industry, Innovation, and Infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
10. Reduced Inequality: Reduce inequality within and among countries.
11. Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient, and sustainable.
12. Responsible Consumption and Production: Ensure sustainable consumption and production patterns.
13. Climate Action: Take urgent action to combat climate change and its impacts.
14. Life Below Water: Conserve and sustainably use the oceans, seas, and marine resources.
15. Life on Land: Protect, restore, and promote sustainable use of terrestrial ecosystems, forests, and biodiversity.
16. Peace, Justice, and Strong Institutions: Promote peaceful and inclusive societies, provide access to justice, and build accountable institutions.
17. Partnerships for the Goals: Strengthen global partnerships to support and achieve the SDGs.

MODULE 2: CLIMATE CHANGE EDUCATION


Climate change
education

MODULE 2: CLIMATE CHANGE EDUCATION

1. Introduction:

This module focuses on equipping educators with the knowledge and tools necessary to effectively teach about climate change. With climate change being one of the most pressing global issues, the module aims to raise awareness and facilitate meaningful discussions among students. The objectives include understanding the science behind climate change, exploring its impacts, and fostering proactive attitudes towards mitigation and adaptation.

- Focus: Equipping teachers with the skills and tools to effectively teach about climate change.
- Purpose: Raising awareness and facilitating meaningful discussions among students regarding climate change as a global issue.
- Goals:
    - Understand the science behind climate change.
    - Analyze the impacts of climate change.
    - Propose mitigation and adaptation strategies.

2. Target Audience:

Educators from all disciplines who are motivated to incorporate climate change discussions and activities into their curriculum, enhancing students' understanding of this vital issue.

3. Key Components:

1. Understanding Climate Science: Exploring the fundamental principles of climate science, including greenhouse gases, the greenhouse effect, and the role of human activities in climate change.
2. Impacts of Climate Change: Discussing the social, economic, and environmental impacts of climate change on local and global scales, including extreme weather events, biodiversity loss, and social justice issues.
3. Mitigation and Adaptation Strategies: Investigating ways to address climate change through both mitigation (reducing emissions) and adaptation (preparing for its impacts), engaging students in solution-oriented thinking.
4. Interactive Learning Activities: Hands-on projects, group discussions, and simulations that encourage critical thinking and collaborative problem-solving regarding climate change issues.

4. Learning Objectives:

1. Comprehend Climate Change Fundamentals: Educators will gain a clear understanding of the scientific principles related to climate change and its broader impacts.
2. Foster Critical Thinking: Cultivate students' ability to analyze climate change data, discuss its implications, and evaluate potential solutions.
3. Develop an Engaging Curriculum: Equip educators with strategies to create dynamic lesson plans that effectively incorporate climate change themes across various subjects.
4. Promote Activism and Awareness: Encourage students to become proactive advocates for environmental sustainability and climate resilience within their communities.

5. Curriculum Structure:

The module is structured around interactive sessions that blend theoretical knowledge with practical applications. Each session will include lectures, small group work, case studies, and project-based activities designed to help educators implement climate change education effectively in their classrooms. By the end of the module, participants will feel empowered to address climate change comprehensively and confidently in their lesson plans.

Certainly! Here's a completion of the unfinished sections to provide a comprehensive outline for the Climate Change Education module:

6. Pedagogical Approach:

The pedagogical approach will be inquiry-based learning, promoting active engagement and student-centered discussions. Educators will be encouraged to facilitate a learning environment where students can ask questions, conduct investigations, and reflect on their own understanding of climate change. This approach will emphasize collaborative work, critical thinking, and problem-solving, allowing students to explore real-world climate issues.

7. Integration:

Climate change education will be integrated across various disciplines. For example, science classes can focus on the scientific principles, language arts can involve writing persuasive essays on climate action, and social studies can explore the socio-economic impacts. The goal is to create interdisciplinary connections that highlight the relevance of climate change in multiple contexts, fostering a holistic understanding among students.

8. Assessment and Evaluation:

Assessment will be both formative and summative. Educators will use tools like quizzes, reflections, group projects, and presentations to evaluate understanding and engagement. Additionally, peer assessments can be incorporated to encourage collaboration and feedback. Evaluations will focus on the application of knowledge, critical thinking, and engagement in climate action initiatives.

9. Resources and Support:

Educators will be provided with a comprehensive resource list, including scientific articles, documentaries, educational websites, and curriculum guides related to climate change. Ongoing support will include access to webinars, online forums, and mentorship opportunities with climate professionals. Collaborations with local environmental organizations can also enhance the learning experience and provide field trip opportunities for students.

10. Cultural Relevance:

The curriculum will acknowledge and incorporate diverse perspectives and local community issues related to climate change. This includes discussing how different cultures are affected by climate change and examining indigenous knowledge and practices about environmental stewardship. Engaging with local communities to address their unique climate challenges will help students understand the global nature of the issue while reinforcing local significance.

11. Technology Integration:

Technology will play a crucial role in the module. Educators will learn to utilize online platforms for simulations, data analysis, and virtual collaborations. Tools such as climate modeling software, geographic information systems (GIS), and social media platforms will be explored for their pedagogical potential. Integrating technology will not only enhance learning experiences but also familiarize students with modern tools used in climate science and advocacy.

Activity 1: Climate Action Design Challenge

Learning outcomes:

Remembering

Activity 1: Recall key effects of weather exchange on communities, ecosystems, and economies. Activity 2: Identify unique weather-associated demanding situations (e.G., drought, excessive heat) mentioned in group eventualities.

Understanding

Activity 1: Explain the immediately and long-term techniques for addressing the assigned climate mission.

Activity 2: Describe the target market and key messages of the climate action marketing campaign.

Applying

Activity 1: Apply understanding of weather exchange to advocate realistic answers for the assigned climate-associated situation.

Activity 2: Develop and put in force a campaign strategy that addresses the precise weather-related troubles confronted by the group.

Analyzing

Activity 1: Analyze the effectiveness of various proposed solutions with the aid of evaluating and contrasting the organization's technique with others during magnificence discussion.

Activity 2: Examine capacity boundaries to the climate motion marketing campaign and advise strategies to overcome those challenges.

Evaluating

Activity 1: Evaluate the strengths and weaknesses of the institution's proposed solution for the duration of the presentation and peer Q&A session.

Activity 2: Assess the capability impact of the weather movement campaign at the target audience and discuss its viability in the course of magnificence mirrored image.

Creating

Activity 1: Create a comprehensive plan that integrates on the spot measures, lengthy-time period techniques, and network engagement to cope with the weather mission.

Activity 2: Produce visual materials (video, poster, infographic) that deliver the climate movement marketing campaign's message to the audience.

Warmup activity:

Instructions:

1. Introduction (10 minutes) Begin the lesson with an overview of the impacts of climate change on communities, ecosystems, and economies. Explain that students will participate in a simulation in which they must solve and propose solutions for specific weather-related situations.
2. Presentation Session (5 minutes) Prepare preliminary presentations showing various challenges based on climate change. Examples of events include: An interconnected coastal city growing on the sea. Farming communities facing increasing drought affecting crop production. Extreme heat is the urban area where energy is critical. An island nation threatened by tropical cyclones and displaced residents. Distribute cards to each group of 4-5 students, and make sure there are different challenges in the classroom.
3. Group Work (20 minutes) In their groups, students will discuss the given scenario and work together to create a multifaceted solution. It should be considered that: Immediate measures to address the issue. Long-term strategies for mitigation and adaptation. community engagement and education. Possible barriers and how to overcome them. Encourage teams to assign roles (e.g. researcher, provider, drafter) to facilitate effective collaboration.
4. Solution Presentation (15 minutes) . Each group will present their situation and proposed solutions to the class. Allow each group about 3 minutes for their presentation, and 1-2 minutes for peer Q&A.
5. Classroom Discussion and Reflection (10 minutes) . Once all teams have provided feedback, facilitate a discussion about the challenges and solutions presented. Consider

saying: Which solution was the most innovative or interesting? What similarities have been observed in the degree of variation?

Main Activity:

1. Introduction (10 minutes) Recap the key climate change issues discussed in the warming session. Explain the purpose of the Climate Action Plan Challenge and identify expectations and deliverables.

2. Team Building (5 minutes) Organize students into similar groups based on their situations from the warm-up activity. Make sure each group has the same playlist to keep it going.

3. Campaign Planning (30 minutes) Each group will develop a climate action campaign targeted at their specific situation. It should be considered that:

Target Audience: Consider who the campaign is targeting (e.g. communities, schools, businesses).

Campaign Goals: Define the main objectives. What are the expected outcomes (e.g. raising awareness, encouraging specific actions, influencing policy)?

Key Messages: Create compelling and clear messages to convey urgency about the weather. Action strategies: workshops, social media campaigns, community events to connect with the target audience) actionable steps or events (e.g. Materials: Create graphics or slogans that can be used in their campaign.

Encourage groups to brainstorm together and assign roles, such as demonstrators, developers and researchers.

4. Visual material preparation (30 minutes) Teams will prepare either a short video, a poster or an infographic to present their campaign ideas to the class. They can use their poster boards to illustrate points, which they can use to present to their teams.

5. Presentation (20 minutes) . Each group will present their climate action campaign to the class. Allow 2-3 minutes for peer questions and answers after each presentation.

6. Classroom Reflections and Transportation (10 minutes) . Facilitate class discussion as you identify assigned campaigns.

Formative assessment:

Introduction and Team Building: Observe student engagement in recaps and team-building activities to assess their understanding of climate change issues and team development. Provide real-time feedback to ensure alignment with anticipated climate policy challenges.

Campaign Planning: Monitor group discussions during brainstorming sessions to assess the feasibility of targeted campaigns. Provide guidance and encourage students to refine their campaign objectives, messages, and action strategies as needed.

Summative assessment:

Visual Creation: Review the final visuals (videos, posters, or infographics) created by each team, and using the created rubric, the teacher assesses the product made by the student teams.

Resources:

Tools of presentation: Tools to convey content during introductions and presentations.

Writing pages: Letters or large pieces of paper used to record and organize ideas. Support groups: Tools or resources to help organize groups of students and facilitate group work.

Creative Content: Key content with intellectual content to incorporate and create visual content (e.g., posters, videos, infographics).

Digital devices: Access to technology for research, collaboration, and information production.

Assignment task resources: Suggestions or prompts to help students deliver group assignments.

Visual-media equipment: Equipment needed to produce and display visual devices or multimedia content (Canva, Powerpoint, Google Slides).

Feedback mechanism: A simple method for gathering peer comments and reflections on a final discussion (Mentimeter, Padlet, etc.).

Integration:

Science Integration: Students or staff can explore the scientific causes and consequences of climate change, using the findings to inform the development of evidence-based climate action strategies.

Application of mathematics: Incorporate data analysis and calculations such as carbon footprint measurements or mathematical trends to demonstrate the impact of proposed climate actions and visualize data with charts or graphs in your cognitive. Social Studies Interactive: Explore the socioeconomic and political consequences of climate change, encouraging participants to consider how communities are impacted and how policies can affect environmental impacts.

Language and Communication Skills: Encourage the development of persuasive messages and effective communication strategies, enabling participants to create persuasive presentations and clearly present their climate strategy

Creative Art Integration: Use art and design to create engaging content such as posters or infographics that communicate key messages about climate action and raise awareness in an impactful way.

Digital and ICT skills: The use of digital tools to research, collaborate and create multimedia content, enhances participants' digital skills and enables them to share their climate action campaign effectively.

Activity 2: Climate change trivia challenge:

Learning Outcomes:

Remembering

1: Recall key climate alternate problems articulated during the brainstorming consultation.

2: Identify accurate answers to the weather alternate trivia questions primarily based on understanding from elegance discussions.

Understanding

1: Explain why sure answers to the minutiae questions are correct, and articulate the reasoning to friends.

2: Describe the manner of growing correct and informative minutiae questions related to climate trade.

Applying

1: Apply expertise of weather exchange to broaden correct and challenging minutiae questions.

2: Engage inside the quiz by means of selecting the ideal solutions and justifying them all through the institutional discussion.

Analyzing

1: Analyze the effectiveness of various trivialities questions in checking out information about weather alternate troubles.

2: Examine the reasoning behind accurate and incorrect answers, and speak how nicely every query captured the complexity of the subject.

Evaluating

1: Evaluate the pleasant and relevance of trivia questions based totally on comments from the trainer and friends.

2: Assess the overall effectiveness of the quiz in enhancing information of weather trade troubles.

Creating

1: Create nicely-constructed minutiae questions that as it should be constitute key weather trade demanding situations.

2: Generate reflective insights on the collaborative process and the depth of understanding finished through the quiz.

Warm up activity: Creating a quiz

Instructions:

1. Brainstorming 1 (10 minutes)**:** the class is divided into small teams, where they think of 5 different possible climate change problems that are then articulated into questions;
2. Brainstorming 2 (10 minutes): for each question think of 4 different possible answers, choosing one as the correct one which they can explain to the whole class;
3. The teacher overlooks the questions and gives feedback to the students, whether the question can be included in the final quiz, if not, students think of new questions (10 minutes).

4. The students will send in the questions and answers using a SurveyMonkey form. The teacher then will use the questions and answers they've brainstormed to create a final quiz on Kahoot (10 minutes);

Main activity:

1. Preparing for the quiz (5min):

1.1 Students dissolve the teams and sit individually;

1.2.Prepare their phones, making sure that they are connected to the internet in order to play Kahoot

2. Playing the quiz (30min);

2.1.Start the quiz, making sure that everyone is able to play;

2.2.After each question, a student from the respective group who thought of the question explains the correct answer and explains why the other answers are not correct;

3. Reflection (15 min);

3.1.Students reflect on the group work and the contents of the quiz regarding collaborative learning, critical thinking, and the complexity of climate change issues using the mentimeter's open-ended question form;

3.2.The teacher chooses 5 of the most common answers and students explain why they chose to write that.

Formative Assessment:

Observe student engagement in brainstorming activities, focusing on how well they articulate climate change concerns and formulate appropriate general questions.

Provide feedback on the quality of the questions and guide students to improve their questions as needed.

Quiz Preparation: Supervise students as they set up their devices and participate in the quizz.

Monitor students' engagement in the reflection activity, and assess their ability to critically evaluate group work and inquiry content. Answer their problems to deepen their understanding.

Summative Assessment:

- Review the quiz questions submitted via SurveyMonkey to assess their accuracy, relevance and complexity.
- Assess how the questions in the quiz cover the main climate change topics and how effectively did students apply their knowledge.
- Evaluate students performance in the Kahoot quiz.

Resources:

Tools for guiding the brainstorming sessions and quiz creation (whiteboards, monitors, etc.).
Writing materials: paper or digital tools for students to record their quiz questions and answers.
Digital devices: each student have access to smartphones or tablets to participate in the Kahoot quiz.
Quiz and reflection platforms: SurveyMonkey, Mentimeter and Kahoot for quiz and reflection.

Integration:

Scientific Integration: Encourage students to draw on knowledge from science classes about climate change, its causes and consequences, and to explore the scientific basis for asking trivial questions.
Mathematics Applications: Include questions that require basic calculations or data interpretation, such as calculating carbon footprints or understanding climate trends.
Social Learning Coalition: Include questions about the social, economic, and political implications of climate change to help students understand the broader impacts on communities and systems.
Language and Communication Skills: Develop simple questions that are clear and precise, and focus on using language to convey complex ideas simply and effectively.
Digital and IT skills: Use digital tools for creating and participating inquiries, increasing students' technical skills and their ability to express knowledge digitally.

Activity 3: Climate Change Debate Challenge

Learning Outcomes:

Remembering:

1:Remember the main arguments and evidence about climate change and the issues discussed in previous activities.

2: Identify the main stakeholders and their positions in climate-related debates.

Understanding:

1: Explain the perspectives of various stakeholders on climate change issues.

2: Describe the importance of each argument in the context of the broader climate change debate.

Applying:

1: Apply knowledge of climate change to formulate well-designed arguments for a debate.

2: Engage in the debate by presenting the arguments and counterarguments, they should be evidence to support these positions.

Analyzing:

1: Analyze the pros and cons of the arguments presented during the debate.

2: Examine the effect of stakeholder interests on their positions regarding climate change.

Evaluating:

1: Evaluate the effectiveness of different debate strategies in conveying climate change arguments.

2: Assess the impact of the debate on deepening understanding of climate change issues and potential solutions.

Creating:

1: Create compelling opening and closing statements that summarize key arguments and appeal to the audience.

2: Generate reflective insights on the debate process and the learning outcomes achieved.

Warm-up Activity: Argument Development

Instructions:

1. **Introduction (10 minutes):**

Begin the activity with a brief description of the structure and purpose of the arguments, emphasizing their role in requiring multiple perspectives on complex issues. Bring up the debate topic: "Should governments prioritize economic growth over environmental protection in climate change policies?"

2.**Group Formation and Topic Assignment (5 minutes):**

Divide the students into two groups, one group to argue for the priority of economic development, and the other to argue for the protection of the environment. Each group is further divided into subgroups and each group focuses on specific aspects of the debate,for example scientific evidence, economic implications, social impact, and ethical considerations.

3.**Research and Argument Development (20 minutes):**

In their small groups, students will research and develop arguments for their assigned ideas. Each subgroup should identify key points, supporting evidence, and potential objections. Encourage teams to assign roles (e.g., lead debater, analyst, presenter) to facilitate effective collaboration.

4.**Argument Presentation and Feedback (15 minutes):**

Each group will present their arguments to their group, refine their points and receive feedback from their classmates. Teams must complete their program, including opening and closing remarks.statements.

5. **Classroom Discussion and Reflection (10 minutes):**

Conduct a brief discussion about the argument development process. Consider asking: What was the hardest part of preparing for the debate? How did your team address potential weaknesses in your argument?

Formative Assessment:

1. **Research and Argument Development:**
    - During the research phase, observe students' engagement, assess their ability to gather relevant information and formulate coherent arguments. Provide real-time feedback to help students strengthen their arguments and prepare for debate.
2. **Debate Execution:**
    - Monitor arguments to observe how well students present their arguments, respond to counterarguments, and engage with the audience. Provide guidance in question and answer sessions to deepen student understanding and encourage critical thinking.

Summative Assessment:

1. **Debate Performance:**
    - Evaluate the performance of each group based on the quality of their arguments, use of evidence, and effectiveness in refuting opposing viewpoints. Check the clarity and persuasiveness of the opening and closing statements.
2. **Reflection and Feedback:**

Review the summary during the reflection session to assess students' own knowledge and understanding of the key issues in the debate. Evaluate the depth of insight demonstrated in students' reasoning about the argumentation process.

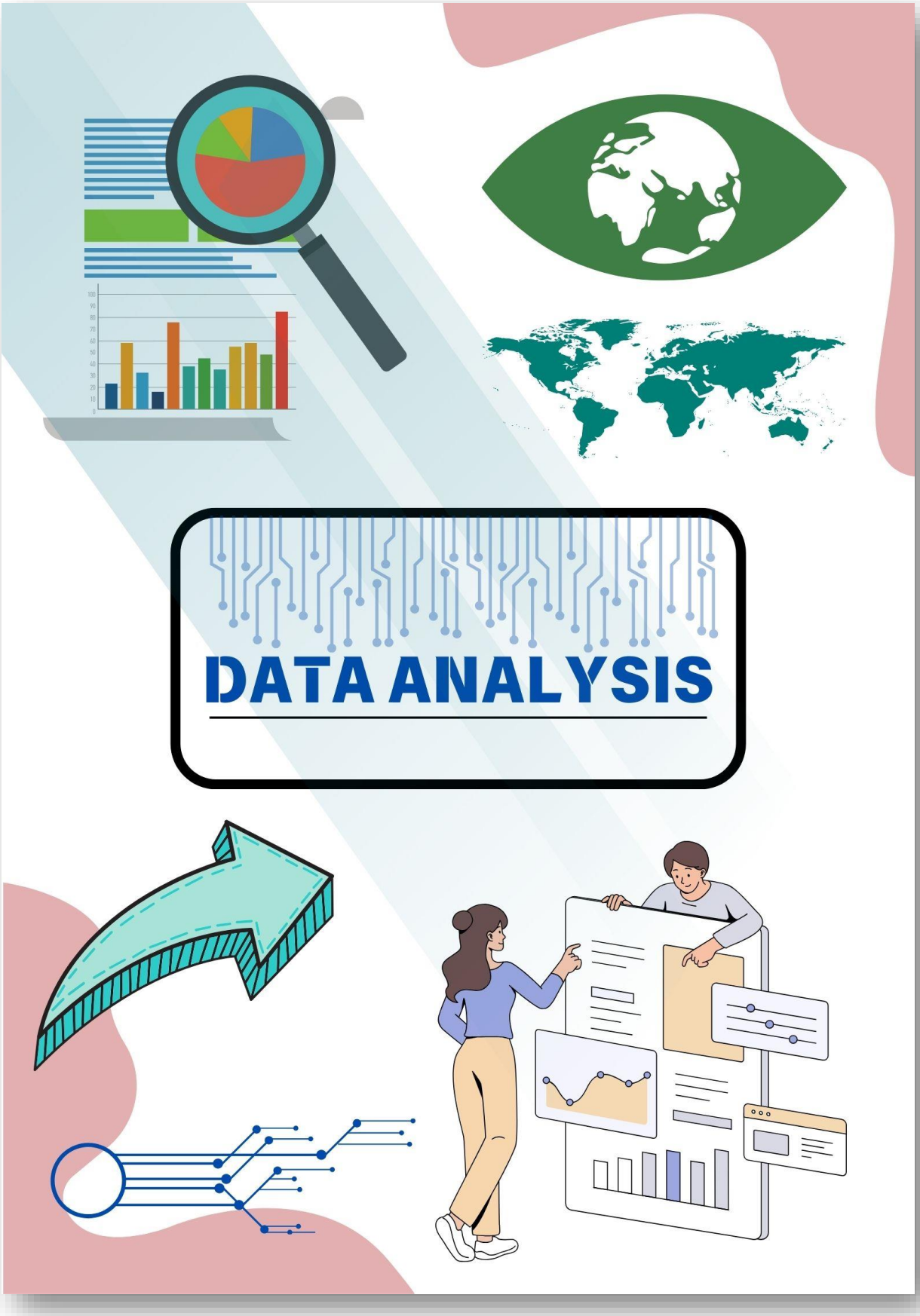
Resources:

1. Research resources: Access to digital resources (articles, databases, etc.) to gather evidence for argumentative debate.
2. Notepads: Paper, notebooks, or digital tools that students use to organize their arguments and take notes during debate.
3. Organizing the debate: Classroom settings to facilitate the debate and any necessary audio/visual equipment (e.g. microphones, projectors).
4. Assessment tools: Forums such as Mentimeter or Padlet for collecting student responses and reflections.

Integration:

1. Scientific Integration: Encourage students to use scientific research and data to support their arguments about the effects of climate change on the environment.
2. Social Learning Coalition: Explore the social and economic and political context of the debate topic, including the impact of climate policy on communities and communities.
3. Language and Communication Skills: Focus on creating persuasive arguments and clear communication during debate, and enhance students' rhetorical skills.
4. Digital and IT skills: Use digital tools for exploration, collaboration, and feedback to develop students' ability to use technology.

MODULE 3: DATA ANALYSIS AND VISUALISATION


DATA ANALYSIS

MODULE 3: DATA ANALYSIS AND VISUALIZATION

1. Introduction

a. Data analysis is so important for understanding climate change patterns and its impacts.

b. Effective visualization of climate data helps in communicating complex information to the students.

c. This module introduces necessary tools and techniques. These tools help in monitoring climate variables and assessing environmental impacts.

2. Target Audience:

This course has been created for educators who want to use data-driven insights about environmental concerns and climate change to improve their curricula. Teachers can more effectively explain difficult ideas and trends to their students by becoming skilled in data analysis.

3. Key Components:

a. Data Analysis Techniques

b. Visualization Tools

c. Application in the Classroom

4. Learning Objectives:

a. to understand the fundamental ideas and methods of data analysis, particularly as they relate to environmental and climate change data, such as trend detection, statistical analysis, and data cleansing.

b. to become proficient in the use of various visualization technologies to provide coherent, captivating visual representations of environmental data.

c. to develop skills to incorporate data analysis and visualization into their curriculum.

d. to create interesting, data-driven courses and projects that support students' critical thinking and data literacy while assisting them in understanding and analyzing environmental concerns like climate change.

5. Curriculum Structure:

The curriculum structure includes modules on data collection, statistical analysis, visualization tools, application to climate change, lesson design, interactive projects, and further learning resources.

6. Pedagogical Approach:

The educational methodology prioritizes experiential learning via pragmatic tasks, real-life scenarios, and collaborative projects that improve educators' competence in data analysis and visualization methodologies for easy incorporation into their curricula.

7. Integration:

To increase student engagement and comprehension of environmental issues and climate change, data analysis and visualization techniques are integrated into the curriculum through structured modules. Teachers are taught how to incorporate these techniques into lesson plans, create interactive activities, and use real-world environmental data.

8. Assessment and Evaluation:

Both formative and summative assessments are used in assessment and evaluation procedures. Rubrics are used to examine students' proficiency in data analysis and visualization abilities, as well as their comprehension of climate change ideas and their capacity to apply these skills in practical situations.

9. Resources and Support:

Teachers are provided with helpful materials and guidance to easily integrate data analysis and visualization techniques into their teaching.

10. Cultural Relevance:

To ensure inclusivity and engagement among students from diverse backgrounds and to foster a deeper understanding of climate change and environmental issues within diverse communities, the module is designed to be culturally relevant. To do this, it incorporates diverse perspectives and examples from various cultures.

11. Technology Integration:

To improve data analysis and visualization skills, teachers can create dynamic and engaging learning experiences that equip students for the digital age through the use of technology integration, which involves using tools like interactive software, online platforms, and digital resources.

Module 3: Data Analysis and Visualization

Activity 1: Exhibition Of Data

Learning Outcomes:

a. Students will have a comprehension of fundamental terms and concepts in data analysis.
b. Students will be able to name common data analysis tools and their uses for them.
c. Students will acknowledge the importance of data analysis and visualization in understanding complex and compound issues about climate change.
d. Students will engage in collaborative debate and critical thinking.
e. Students will apply data analysis techniques to explore and interpret real-world data related to climate change and environmental issues.
f. Students will practice using data analysis software to organize, analyze, and visualize data effectively.
g. Students will demonstrate creativity and problem-solving skills in designing visual representations of their data analysis results.
h. Students will engage in peer-to-peer learning and collaboration throughout the gallery walk, gaining insights from their peers' visualizations.
i. Students will be able to express the importance of data analysis skills in addressing complex challenges and making informed decisions.

Time: 15 + 45 Mins

Description of Activity:

Warmup Activity

1. Instructions:

a. Introduce the module to the class and go over the features of the warm-up exercise with the students.
b. Give each student a printed copy of the quiz (3.1) and let them know they have a few minutes to finish it on their own.

c. Show each question on the whiteboard or projector, allowing students enough time to read and respond.

d. After completing the quiz, collect the papers and briefly review the answers, providing explanations for each question. (or use Kahoot)

e. Encourage students to ask questions and discuss any concepts they find challenging.

2. Discussion Points:

- What did you learn from the quiz about data analysis?
- Are there any concepts you would like to explore further?
- How do you think data analysis skills can be useful in understanding environmental issues like climate change?
- What are some real-world examples where data analysis is used to solve problems?

Main Activity 1

Instructions:

1. Introduction:
- Introduce the activity to the class: a data analysis challenge focused on exploring climate change data.
- Emphasize the importance of data analysis in understanding environmental issues and making conscious decisions.

2. Dataset Exploration:
- Provide students with the sample dataset (3.2) related to monthly average temperatures in a particular city which provides data for climate change.
- Instruct students to analyze the dataset in groups, looking for patterns.

3. Data Visualization:
- After analyzing the dataset, instruct students to create visualizations in the forms of bar graphs, line charts, pie charts, scatter plots, or columns.
- Provide large papers for students to create visual displays of their data analysis results.
- Encourage students to use markers, pens, and sticky notes to create visual representations.

4. Gallery Walk:
- Organize the visual displays around the classroom.
- Conduct a gallery walk, where students walk around the room to see each other's data analysis visualizations.
- Students should be encouraged to make notes and look for trends or ideas in the work of their peers.

5. Discussion and Reflection:
- Lead a class discussion about the data analysis challenge.
- Ask students to share their observations, insights, and any challenges they encountered during the activity.
- Facilitate a reflection on the importance of data analysis skills in understanding climate change and environmental issues.

Conclusion:
The data analysis challenge provides students with a practical and interactive experience in analyzing and visualizing real-world data related to climate change. By engaging in hands-on data analysis, students develop critical thinking skills and gain a deeper understanding of the complexities of environmental issues.

Warmup Activity:

Materials Needed:
- Whiteboard or projector for displaying questions
- Printed copies of a simple quiz (3.1) on data analysis concepts, Kahoot
- Pens or pencils for students

Main Activity:

Materials Needed:
- Sample dataset (one dataset for the entire class) (3.2)
- Poster boards or large papers for visualization
- Markers, pens, and sticky notes

Assessment:

Peer Evaluation

a. As part of the assessment procedure during the gallery walk, include peer evaluation.
b. Have students provide feedback on their peers' visualizations, focusing on strengths and areas for improvement.
c. Encourage students to consider criteria such as clarity, creativity, and effectiveness of visual representation in their evaluations.

Evaluation Criteria:

1. Understanding of Data Analysis Concepts:
- Demonstrates understanding of basic data analysis concepts and terminology.
- Applies appropriate data analysis techniques to interpret and explore the data.

2. Data Visualization Skills:
- Effectively uses data visualization techniques to represent findings visually.
- Creates clear and engaging visualizations that improve understanding of the data.

3. Creativity and Problem-Solving:
- Demonstrates creativity and innovation in presenting data analysis results.
- Applies problem-solving skills to overcome challenges encountered during data analysis.

4. Collaboration and Communication:
- Collaborates effectively with peers during group activities.
- Communicates ideas and findings clearly during presentations and discussions.

5. Critical Thinking and Reflection:
- Uses critical thinking to properly examine and understand data.
- Reflects on the significance of data analysis skills in addressing environmental issues and making informed decisions.

6. Peer Evaluation Feedback:
- Provides feedback to peers on the clarity, creativity, and effectiveness of their visualizations.
- Demonstrates empathy and respect in providing feedback to peers.

7. Overall Presentation Quality:
- Organizes presentation content logically.
- Uses appropriate language and visual aids to convey information.
- Engages the audience and demonstrates enthusiasm for the topic.

Resources:

a. Online Datasets:

- NASA Climate Change Data
- NOAA Climate Data Online
- World Bank Climate Change Data

b. Data Analysis and Visualization Tutorials:

- Microsoft Excel Tutorial
- Tableau Public Training Videos
- Google Sheets Help Center

c. Environmental Science Websites:

- Environmental Protection Agency (EPA)
- National Geographic - Environment
- Intergovernmental Panel on Climate Change (IPCC)

d. Peer Review Guidelines:

- Peer Review Template - Purdue OWL
- Effective Peer Review Guidelines - University of California, Berkeley

e. Reference Materials:

- Climate Change: Evidence & Causes - National Academy of Sciences
- UN Environment - Climate Change
- Climate Central - Research & Analysis

Integration:

1. Curriculum Integration:
a. Match the data analysis and visualization activities with relevant curriculum standards and learning objectives in subjects such as science, mathematics, and technology.
b. Integrate the activities into existing units or lessons on climate change, environmental science, or data analysis to provide context and relevance to students' learning.

2. Interdisciplinary Connections:
a. By connecting elements of data analysis and visualization with other courses, such as language arts, geography, and social studies, you can promote interdisciplinary connections.
b. Encourage students to explore the social, economic, and cultural aspects of environmental issues through data analysis and visualization activities.

3. Real-World Applications:
a. Emphasize the real-world applications of data analysis and visualization techniques in addressing complex environmental challenges such as climate change.
b. Supply opportunities for students to engage with authentic datasets and explore how data-driven decision-making can inform environmental policy and action.

4. Project-Based Learning:
a. Create project-based learning opportunities that incorporate research projects, practical investigations, and community-based activities with data analysis and visualization exercises.
b. Motivate students to use their knowledge of data analysis to solve problems in the real world and work together to find answers.

5. Technology Integration:

a. Make use of technological tools and platforms to ease the process of data analysis and visualization, giving students digital access to, analysis, and visualization of data.
b. Use technological tools to improve student learning and advance digital literacy, such as interactive software, online databases, and digital mapping platforms.

6. Critical Thinking and Problem-Solving:
a. Promote critical thinking and problem-solving skills by challenging students to analyze complex datasets, identify patterns, and draw evidence-based conclusions.
b. Motivate students to evaluate the consequences of their research and take into account different points of view when analyzing information concerning environmental challenges..

Module 3: Data Analysis and Visualization

Activity 2: Data Prediction

Learning Outcomes:

a. Students will develop proficiency in analyzing data about climate change impacts

b. Students will apply critical thinking skills to identify and analyze the potential impacts of climate change

c. Students will strengthen their ability to create effective data visualizations using the right tools and techniques

d. Students will improve their communication skills by presenting their visualizations and explaining the estimated impacts of climate change to their peers

e. Students will develop empathy and awareness of the social, environmental, and economic impacts of climate change

Time:

1.30 hours

Description of Activity:

Instructions:

1. Introduction:
- Begin by introducing the activity and its objectives to the class.
- Explain the importance of understanding the impacts of climate change on different aspects such as ecosystems, communities, and economies.
- Encourage students to think critically and creatively about how climate change affects various areas of life.

2. Brainstorming Session:
- Facilitate a brainstorming session in groups where the students identify different aspects or sectors that are vulnerable to climate change impacts (e.g., agriculture, health, biodiversity, infrastructure). Use WordArt.com
- Each group will present their work

3. Discussion :
- Divide the class into small groups, with each group focusing on only one aspect identified during the brainstorming session.

- Instruct each group to discuss and analyze the potential impacts of climate change on their assigned aspect.
- Encourage students to consider both direct and indirect effects, as well as short-term and long-term impacts.

4. Visualization Project Planning:
- Following the discussion, call the class back together and give each group the task to illustrate the given aspect of climate change.
- Provide time for groups to plan their visualization projects, including deciding on the type of visualization (e.g., infographic, chart, map) and gathering relevant data.

5. Presentation Preparation:
- Instruct groups to prepare a brief presentation to show their visualizations to the class.
- Encourage groups to practice their presentations and ensure that they clearly explain the data and the estimated consequences shown in their visualizations.

6. Presentation and Discussion:
- Invite each group to present their visualizations to the class, explaining the chosen aspect, the specific impact of climate change depicted, and the data sources used.
- Facilitate a discussion after each presentation, allowing students to ask questions, provide feedback, and share their thoughts on the estimated impacts of climate change.

7. Reflection:
- Conclude the activity with a reflection session where students discuss what they have learned.
- Encourage students to consider the interconnection of various components and the significance of taking action to reduce the effects of climate change..

Training Material:

Materials Needed:
- WordArt.com
- Markers
- Computers or tablets with internet access
- Art supplies for visualization projects (optional)

Assessment:

Evaluate students' communication and presentation skills, including their ability to clearly articulate their ideas, engage their peers, and effectively convey complex information about climate change impacts during the presentation phase.

Evaluation Criteria:

Evaluate students' ability to integrate multidisciplinary perspectives into visualization projects, demonstrating an understanding of interconnected social, environmental, and economic concerns. Take into account the capacity of students to evaluate themselves, reflect on their education, and pinpoint areas in which they still need to develop in their comprehension of and response to the effects of climate change.

Resources:

1. Online Courses:

- Platforms like Coursera, edX, and Udemy offer a variety of courses on data analysis and visualization, ranging from introductory to advanced levels. 2. Books: - "The Visual Display of Quantitative Information" by Edward Tufte provides foundational principles for creating effective data visualizations. - "Storytelling with Data: A Data Visualization Guide for Business Professionals" by Cole Nussbaumer Knaflic offers practical tips and techniques for communicating data effectively. 3. Online Guides: - Websites like DataCamp, Kaggle, and Towards Data Science offer tutorials, articles, and guides on various aspects of data analysis and visualization, catering to different skill levels and interests.
Integration:
a. Incorporate data visualization and analysis into multidisciplinary fields like sociology, economics, public health, and environmental science. b. To foster deeper learning and the development of students' skills, give them practical experiences that allow them to gather, analyze, and visualize data in real-world settings.

Module 3: Data Analysis and Visualization
Activity 3: Climate Change Storytelling through Data Visualization
Learning Outcomes:
1. Students will enhance their ability to analyze climate change data to identify significant trends, patterns, and insights. 2. Students will learn to craft compelling narratives that effectively communicate the effects of climate change 3. Students will gain proficiency in using data visualization tools 4. Students will strengthen critical thinking 5. Students will boost communication skills 6. Students will foster creativity 7. Students will understand interdisciplinary connections 8. Students will increase awareness and empathy
Time: 2 hours
Description of Activity:
Instructions: 1. Introduction: - Introduce the activity and its objectives to the class. - Explain the power of storytelling in communicating complex data and engaging audiences. - Discuss the elements of a compelling story (e.g., clear narrative, emotional connection, strong visuals). 2. Brainstorming Session: - Conduct a brainstorming session to generate ideas for climate change. - Encourage students to think from different angles, such as personal experiences, community impacts, or global trends.

- List potential themes on large papers, such as rising sea levels, extreme weather events, or changes in biodiversity.

3. Research and Data Collection:
- Provide access to sample climate change datasets or guide students to reliable data sources (e.g., NASA, NOAA, IPCC reports).
- Instruct students to work in groups to select a specific theme for their story.
- Encourage students to gather relevant data and supporting information for their chosen theme.

4. Storyboarding:
- Distribute storyboarding templates to students. (3.3)
- Instruct students to outline their story, including the main message, key data points, and how they will visualize each part.
- Emphasize the importance of a clear beginning, middle, and end in their storytelling.

5. Presentation Preparation:
- Instruct students to compile their visualizations and narrative into a presentation format (e.g., PowerPoint, Google Slides or Canva).
- Students will record the story and add it to their story on Canva.

6. Presentations and Peer Review:
- Have students present their climate change stories to the class.
- Encourage peer review by having students provide feedback on each other's presentations, focusing on the effectiveness of the storytelling and visualizations.

7. Reflection and Discussion:
- Facilitate a class discussion on the different stories presented.
- Encourage students to reflect on the role of data visualization in storytelling and its impact on understanding and addressing climate change.
- Discuss how effectively communicating data can influence public perception and policy decisions.

Training Material:

Materials Needed:

- Computers or tablets with internet access
- Visualization tools (e.g., Canva, Tableau, Google Data Studio)
- Presentation tools (e.g., PowerPoint, Google Slides, Canva)

Assessment:

1. Assess the originality and creativity of the storytelling.
2. Review the clarity and effectiveness of data visualizations.
3. Evaluate the clarity and engagement of the presentation.
4. Assess teamwork and contributions to group efforts.

Evaluation Criteria:

1. Data Analysis Quality:
- Accuracy and thoroughness of data analysis.
- Ability to identify significant trends and insights.

2. Storytelling Effectiveness:
   - Clarity and coherence of the narrative.
   - Ability to engage the audience and communicate the impact of climate change.

3. Visualization Quality:
   - Clarity, creativity, and effectiveness of visualizations.
   - Appropriate use of visualization tools to represent data.

4. Presentation Skills:
   - Clarity, confidence, and engagement during the presentation.
   - Effective communication of key points and data insights.

5. Collaboration:
   - Evidence of teamwork and balanced contributions from all group members.
   - Ability to work cooperatively and supportively with peers.

6. Engagement and Reflection:
   - Active participation in discussions and gallery walk.
   - Thoughtfulness and insight in reflective comments and self-assessment.

Resources:

- **Sample Datasets:**
  - Pre-selected climate change datasets from sources like NASA, NOAA, and IPCC reports. (e.g., NASA Climate Data)
  - Downloadable CSV files with climate data relevant to the activity.
- **Data Analysis Tools:**
  - Microsoft Excel or Google Sheets for data manipulation and analysis.
  - Tutorials and guides on basic data analysis techniques.
- **Visualization Tools:**
  - Canva for creating visually appealing infographics and posters. (e.g., Canva)
  - Tableau Public for interactive data visualizations. (e.g., Tableau Public)
  - Google Data Studio for creating dynamic reports. (e.g., Google Data Studio)
- **Storyboarding Templates:**
  - Printable or digital storyboarding templates to help students plan their narratives.
- **Presentation Tools:**
  - Microsoft PowerPoint or Google Slides for creating presentation slides. (e.g., Google Slides)

Integration:
a. Integrate data analysis and visualization into subjects like science, geography, and social studies. b. Use climate change data to connect scientific concepts with real-world environmental, economic, and social impacts. c. Collaborate with other teachers to design projects that incorporate data analysis and visualization skills. d. Example: Combining geography lessons on climate zones with data analysis to study changes in weather patterns.

Appendix

Module 3

3.1

Data Analysis Introduction Quiz

1. What is data analysis?

a) Sorting data alphabetically

b) Examining and interpreting data to extract useful information

c) Creating new data from scratch

d) Deleting irrelevant data

2. Which of the following is a common data analysis tool?

a) Calculator

b) Spreadsheet software

c) Word processor

d) Email client

3. True or False: Data analysis involves only numerical data.

a) True

b) False

4. What is the purpose of data visualization?

a) Making data look pretty

b) Simplifying complex data for better understanding

c) Adding unnecessary complexity to data

d) Hiding data from others

5. Which software is commonly used for data visualization?

a) Microsoft Word

b) Adobe Photoshop

c) Tableau

d) Microsoft PowerPoint

Answers:

1. b) Examining and interpreting data to extract useful information

2. b) Spreadsheet software

3. b) False

4. b) Simplifying complex data for better understanding

5. c) Tableau

3.2

Sample Dataset: Monthly Average Temperatures for Eskişehir in 2022

Location: Eskişehir, Turkey

Year: 2022

Data Source: Eskişehir Meteorological Station

Monthly Average Temperatures (in Celsius):

January: 1.5, 2.0, 1.8, 2.2

February: 3.2, 3.5, 3.7, 4.0

March: 6.0, 6.2, 6.5, 6.8

April: 11.5, 11.8, 12.0, 12.2

May: 16.0, 16.2, 16.5, 16.8

June: 21.5, 21.8, 22.0, 22.2

July: 25.0, 25.2, 25.5, 25.8

August: 24.5, 24.8, 25.0, 25.2

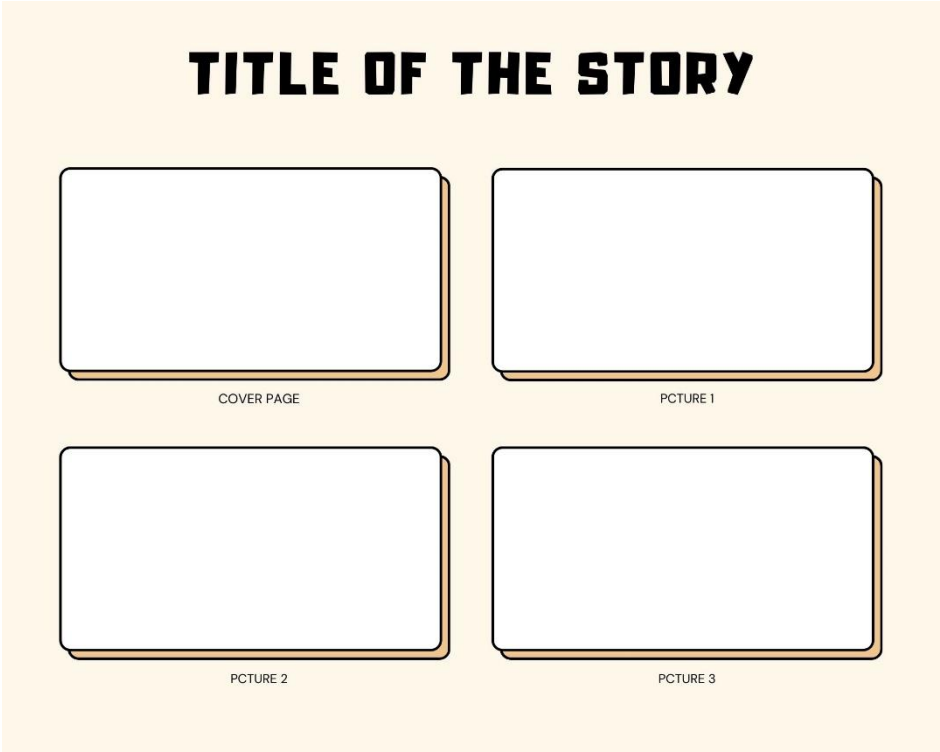
September: 20.0, 20.2, 20.5, 20.8

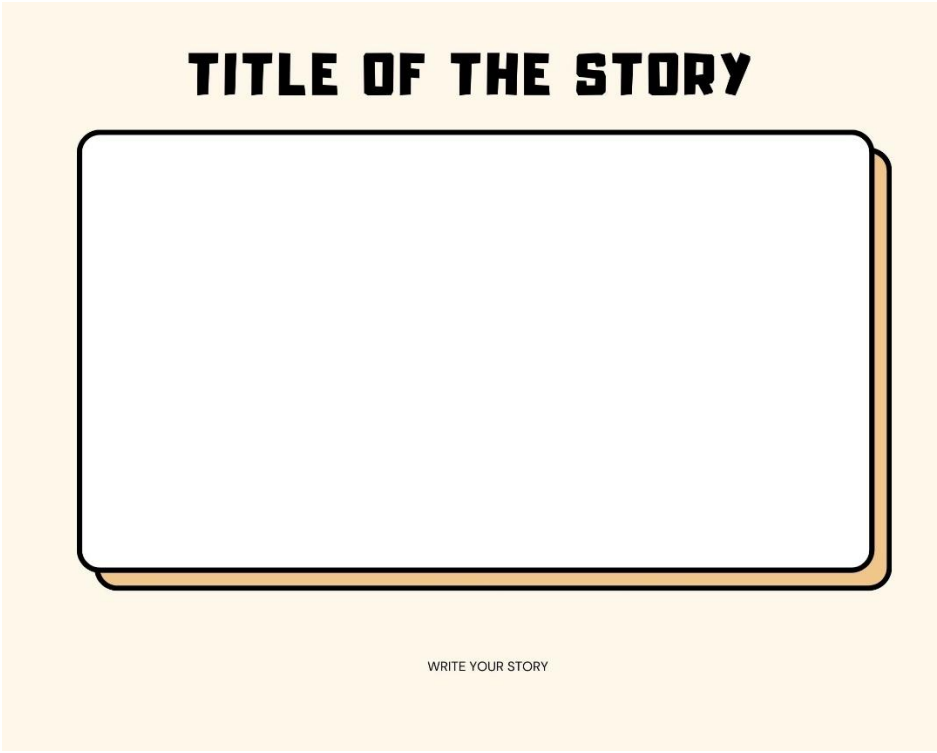
October: 14.5, 14.8, 15.0, 15.2

November: 8.0, 8.2, 8.5, 8.8

December: 3.5, 3.8, 4.0, 4.2

3.3


TITLE OF THE STORY
COVER PAGE
PCTURE 1
PCTURE 2
PCTURE 3


TITLE OF THE STORY
WRITE YOUR STORY

MODULE 4: EFFECTIVE COMMUNICATION


Effective
Communication

MODULE 4: EFFECTIVE COMMUNICATION

1. Introduction:

This theme aims to introduce the ways of communication, as well as understand the structure and key elements of the communication process, raise awareness of the diversity of means of expression (verbal, non-verbal) of the communication process, as well as the ability to engage responsibly in communication and respond, thus improving students' communication skills to enable them to communicate effectively and cooperate, as communication is an interactive interface process whose participants realize their goals by influencing each other. Effective communication focuses not only on the process of conveying information but also on the full reception and processing of information - to convey the message in a way that is not only understandable but can also be remembered, analyzed, and used by the recipient, thus contributing to providing society with information on sustainable development principles and environmentally friendly lifestyles, especially among young people.

Discussion plays an important role in environmental education as it promotes language development and the development of communication skills. The discussion builds on questions and answers asked by students and teachers. Asking questions makes students think and involve them more directly in the learning process, it's also possible to clarify students "personal attitudes to the problem. Issues can develop ideas, make proposals and evaluate them. The main conditions for a successful discussion are the responses of the participants, the involvement of all those present and a favorable atmosphere.

In the introductory workshop, students will learn and test the principles of effective speech, then, with the help of a teacher, establish rules for successful communication, which is an important basis for effective communication.

In the main part, students will discuss with each other, study the environmental issue and perform in a debate with a reasoned justification for their thoughts, participate in the role play, explore and discuss forest diversity, create a presentation on eco-labeling and signs, discuss packaging for soft drinks, and create video advertisements about current environmental issuesIn conclusion, students evaluate their performance and the others students performance.

1. Target Audience:

- to participate effectively in communication, taking into account the core elements of the c ommunication process;
- to express and justify their views in a reasoned manner;
- develop critical and analytical thinking;
- improve communication ability and listening skills;
- develop public speaking skills, be able to persuade listeners;
- promote cooperation within the group;
- Create promotional videos with powerful visual aids.

3. Key Components:

Forms of communication (interpersonal, group, media or mass), communication process, effective communication, communication, cooperation, debate, advertisement.

4. Learning Objectives:

Knowledge: knows the various forms of effective communication, their purpose and recipient, is able to analyze situations and use verbal and non-verbal means.

Understanding: Understand the importance of effective communication on the environment in the process of stakeholder interaction.

Application: different audiences participate skilfully in communication, taking into account the purpose of communication, the goal, ability to judge and evaluate.

Analysis: analyse different means of expression and their effectiveness in the communication process, formulate statements in the form of the desired outcome, taking into account positive thinking.

Assessment: be able to assess critically each communication situation, taking into account partners' values, needs, aspirations, while also being able to spot resistance (objections, denials, delay of response, ignorance), direct the communication into a positive atmosphere, thus contributing to success.

Create: create a habit of interpreting any communication message according to its purpose, will be able to assess the impact of communication tools on the recipient by working in groups, and creating video adverts about current environmental issues.

5. Curriculum Structure :

Learning in collaboration: students work in groups, solving issues connected with environmental challenges, promoting communication and collaboration skills, teamwork, and responsibility for accomplishments.

Student-oriented learning: decision-making in teamwork and individual working.

Discussion and debate: introduces with basic concepts and promotes critical thinking.

Problem-based learning: students learn to solve real-world problems by applying knowledge and developing critical thinking.

6. Pedagogical Approach:

* Effective communication skills

* Critical thinking

* Collaborative skills

* Problem-solving capabilities

* Use of visual and digital tools

7. Cultural relevance: taking account of cultural and environmental differences across countries when planning lessons.

Module 4: Effective Communication

Activity 1: Principles of Effective Communication about Environmental Issues

Warm-up. 1. ACTIVITY 20 mins Effective speech.

Guidance for students: think about what words or word connections you associate with the environment, with its current problems! Write one of the most meaningful imaginary concepts, you think, on the note given to you by your teacher! Put the note on the specified table! The first participant comes out in front of the audience and picks up one note. S/He has to talk about a word written on the selected note for a minute. Three rules: you should not deviate from the subject (you should talk about the word you chose), not stop, or use vocabulary (such as "mmm," "Umm," or "eat") – hesitation phrases, not lose eye contact with your audience.

Instructions for teachers: Get speaking time for each student - not everyone will be able to speak for 1 minute. A minute later, the next student goes ahead, it continues, while everyone has taken part in the activity.

Then discuss together what succeeded, and what difficulties should be improved. The teacher reminds the basics of effective speech - content, confidence, eye contact, voice volume and pace of speech, body language and movement.

2. ACTIVITY 10 min.

What is effective communication? Why is it so important? Students use the brainstorming method, and then the teacher builds a cloud of words, including the essentials for effective communication.

The Main part

1. ACTIVITY. *Discussion about important environmental issues. 30 min.*

Instructions for teachers:

* Students create teams.

* Each group consults and discusses various current environmental issues.

* At the end of the discussion, they put forward one of the most important and topical issue for the debate.

Guidance for students:

* Understand the challenges of environmental relevance both locally and globally.

* Each group should think about what they can do and how to help with environmental issu es.

* Agree on an up-to-date debate topic in a group that can be viewed by both assertion and denial.

1. The result - the subject of debate created by each group.

2. ACTION. Debate after Carl Poper's debate format on the environmental problem raised. 90 min.

Instructions for teachers:

* Each team writes the subject of their nominated debate, such as Food packaging is/isn't essential.

* Using the Mentimeter, the teacher and students vote on one, of the best subjects of the offered debate.

* The teacher recalls that the debate format is made up of 3 key parts - reasoning, rebuttal, and aggregation.

* Class is divided into 2 groups - affirmative and negative teams.

* Students have access to a variety of websites and training materials to prepare for a topic debate based on their assigned role.

* Of the two groups - both affirmative and negative - nominate 3 people who will form a team of debaters.

* The debate tournament needs a referee.

Guidance for students:
* Repeat the principles of the structure of the debate.

* Prepare the best facts and arguments possible, and record their sources so that they can be used when speaking.

* Do not move away from the subject and role of the debate.
* By standing up, try to be convincing using your best effective communication skills.

Progress of the debate:
1. The debate begins and the first speaker of the confirmatory team speaks with the first debate speech, who has 6 minutes to present his arguments and the team's case. After the first confirmatory team speaker’s speech, he is questioned by a third spokesman from the denying team (3 minutes)

2. The second speech comes from the first speaker of the denying team, who has 6 minutes to present his arguments and refute the confirmatory side team's case. First
a spokesman for the denying team is questioned by a third spokesman from the confirmatory team (3 minutes).

3. The debate continues by the second confirmatory-side speaker, who has 5 minutes to defend his team's arguments, refute the opposing team's case and add to his team's overall position. This speaker is questioned by the first speaker of the denying team (3 minutes).

4. Debate continues second contestant team speaker who has 5 minutes for his speech
and whose duty is identical to the second speaker of the affirmative team. This speaker is questioned by the first speaker of the confirmatory team (3 minutes).

5. A third speaker of the affirmative team delivers his fifth speech. His duty is during 5min summarise what has happened in the debate, refute what has been said by the denying team and demonstrate why the confirmatory team has won. This speech is not followed by questioning.

6. The final speech comes from the third denying team's Speaker, whose duty is during 5min to refute all the arguments against the denying team which have not yet been rebutted and summarise,
why has the negative side won? This speech, too, is not followed by questioning.

2 Final result - Each student has
studied the problem and has been an active participant in communication.

3. ACTION. Promotional videos. 120 mins.

Instructions for teachers:

* Students are divided into groups and are working on creating promotional videos.
* Students have access to computer and Internet resources, as well as photos they take.

Guidance for students:

*Coming to consensus on what current environmental topic or problem you're creating your advert for! It's a good idea to start with your neighborhood, such as waste in my local government area.

* What is the advertisement's target audience? What habits, values and actions are typical to it?

* What features should you use to make your ad relevant and understandable to your specific audience?

* What means of expression should I use to keep the message in my memory?

3. The final result - multiple video ads have been created on topical environmental topics and issues that appeal to both student peers and adults.
The end. 40 min.
Each group of students showcases the video advert they created.
After watching each video, groups use the 3 P method - say hello, ask extra, give feedback and their assessment of what's done.

To assess their participation in this learning process, every student receives a petal on which they write what they liked, what they learned, what they acquired or learned, and what they commit to doing to preserve a sustainable environment. The student with the filled petal goes to the wall, and reads aloud what has been written on the petal and attaches it to the middle of the flower – and we have bloomed new, beautiful flower!

Learning Outcomes: During the work process, using effective communication skills, figured out various topics of debate on topical environmental issues, students engaged in debates and created multiple adverts to address their peers and the public to delve into environmental concerns to educate the public and focus attention on an environmentally friendly lifestyle.

Time: Warmin up 30 min.
Main part 240 min.
Conclusion40 min.

Description of Activity: The process of debate

Assessment:

Assessment of training (formal assessment)

* feedback is provided to each pupil on his or her speech;
Evaluation as learning (peer evaluation)

* the involvement of group members in discussions, the ability to make decisions in teamwork are assessed;

Assessment of training (cumulative assessment)

* Evaluate created video adverts that reveal students' knowledge of environmental sustaina bility and the principles of effective communication.

Valuation Criteria:

In the debate, the judge assesses each speaker's performance in the debate separately, making his assessment in points.
Wins the team that has more points.
Evaluation criteria for a judge:

1. How convincing was the speaker? Posture, voice intonation, timbre, choice of words, ges tures.

2. How good was the speaker's reasoning? Logic, judgment, understanding of debate, and quality of topics, arguments, quality of examples/testimonies.

3. How well was the speaker able to provide references to the information used?

4. How well the speaker was able to answer questions and arguments from opponents. Note : the first affirmative speaker cannot, of course, be blamed for the lack of rebuttal. That would be illogical.

Points:
29-30: prominent speech.

27-28: excellent speech.

25-26: very good speech.
23-24: good speech.

21-22: satisfactory performance.

21-20: There are significant flaws in the speech.

< 20: weak speech.

Material and Resources: Tablets or computers with Internet access, interactive board or video projector A4 pages, small leaflets, pens, felt-tip pens, camera or smartphone with photo capture capability.

Integration:

Computer - creating a model logo; creating ad videos, using various Internet browsers and tools.
English - listening to others and giving their public speech gets information on different environmental topics, including asking questions, and
learns the principles of effective communication.
Geography - develops the
understanding of human economic activity and environmental impact, creating the need to care about the preservation of a sustainable environment.
Social education- students learn democratic civic participation skills, and are aware of their own and others' responsibilities for a healthy environment.
Biology - understands the importance of natural resources to conserve biodiversity, and knows how to justify the need for environmentally friendly action.

SECOND ACTIVITY. Effective communication on the diversity and importance of forests.

15 min.+ 40 min.+20 min.

Target Audience:

* Actively involve in communicating, watching and describing.

* Formulate problems and draw conclusions.

* Improve communication and listening skills.

* Be successful and active in the group.

Pedagogical Approach:

* Collaborative skills while working in a group

* Effective communication skills - debating skills

* Critical thinking

* Skill in perceiving nature as aesthetic value and treating it respectfully

Description of Activity

Instructions for teachers:

* Draw students' attention to the diverse role of trees in nature and human life, their use for centuries, and now, to think about sustainable forest management.

* On the way to the classroom, ask students to look at the landscape with trees and a landscape where there are no trees. Ask students which landscape they liked better and why.

* Try students to think why trees matter to nature, and people. Ask students to look around and say what's made of wood, what else is made of wood?

* At the lesson site, divide students into small groups and ask them to find 10 things in 15 minutes that match their worksheet.

* Give each group a bag to put the findings they collected in.

* After completing the task, invite all groups to present their findings and work results together, share their thoughts and complement the more interesting ideas, and complete student ideas with specific examples from the attachment.

* Engage students in a discussion about the forest as an important component of the environment.

* Before the discussion, it would be valuable to explore the poster about the forest management cycle.

- ATTACHMENT - The teacher can choose which of these ideas to give students.
- In many countries, wood is the main fuel resource.
- Timber is derived from various types of timber for construction, furniture production, and other products.
- Some trees have fruits used for food by humans and animals alike.
- The tree is used in paper production.
- Wood can be a raw material or material from which a variety of things, such as rubber, cork, and medical preparations, are made.
- Trees give landscape, adorn towns, and reduce air pollution.
- Many trees are home to birds, insects, and other animals.
- Trees provide water balance in the ecosystem. Tree leaf branches, and roots absorb rainwater and protect soil from erosion.
- Trees affect climate. The presence of trees has been shown to increase rainfall.
- Forest is a great place to relax.

Guidance for students:

* Keep a close eye on your surroundings according to your work page and find 10 things to put in the bag:
- something beautiful
- something breathable
- something damp
- something to eat
- something made of wood
- something to do with the festivities
- something healthy
- something flammable
- something that serves as home
- something historic

* Once you've found all the things, think about the meaning each has in the forest and in human life, then try to group them into three large groups (one thing can also be in multiple groups):

1. Forest as a provider of life and natural diversity.
2. Forest as an object of recreation and cultural history.
3. Forest as a source of timber extraction and human livelihood.

Discussion.

*You know that the forest is one of Latvia's main natural resources. Do you think it is possibl e to completely separate the importance of these things in the forest and in human life? For ex ample, a fungus in the forest can serve as both home to insects and food for humans.

***Is wood a renewable resource?**

Wood is one of the rare resources in the world that is constantly recovering. Both trees and for ests are constantly influenced by external environmental factors - storms, fires, pests, diseases , excess moisture.

***What is sustainable forestry?**

Sustainable forest management means the use of forests and woodlands in such a way that, wi thout posing a threat to other ecosystems, forest biodiversity, forest productivity, vitality and potential capacity to provide ecological, economic and social functions at local, national and g lobal level.

***How does the use of wood help combat global warming?**

Trees breathe by ingesting oxygen and releasing carbon dioxide - a substance that promotes gl obal warming. However, as a result of photosynthesis, they release far more oxygen than they consume, absorbing a significant proportion of carbon dioxide within themselves. When conv erting timber into different wood products, a significant proportion of carbon remains in the w ood throughout its lifetime. This reduces the amount of carbon dioxide in the atmosphere.

Final task: all students in the classroom perform Kahoot on the theme of the forest.

Material and Resources: assembled work and bags, writing instruments, computer or smartphone with an Internet connection, interactive board or projector, forest management cycle.

Assessment:

Assessment of training (formal assessment)

* provides feedback to students about their work, activity in the discussion, and the result sho wn by Kahoot
Evaluation as learning (peer evaluation)
* participation of group members in group work is assessed

Integration:

Science, biology and geography provide students with basic knowledge of the forest, its ecological, economic , and social significance. The forest in these classes helps to link the substance to what is being learnt to what is happening in the surrounding area.

History lessons provide an opportunity to focus on the forest in different eras, build an understanding of how human attitudes towards the forest and its use have changed in the course of the evolution of society before and now.

In social education classes, the teacher helps students become aware of their role in sustainable forest management, encouraging them to play an active role in forest cleaning and planting; human-environmental interaction should be emphasised.

In language classes, you can stimulate discussions on the theme of the forest, express your feelings in creative works, empowering students to show their personal attitudes

Learning Objectives:

By knowing the forest in any subject, the teacher, along with students, should move step by step toward understanding sustainable action in the forest, about how to preserve fores t values for future generations:

1. Learn to feel good in nature under any circumstances.
2. Watching, feeling, getting to know nature and the forest.
3. Understand nature's relationships in the forest.
4. To understand how one influences the development of the forest.
5. Be able to make decisions about good forest management.
6. To become responsible for the forest in the future.

The third activity

Role play – The hot air balloon

60 min.+ 20 min.+ 40 min.

Instructions for teachers:

* Invite students to think about the diversity of professions and how each can help with the sustainable development of the environment.

* Prepare leaflets for all students in the class with different professions written on them, such as police officers, Presidents, gardeners, programmers, etc.

* Introduce the situation and regulations to students.

We are all in the balloon, but there are too many people in it. Constantly we'll have to put someone down the rope or we'll crash. We have to decide who will stay in the balloon and who will have to go down. Please convince me why it is you who need to stay in the balloon. When everyone justifies their role once, someone gets voted out. Then another justification follows again. Then again, the most inconclusive is voted out. That's how it goes, while there's only one unvoted left in the balloon.

Discussion. Packaging

Goods often bought by students include a variety of lemonades and other drinks. They are usually packed in plastic or glass bottles, uncommon in aluminum cans.

Questions for discussion:

 how better to pack drinks in glass or plastic bottles?

What are the drawbacks of each type of packaging and what are the benefits?

Which type of package is most advantageous - 0.33 L, 0.5 L, 1 L, or more?

Where does the packaging go when the item is used?

How do different types of packaging affect the environment when they're just discarded?

Pair presentation Eco markings and signs.

Instructions for teachers:

* Split the class into pairs.

* Allocate one sign to each pair.

* Provide computers with an Internet connection.

* Predict the equipment required for presentation.

Guidance for students:

* Students select one sign and reveal in their presentation what that sign means, what it suggests, whether it is an environmentally friendly product, and also find products labeled

with that sign, etc. In this way, all classmates will get to know these diverse signs and pay attention to labelling when buying products.

Integration:

Computer - creating a presentation, using a variety of tools, such as power point or googl presentations, working with Internet resources.

Languages - practise clear and correct language through your presentation, speak reasoned and confident in discussion and role play, use facts and arguments.

Biology - use knowledge that includes environmental facts, think about sustainable environmental development and ecological issues.

Chemistry: characteristics of packaging materials (glass, plastic, paperboard, etc.) and their environmental impact.

Material and Resources:

- leaflets with occupational names for each student
- in the packaging of non-
  alcoholic beverages of all kinds, instructional material for discussion
- Eco tags for every student couple
- with Internet connection

APPENDIX

4.1.

Author Jolanta Glāzere

What is communication?

Communication is an exchange of information and interaction.

Effective communication is a process in which the message is received and understood exactly as the sender intended.

The goal of effective communication is to present the message in such a way that it is understandable and that the target audience can later remember and use it.

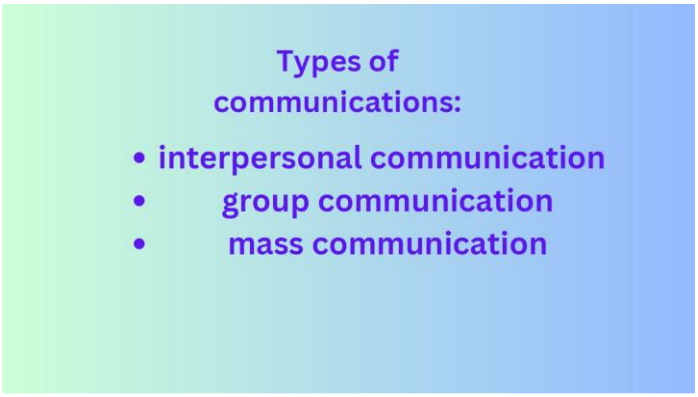
Key elements of effective communication:

Your audience (who to talk to, know your audience's needs, different message for different audiences)

- Your message (what you want to say, what is the purpose, how best to formulate the idea)
- Your style (the speaker's style and attitude, text and non-verbal communication – eye contact, facial expressions, gestures, posture, voice)

Elements of the communication process

Sender (author) - message - channel - addressee (recipient) - impact (feedback)



4.2.

Quiz

Question 1: What is communication?

A) The process of receiving and sending messages only.
B) An exchange of information and interaction.
C) Understanding messages without speaking.

Question 2: What defines effective communication?

A) A process where the message is transmitted, even if it's misunderstood.
B) A process where the message is received and understood exactly as the sender intended.
C) A process of delivering a message to a large audience, regardless of clarity.

Question 3: What is the goal of effective communication?

A) To make sure the message reaches as many people as possible.
B) To present the message in a way that is understandable, memorable, and usable by the target audience.
C) To convey the message in a fast and efficient manner, regardless of understanding.

Question 4: Which of the following is an important aspect of understanding your audience in communication?

A) Knowing your audience's needs and tailoring the message accordingly.
B) Speaking in the same way to every audience.
C) Focusing only on your own message, regardless of who the audience is.

Question 5: What is a key consideration when forming your message?

A) Focusing only on the length of the message.
B) Thinking about how best to formulate the idea and what the purpose is.
C) Ignoring the clarity of the message as long as it sounds professional.

Question 6: Which of the following elements is part of the speaker's style?

A) Only the words being used.
B) Non-verbal communication like eye contact, facial expressions, gestures, and posture.
C) The speed at which the message is delivered, regardless of clarity.

Question 7:
Which of the following is a communication channel?

A) TV
B) Books
C) Face-to-face conversation

Question 8:
Which of these is an example of a digital communication channel?

A) Conferences
B) Social platforms
C) Seminars

Answers

Question 1: What is communication?

A) The process of receiving and sending messages only.
B) An exchange of information and interaction.*
C) Understanding messages without speaking.

Question 2: What defines effective communication?

A) A process where the message is transmitted, even if it's misunderstood.
B) A process where the message is received and understood exactly as the sender intended.*
C) A process of delivering a message to a large audience, regardless of clarity.

Question 3: What is the goal of effective communication?

A) To make sure the message reaches as many people as possible.
B) To present the message in a way that is understandable, memorable, and usable by

the target audience.*
C) To convey the message in a fast and efficient manner, regardless of understanding.

Question 4: Which of the following is an important aspect of understanding your audience in communication?

A) Knowing your audience's needs and tailoring the message accordingly.*
B) Speaking in the same way to every audience.
C) Focusing only on your own message, regardless of who the audience is.

Question 5: What is a key consideration when forming your message?

A) Focusing only on the length of the message.
B) Thinking about how best to formulate the idea and what the purpose is.*
C) Ignoring the clarity of the message as long as it sounds professional.

Question 6: Which of the following elements is part of the speaker's style?

A) Only the words being used.
B) Non-verbal communication like eye contact, facial expressions, gestures, and posture.*
C) The speed at which the message is delivered, regardless of clarity.

Question 7:
Which of the following is a communication channel?

A) TV*
B) Books
C) Face-to-face conversation

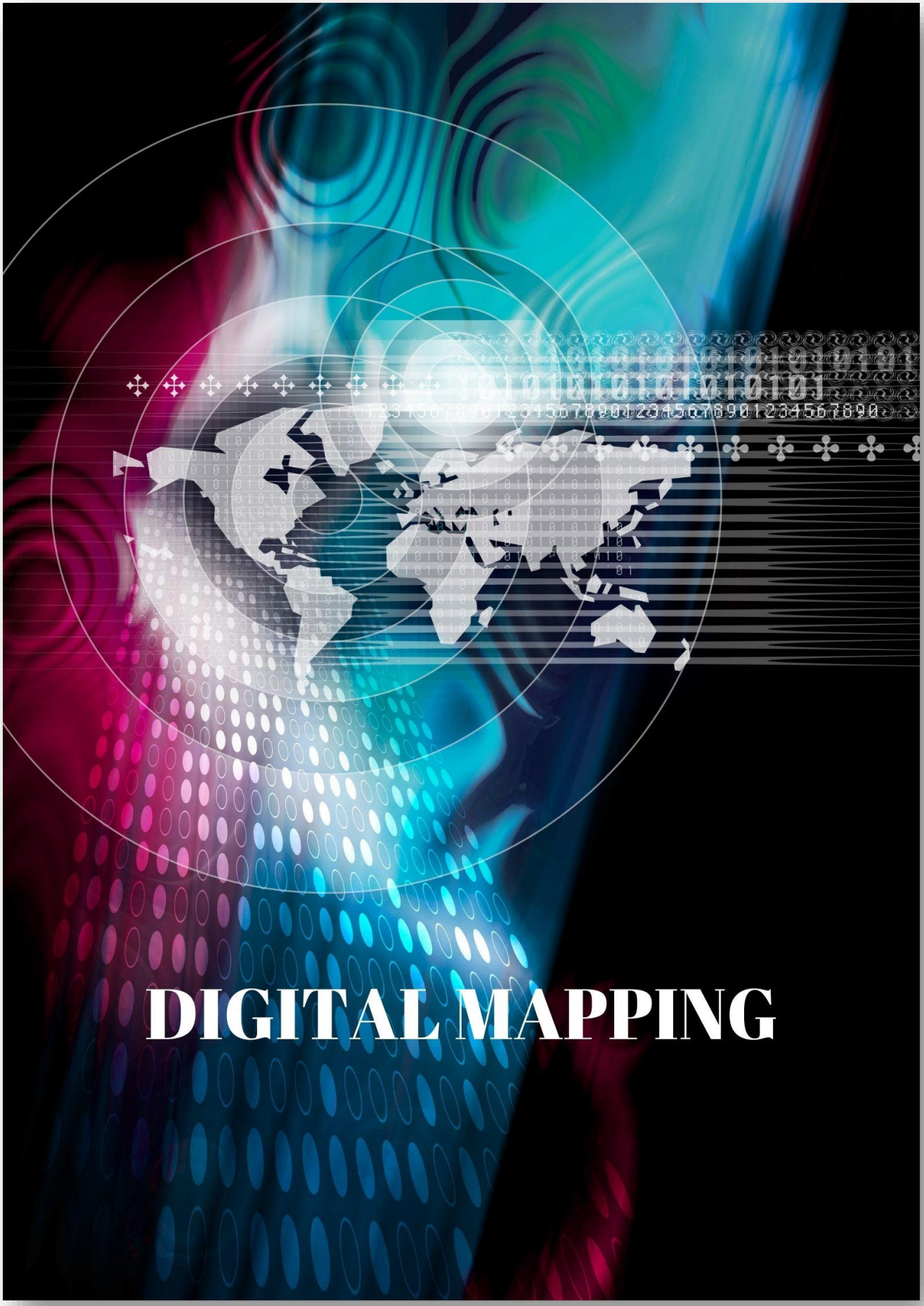
Question 8:
Which of these is an example of a digital communication channel?

A) Conferences
B) Social platforms*
C) Seminars

Co-funded by
the European Union

MODULE 5: DIGITAL MAPPING

Co-funded by
the European Union



MODULE 5: DIGITAL MAPPING

1. Introduction:

In today's tech-driven environment, digital mapping is a crucial ability that aids in the visualization and comprehension of spatial data. Students learn the fundamentals of making and deciphering digital maps in this module. Important ideas including map kinds, geographic information systems (GIS), and real-world applications of mapping in a variety of industries are covered. Students will be able to make their own digital maps and comprehend their practical applications by the conclusion of this module.

2. Target Audience:

This module is designed for students who want to explore data-driven insights through digital mapping. By learning how to visualize and analyze spatial data, students can better understand environmental concerns and climate change.

3. Key Components:

a. Introduction to Digital Mapping

b. Types of Maps

c. Geographic Information Systems (GIS)

d. Data Collection and Management

e. Map Design and Visualization

f. Applications of Digital Mapping

g. Hands-on Mapping Activities

4. Learning Objectives:

By the end of this module, students will be able to:

a. explain the purpose and components of digital maps and differentiate between various types of maps.
b. demonstrate basic skills in using GIS software to collect, manage, and analyze spatial data.
c. design effective digital maps using appropriate symbols, colours, and layouts, and interpret the information they convey.
d. apply spatial analysis techniques to explore and understand geographic patterns and relationships.
e. identify and discuss the applications of digital mapping in various fields, such as environmental monitoring.
f. complete hands-on exercises and projects, creating digital maps that address specific questions or issues.

5. Curriculum Structure:

The curriculum structure includes modules on map types, data collection and management, GIS tools, map design and visualization, spatial analysis, practical applications, hands-on projects, and additional learning resources.

6. Pedagogical Approach:

The Digital Mapping module emphasizes experiential and inquiry-based learning through the use of a student-centered approach. Students utilize GIS technologies and map design ideas through practical exercises and group projects. Blended learning approaches integrate interactive and online materials, and facilitate gradual skill development and self-evaluation through reflective practice and scaffolded training.

7. Integration:

By utilizing mapping techniques across multiple disciplines, the Digital Mapping module connects with other academic subjects. For instance, students can research environmental changes in science, examine historical events and patterns in history, and evaluate spatial data in geography, science, and geography classes using digital maps. By assisting students in seeing links between topics and comprehending how digital mapping may be used in a variety of academic fields, this cross-disciplinary method enhances learning.

8. Assessment and Evaluation:

The Digital Mapping module uses a variety of assessment and evaluation methods, including tests and quizzes to determine mastery of important ideas, practical projects to show off map-making abilities, and group projects to evaluate teamwork. To monitor their development and evaluate their learning, students also keep reflective notebooks. The module ends with a final project that incorporates all of the knowledge and abilities that have been acquired, enabling students to use digital mapping approaches to solve practical issues and demonstrate their thorough comprehension of the material.

9. Resources and Support:

A number of tools and resources are available in the Digital Mapping module to improve learning. GIS software, online mapping resources, and interactive tutorials are available to students to help them build their technical skills. To further knowledge, supplementary materials include case studies, articles, and instructional videos.

10. Cultural Relevance:

The Digital Mapping module emphasizes cultural relevance by incorporating diverse perspectives and local contexts into mapping activities. Students explore how different cultures and regions use mapping tools for various purposes, such as environmental monitoring, urban planning, and historical documentation. The module encourages the examination of cultural and geographic diversity, fostering an appreciation for how mapping practices can reflect and impact different communities. This approach ensures that students understand the global and local significance of digital mapping while respecting cultural differences.

11. Technology Integration:

The Digital Mapping module leverages technology to enhance learning and practical application. Students use GIS software and online mapping tools to create, analyze, and visualize spatial data.

Module 5: Digital Mapping
Activity 1: Introduction to Geographic Information Systems (GIS)
Learning Outcomes:
1. Explain basic GIS terms and functions. 2. Identify practical applications of GIS. 3. Perform basic tasks in GIS software. 4. Describe how data layers work in GIS. 5. Identify key tools for spatial analysis and visualization.
Time: 60 Mins
Description of Activity: Warmup Activity: Instructions: 1. Introduction: - Explain to students that maps are not just for geography; they can represent any kind of information. Today, they'll create a map of their daily routine. 2. Activity: - Ask students to think about the places they go and their activities on a typical day. - Have them draw a simple map with key locations (e.g., home, school, park) and routes they take. Please encourage them to use symbols or labels for each place and to draw lines or arrows to show the sequence of their activities. - Invite a few students to share their maps with the class. They can explain the places they've included and why they chose them. - Discuss how maps can be used to represent different types of information, not just geographical locations. Highlight the use of symbols, labels, and routes in their maps. - Ask students to think about other types of maps they might encounter in their daily lives (e.g., weather maps, mall directories). Main Activity 1 Instructions: - Briefly review what students have learned about digital maps and GIS. - Explain that in this activity, they will create a digital map of their community, highlighting important locations and features. - Have students log into the GIS software or online mapping tool. - Demonstrate how to create a new map project and set the map's base layer (e.g., satellite view, terrain view).

- Instruct students to add markers for at least five key locations in their community. These could include their school, local parks, hospitals, libraries, or any other places they find significant.
- Show them how to add labels and descriptions to each marker, providing information about why these locations are important.
- Demonstrate how to create and manage data layers. For example, students can create separate layers for different types of locations (e.g., recreational, educational).
- Ask students to organize their markers into appropriate layers, ensuring each layer is clearly labelled.
- Encourage students to customize their maps by changing marker icons, colours, and other visual elements to make their map clear and visually appealing.
- Show them how to adjust the visibility of layers to highlight specific information.

- Instruct students to review their maps, ensuring all markers are correctly placed and labeled.
- Demonstrate how to save and export the map. If using an online tool, show how to share the map via a link or embed code.

Presentation and Reflection:
- Allow students to present their maps to the class, explaining the locations they chose and the information they included. (5.1)
- Lead a brief discussion on the importance of digital mapping and how it can be used to convey information about communities.

Training Material:

Warmup Activity

Materials Needed:
- Paper and pencils
- Colored markers or crayons
- A whiteboard or projector for demonstration

Main Activity
Materials Needed:
- Computers or tablets with internet access
- Access to GIS software (e.g., QGIS, ArcGIS Online) or an online mapping tool (e.g., Google My Maps)
- A list of key locations/features to include (e.g., schools, parks, hospitals, libraries)

Assessment: Rubric for Digital Mapping Activity (5.2)

Evaluation Criteria:

- Excellent (90-100): Demonstrates outstanding understanding and application of digital mapping concepts.
- Good (70-89): Shows good grasp of digital mapping with minor areas for improvement.

- Fair (50-69): Basic understanding with noticeable gaps in application and understanding.
- Needs Improvement (0-49): Significant gaps in understanding and application of digital mapping concepts.

Resources:

Books and E-Books

- "Getting to Know ArcGIS" by Michael Law and Amy Collins: A comprehensive guide for learning ArcGIS software.
- "GIS Tutorial for Beginners" by Wilpen L. Gorr and Kristen S. Kurland: Practical exercises and examples for beginners.
- "Python for Data Science and GIS" by Chris Garrard: Integrating Python programming with GIS.

Websites and Blogs

- GISGeography.com: Articles, tutorials, and resources for learning GIS.

Geospatial World: News and insights on geospatial technologies and their applications.

YouTube Channels

- Esri: Official channel with tutorials, webinars, and case studies on GIS.
- GeoDelta Labs: Tutorials on various GIS software and tools.
- The Spatial Times: Videos on GIS concepts, tools, and real-world applications.

Integration:

By using mapping skills to improve comprehension in areas like geography, science, history, and social studies, the Digital Mapping module interacts with a variety of academic courses. Students studying geography can examine physical landscapes and human-environment interactions by analyzing spatial data. Scientists can map ecological data to comprehend biodiversity and changes in the ecosystem. Students can see historical events and migrations using historical maps, and social studies can gain from visualizing demographic and economic data. This multidisciplinary method enhances students' educational experiences while also illuminating the usefulness of digital mapping in comprehending and resolving intricate, real-world problems.

Module 5: Digital Mapping

Activity 2: Practical mapping exercise using environmental data

Learning Outcomes:

1. Students will learn to gather relevant environmental data from various sources and prepare it for use in GIS software.
2. Students will understand how to create and manage multiple data layers within a digital map, organizing information effectively.
3. Students will apply basic spatial analysis techniques, such as buffering and overlay, to interpret environmental data and identify patterns.
4. Students will design a clear and informative digital map, utilizing appropriate symbols, colours, and labels to convey environmental information.
5. Students will develop critical thinking skills by analyzing the mapped data and drawing conclusions about environmental trends and issues.
6. Students will effectively communicate their findings through a brief presentation, explaining the significance of their mapped data and analysis

Time: 1.30 hours

Description of Activity:

- Select an environmental topic you're interested in, such as air quality, water pollution, or deforestation.
- Find relevant data online or from provided resources. Make sure your data is specific to the issue you've chosen (e.g., air quality data for a specific city).
- Open Google My Maps on your computer or tablet.
- Import your collected data into the software (Google Spreadsheet)
- Organize your data by creating different layers on the map. For example, you might have one layer showing areas with high pollution levels and another showing areas with low pollution.
- Label each layer clearly so it's easy to understand what it represents.
- Customize your map with symbols, colours, and labels. Make sure these elements help to present your data.
- Check that your map is easy to read and visually appealing
- Be ready to share your map with the class. In your presentation, explain:
  - The environmental issue you focused on
  - The data you collected and how you organized it
  - The patterns you found in the data
  - Why these patterns are important and what do they tell us about the issue

Training Material:

- Google My Maps
- Google Spreadsheet

Assessment:

Students will evaluate each other's digital maps and presentations. Based on data preparation and collection, data stacking and management, application of spatial analytic methodologies, map design and visualization, and presentation and communication skills, each student will assess their classmates.

Evaluation Criteria:

Peer Evaluation Criteria

1. Evaluate if the data is accurately collected and well-prepared for analysis.

2. Assess whether layers are well-organized and clearly labelled for easy understanding.

3. Review how effectively spatial analysis techniques are used to identify and interpret patterns.

4. Consider if the map is visually clear, with appropriate use of symbols, colors, and labels.

5. Judge how clearly and effectively the student presents their map and explain their findings.

Resources:

- GISGeography.com: Articles and tutorials on various GIS topics.
- Geospatial World: News and insights on geospatial technologies.

Integration:

1. Geography:
   - Students can create maps showing physical features like mountains, rivers, and climate zones. They can analyze how these features influence human activity and environmental conditions.
   - Students use GIS to map urban areas, study land use, and understand city planning concepts.

2. Science:
   - Create maps to visualize environmental data such as air quality, water pollution, and deforestation. Analyze spatial patterns and their impacts on ecosystems.
   - Map species distributions and habitats to study biodiversity and conservation efforts.

3. History:
   - Students can compare historical maps with current maps to analyze changes over time, such as territorial boundaries, migration patterns, or historical events.
   - Map historical trade routes, ancient civilizations, and their impact on modern geography.

4. Social Studies:
   - Use GIS to map demographic data such as population density, age distribution, and economic indicators to understand social issues and regional differences.
   - Analyze how different policies impact various regions by mapping data related to healthcare, education, or transportation.

5. Mathematics:
   - Apply statistical methods to analyze spatial data, such as calculating averages or identifying trends in environmental data.
   - Use concepts from geometry and coordinate systems to understand map projections and spatial relationships.

Module 5: Digital Mapping

Activity 3: Community Impact Mapping

Learning Outcomes:

1. Students will learn to gather and analyze data related to a specific environmental or social issue within their community.

2. Students will gain skills in using GIS software to create detailed maps that highlight the impact of the chosen issue on different areas.

3. Students will enhance their critical thinking by evaluating how the issue affects various aspects of their community and proposing potential solutions or improvements.

4. Students will practice effectively communicating their findings through maps and presentations, making complex data accessible and understandable to others.

Time: 1 hour

Description of Activity:

- Pick an environmental or social issue affecting your community, such as pollution, traffic congestion, or access to public services
- Gather information related to your chosen issue. This might include data on pollution levels, traffic patterns, or locations of public services. Use online resources, community reports, or surveys
- Open Google My Maps on your computer or tablet.
- Import your collected data into the software (Google Spreadsheet)
- Add data layers to your map to show different aspects of the issue. For example, if you are mapping pollution, you might have layers showing pollution sources and affected areas.
- Use colors, symbols, and labels to make your map easy to understand and visually appealing.
- Create a brief presentation to explain your map and findings

Training Material:

- Google My Maps
- Google Spreadsheet

Assessment:

1. Data Collection and Preparation
   - Excellent: Data is comprehensive, accurately collected, and relevant to the chosen issue. It is well-prepared for analysis.
   - Good: Data is mostly accurate and relevant, with minor issues in collection or preparation.
   - Fair: Data has some relevance but includes inaccuracies or incomplete preparation.
   - Needs Improvement: Data is irrelevant or poorly prepared, affecting the analysis.

2. Map Creation and Design
   - Excellent: The map is well-designed with clear layers, appropriate symbols, and labels. It effectively visualizes the issue and is easy to understand.
   - Good: The map is generally well-designed with minor issues in clarity or design elements.

- Fair: Map design is basic; some elements may be unclear or inconsistent.
- Needs Improvement: Map design is unclear or poorly executed, making it difficult to interpret.

3. Data Analysis and Interpretation
- Excellent: Analysis is thorough and insightful, with clear identification of patterns and trends related to the issue.
- Good: Analysis is mostly accurate, with some insightful findings.
- Fair: Analysis is somewhat accurate but lacks depth or clarity in identifying patterns.
- Needs Improvement: Analysis is inaccurate or superficial, with unclear or missing patterns.

4. Presentation and Communication
- Excellent: Presentation is clear, engaging, and effectively communicates key points and findings. Answers questions thoroughly.
- Good: Presentation is mostly clear with minor issues; communicates key points and answers questions adequately.
- Fair: Presentation is somewhat unclear or disorganized; limited effectiveness in communicating key points and answering questions.
- Needs Improvement: Presentation is unclear or ineffective; struggles to communicate key points and answer questions.

5. Reflection and Insight
- Excellent: Reflection shows a deep understanding of how mapping can address community issues and provides thoughtful insights.
- Good: Reflection demonstrates a good understanding with some insightful observations.
- Fair: Reflection shows basic understanding with limited insight into the mapping process and its impact.
- Needs Improvement: Reflection is superficial or lacks a clear understanding of the mapping process and its implications.

Evaluation Criteria:

1. Excellent: Demonstrates a high level of skill and understanding in data collection, map creation, analysis, presentation, and reflection.
2. Good: Shows a good grasp of the activity with some areas for improvement.
3. Fair: Basic understanding and execution with noticeable gaps.
4. Needs Improvement: Significant gaps in understanding and execution of the activity.

Resources:

Books

- "Introduction to Geographic Information Systems" by Kang-Tsung Chang: A foundational book covering essential GIS concepts and practices.
- "The GIS 20: Essential Skills for Geospatial Analysis" by Gina Clemmer: Practical guide for improving GIS skills.

Integration:

1. Language Arts:

- Students create narrative maps that combine text, images, and geographic data to tell a story related to a specific location or event. This helps in developing writing skills and understanding spatial context.

2. Mathematics:
- Use GIS to perform statistical analyses of spatial data. Students can apply concepts such as mean, median, and range to interpret environmental data or population distributions.

3. Art:
- Incorporate artistic principles into map creation. Students can explore elements of design, colour theory, and visual aesthetics while creating their maps, integrating artistic skills with technical mapping techniques.

4. Science:
- Use GIS to map and analyze environmental phenomena such as deforestation, pollution, or climate change impacts. This integration supports scientific inquiry and data interpretation skills.

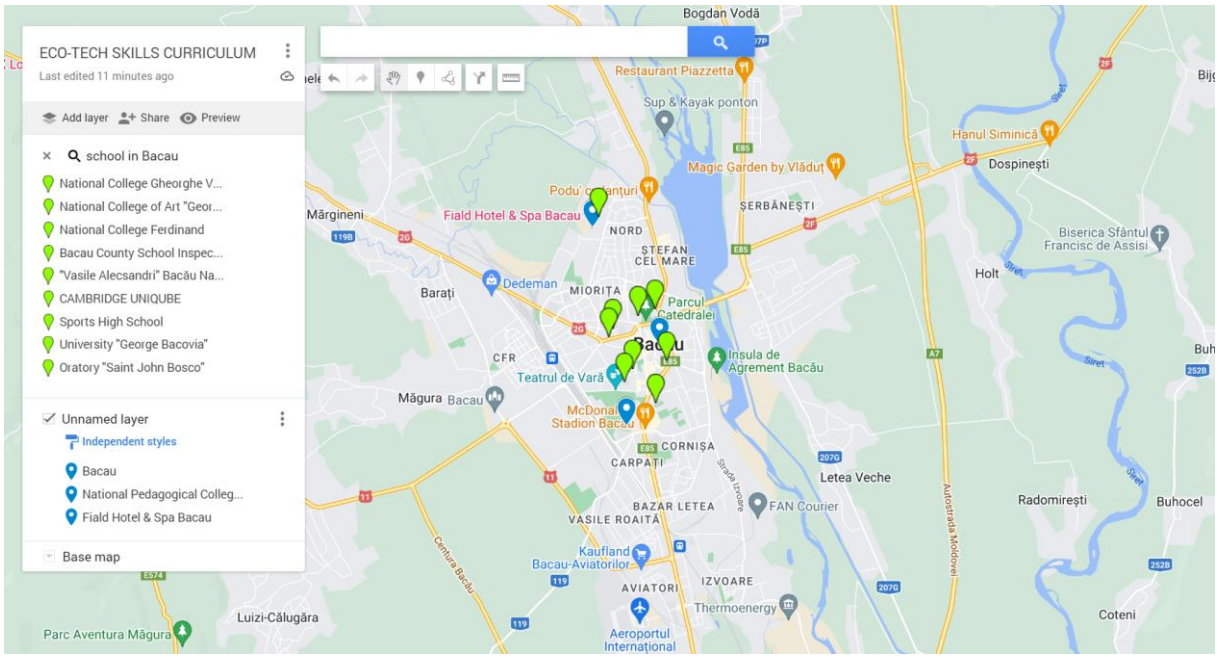
5. Social Studies:
- Create maps that depict historical changes in borders, population, or infrastructure. This helps students understand historical events and their impact on different regions.

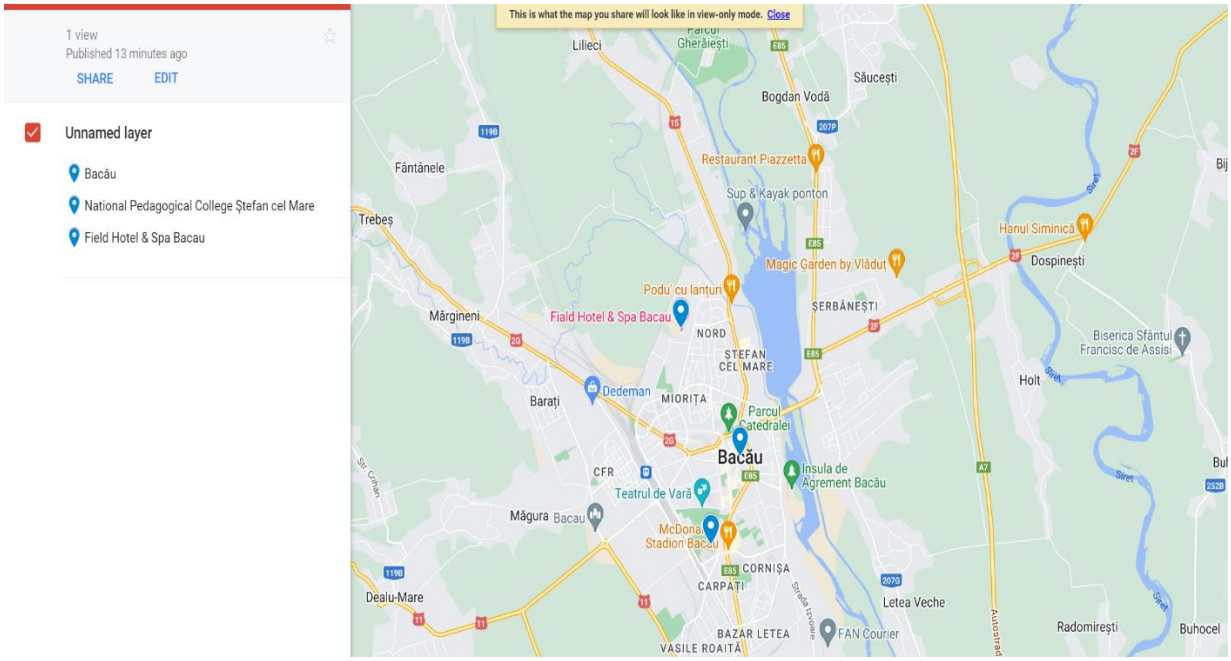
6. Technology:
- Develop technical skills by using GIS software to manage and analyze spatial data. This integration provides hands-on experience with tools used in various technology and engineering fields.

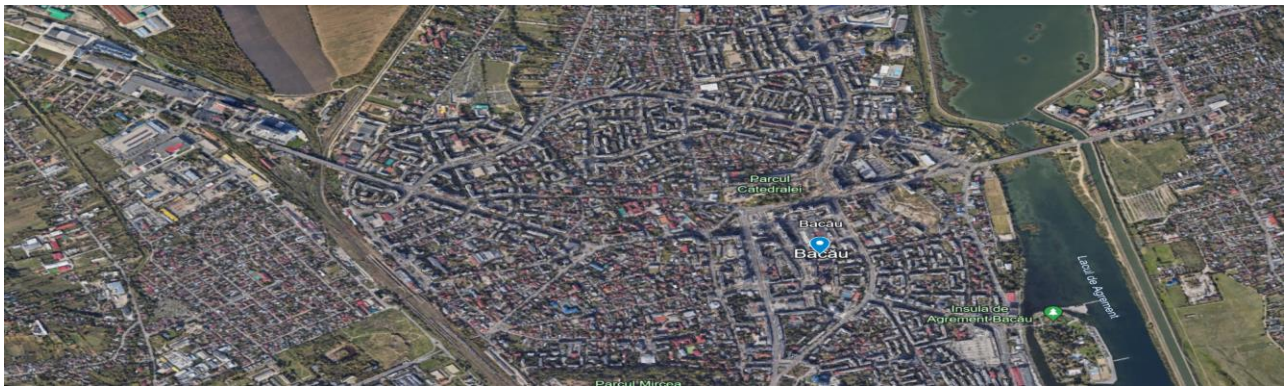
Appendix

Module 5

5.1





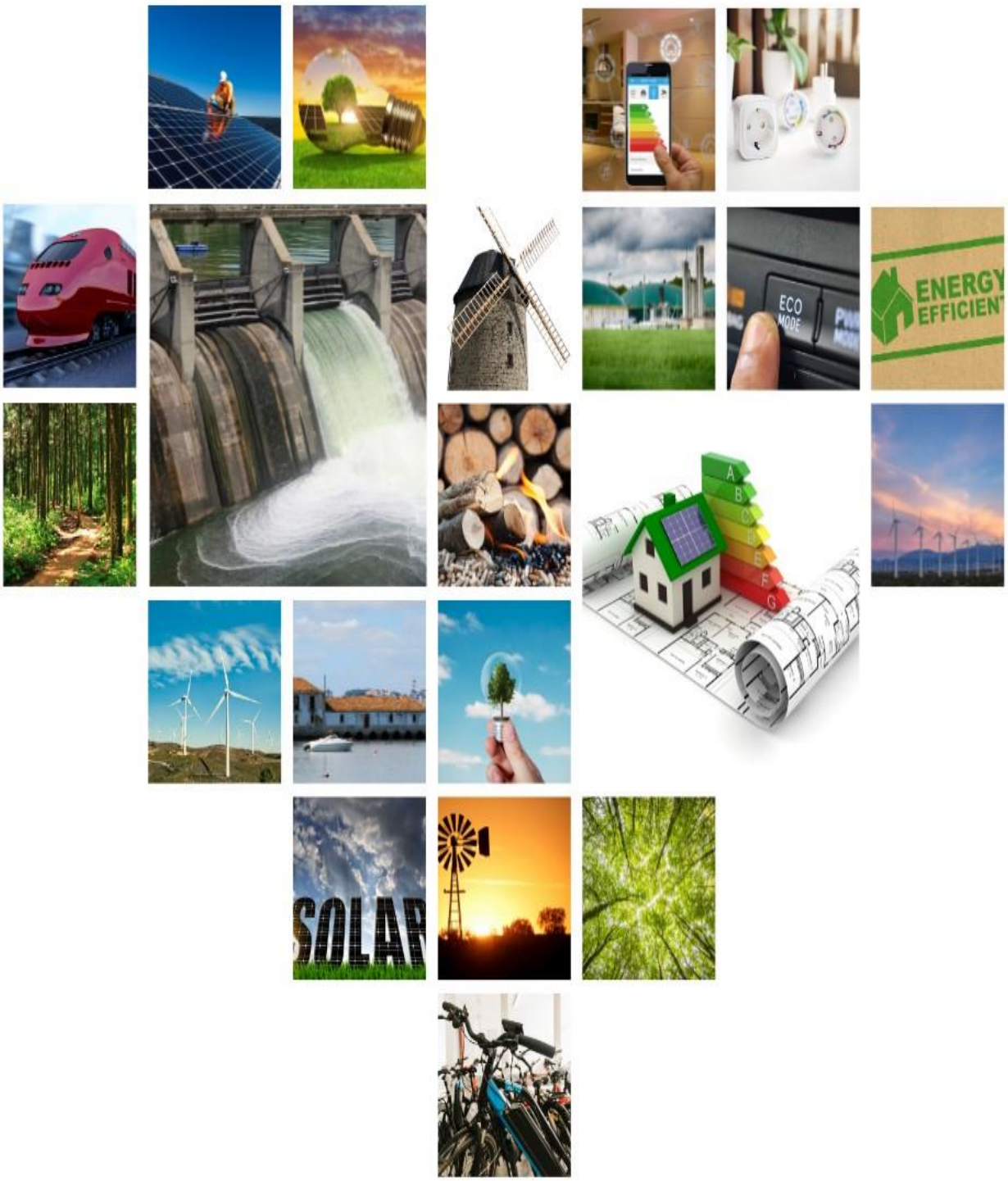


5.2

Criteria	Excellent	Good	Fair	Needs Improvement
Accuracy and Completeness (30%)	All key locations are accurately placed; labels and descriptions are thorough and precise.	Most key locations are accurately placed; labels and descriptions are mostly accurate.	Some key locations are inaccurately placed; labels and descriptions are incomplete.	Key locations are mostly inaccurately placed; labels and descriptions are missing or incorrect.
Organization and Use of Layers (20%)	Layers are effectively used and clearly labelled; categories are well-defined.	Layers are used with minor inconsistencies; categories are generally well-defined.	Layers are used inconsistently; categories are not clearly defined.	Layers are not used or poorly defined; categories are unclear.
Map Design and Customization (20%)	Design is visually appealing and aids in understanding; consistent use of icons and colours.	The design is generally good; minor inconsistencies in icons and colours.	The design lacks cohesion; and inconsistent use of icons and colours.	The design is confusing or cluttered; poor use of icons and colours.
Presentation and Communication (20%)	Presentation is clear, concise, and effectively communicates key points; excellent articulation of importance.	The presentation is clear with minor issues; and good articulation of key points.	The presentation is somewhat unclear; the articulation of key points needs improvement.	The presentation is unclear or ineffective; poor articulation of key points.
Reflection and Critical Thinking (10%)	Thoughtful reflection and insights; clear consideration of broader applications.	Good reflection with some insights; and consideration of broader applications.	Basic reflection with limited insights; minimal consideration of broader applications.	Reflection lacks depth; no consideration of broader applications.

Co-funded by
the European Union

MODULE 6: SUSTAINABLE DESIGN AND ENERGY


ECO
MODE
ENERGY
EFFICIEN
A
B
C
D
E
F
G
SOLAR

MODULE 6: SUSTAINABLE DESIGN AND ENERGY

1. **Introduction:**
   Provide learners with sustainable design and its significance in energy conservation principles, and energy efficiency.
   Discuss the impact of buildings and infrastructure on the environment and the importance of integrating sustainability into design practices.

2. **Target Audience:**

   Educators and other community members interested in energy consumption, sustainable design principles and energy efficiency.

3. **Key Components:**
   Sustainable Materials: Explore the use of renewable and recyclable materials in construction and design.
   Energy Efficiency: Discuss design strategies that minimize energy consumption, such as passive solar design and high-performance building systems.
   Indoor Environmental Quality: Examine the importance of air quality, natural lighting, and thermal comfort in sustainable design.

4. **Learning Objectives:**
   Be able to identify key principles of sustainable design.
   Analyse the environmental impact of various design choices.
   Develop skills in creating energy-efficient design solutions.
   Understand the importance of lifecycle assessment in decision-making.

5. **Curriculum Structure:**
   Module divided into interactive sessions covering design and energy efficiency principles and practical activities.

6. **Pedagogical Approach:**
   Use a combination of direct instruction, collaborative projects, and hands-on activities to engage students.
   designs where students observe real-world challenges related to sustainable design.

7. **Integration:**

Cross-curricular integration with subjects such as science and geography (energy systems), mathematics (calculating energy savings), and social studies (impact on communities).

Encourage collaboration with local architects and community planners.

8. Assessment and Evaluation:

Formative and summative assessments, including project presentations and design proposals, to evaluate students' ability to apply sustainable design principles.

9. Resources and Support:

Provide access to literature on sustainable design, online resources, and local case studies.

Collaborate with local organizations and experts in sustainability to offer field trips.

10. Cultural Relevance:

Highlight the importance of understanding local environmental issues and cultural contexts when designing sustainably.

Discuss how sustainable design can address social equity and community needs, emphasizing the role of cultural relevance in design choices.

11. Technology Integration:

Use of digital tools and resources to support and promote more sustainable consumption choices.

Encourage the use of digital platforms for collaboration and research on sustainable practices.

Module 6: Sustainable Design and Energy

Activity 1: Assessment of energy sustainability of buildings

Learning Outcomes:

- **Understanding Energy Concepts**: Students will be able to explain fundamental concepts related to energy consumption, energy efficiency, and renewable energy sources.
- **Building Evaluation Skills**: Students will develop the ability to assess the energy sustainability of various building types using specific criteria and metrics.
- **Critical Thinking**: Students will enhance their critical thinking skills by evaluating the effectiveness of different energy-saving measures and sustainability practices.
- **Application of Knowledge**: Students will be able to apply theoretical knowledge of energy sustainability to real-world scenarios, making informed recommendations and choices for improvement in the future.
- **Communication Skills**: Students will improve their ability to communicate findings and recommendations effectively, both in written reports and oral presentations.

- **Collaboration**: Students will develop teamwork skills by working collaboratively in groups to assess buildings and share insights.

Awareness of Environmental Impact: Students will gain a deeper understanding of the environmental impacts of building energy consumption and the importance of sustainability in urban planning.

Time**:** 90 minutes + 30minutes

Description of Activity:

Objective:
Students will analyse the sun exposure of local buildings and critically evaluate the effectiveness of central air conditioning systems, applying their knowledge of solar radiation and energy efficiency.

1. **Introduction**
    - Overview of Solar Radiation
        - Class will discuss the importance of solar radiation in energy efficiency and building design.
    - Central Air Conditioning Systems
        - The teacher introduces the concept and functionality of central air conditioning systems.
2. **Exploration Phase**
    - Identifying Local Buildings
        - Students use Google Maps to locate and select buildings (e.g., their own house, school, factories).
3. **Data Collection**
    - Gathering Visuals
        - Students collect images from Google Maps or construction diagrams related to the chosen building.
    - Assessing Sun Exposure
        - Students evaluate areas of direct sunlight and shading, noting how these factors affect energy consumption.
4. **Critical Evaluation**
    - Analysing Air Conditioning Effectiveness
        - Students assess how the building's design and sun exposure impact the effectiveness of the central air conditioning system.
    - Pros and Cons
        - Students identify positive and negative aspects of the building's sun exposure and HVAC system.
5. **Proposing Improvements**
    - Energy Efficiency Enhancements
        - Based on their evaluations, students propose potential improvements for energy efficiency, such as:
            - Installing solar panels
            - Upgrading insulation
            - Replacing windows with energy-efficient models
            - Implementing green roofing solutions

6. **Presentation**
    - Students present their findings and proposals to the class.
    - Peer Feedback: The teacher engages classmates in a Q&A session for constructive feedback and discussion.
7. **Conclusion**
    - The class will summarize the main points discussed during the presentations.

The class will discuss the importance of understanding sun exposure and energy efficiency in building design and urban planning (street orientation).

Training Material:

- Computer, tablet or smartphones
- Internet access
- Digital photos
- Textbook
- Canva
- Google Maps
- Satellite images of selected buildings
- Presentation tools (e.g., slides, posters)
- Research materials on solar radiation and energy efficiency

Assessment:

Formative and summative assessment

- Peer assessment
- Qualitive assessment of the work progress and check-ins using rubrics;
- Quantitative evaluation of the final product using rubrics

Evaluation Criteria: **Rubric for: Knowledge, Capability, Communication**

- **Presentation Structure** assesses if the presentation is organised, and it has a clear and logical structure that facilitates understanding.
- **Correct Use of Language** assesses if the language used is precise, fluent, and if it demonstrates command of the language.
- **Engagement of Peer assesses** if the presentation is engaging and if it maintains the attention of peers throughout.
- **Ability to Clarify Doubts** assesses if the student demonstrates the ability to clarify peers' questions clearly and accurately.
- **Aesthetic of the Work** assesses if the presentation has a visually appealing design, with effective use of images, graphs, and other visual resources.

Rubric for *Eficiência energética* Presentation

Criteria	Exceeding (4)	Meeting (3)	Approaching (2)	Emerging (1)
Scientific Content	The scientific content is complete, accurate, and demonstrates a deep understanding of the topic.	The scientific content is comprehensive and demonstrates a good understanding of the topic.	The scientific content is basic and demonstrates a limited understanding of the topic.	The scientific content is insufficient and demonstrates little to no understanding of the topic.
Presentation Structure	The presentation is highly organized, with a clear and logical structure that facilitates understanding.	The presentation is well-organized, with a clear structure that helps convey the information.	The presentation has a basic structure, but may have some inconsistencies or lack of clarity.	The presentation lacks a clear structure, making it difficult to understand.
Correct Language Usage	The language used is precise, fluent, and demonstrates advanced language proficiency.	The language used is clear and correct, demonstrating good language proficiency.	The language used has some errors, but is still comprehensible.	The language used has many errors, hindering comprehension.
Capturing Peer Attention	The presentation is highly engaging and manages to maintain the attention of peers throughout the entire time.	The presentation is engaging and manages to maintain the attention of peers for most of the time.	The presentation manages to capture the attention of peers, but may have moments of disinterest.	The presentation fails to capture the attention of peers, who get distracted frequently.
Ability to Clarify Doubts	The student demonstrates excellent ability to clearly and accurately clarify all doubts raised by peers.	The student demonstrates good ability to clarify most of the doubts raised by peers.	The student is able to clarify some doubts raised by peers, but may struggle with others.	The student is unable to satisfactorily clarify the doubts raised by peers.
Aesthetics of the Work	The presentation has a visually appealing design, with effective use of images, graphs,	The presentation has an organized and clean design, with appropriate use of visual resources.	The presentation has a basic design, with limited use of visual resources.	The presentation has an unattractive design and makes inadequate use of visual resources.

Resources:

- Computer, tablet or smartphones
- Internet access
- Collaborative platforms
- Presentation app(s)
- Text, photo and video editing tools (apps)
- Online and offline research materials on solar radiation and energy efficiency

Integration:

1. **Geography**
   - Solar Radiation: Understanding the concept of solar energy and its impact on buildings.
   - Mapping Skills: Utilizing tools like Google Maps to analyse geographical data.
2. **Science / Social Studies**
   - Exploring principles of energy transfer and thermodynamics related to heating and cooling buildings.
   - Evaluating energy efficiency and sustainability practices.
3. **Mathematics**
   - Data Analysis: Interpreting data related to sun exposure and energy consumption.
   - Measurement: Calculating time of sunlight exposure and evaluating the effectiveness of insulation.
4. **ICT**
   - Using online tools and resources for research and data collection.
   - Employing technology to create presentations of findings.
5. **Critical Thinking**

- Analysis: Critically evaluating the effectiveness of air conditioning systems based on sun exposure.

6. **Communication**
   - Presentation Skills: Clearly articulating findings to peers.
   - Collaboration: Engaging in group discussions and providing constructive feedback.

Module 6: Sustainable Design and Energy

Activity 2: Development of an energy efficiency questionnaire or assessment form for a building

Learning Outcomes:

- **Knowledge of Energy Efficiency**: Students will be able to define key concepts and principles related to energy efficiency in buildings.
- **Questionnaire Design Skills**: Students will develop skills in designing effective questionnaires or assessment forms, focusing on clarity, relevance, and comprehensiveness.
- **Application of Assessment Criteria**: Students will learn to identify and apply appropriate criteria for evaluating energy efficiency in buildings, including insulation, heating, cooling, and appliance efficiency.

- **Data Collection Techniques**: Students will gain experience in various data collection techniques, understanding how to formulate questions that produce useful information for energy assessments.
- **Analytical Thinking**: Students will enhance their analytical thinking skills by interpreting responses and identifying trends or areas for improvement in energy efficiency.
- **Communication Skills**: Students will improve their ability to communicate the purpose and importance of the questionnaire to stakeholders, ensuring clear understanding of the assessment process.
- **Awareness of Sustainability**: Students will develop a deeper awareness of the role that energy efficiency plays in sustainability and the broader implications for environmental conservation.

Time: 45 minutes + 30 minutes

Description of Activity:

Objective:
Students will design a comprehensive questionnaire using Google Forms to evaluate the energy efficiency of various buildings.

1. **Introduction**
    - Review of Previous Work
        - The students will briefly present findings from the previous activity related to energy efficiency.
    - Importance of Questionnaires
        - Class discusses the role of questionnaires in gathering data and assessing energy efficiency.
2. **Understanding Energy Efficiency**
    - Key Concepts
        - In groups, students define energy efficiency and its significance in building design and operation.
    - Factors to Consider
        - Students identify important factors that impact energy efficiency (e.g., insulation, windows, HVAC systems, renewable energy sources).
3. **Questionnaire Design Basics**
    - Types of Questions
        - The teacher explains different types of questions (multiple choice, open-ended, Likert scale) and when to use them.
    - Best Practices
        - The class discusses best practices for writing clear and concise questions, avoiding bias, and ensuring relevance.
4. **Group Work: Developing the Questionnaire**
    - Forming Groups
        - The teacher divides students into small groups to encourage collaboration.
    - Creating Questions
        - Each group will brainstorm and draft questions that assess various aspects of energy efficiency in buildings.
    - Using Google Forms

- The teacher guides students on how to set up and create their questionnaire using Google Forms, incorporating their drafted questions.

5. **Peer Review and Feedback**
   - Sharing Questionnaires
     - Groups share their questionnaires with other groups for feedback.
   - Constructive Critique
     - The teacher encourages students to provide constructive feedback on clarity, relevance, and comprehensiveness of questions.
6. **Finalizing the Questionnaires**
   - Revisions
     - Groups revise their questionnaires based on the feedback received.
   - Submission
     - Groups finalize and submit the completed questionnaire for assessment.
7. **Class Discussion and Reflection**
   - Sharing Experiences
     - Groups share their experiences in designing the questionnaire and what they learned about energy efficiency.
   - Reflective Discussion

- The class discusses the importance of effective data collection methods in evaluating energy efficiency.

Finalised questionnaire:

- Avaliar a Eficiência Energética de uma Casa

Training Material:

- Computer, tablet or smartphone for each group or student
- Access to Google Forms
- Previous works and presentations from Activity 1
- Research materials on energy efficiency

Assessment:

1. Observation of effort/engagement, correctness/ability to accept suggestions and criticism

Evaluation Criteria:

Rubric for Group Work:

- **Listens to Colleagues** assesses how students listen and respond to group members' ideas and feedback.
- **Explains Ideas** assesses how students explain ideas in a way that the group members can understand.
- **Accepts Critiques** assesses how students accept or not feedback from group members and makes adjustments.
- **Cooperation** assesses how students cooperate with members and contributes to the task.
- **Mood** assesses how students maintain a mood that does not disrupt the group.

Criteria	4 - Exceeds Expectations	3 - Meets Expectations	2 - Approaching Expectations	1 - Below Expectations
Listens to Colleagues	Actively listens and responds thoughtfully to all group members' ideas and feedback.	Listens and responds to most group members' ideas and feedback.	Occasionally listens and responds to group members' ideas and feedback.	Rarely listens or responds to group members' ideas and feedback.
Explains Ideas	Clearly and effectively explains ideas, ensuring all group members understand the concepts.	Explains ideas in a way that most group members can understand.	Struggles to explain ideas in a way that group members can understand.	Fails to explain ideas in a way that group members can understand.
Accepts Critiques	Gracefully accepts and incorporates feedback from group members to improve work.	Accepts feedback from group members and makes some adjustments.	Reluctantly accepts feedback from group members and makes minimal changes.	Rejects or becomes defensive when receiving feedback from group members.
Cooperation	Actively collaborates with all group members, contributing equitably to the task.	Cooperates with most group members and contributes to the task.	Occasionally cooperates with group members and contributes minimally to the task.	Fails to cooperate with group members or contribute to the task.
Mood	Maintains a positive and enthusiastic mood that motivates the group.	Maintains a generally positive mood that does not disrupt the group.	Occasionally displays a negative mood that affects the group's dynamics.	Consistently displays a negative mood that disrupts the group's productivity.

Resources:

- Computer, tablet or smartphone for each group or student
- Google Forms
- Previous works and presentations from Activity **1**
- Research materials on energy efficiency

1. Integration: **Mathematics**
   - Understanding how to gather quantitative and qualitative data through surveys.
   - Analysing responses to identify trends and patterns in energy efficiency.
2. **Social Studies**
   - Learning about energy efficiency concepts, sustainable practices, and the environmental impact of buildings.
   - Understanding principles related to energy consumption and efficiency in building design.
3. **ICT**
   - Using Google Forms to create and distribute questionnaires effectively.
   - Organizing and interpreting data collected from the questionnaires.
4. **Critical Thinking**
   - Developing clear, relevant, and unbiased questions to gather meaningful information about energy efficiency.
   - Assessing the effectiveness of the questionnaire in capturing the necessary data.
5. **Communication**
   - Crafting clear and concise questions that are easy for respondents to understand.
   - Sharing and discussing the developed questionnaire with peers.

6. **Research Skills**
    - Combining knowledge from various sources to create a comprehensive assessment tool.
7. **Collaboration**
    - Working with peers to brainstorm and refine questionnaire questions and structure.
    - Providing and receiving constructive criticism to improve the questionnaire's design.

Module 6: Sustainable Design and Energy

Activity 3: Visit a local company to witness the implementation of circular economy practices

Learning Outcomes:

- **Understanding Circular Economy Principles**: Students will be able to explain the core principles of the circular economy, including waste reduction, resource recovery, and sustainable production.
- **Real-World Application**: Students will observe and describe how a local company implements circular economy practices in their operations, gaining insights into practical applications.
- **Critical Evaluation**: Students will develop the ability to critically evaluate the effectiveness and challenges of circular economy practices as demonstrated by the company.
- **Sustainability Awareness**: Students will gain a deeper understanding of the environmental and economic benefits of transitioning from a linear to a circular economy.
- **Communication Skills**: Students will enhance their ability to communicate observations and reflections about the company's practices, both in discussions and written reports.
- **Engagement with Industry Professionals**: Students will have the opportunity to interact with industry professionals, asking questions and seeking insights into the practical challenges and successes of implementing circular economy practices.
- **Inspiration for Innovation**: Students will be inspired to think creatively about how they can contribute to circular economy initiatives in their own communities or future careers.

Time: 180 minutes + 60 minutes + 15 minutes

Description of Activity:

Objective
Students will observe and learn about strategies for minimizing energy consumption and

waste in a manufacturing setting, while understanding the connection to the Sustainable Development Goals (SDGs).

1. **Preparation for the Visit**
    - **Overview of Sustainable Development Goals (SDGs)**
        - The teacher introduces the SDGs and discusses their relevance to sustainability and environmental protection.
        - The teacher highlights specific goals related to energy efficiency and waste reduction.
    - **Setting Expectations**
        - The teacher discusses the objectives of the visit and what students should focus on during the tour.
2. **Company Visit (Duration of the visit)**
    - **Guided Tour by Polymer Engineer**
        - Students will be guided by a polymer engineer who will explain the processes used to minimize energy consumption and waste.
    - **Active Observation**
        - The teacher encourages students to take notes, ask questions, and capture photographs that illustrate key concepts and practices observed during the visit.
    - **Interactive Discussion**
        - The teacher will facilitate a Q&A session with the engineer, allowing students to engage directly and clarify their understanding.
3. **Post-Visit Reflection**
    - **Group Discussion**
        - After the visit, the teacher facilitates a discussion where students share their observations and insights.
    - **Identifying Key Takeaways**
        - The teacher will guide students in identifying the most important strategies for minimizing energy consumption and waste discussed during the visit.
4. **Research and Compilation**
    - **Gathering Additional Information**
        - Students research more about the company's practices and how they align with the SDGs, using the SDGs website as a reference.
    - **Organizing Findings**
        - Students compile their notes, photographs, and research findings into a cohesive format for their presentation.
5. **Creating Presentations**
    - Students create a presentation using the collected information, ensuring it includes:
        - Overview of the company and its sustainability practices
        - Connection to relevant SDGs
        - Key observations and recommendations for improvements
    - The teacher encourages students to include photographs taken during the visit to enhance their presentations.
6. **Class Presentations**
    - The students present their findings to the class, highlighting their key takeaways and recommendations.

- Following the presentation, the teacher will allow time for questions and discussions to deepen understanding and encourage critical thinking.

7. **Conclusion and Reflection**
   - The class will recap the main points discussed during the presentations and their implications for sustainability.
   - The teacher will encourage students to reflect on how their understanding of energy consumption and waste management has evolved from this experience.

- Training Material: Notebook and writing utensils for note-taking
- Camera or smartphone for capturing photographs
- Access to presentation tools (e.g., Google Slides, PowerPoint)
- Research materials on the Sustainable Development Goals (SDGs)

Assessment:

- Quality, effort, and commitment to the presentation

Evaluation Criteria:

Rubric for: Knowledge, Capability, Communication

- **Presentation Structure** assesses if the presentation is organised, and it has a clear and logical structure that facilitates understanding.
- **Correct Use of Language** assesses if the language used is precise, fluent, and if it demonstrates command of the language.
- **Engagement of Peer assesses** if the presentation is engaging and if it maintains the attention of peers throughout.
- **Ability to Clarify Doubts** assesses if the student demonstrates the ability to clarify peers' questions clearly and accurately.
- **Aesthetic of the Work** assesses if the presentation has a visually appealing design, with effective use of images, graphs, and other visual resources.

Rubric for *Eficiência energética* Presentation

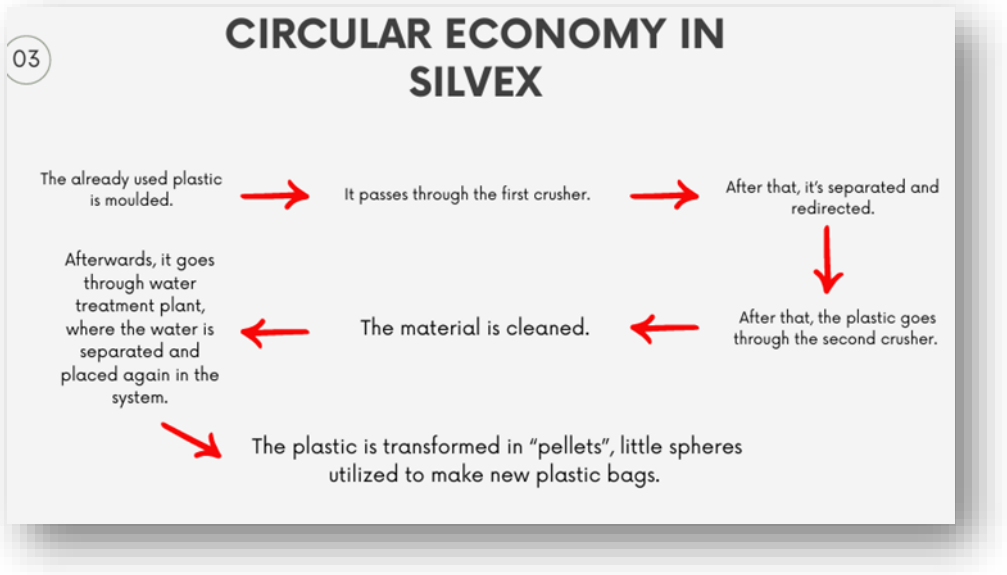
Criteria	Exceeding (4)	Meeting (3)	Approaching (2)	Emerging (1)
Scientific Content	The scientific content is complete, accurate, and demonstrates a deep understanding of the topic.	The scientific content is comprehensive and demonstrates a good understanding of the topic.	The scientific content is basic and demonstrates a limited understanding of the topic.	The scientific content is insufficient and demonstrates little to no understanding of the topic.
Presentation Structure	The presentation is highly organized, with a clear and logical structure that facilitates understanding.	The presentation is well-organized, with a clear structure that helps convey the information.	The presentation has a basic structure, but may have some inconsistencies or lack of clarity.	The presentation lacks a clear structure, making it difficult to understand.
Correct Language Usage	The language used is precise, fluent, and demonstrates advanced language proficiency.	The language used is clear and correct, demonstrating good language proficiency.	The language used has some errors, but is still comprehensible.	The language used has many errors, hindering comprehension.
Capturing Peer Attention	The presentation is highly engaging and manages to maintain the attention of peers throughout the entire time.	The presentation is engaging and manages to maintain the attention of peers for most of the time.	The presentation manages to capture the attention of peers, but may have moments of disinterest.	The presentation fails to capture the attention of peers, who get distracted frequently.
Ability to Clarify Doubts	The student demonstrates excellent ability to clearly and accurately clarify all doubts raised by peers.	The student demonstrates good ability to clarify most of the doubts raised by peers.	The student is able to clarify some doubts raised by peers, but may struggle with others.	The student is unable to satisfactorily clarify the doubts raised by peers.
Aesthetics of the Work	The presentation has a visually appealing design, with effective use of images, graphs.	The presentation has an organized and clean design, with appropriate use of visual resources.	The presentation has a basic design, with limited use of visual resources.	The presentation has an unattractive design and makes inadequate use of visual resources.

Resources:

- Computer, tablet or smartphone for each group or student
- Internet connection
- Camera
- Notebook

Integration:

1. Geography
    - Understanding concepts related to sustainability, energy consumption, and waste management.
    - Learning about the processes involved in polymer engineering and how they relate to energy efficiency.
2. Mathematics
    - Analysing data related to energy consumption and waste reduction.
    - Understanding quantities and metrics used in evaluating energy efficiency and waste management efforts.
3. Social Studies
    - Discussing the Sustainable Development Goals (SDGs) and their relevance to contemporary environmental and social challenges.
    - Exploring the role of businesses in contributing to sustainable practices and community well-being.
4. ICT
    - Observing technological innovations and processes that promote energy efficiency and waste reduction.
    - Gathering information about the company's practices and their alignment with sustainability goals.
5. Critical Thinking
    - Evaluating the effectiveness of the company's practices in minimizing energy consumption and waste.
    - Considering ways that other companies or industries might adopt similar sustainable practices.
6. Communication
    - Actively engaging with the polymer engineer to grasp the intricacies of energy consumption and waste management.
    - Participating in conversations that reflect on learned concepts and practices observed during the visit.
7. Collaboration
    - Working together as a group to formulate questions and discuss observations during the company visit.
    - Sharing insights and reflections with classmates after the visit.
8. Ethics
    - Developing a sense of responsibility towards environmental responsibility and sustainable development.
    - Understanding the ethical implications of business practices in relation to sustainability.



Appendix

Module 6

6.1 **Rubric for Energy Efficiency Presentation**

Criteria	Exceeding (4)	Meeting (3)	Approaching (2)	Emerging (1)
Scientific Content	The scientific content is complete, accurate, and demonstrates a deep understanding of the topic.	The scientific content is comprehensive and demonstrates a good understanding of the topic.	The scientific content is basic and demonstrates a limited understanding of the topic.	The scientific content is insufficient and demonstrates little to no understanding of the topic.
Presentation Structure	The presentation is highly organized, with a clear and logical structure that facilitates understanding.	The presentation is well-organized, with a clear structure that helps convey the information.	The presentation has a basic structure, but may have some inconsistencies or lack of clarity.	The presentation lacks a clear structure, making it difficult to understand.
Correct Language Usage	The language used is precise, fluent, and demonstrates advanced language proficiency.	The language used is clear and correct, demonstrating good language proficiency.	The language used has some errors, but is still comprehensible.	The language used has many errors, hindering comprehension.
Capturing Peer Attention	The presentation is highly engaging and manages to maintain the attention of peers	The presentation is engaging and manages to maintain the attention of peers for most of the time.	The presentation manages to capture the attention of peers, but may have	The presentation fails to capture the attention of peers, who get distracted frequently.

	throughout the entire time.		moments of disinterest.	
Ability to Clarify Doubts	The student demonstrates excellent ability to clearly and accurately clarify all doubts raised by peers.	The student demonstrates good ability to clarify most of the doubts raised by peers.	The student is able to clarify some doubts raised by peers, but may struggle with others.	The student is unable to satisfactorily clarify the doubts raised by peers.
Aesthetics of the Work	The presentation has a visually appealing design, with effective use of images, graphs, and other visual resources.	The presentation has an organized and clean design, with appropriate use of visual resources.	The presentation has a basic design, with limited use of visual resources.	The presentation has an unattractive design and makes inadequate use of visual resources.

6.2. Collaborative Group Work Rubric

Criteria	4 - Exceeds Expectations	3 - Meets Expectations	2 - Approaching Expectations	1 - Below Expectations
Listens to Colleagues	Actively listens and responds thoughtfully to all group members' ideas and feedback.	Listens and responds to most group members' ideas and feedback.	Occasionally listens and responds to group members' ideas and feedback.	Rarely listens or responds to group members' ideas and feedback.
Explains Ideas	Clearly and effectively explains ideas, ensuring all group members understand the concepts.	Explains ideas in a way that most group members can understand.	Struggles to explain ideas in a way that group members can understand.	Fails to explain ideas in a way that group members can understand.
Accepts Critiques	Gracefully accepts and incorporates feedback from group members to improve work.	Accepts feedback from group members and makes some adjustments.	Reluctantly accepts feedback from group members and makes minimal changes.	Rejects or becomes defensive when receiving feedback from group members.
Cooperation	Actively collaborates with all group members, contributing equitably to the task.	Cooperates with most group members and contributes to the task.	Occasionally cooperates with group members and contributes minimally to the task.	Fails to cooperate with group members or contribute to the task.
Mood	Maintains a positive and enthusiastic mood that motivates the group.	Maintains a generally positive mood that does not disrupt the group.	Occasionally displays a negative mood that affects the group's dynamics.	Consistently displays a negative mood that disrupts the group's productivity.

Co-funded by
the European Union

MODULE 7: EFFECTIVE COMMUNICATION ON ENVIRONMENTAL ISSUES

Co-funded by
the European Union

MODULE 7: EFFECTIVE COMMUNICATION ON ENVIRONMENTAL ISSUES

1. Introduction:
- Presentation of the objective and tasks of the module
- Explaining the importance of ecological awareness teaching practices and effective communication on environmental issues

2. Target audience:
- Educators interested in and working with environmental issues and students who are interested in environmental protection and sustainability

3. Main components:
- Principles of Effective communication
- Integrating Effective communication into lesson plans emphasizing environmental issues

4. Learning objectives:
- Understand the principles of Effective communication on environmental issues
- Develop skills to integrate environmental issues into lesson planning

5. Curriculum Structure:
- It is a combination of theory and practical activities of effective communication on environmental issues

6. Pedagogical Approach:
- Focus on developing awareness of sustainability and environmental communication

7. Integration:
- Strategies for integrating the principles of effective communication on environmental issues into existing educational programs

8. Assessment and Evaluation:
- Methods for assessing participants' understanding and application of effective communication on environmental issues principles

9. Resources and Support:
- Access to online resources, training materials, case studies

10. Cultural Relevance:
- Revealing effective communication on environmental issues in different cultures in lesson plans

11. Technology Integration:
- Use of digital tools and resources to support the implementation of environmental issues teaching strategies

Module 7: **Effective communication on environmental issues**

Activity 1: **Introducing the importance of effective communication on environmental issues**

Learning Outcomes:

Students will have an understanding of the terms and concepts of effective communication.
Students will be able to name the most important elements of effective communication
Students will recognize the importance of effective communication in understanding environmental issues.
Students will engage in discussions and develop critical thinking.
Students will demonstrate creativity and problem-solving skills in communicating about environmental issues.
Students will be able to create effective communication strategies on environmental issues.

Time: 2 hours

Description of Activity:

WARMUP ACTIVITY: UNDERSTANDING EFFECTIVE COMMUNICATION:

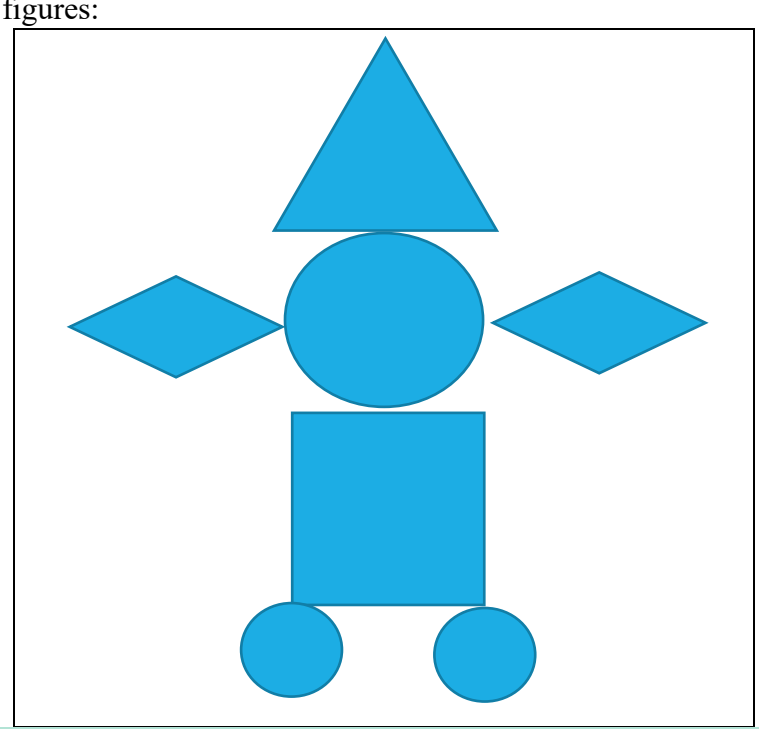
Introduction:

This game will reveal:

- Do we know how to communicate effectively?
- How to convey a message effectively?
- Who is involved in this process?
- What barriers are there in communication?

Preparation and task presentation. The teacher explains the task:

- The teacher secretly prepares two sheets of drawings of different geometric figures (from 6-10 figures, drawn by hand or by computer)
- Examples of figures:



- The audience is asked to prepare sheets and pens (or distributed by the teacher)

Completing the task. The task is carried out in two stages:

- 1 stage. Students will only be listeners-receivers of information, they will not be able to question the sender of information, only listen carefully (as if to the radio).

You invite one of the students to be the sender of the information. Instruction for him: take a good look at the work of geometric figures, think about how he could convey what he sees to the audience in words/sentences. When ready, start the game. each figure must be described by the information sender in three different sentences to make it as clear as possible to the audience (gestures are not allowed). after completing the transfer of information, the student and the teacher go around the audience and check how many students correctly transferred the image they heard on the sheet.
P.S. It usually happens that 30-50% of students understand correctly (the sizes of the figures do not matter). Because we only send information in one direction and it was not possible to clarify information issues.
This is an example of ineffective communication. The results depend in particular on the ability, preparation, quality of verbal language, etc. of the information sender. And from the concentration and attentiveness of the information recipients. It is very important to speak in language and terms that are understandable to the audience

- 2 stage. The situation is a bit different - the information receivers will be able to ask the information sender as many questions as they need and it will be clear how to draw a picture from geometric figures. Communication will be two-way.

Another student is invited and explained what he has to do. he begins to describe what he sees and the audience begins to ask him questions about each figure. The sender of the information explains until it is clear to all who ask what figure it is? where is she what size how do you connect with other figures? etc.
After finishing the description of the drawing, the student and the teacher go around the audience and count the number of correct drawings.
P.S. Usually 80-95% are correct.
This is an example of effective communication. A better result is determined by two-way communication, the ability to explain and ask questions. At this stage of the game, false drawings indicate that someone in the audience was not attentive, did not dare to ask and find out completely.

Summary and discussion:
The teacher discusses the results with the audience, explains why and how the information recipients made mistakes, why the results of the first and second stages differ, who is responsible for the wrong results of the task
Conclusions
This game shows what is important in effective communication, why and when an information message is misunderstood, distorted. What are the barriers/obstacles to effective communication?

DESCRIPTION OF MAIN ACTIVITY:

Introduction:

- Introduce students to the first activity: the essence of effective communication about environmental issues

- Emphasize the importance of effective communication in order to solve environmental problems and make conscious decisions.

Case studies:

- Provide students with 2 visual examples of effective and ineffective environmental communication in a given city/country
  There is example of ineffective communication: The Art of Communication - YouTube or A Failure to Communicate (youtube.com)
- Instruct students to analyse these cases in groups and explain what was effective and ineffective in these communication cases. What have to be in effective communication follow communication cycle components of in video Communication Cycle (youtube.com)

Comments and suggestions:

- After analysing the cases in groups, students discuss the findings and suggest what could be different in these communication cases
- Prepares short visual presentations for students using pens/markers or computers

Visualization:

- Organize a visual presentation of solutions (on walls/whiteboards or on computers).
- Give students time to familiarize themselves with their colleagues' work
- Each group briefly presents suggestions for more effective communication

Discussion and reflection:

- Moderate a class discussion about the challenges of effective communication
- Encourage student reflection and insights
- Summarize the importance of effective communication on environmental issues

Case studies of effective and ineffective environmental communication provide students with initial hands-on experience in analysing and visualizing communication forms and methods related to environmental issues. By performing a practical case analysis and presenting proposals, students develop creativity, critical thinking skills, and delve into the complexity of environmental problems.

Materials:

- Internet access
- Poster boards or large papers for visualization
- Markers, pens and sticky notes
- Computers/tablets
- Evaluation forms

Assessment:

Formative Assessment:

Peer evaluation form: Students evaluate the work of colleagues on a five-point scale. Criteria such as the clarity of the proposed communication message and the effectiveness of visual representation in conveying environmental problems are important in the assessment.

In the course of the case study. During the development of the communication message, teachers act as assistants, advise and provide guidelines. They act as moderators during discussions.

Summative assessment:

The teacher evaluates the presentation of each group of students on cases of effective/ineffective communication. According to pre-specified criteria (clarity and visual effectiveness), evaluate the version of the improved communication message.
Students provide evaluations of their peers' presentations
An overall assessment of the improved communication message on a five-point scale is provided

Evaluation Criteria:

Clarity of presentation: assesses the clarity and logic of the information presented, whether the audience can easily understand the communicative content.
Effectiveness of visual aids: assesses how visual aids contribute to the audience's understanding of effective communication
Communication Skills: Focuses on the speaker's ability to communicate clearly and confidently, and overall effectiveness in conveying key messages and maintaining audience interest.
Team Cooperation: Assesses the level of cooperation and teamwork among group members.
Overall Presentation: Provides an overall assessment of the presentation based on clarity, visual effectiveness, communication skills and teamwork

Resources:

Tools and Materials:
Large sheets of paper, markers, sticky notes.
Computers/tablets
Stationery (pens, markers, post-it notes).
Projector and screen.
Online Resources and Websites:
Access to research material: Internet access to research information
TED Talks on sustainability: ted.com/topics/sustainability
Digital tools: Microsoft Word, Google, Microsoft PowerPoint, Google Slides
Visual design tools: Canva

Integration:

Language skills: supplementing the English vocabulary with new terms about effective communication and environmental issues.
Art: Students create visual presentations that effectively convey the message of environmental issues
IT skills: Students learn to navigate online platforms by creating, developing their digital literacy skills.
Critical thinking: by analysing cases of effective communication, students learn to draw conclusions, creativity, critical thinking, and problem-solving skills are encouraged.
Natural sciences: analysis of environmental issues, solutions to ecological challenges while protecting nature
Entrepreneurship studies: cases of the roles of stakeholders in sustainability decisions, good practices, which business strategies are used by companies for sustainable development in solving environmental challenges.
Curriculum Development: Integrating Principles of Effective Communication into Teaching Practice

Module 7: Effective Communication about Environmental Issues

Activity 1: C**ase analysis of communication of environmental issues**

Learning Outcomes:

Students will be introduced to ways of publicizing environmental problems (ex: media, internet, mass media, public relations).
Students will be able to analyse the data of digital and written media, interpret the effectiveness of the disseminated communication
Students will understand the practical application of effective communication in environmental science by analysing selected cases
Students will learn to monitor and evaluate information provided by digital and written communication

Time: 3 hours

Description of Activity:

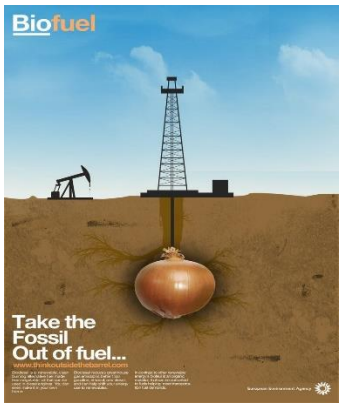
Introduction:

- Brief explanation of the task - Case study of communication of environmental problems
- Ask students to work in groups, choose a topic of environmental issues and search for communication messages in the digital or media space based on this topic

Case Studies:

Give students examples of how to analyse different types of communication data (digital or written): text, image, sound, message gist, target audience, etc.

The example f*alse/not correct* message of communication message about environmental issues:



The example *true/correct* message of communication message about environmental issues:

Case Study Purpose. When analysing communication messages, determine:

- • What the information sender wants to say
- • Is it true or false message? Maybe somethings here is wrong/not correct from the angle of environmental issues?
- • Is the message channel chosen correctly, taking into account the target audience?
- • What results the sender wants to achieve?
-

Comments and suggestions:

- After analysing the cases in groups, students discuss the case study questions and present their conclusions.
- Provide assistance and answer questions as needed.
- Encourage creativity in how they analyse data and draw conclusions.

Visualization:

- Prepares a visual presentation of the group case study (slide or drawing format).
- One group as message sender shows them slides/drawing to other group who are message receivers. This group have to say what understand from sender message. After them answers about the message, sender group make comments answers of receiver group. Teacher/coordinator makes conclusions and suggestions.

The examples results of messages sender groups:

Discussion and reflection:

- Lead a class discussion of cases of effective communication on environmental issues
- Encourage student reflection and insight
- Summarize the obtained results

The case study research method provides students with practical experience in analysing communication messages, observes the forms and methods used in spreading the message on environmental issues. By completing the case study task on their own, students develop critical thinking skills, delve into the complexity of environmental problems, creativity and teamwork are revealed.

Training Material:

Computers or tablets
Internet access.
Printed material on the topic of environmental issues
Publicly available environmental datasets.
Field notebooks or digital note

Assessment:

Formative Assessment:
Form of peer evaluation: Students evaluate the work of colleagues in a five-point system. Such criteria as the clarity of the communication message of the analysed case and the effectiveness of visual representation in conveying environmental problems are important in the assessment.
Teachers work as facilitators, helping to identify appropriate topics, guiding students in the right direction during case studies. They act as moderators during discussions.
Summative assessment:
The teacher evaluates the presentation of each group of students on the presentations of the case study papers. Reports of the performed analysis are evaluated according to predetermined criteria.
Assess students based on their ability to effectively use digital tools to find forms of communication on environmental issues, their ability to analyse and interpret.
Students submit evaluations of their peers' presentations
A general assessment of the tasks performed in the case study is presented on a five-point scale

Evaluation Criteria:
Clarity of presentation: the clarity and logic of the information presented is evaluated. The ability to determine and explain the message of the communication being sent, to assess whether the chosen channels are appropriate and fully utilized (according to the above questions of case study) *Effectiveness of visual aids:* evaluates how visual aids are used to reveal the presentation of the case study. Clarity and quality of case study presentation (slide format) *Communication Skills:* Focus on overall effectiveness in communicating key messages and maintaining audience interest. *Group cooperation*: the level of cooperation of group members is evaluated (group members evaluate each other). *Overall Presentation*: Provides an overall assessment of the presentation: presentation clarity, visualization, communication skills and teamwork. Ability to communicate findings and answer questions.
Resources:
Computers/tablets Projector and screen. *Online Resources and Websites:* What Is Environmental Communication and Why Is It Important? | SpringerLink Here are 7 ways to improve sustainability communication | World Economic Forum (weforum.org) Environmental Barriers to Communication (barriersofcommunication.com) What is Environmental Communication? - Environmental Communication (communicating.green)
Integration:
ICT skills: Students learn to navigate online platforms by creating, developing their digital literacy skills. Critical thinking: by analysing cases of effective communication, students learn to draw conclusions, encourage creativity, critical thinking, and problem-solving skills. Natural sciences: analysis of environmental problems Entrepreneurship Studies: Stakeholder Roles in Sustainability Decisions Case Studie. What business strategies companies use for sustainable development to address environmental challenges. Art: Students create visual presentations that effectively convey a message about environmental issues Language skills: adding new terms to the English vocabulary for effective environmental communication.

Module 7: Effective Communication about Environmental Issues
Activity 3: S**torytelling as effective communication through environmental issues**
Learning Outcomes:
Students will be introduced to the storytelling method as one of the ways of publicizing environmental issues. Students will be able to select information provided by digital and written communication and use it in creating a story Students will understand the practical process of creating a story, learn to create an effective communication message on environmental issues Students will develop creativity skills, strengthen group work skills Students will develop visual presentation and public speaking skills

Time: 2 hour

Description of Activity:

Introduction:

• Brief explanation of the task - what is storytelling and how can it be used to create effective communication messages and channels

• Ask students to work in groups, choose an environmental topic and create a story based on that topic as an example of a communication message about environmental issues

Recommendation for storytelling presentation:
Before creating a communication message, you should be clear about:

- who you want to read it and what they already know?
- what you want the recipients of the information to do after reading it?
- what results you want to achieve?

Effective communication of sustainable solutions is crucial to solving environmental problems. Here are some strategies to consider:

- *Transparency:* Be open about your sustainability efforts, including successes and challenges. It builds trust and credibility.
- *Positive messaging:* Emphasize the benefits of sustainable practices, such as better health, cost savings and environmental protection.
- *Engage Stakeholders:* Engage a variety of stakeholders, including employees, customers and the community, in your sustainability initiatives. Their input and support can strengthen your efforts.
- *Use clear and simple language:* Avoid jargon and complicated terms. Make your message accessible to a wide audience.
- *Visual communication:* Use infographics, videos and images to convey complex information in an easy-to-digest format.
- *Consistency:* Make sure your sustainability message is consistent across all platforms and communications.
- *Authenticity:* Avoid greenwashing by ensuring your claims are backed by real action and data.

Effective communication about environmental issues to the local community can have a significant positive impact on the environment. Here are some effective communication strategies:

- *Education and Awareness*: Use social media, community newsletters and local events to educate residents about the benefits of recycling and how to do it properly. Emphasize environmental and economic benefits.
- *Community Events:* Organize recycling drives, clean-up events and workshops. These events can be both educational and fun, fostering a sense of community and promoting recycling.
- *Incentives:* Offer rewards or incentives for recycling. This could be discounts at local businesses, recognition in community newsletters or small prizes.
- *Clear communication*: Provide clear information about what can and cannot be recycled. Misunderstandings about recycling guidelines can lead to contamination and lower recycling rates.
- *Partnerships:* Work with local businesses and organizations to promote recycling. They can help spread the word and provide additional resources.

Storytelling instruction:

For creating of story follow these recommendations with 5 question. It will help to create effective communication messages for your readers/information receivers

The five W's for writing	**Notes**
1. Who?	
Who is my reader? What is my relationship with my reader?	
2. When?	
When does my reader need the information? When should I start this document/presentation? When is the deadline? When do I need a reply?	
3. What?	
What message do I want to convey? What does my reader know already? What does my reader need to know? What does my reader expect of me? How can I help my reader understand? What are my reader's attitudes and how can I turn these to my advantage?	
4. Where?	
Where can I find the information that my reader needs? Where is the reader (this will influence your choice of communication method) ?	
5. Why?	
Why is the subject important to me? How does it contribute to my goals? Why should the reader pay attention to me? Why should the reader not pay attention to me? Why does my reader need this information? Why might my reader be interested in this topic? Why might my reader not be interested in this topic?	

Notes and suggestions:

• In groups they create stories, students discuss how to better convey the message to the target audience (use the table of five questions)

• Provide assistance to students and answer any questions they may have about creating a story.

• Promote creativity, encourage the use of various methods for creating and conveying an interesting environmental story

Visualization:

• Prepares a visual presentation of the group's history (slide format; video creation).

• Each group presents an environmental story.

Discussion and reflection:

• Lead a class discussion about which story was the most effective and clear expression of communication

• Encourage student reflection and insight

• Summarize the obtained results

The storytelling method provides students with practical experience in creating stories, crafting messages, thinking through which channels and to whom this communicative message will go; learns what forms and methods can be used to spread the word about environmental issues. By independently completing the task of telling a story, students demonstrate creativity, develop critical thinking skills, delve into the highlighting of environmental problems and the dissemination of communication.

Training Material:

Computers/tablets
Internet access
Printed material on the topic of environmental issues
Publicly available environmental datasets.
Digital note
Visualization tools (Canva, Google Data Studio, YouTube and etc.)
Presentation tools (PowerPoint, Google Slides, Canva and etc.)

Assessment:

Formative Assessment:
Form of peer evaluation: Students evaluate the work of colleagues in a five-point system. Criteria such as the clarity of the communication message of the story being analysed and the effectiveness of visual representation in conveying environmental issues are important in the assessment.
Teachers work as assistants, help, guide students in the right direction during the creation of a story. They act as moderators during discussions.
Summative assessment:
The teacher evaluates the presentation of each group's story. The presented stories are evaluated according to predetermined criteria (based on five questions).
Students' ability to use visualization tools in creating a communication story on environmental issues is assessed, as well as their ability to emphasize and interpret.
Students provide evaluations of their peers' story presentations
The overall rating of the stories is given on a five-point scale

Evaluation Criteria:

Clarity of the story: the clarity and logic of the created story, creativity are evaluated; the ability to deliver the communication message being sent.
Effectiveness of Visual Aids: Evaluates how visual aids are used to reveal the presentation of the environmental story. Clarity and quality of story presentation (slide format/video format)
Group cooperation: the level of cooperation among group members is evaluated (group members evaluate each other).
Communication Skills: Focus on overall effectiveness in communicating key messages and maintaining audience interest.
Overall Presentation: Provides an overall assessment of the presentation: creativity, clarity of story delivery, visualization, communication skills and teamwork. Ability to communicate findings and answer questions.

Resources:

Computers/tablets
Projector and screen.
Online Resources and Websites:
Storyteller Apps
Arctik - 10 tips for delivering effective environmental communication
Here are 7 ways to improve sustainability communication | World Economic Forum (weforum.org)

Sustainability Communication: Strategies and Good Practices (aplanet.org)
Integration:
Art: Students create visual presentations of stories that can help communicate effectively about environmental issues to the public ICT skills: Students learn to navigate online platforms by creating, developing their digital literacy skills. Creativity and critical thinking: by creating environmental stories, students learn to use the storytelling method, encourage creativity, critical thinking, and problem-solving skills in groups Natural and geographical sciences: refining and publicizing local/regional environmental problems Language skills: adding new terms to the English vocabulary for effective communication about environmental issues

Co-funded by
the European Union

MODULE 8: DIGITAL TOOLS

Co-funded by
the European Union

MODULE 8: DIGITAL TOOLS

1. Introduction:

- Usage of some digital tools for sustainable solutions.
- Exploration of digital tools for environmental monitoring and analysis.
- Hands-on activities using digital tools for sustainability projects.
- Discussion of ethical considerations in digital environmental activism.

2. Target Audience:

This course aims to equip students with the knowledge and skills to leverage digital tools in developing sustainable solutions for contemporary environmental and social challenges. The course integrates theoretical knowledge with practical applications, encouraging students to design, implement, and assess sustainability projects using various digital tools.

Digital tools for sustainability integrate these components to provide comprehensive solutions that help mitigate environmental impacts, promote social equity, and support economic viability. By leveraging technology, these tools enable better decision-making, efficient resource management, and enhanced collaboration towards a more sustainable future.

3. Key Components:

- Digital tools for sustainable solutions.
- Environmental monitoring and analysis.
- Ethical considerations in sustainability.

4. Learning Objectives:

- Understand the importance of digital tools for sustainable solutions
- Develop skills to use digital tools for sustainability
- Proficiency in data collection and analysis
- Data analysis and visualization
- Decision-making and strategic planning
- Technology and innovation for sustainability
- Practical application of digital tools
- Ethical and social considerations

5. Curriculum Structure:

The present module is divided into activities concerning digital tools for sustainable solutions

6. Pedagogical Approach:

A pedagogical approach that incorporates these strategies can effectively engage students in learning about sustainability through the use of digital tools. This approach not only builds technical skills but also fosters critical thinking, collaboration, and a deep understanding of sustainability issues.

7. Integration:

- Integration the environmental program into the school curriculum.
- The results and conclusions of digital tools can be:
  - Presented in the whole school in a conference related to sustainability and environmental protection.
  - Published in social media.
  - Published in local press.

8. Assessment and Evaluation:

The assessment framework ensures a comprehensive evaluation of student's abilities to use digital tools for sustainable solutions, emphasizing both technical skills and critical thinking. By incorporating various assessment methods, students receive constructive feedback that aids in their overall learning and development.

9. Resources and Support:

All resources related to each activity are mentioned to provide students holistic information for further learning.

10. Cultural Relevance:

Ensuring cultural relevance in activities involving digital tools for sustainable solutions is crucial for fostering meaningful and respectful engagement with communities. By integrating traditional knowledge, respecting cultural practices, and collaborating closely with the community, such projects can achieve sustainable and culturally appropriate outcomes while enhancing students' cultural competence and interdisciplinary skills.

11. Technology Integration:

Integrating technology into activities involving digital tools for sustainable solutions was made with careful planning, selection, and implementation of appropriate tools. By ensuring effective training, seamless integration, and continuous evaluation, such projects can significantly enhance sustainability practices and provide valuable learning experiences for students and stakeholders alike.

Module 8: Digital Tools

Activity 1: Exploration of Digital Tools for Environmental Monitoring and Analysis

Learning Outcomes:

- Students will understand what environmental monitoring is and its importance.
- Students will gain an overview of various environmental monitoring methods.
- Students will learn about various digital tools used for environmental monitoring and analysis to assess and present environmental data.
- Students will develop and implement digital solutions for sustainable development.
- Students will learn how to use digital tools for observing, analyzing, and presenting environmental data.
- Students will develop skills in data collection, analysis, and interpretation.
- Students will foster critical thinking about environmental issues and solutions.
- Students will evaluate the impact of digital solutions on sustainability goals.

Time:

2 hours

Description of Activity:

- Teacher introduces environmental monitoring and its significance for sustainability.
- Students watch the video_1 and video_2 related to the environmental monitoring.
- Students visit the website related to Environmental Observation and Modelling.
- Teacher shares to students a hard copy of the quiz (8.1) or https://forms.gle/xRvR7LnffszZHUoy7 and gives them a few minutes to answer the questions on it. Simultaneously, teacher presents the quiz on the interactive board or projector.
- Teacher collects the quizzes and discusses the answer of each question with students.
- Students are encouraged to participate in a discussion that foster creative thinking.

Training Material:

The Activity demands the following materials:

- Computers with internet connection.
- Whiteboard with the projector or interactive board in which the quiz is presented.
- Hard copies of the quiz 8.1.
- Pens or pencils for students.

Assessment:

- Provides students a comprehensive exploration of digital tools for environmental monitoring and analysis, equipping students with the skills needed to tackle complex environmental challenges.
- Helps students to enhance their technical skills in environmental data collection, analysis, and visualization.

Evaluation Criteria:

The evaluation criteria of this activity are designed to comprehensively assess students' theoretical understanding, practical skills, analytical abilities, and creativity in applying digital tools for environmental monitoring and analysis.

The usage of a quiz demonstrates retention and understanding of key concepts and theories, applies theoretical knowledge to answer quiz questions accurately and shows critical thinking and problem-solving abilities of students in quiz responses.

Resources:

videos:

https://youtu.be/6EvoGWGtyFQ

https://youtu.be/ifiVjUmi_-8

websites:

https://www.ualberta.ca/science/environmental-observation-modelling.html

https://doc.arcgis.com/en/arcgis-solutions/latest/reference/introduction-to-environmental-analysis.htm

https://link.springer.com/article/10.1134/S101933162202006X

Integration:

This curriculum provides to students a comprehensive understanding of how digital tools can be harnessed to develop and implement sustainable solutions. Through practical sessions and real-world projects, students will gain hands-on experience, preparing them to contribute effectively to sustainability initiatives in their professional careers.

Integrating a review on digital tools for environmental monitoring and analysis into the curriculum enriches the learning experience by connecting theoretical knowledge with current research and practical applications. This approach ensures that students are well-versed in the latest advancements, capable of critical analysis, and prepared to address contemporary environmental challenges effectively.

This activity can easily be integrated to the environmental program into the school curriculum.

Module 8: Digital Tools

Activity 2: Creating a presentation about electricity reduction at home using Canva

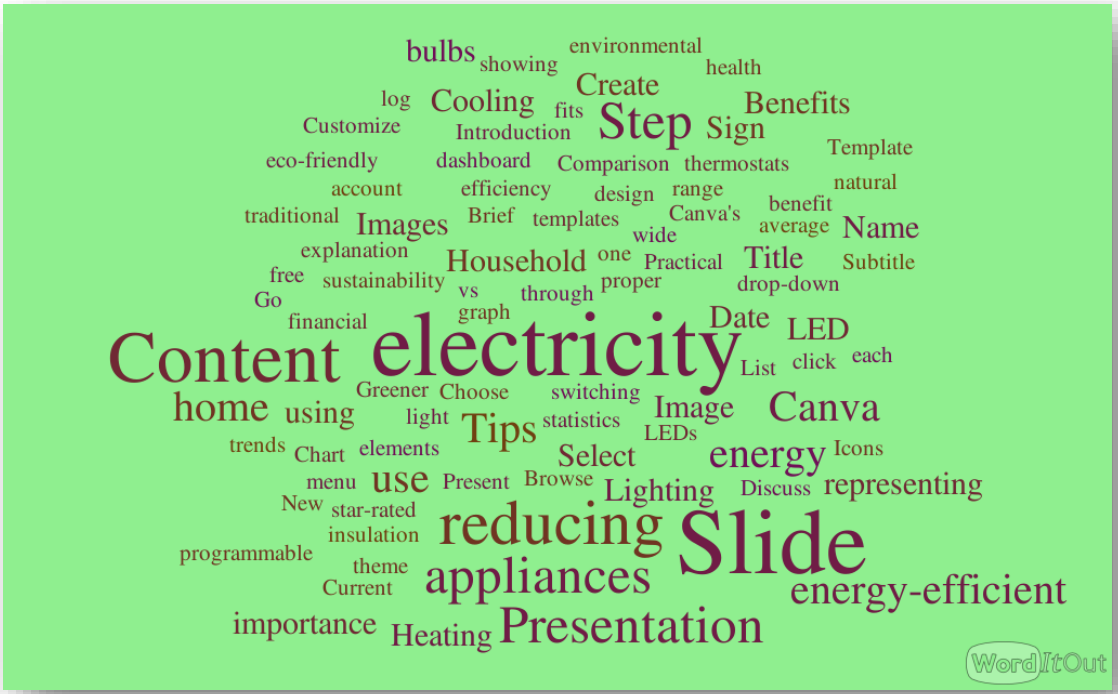
Learning Outcomes:

Participants will create a visually appealing and informative presentation on how to reduce electricity consumption at home using Canva. This activity will help participants learn about energy-saving practices while enhancing their presentation design skills.

Time:

3 hours

Description of Activity:



Step 1: Sign In to Canva

Go to Canva and log in or sign up for a free account.

Step 2: Create a New Presentation

From the Canva dashboard, click on "Create a design" and select "Presentation" from the drop-down menu.

Step 3: Choose a Template

Browse through Canva's wide range of presentation templates. Select one that fits the theme of sustainability and energy efficiency.

Step 4: Customize Your Presentation

- **Slide 1: Title Slide**
  - **Title**: "Reducing Electricity Consumption at Home"
  - **Subtitle**: Practical Tips for a Greener Household
  - **Your Name**: [Your Name]
  - **Date**: [Date]
  - **Visuals**: Image of a home with eco-friendly elements.
- **Slide 2: Introduction**
  - **Content: Brief explanation of the importance of reducing electricity consumption at home.**
  - **Visuals: An image representing energy consumption.**
- **Slide 3: Current Electricity Consumption**
  - **Content**: Present statistics on average household electricity use.
  - **Visuals**: Chart or graph showing electricity consumption trends.
- **Slide 4: Benefits of Reducing Electricity Consumption**
  - **Content**: List the benefits (environmental, financial, health).
  - **Visuals**: Icons representing each benefit.
- **Slide 5: Energy-Efficient Appliances**
  - **Content**: Discuss the importance of using energy-efficient appliances.
  - **Visuals**: Images of energy-efficient appliances (e.g., LED bulbs, energy star-rated appliances).
- **Slide 6: Lighting**
  - **Content**: Tips for reducing electricity use in lighting (e.g., switching to LEDs, using natural light).
  - **Visuals**: Comparison images of LED vs. traditional bulbs.
- **Slide 7: Heating and Cooling**
  - **Content**: Tips for reducing electricity use in heating and cooling (e.g., proper insulation, programmable thermostats).

- **Visuals**: Diagrams of insulated homes, smart thermostats.

- **Slide 8: Smart Home Technology**
  - **Content**: Introduction to smart home devices that help save electricity.
  - **Visuals**: Images of smart plugs, smart thermostats, and energy monitoring systems.
- **Slide 9: Simple Everyday Habits**
  - **Content: Simple habits to reduce electricity consumption (e.g., unplugging devices, turning off lights).**
  - **Visuals: Infographic or list with icons.**
- **Slide 10: Case Study**
  - **Content: Real-life example of a household that successfully reduced its electricity consumption.**
  - **Visuals: Before-and-after images, key results**
- **Slide 11: Benefits of Reducing Energy Consumption**
  - Content: List the environmental, economic, and social benefits.
  - Visuals: Use icons and images to visually represent these benefits.
- **Slide 12: Energy-Saving Strategies**
  - Content: Tips for residential, commercial, and industrial energy-saving.
  - Visuals: Use bullet points for clarity and include relevant images.
- **Slide 13: Technologies and Innovations**
  - Content: Provide information about renewable energy sources and smart technologies.
  - Visuals: Include pictures and brief descriptions of each technology.
- **Slide 14: Implementation Plan**
  - Content: Outline the steps to develop and implement an energy reduction plan.
  - Visuals: Highlight the roles of different stakeholders.
- **Slide 15: Challenges and Solutions**
  - Content: Address common challenges and potential solutions in energy reduction.
  - Visuals: Use infographics to make the information easily digestible.
- **Slide 16: Benefits of Reducing Electricity Consumption:**
  - Content:
    - Environmental Benefits: Reduction in greenhouse gas emissions, and conservation of natural resources.
    - Economic Benefits: Lower energy bills, and increased savings.
    - Health Benefits: Improved indoor air quality, and reduced exposure to harmful emissions.
  - Visuals: Icons representing environment, economy, and health.
- **Slide 17: Conclusion**
  - **Content: Recap key points and encourage the audience to take action.**
  - **Visuals: Motivational image or quote about energy conservation.**

- **Slide 18: Questions &Answers**
  - **Content: Open the floor for questions.**
  - **Visuals: Image or icon indicating a Q&A session.**

Step 5: Customize the Design

- **Colors and Fonts**: Choose a color scheme and fonts that are consistent and align with the theme of sustainability.
- **Images and Icons**: Use high-quality images and icons from Canva's library to illustrate your points.
- **Animations**: Add animations to text and images to make the presentation more engaging.
- **Speaker Notes**: Add notes for each slide to help you remember key points during your presentation.

Step 6: Review and Finalize

- Go through your presentation to check for any errors or areas that need improvement.
- Ensure that all visuals and text are aligned and consistent.

Step 7: Save and Share

- **Download**: Click on the "Download" button at the top right corner and choose your preferred file type (e.g., PDF, PPTX).
- **Share**: You can also share your presentation directly from Canva by clicking the "Share" button. Enter the email addresses of your audience or generate a shareable link.

Training Material:

- Computer or tablet with internet access
- Canva account (free or pro)

Assessment:

Assessment for Learning (Formative Assessment)

- Tool Proficiency Test: Assesses technical proficiency in using digital presentation tools.
- Overall Class Contribution: Evaluates participation and engagement throughout the learning scenario.
- collaboration and teamwork skills during group activities.

Assessment of Learning (Summative Assessment):

- Assessment of creating digital presentations.
- Assessment of presenting ideas, results and solutions to an audience.
- Real-World Case Study Analysis: Applies learned skills to analyze and propose solutions for a real-world sustainability case.

Assessment as Learning (peer assessment)

- Project Peer Assessment: Assesses collaboration, teamwork, and contribution within group projects and gives opportunities for students to discuss and resolve any

discrepancies.

- Presentation Evaluation: Evaluates the clarity and effectiveness of project presentations and creates written feedback and constructive suggestions for improvement.
- Sustainability Challenge Simulation Review: Assesses the application of digital tools in solving sustainability challenges while the evaluation based on problem identification and proposed solutions. This gives the students the opportunities for discussion and sharing of diverse perspectives.
- Case Study Analysis Peer Feedback: Evaluates the depth and effectiveness of analysing a real-world sustainability case.

Continuous Collaboration Assessment

Assesses ongoing collaboration and communication within the class. Opportunities for students to reflect on and improve their collaborative skills

Evaluation Criteria:

The students' work can be assessed based on the following criteria (each criterion can be scored on a scale from 1 to 5, with 1 being "Needs Improvement" and 5 being "Excellent"):

1. Content Accuracy and Relevance

- Information is accurate and up-to-date.
- Content is relevant to the topic of electricity reduction at home.
- Key points are clearly explained and well-organized.

2. Structure and Organization

- Presentation follows a logical structure.
- Each slide focuses on a single topic or idea.
- Smooth transitions between slides and sections.

3. Visual Design and Aesthetics

- Use of consistent color schemes and fonts.
- High-quality images, icons, and graphics.
- Visually appealing and not overcrowded.

4. Clarity and Readability

- Text is clear and easy to read.
- Appropriate use of headings, bullet points, and spacing.
- Avoidance of clutter and overly complex slides.

5. Use of Canva Features

- Effective use of Canva's design tools (e.g., templates, charts, animations).
- Creative and appropriate use of visuals.
- Use of speaker notes for additional details.

6. Engagement and Interactivity

- Slides are engaging and hold the audience's attention.
- Use of interactive elements (e.g., questions, calls to action).
- Use of animations and transitions to enhance the presentation.

7. Overall Impact

- Presentation is compelling and persuasive.
- Effectively communicates the importance of reducing electricity consumption.
- Inspires the audience to take action.

Alternatively, the students can be evaluated by using the Rubric for Assessment:

Criteria	Needs Improvement (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
Content Accuracy and Relevance					
Structure and Organization					
Visual Design and Aesthetics					
Clarity and Readability					
Use of Canva Features					
Engagement and Interactivity					
Overall Impact					

Resources:

Canva web site: https://www.canva.com/

Some resources to help students to find information and create an attractive presentation are:

1. General Information and Statistics

- **Energy Information Administration (EIA)**: Offers data and statistics on energy consumption.
  - Website: eia.gov
- **Environmental Protection Agency (EPA)**: Provides resources on energy efficiency and renewable energy.
  - Website: epa.gov

2. Energy-Saving Tips

- **Energy Star**: Provides tips for improving energy efficiency in homes.
  - Website: energystar.gov

- **Department of Energy (DOE)**: Offers a comprehensive guide to energy efficiency and renewable energy.
  - Website: energy.gov

3. Case Studies and Real-Life Examples

- **Rocky Mountain Institute**: Features case studies on energy efficiency in buildings.
  - Website: rmi.org
- **National Renewable Energy Laboratory (NREL)**: Provides research and case studies on renewable energy technologies.
  - Website: nrel.gov

4. Visual and Design Resources

- **Canva Templates**: Canva offers a wide range of presentation templates that you can customize.
  - Website: canva.com/templates
- **Unsplash**: Free high-quality images for your presentation.
  - Website: unsplash.com
- **Pexels**: Another source for free stock photos and videos.
  - Website: pexels.com

5. Infographics and Data Visualization

- **Canva Infographics**: Canva has built-in tools for creating infographics.
  - Website: canva.com/infographics
- **Infogram**: A tool for creating interactive charts and infographics.
  - Website: infogram.com

6. Smart Home Technology and Innovations

- **Smart Energy Consumer Collaborative (SECC)**: Offers resources on smart grid technology and smart home devices.
  - Website: smartenergycc.org
- **IoT For All**: Information on the latest in smart home technology and IoT devices.
  - Website: iotforall.com

7. Educational Videos and Tutorials

- **YouTube**: Search for videos on energy efficiency and electricity reduction at home.
  - Example: Energy Saving Tips - YouTube
- **Khan Academy**: Offers educational content on energy and environmental science.
  - Website: khanacademy.org

Integration:

The productive presentations can be:

- Presented in the whole school in a conference related to sustainability and environmental protection.

- Published in social media.
- Published in local press.

Module 8: Digital Tools

Activity 3: Monitoring Deforestation Using Google Earth

Learning Outcomes:

- Students will learn to use Google Earth for tracking and analyzing deforestation.
- Students will gain proficiency in using Google Earth for spatial data analysis.
- Students will develop the ability to map, analyze, and propose sustainable solutions.
- Students will understand the principles of environmental monitoring.
- Students will apply Google Earth tools to real-world environmental issues.
- Students will understand the impact of deforestation on the environment.
- Students will learn to propose strategies for mitigating deforestation.
- Students will learn about digital tools used for environmental monitoring and analysis, gaining hands-on experience in using these tools to assess and present environmental data.

Time:

3 hours (1 hour for introduction and data collection, 2 hours for mapping, analysis, discussion and presentation).

Description of Activity:

Introduction

Teacher:

- Makes a brief introduction to the meaning of deforestation and the tool of Google Earth.
- Discusses the causes and consequences of deforestation.
- Explains the importance of monitoring deforestation for environmental conservation.
- Discuss the causes and impacts of deforestation on biodiversity, climate change, and local communities.
- Introduces Google Earth and its capabilities for environmental monitoring.
- Guides students through the interface of Google Earth.
- Shows how to navigate, search for locations, and switch between different views (2D, 3D, satellite imagery).

Data Collection

Teacher asks from students to:

- Identify a region known for deforestation (e.g. the Amazon Rainforest) or a region of their interest (e.g. Chios or Greece in overall).

- Use Google Earth's historical imagery feature to collect images from different years.
- Save images for later analysis.

Mapping and Analysis

Teacher asks from students to:

- Open Google Earth and navigate to the selected area of interest.
- Create a time-lapse animation to visualize changes in forest cover over time.
- Use the time slider to observe and record changes year by year.
- Analyzing the Extent of Deforestation by using the polygon tool to outline areas of deforestation in different years.
- Calculate the area of deforested land using the measurement tool.
- Compare the areas over different time periods to quantify the rate of deforestation.
- Identifying Patterns and Causes by analyzing the spatial patterns of deforestation.
- Identify possible causes (e.g., agricultural expansion, logging, infrastructure development).
- Use the "Placemark" tool to mark locations with significant changes and add notes on potential causes.
- Impact Assessment by discussing the environmental impacts of deforestation (e.g., loss of biodiversity, carbon emissions, soil erosion).
- Use the "Tour" function to create a narrated tour of the deforestation sites, highlighting key impacts and observations.

Discussion and Mitigation Strategies

Teacher asks from students to:

- Results Interpretation by discussing the findings of the deforestation analysis.
- Compare students' observations and measurements.
- Identify key trends and patterns.
- Identify key areas where deforestation is most significant.
- Discuss the potential impacts of deforestation on the local ecosystem and communities.
- Propose Mitigation Strategies by brainstorming strategies for mitigating deforestation (e.g., reforestation, sustainable land management, policy changes).
- Develop a proposal for a mitigation strategy, considering ecological, social, and economic factors.
- Consider: reforestation and afforestation projects for sustainable agricultural practices, community-based forest management and policies and regulations to prevent illegal logging.

Presentation

Each student individually or groups of students presents their proposals to the class.

Training Material:

- Computer with internet access.
- Google Earth software installed (or use Google Earth Web).
- Access to historical satellite imagery datasets.

Assessment:

This curriculum provides a comprehensive evaluation of students' knowledge, technical skills, and ability to apply Google Earth for environmental monitoring. Through a combination of internet searching, practical exercises, and a capstone project, students will be assessed on their understanding of theoretical concepts, proficiency with Google Earth, and ability to develop and communicate effective solutions to environmental challenges.

Evaluation Criteria:

Accuracy of Mapping
Correctly identifying and mapping deforested areas.

Depth of Analysis
Thoroughness in spatial analysis and identification of key trends and causes.

Quality of Proposals
Practicality, creativity, and sustainability of proposed mitigation strategies.

Presentation Skills
Clarity and effectiveness in presenting findings and proposals.

Resources:

Deforestation sources

- International Organizations and Non-Profits:
  - Food and Agriculture Organization of the United Nations (FAO)
  - World Resources Institute (WRI)
  - Greenpeace
  - World Wildlife Fund (WWF)
- Government Agencies:
  - U.S. Forest Service
  - European Space Agency (ESA)
- Research Institutions and Universities:
  - Yale School of Forestry & Environmental Studies
  - Center for International Forestry Research (CIFOR)
- Data and Mapping Tools:
  - Global Forest Watch (GFW)
  - Google Earth Engine
  - Website: Google Earth Engine

- News and Media
  - Mongabay
  - BBC Environment
- Academic Journals
  - Journal of Environmental Management
  - Forest Ecology and Management
- Social Media and Blogs
  - Twitter and LinkedIn
  - Handles/Groups: Follow environmental scientists, organizations, and groups focused on deforestation.
  - Resources: Provides real-time updates, discussions, and links to recent studies and reports.

Presentation Tools:

Microsoft PowerPoint, Google Slides , Apple Keynote, Prezi, Canva, Visme, Powtoon, Tableau.

Integration:

This activity uses Google Earth to monitor deforestation, emphasizing its importance in environmental monitoring. Through hands-on mapping, change detection analysis, spatial analysis, and solution proposal, students will gain practical experience with Google Earth tools and develop a deeper understanding of the impact of deforestation and how to address it sustainably. This activity also encourages critical thinking and problem-solving by asking students to propose actionable strategies for mitigating deforestation.

The activity can be published in local press as well as in the social media of school.

Module 8: Digital Tools

Activity 4: Analysing Local Environmental Data with ArcGIS Online Digital Tool

Learning Outcomes:

- Students will be introduced to ArcGIS Online as a tool for environmental monitoring and analysis.
- Students will be enabled to create, analyze maps and spatial data, and interpret environmental changes by using real-world environmental data.
- Students will understand the practical applications of GIS technology in environmental science.
- Students will learn how to use digital tools for environmental monitoring and analysis with hands-on activities in order to assess and present environmental data.

Time:

4 hours (1 hour for introduction and tutorial, 1 hour for data collection and mapping, 1 hour for analysis and discussion and 1 hour for presentation and discussion).

Description of Activity:

Introduction and tutorial

- **Introduction to ArcGIS Online**
  - Explain what GIS (Geographic Information Systems) is and its importance in environmental monitoring.
  - Introduce ArcGIS Online and its key features, including map creation, data layers, and analysis tools.
- **Tutorial: Creating a Simple Map**
  - **Step-by-Step Guide:**
    - Log in to ArcGIS Online.
    - Create a new map.
    - Add a base map (e.g., satellite imagery, topographic map).
    - Add data layers (e.g., local air quality data, water bodies, vegetation cover).
    - Customize the map with symbols, colors, and labels.
  - **Interactive Practice:**
    - Have students follow along on their computers, creating their own maps with provided data sets.
    - Provide assistance and answer questions as needed.

Data Collection and Mapping

- **Data Collection**
  - **Field Data Collection (optional):**
    - If feasible, take students to a nearby field location to collect environmental data (e.g., air quality, water quality, plant species).
    - Use GPS-enabled devices to record locations and data points.
  - **Using Pre-Collected Data:**
    - Provide students with pre-collected environmental data sets relevant to their local area (e.g., air quality indices, water quality measurements, land use maps).
- **Creating a Detailed Map**
  - **Instructions:**
    - Import collected or provided data into ArcGIS Online.

- Create a detailed map by adding data layers and customizing the map appearance.
- Use ArcGIS Online tools to analyze the data (e.g., heat maps for air quality, distribution maps for plant species).

- **Hands-On Practice:**
  - Have students work individually or in groups to create their own maps based on the data provided.
  - Encourage creativity in how they present and analyze the data.

Analysis and Discussion

- **Data Analysis**
  - **Instructions:**
    - Analyze the maps created to identify patterns and trends in the environmental data.
    - Use ArcGIS Online analysis tools (e.g., buffer analysis, spatial statistics) to gain deeper insights.
  - **Guided Analysis:**
    - Lead students through examples of how to analyze different types of data.
    - Discuss common patterns and anomalies that may be observed.

Presentation and Discussion

- **Each group presents their maps and findings to the class, discussing key observations and insights.**
- **Take place a class discussion on the importance of spatial analysis in environmental monitoring, the challenges encountered during data collection and analysis, and potential applications of GIS in addressing environmental issues.**

Training Material:

- Computers or tablets with internet access.
- ArcGIS Online accounts.
- Pre-collected or publicly available environmental data sets (e.g., air quality data, water quality data, land use data).
- Field notebooks or digital notes app.

Assessment:

- Assess students based on their ability to effectively use ArcGIS Online for map creation, data integration, analysis, and interpretation.
- Encourage peer feedback on presentations and maps, focusing on clarity, accuracy, and depth of analysis.

Evaluation Criteria:

Participation:

- Active participation in the tutorial and hands-on practice.
- Engagement during the field data collection or data mapping session.

Map Creation:

- Accuracy and completeness of the map created.
- Effective use of ArcGIS Online tools and customization options.

Data Analysis:

- Quality and depth of the data analysis.
- Ability to identify and explain patterns and trends in the data.

Presentation:

- **Clarity and organization of the presentation.**
- **Ability to communicate findings and answer questions.**

Resources:

Environmental data sets can be collected by:

- **Air Quality Data:**
  - **World Air Quality Index Project (WAQI)**
  - **Environmental Protection Agency (EPA)**
  - **European Environment Agency (EEA)**
- **Water Quality Data:**
  - **United States Geological Survey (USGS)**
  - **European Environment Agency (EEA)**
  - **Water Quality Portal (WQP)**
- **Land Use and Geographic Data:**
  - **United States Geological Survey (USGS) National Map**
  - **European Environment Agency (EEA) Data**
  - **Global Forest Watch (GFW)**

- **General Environmental Data:**
    - **NASA Earth Observing System Data and Information System (EOSDIS)**
    - **NOAA National Centers for Environmental Information (NCEI)**

Presentation Tools:

Microsoft PowerPoint, Google Slides , Apple Keynote, Prezi, Canva, Visme, Powtoon, Tableau.

Follow-Up:

- **Encourage students to explore additional features of ArcGIS Online on their own.**
- **Assign a project where students use ArcGIS Online to monitor and analyze a specific environmental issue over a longer period.**
- **Provide resources for further learning about GIS and its applications in environmental science.**

Integration:

This hands-on activity not only familiarizes students with ArcGIS Online but also allows them to apply skills on digital tools like GIS to real-world environmental monitoring scenarios. It encourages critical thinking, data-driven decision-making, and collaboration, essential for future environmental scientists and practitioners.

Students can present their results in a conference about sustainability in local residents.

Module 8: Digital Tools

Activity 5: Monitoring Air Quality Using AirVisual

Learning Outcomes:

- Students will be introduced to the AirVisual tool for monitoring air quality.
- Students will be enabled to collect, analyze, and interpret real-time air quality data.
- Students will understand the impact of air pollution on health and the environment.
-

Time:

2 hours and 30 minutes (1 hour for introduction and tool exploration, 1 hour for data collection and analysis and 30 minutes for Wrap-Up and Discussion).

Description of Activity:

Introduction and Tool Exploration

- Introduction to Air Quality Monitoring
  - Discuss the importance of monitoring air quality for human health and the environment.
  - Introduce the AirVisual tool as a platform for accessing real-time and historical air quality data.
- Exploring AirVisual
  - **Getting Started**: Guide students through accessing the AirVisual website or mobile app.
  - **Navigating the Interface**: Demonstrate how to navigate the main features, including the map view, AQI (Air Quality Index) readings, and pollutant concentrations.
  - **Understanding AQI**: Explain the concept of AQI, its components (e.g., PM2.5, PM10, ozone), and their health implications.

Data Collection and Analysis

- Field Data Collection
  - Instruct students to use the AirVisual app on their smartphones (if available) or via the website to collect real-time air quality data.
  - Assign students to different locations around the school or local area to gather data points.
- Data Analysis and Interpretation
  - **Data Collection Review**: Gather students' data and compile it for analysis.
  - **Analysis Tasks**:
    - Compare AQI readings between different locations.
    - Analyze trends in pollutant concentrations (e.g., PM2.5 levels) over time.
    - Discuss factors influencing air quality (e.g., traffic, industrial activity, weather conditions).
  - **Discussion**: Facilitate a discussion on the observed data, focusing on health impacts, environmental implications, and possible mitigation strategies.

Wrap-Up and Discussion

- **Presentation**: Ask students to present their findings and observations to the class.
- **Q&A Session**: Encourage questions and discussions on the challenges of air quality monitoring, the reliability of data sources, and the importance of public awareness.

Training Material:

- **Computers or tablets with internet access.**
- **Access to the AirVisual website or mobile app (iOS/Android).**
- **Field notebooks or digital notes app.**

Assessment:

This curriculum:

- **Assesses students based on their ability to effectively use the AirVisual tool for data collection, analysis, and interpretation.**

- **Evaluate the student's critical thinking by their understanding of air quality concepts and their ability to apply knowledge to real-world scenarios.**
- **Encourages peer feedback on the clarity of data presentation and the depth of analysis during the group discussion.**

Evaluation Criteria:

Tool Proficiency:

- Navigation: Ability to navigate the AirVisual website or mobile app effectively.
- Data Collection: Competence in using AirVisual to collect real-time air quality data from different locations.
- Understanding Features: Demonstrated understanding of the features available in AirVisual, such as interpreting AQI readings, viewing historical data, and exploring pollution sources.

Data Analysis:

- Data Interpretation: Capability to interpret AQI data and relate it to environmental factors (e.g., pollutants measured, health implications).
- Comparative Analysis: Ability to compare AQI readings across different locations or time periods and draw conclusions from the data collected.
- Identification of Trends: Skill in identifying trends or patterns in air quality data and explaining potential causes or impacts.

Critical Thinking:

- Problem Solving: Demonstrated ability to analyze factors influencing AQI fluctuations (e.g., weather conditions, human activities) and propose potential solutions.
- Questioning: Posed insightful questions about the data collected and its implications for air quality management and public health.
- Integration of Knowledge: Integrating knowledge of air quality concepts with practical application using AirVisual.

Communication:

- Presentation: Clarity and effectiveness in presenting findings and observations during group discussions or presentations.
- Engagement: Active participation in group discussions, asking questions, and responding thoughtfully to peers' contributions.
- Reflection: Thoughtful reflection on the experience of using AirVisual and its relevance to personal and community actions regarding air quality.

Collaboration:

- Teamwork: Collaboration within small groups to collect and analyze air quality data, demonstrating effective teamwork skills.
- Supportive Contribution: Contribution to group discussions and activities, offering constructive feedback and ideas.

Overall Engagement:

- Interest and Curiosity: Demonstrated interest in exploring air quality issues and curiosity about the factors affecting air quality.
- Initiative: Taking initiative in exploring additional features or data within AirVisual beyond the basic requirements of the activity.

Resources:

The following resources provide comprehensive information and support for using AirVisual to monitor and understand air quality, whether for personal use, educational purposes, or professional research and analysis:

- **AirVisual Website:** The official website provides access to real-time and historical air quality data, information about the AirVisual app, and health recommendations based on air quality levels.
- **AirVisual Blog: Offers articles, updates, and insights related to air quality, pollution trends, and using the AirVisual platform effectively.**
- **AirVisual Support Center: Provides FAQs, troubleshooting guides, and user manuals for navigating and using the AirVisual app and website.**
- **IQAir YouTube Channel (IQAir YouTube) : Includes video tutorials, demonstrations, and informational videos about AirVisual, air quality monitoring, and related topics.**
- **AirVisual Community Forum: Engage with other users, ask questions, and share experiences about using AirVisual for monitoring air quality globally.**
- **AirVisual API Documentation: For developers, provides documentation on the AirVisual API for accessing air quality data programmatically and integrating it into applications or projects.**
- **Social Media Channels:**
    - **Facebook: AirVisual Facebook**
    - **Twitter: AirVisual Twitter**
    - **LinkedIn: AirVisual LinkedIn**

Integration:

Students are familiarized with the AirVisual tool as well as engaged in hands-on learning about air quality monitoring and its implications.

The curriculum promotes critical thinking, data literacy, and awareness of environmental issues related to air pollution.

The productive results can be presented into the whole school in a relevant conference.

Module 8: Digital Tools

Activity 6: Biodiversity Monitoring Using iNaturalist tool

Learning Outcomes:

Students will learn how to monitor and record biodiversity using the iNaturalist app. This activity aims to increase awareness and understanding of local biodiversity and engage participants in citizen science.

Time:

3 hours

Description of Activity:

Steps:

Step 1: Introduction to Biodiversity and iNaturalist

- **Content**: Brief presentation on the importance of biodiversity, its role in ecosystems, and how monitoring biodiversity helps in conservation efforts.
- **Visuals**: Use a PowerPoint presentation with images and infographics on biodiversity.
- **Activity**: Show a short video about iNaturalist and its impact on citizen science.

Step 2: Setting Up iNaturalist

- Download and install the iNaturalist app from the App Store or Google Play.
- Create an account or log in if you already have one.
- Briefly explore the app interface (e.g., observing recent sightings, exploring projects).

Step 3: Getting Ready for Field Observation

- Explain the importance of making accurate and detailed observations.
- Discuss **ethical practices** such as not disturbing wildlife and respecting private property.
- Encourage participants to take notes on location, weather conditions, and habitat types.

Step 4: Field Activity – Making Observations

- Go to a local park, nature reserve, or any area with diverse plant and animal life.
- Encourage participants to spread out and start making observations.
- Use the iNaturalist app to take photos of plants, animals, and fungi. Make sure to capture clear and detailed images.
- Add notes and tags to each observation (e.g., type of habitat, behavior observed).
- Tips:
    - Take multiple photos of each specimen from different angles.
    - Include a common object (like a coin or your hand) in the photo for size reference.

Step 5: Uploading and Identifying Observations

- Gather back as a group after the field activity.
- Connect to Wi-Fi and upload the observations to iNaturalist.

- Add identifications to your observations. Use the app's suggestions or consult field guides.
- Discuss any interesting findings or uncertainties with the group.

Step 6: Reflecting on the Activity

- Have an open discussion about the experience. What did participants find interesting? Were there any challenges?
- Discuss the importance of citizen science and how their observations contribute to scientific research.
- Encourage participants to continue using iNaturalist in their daily lives and share their findings with the community.

Field Observation Guide

- **Field Observation Checklist:**
  - **Location**: Record the exact location using the app's GPS feature.
  - **Date and Time**: Automatically recorded by the app, but ensure it's correct.
  - **Weather Conditions**: Note if it's sunny, cloudy, rainy, etc.
  - **Habitat Type**: Describe the habitat (e.g., forest, meadow, wetland).
  - **Species Observed**: Take clear photos of plants, animals, or fungi.
  - **Behavior Notes**: Record any interesting behavior (e.g., feeding, mating, nesting).
- **Ethical Guidelines:**
  - Do not disturb wildlife or their habitats.
  - Avoid trampling vegetation or disturbing soil.
  - Be mindful of private property and restricted areas.

Follow-Up Activities

- **Create a Project on iNaturalist:**
  - Encourage participants to create a group project to track biodiversity in their area.
  - Share and compare observations regularly.
- **Data Analysis:**

- Teach participants how to analyze their data to look for trends and patterns.
- Discuss how this data can be used for local conservation efforts.

- **Educational Outreach:**
  - Have participants present their findings to the community or local schools.
  - Create informative posters or social media posts to raise awareness about local biodiversity.

Training Material:

- Smartphones or tablets with internet access.
- iNaturalist app (available for free on iOS and Android).
- Notebook and pen (optional for field notes).

Assessment:

Assessment for Learning (Formative Assessment)

- Tool Proficiency Test: Assesses technical proficiency in using digital tools such as iNaturalist,.
- Overall Class Contribution: Evaluates participation and engagement throughout the learning scenario.
- collaboration and teamwork skills during group activities.

Assessment of Learning (Summative Assessment)

- Sustainability Challenge digital tools: Applies learned concepts and tools to address a sustainability challenge.
- Real-World Case Study Analysis: Applies learned skills to analyze and propose solutions for a real-world sustainability case.

Assessment as Learning (peer assessment)

- Visualizations Peer Review: Evaluates the quality and effectiveness of visualizations and creates constructive feedback on strengths and areas for improvement.
- Case Study Analysis Peer Feedback: Evaluates the depth and effectiveness of analyzing a real-world sustainability case.
- Continuous Collaboration Assessment: Assesses ongoing collaboration and communication within the class. Opportunities for students to reflect on and improve their collaborative skills

Evaluation Criteria:

To ensure that participants have understood and effectively engaged in biodiversity monitoring using iNaturalist, and in order to estimate their work, the following criteria (each criterion can be scored on a scale from 1 to 5, with 1 being "Needs Improvement" and 5 being "Excellent") can be used:

1. Understanding of Biodiversity and Its Importance

- Demonstrates knowledge of biodiversity and its role in ecosystems.
- Understands the significance of monitoring biodiversity for conservation efforts.

2. Proficiency with iNaturalist App

- Successfully downloaded and set up the iNaturalist app.
- Able to navigate and use key features of the app (e.g., making observations, uploading photos, adding identifications).

3. Quality of Observations

- Observations are detailed and accurate.
- Photos are clear, well-composed, and provide sufficient detail for identification.
- Additional notes and tags are relevant and informative.

4. Ethical Conduct During Field Activity

- Followed ethical guidelines (e.g., did not disturb wildlife, respected private property).
- Demonstrated respectful and responsible behavior in the field.

5. Engagement and Participation

- Actively participated in the field activity and group discussions.
- Showed enthusiasm and curiosity about biodiversity.

6. Contribution to Group Project or Community

- Effectively collaborated with peers in a group project or community activity.
- Shared observations and findings with the group.
- Contributed to group discussions and reflections.

7. Reflection and Analysis

- Provided thoughtful reflections on the activity.
- Demonstrated an understanding of the impact and importance of their contributions to citizen science.
- Analyzed data and observations to identify patterns or trends.

Rubric for Assessment

Criteria	Needs Improvement (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
Understanding of Biodiversity					
Proficiency with iNaturalist App					
Quality of Observations					
Ethical Conduct					
Engagement and Participation					
Contribution to Group Project					
Reflection and Analysis					

Resources:

Students can enhance their knowledge in biodiversity by having access to various resources that can aid in identification, understanding biodiversity, and maximizing the use of the iNaturalist platform. Some valuable resources are:

1. iNaturalist Resources

- **iNaturalist Website**:
  - Provides tutorials, guides, and FAQs on how to use the iNaturalist platform effectively.
  - Link: iNaturalist.org
- **iNaturalist Help Forum**:
  - Community-driven support and discussions on using iNaturalist, identification help, and best practices.
  - Link: forum.inaturalist.org
- **iNaturalist Blog**:
  - Updates on new features, user stories, and tips for using iNaturalist in various contexts.
  - Link: inaturalist.blog

2. Biodiversity Identification Guides

- **Field Guides**:
  - Physical or digital guides specific to your region's flora and fauna can aid in species identification.
  - Examples: Local field guides for birds, insects, plants, etc.
- **Online Databases**:
  - Websites like Encyclopedia of Life (EOL) or Global Biodiversity Information Facility (GBIF) offer extensive species information and distribution maps.

- Links:
  - Encyclopedia of Life
  - GBIF

3. Citizen Science and Biodiversity Monitoring

- **Citizen Science Alliance**:
  - Offers resources and information on various citizen science projects, including biodiversity monitoring.
  - Link: citizenscience.org
- **National Geographic's Citizen Science Hub**:
  - Provides information and tools to participate in biodiversity monitoring and other scientific projects.
  - Link: natgeo.org/education/citizen-science

4. Educational Resources

- **Khan Academy - Biodiversity and Conservation Biology**:
  - Free courses and educational materials on biodiversity, ecology, and conservation.
  - Link: khanacademy.org
- **Coursera - Biodiversity and Conservation Courses**:
  - Online courses from universities and institutions worldwide on biodiversity monitoring and conservation.
  - Link: coursera.org

5. Community and Local Resources

- **Local Naturalist Groups**:
  - Join local naturalist groups or organizations that conduct biodiversity monitoring activities.
  - They often offer workshops, field trips, and expert-led identification sessions.
- **Libraries and Museums**:
  - Check your local library or museum for biodiversity-related books, workshops, or events.

6. Social Media and Online Communities

- **Twitter**:
  - Follow hashtags related to biodiversity monitoring and iNaturalist (#iNaturalist, #CitizenScience).
- **Facebook Groups**:
  - Join groups dedicated to biodiversity monitoring or iNaturalist users.

7. Scientific Journals and Publications

- **Google Scholar**:
  - Search for scientific papers and articles related to biodiversity monitoring and species identification.
- **PubMed Central**:
  - Database of biomedical and life sciences journal literature.

Integration:

- **Classroom Projects**: Incorporate into biology or environmental science curricula. Students can use the app for field observations, species identification, and data collection.
- **Field Trips**: Organize field trips where students use iNaturalist to document biodiversity. This hands-on experience enhances learning about local ecosystems and species diversity.
- **Community Engagement**: Involve local communities in biodiversity monitoring efforts using iNaturalist. Conduct workshops to teach residents how to use the app and contribute data.
- **Project Collaboration**: Collaborate with other citizen science projects or organizations that use iNaturalist. Share data and contribute to larger-scale biodiversity monitoring efforts.
- **Training Workshops**: Host workshops to train volunteers and citizen scientists on how to use iNaturalist effectively for biodiversity monitoring. Provide guidance on data quality and species identification

Module 8: Digital Tools

Activity 7: Monitoring Forest Cover and Changes Using Global Forest Watch

Learning Outcomes:

- Monitoring forest cover and changes using Global Forest Watch (GFW) can be a valuable activity to understand and address deforestation, forest degradation, and forest conservation efforts globally.
- Students will learn how to use Global Forest Watch to monitor forest cover changes, deforestation, and reforestation efforts. This activity aims to raise awareness about global forest issues and empower participants to contribute to monitoring and conservation efforts.
- Students will gain practical skills in using GFW for monitoring forest cover and changes, deepen their understanding of global forest issues, and be empowered to contribute to forest conservation efforts in their communities and beyond.
- Students will interpret the implications of forest cover changes on biodiversity and climate.

Time:

3 hours (including follow-up activities)

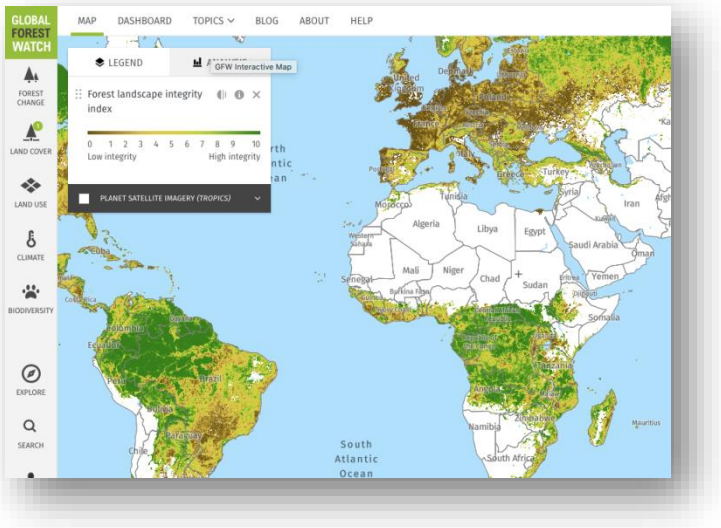
Description of Activity:

Introduction to Global Forest Watch

Teacher:

- Introduce participants to Global Forest Watch (GFW) and its importance in monitoring global forest cover changes.
- Explain the objectives of the activity: to understand deforestation, forest degradation, and reforestation efforts.
- Show examples of how GFW data has been used for conservation and policy-making globally.

Getting Started with Global Forest Watch



- Guide
- participants through accessing the GFW website (https://www.globalforestwatch.org).
- Demonstrate how to navigate the GFW interface, including the map and data layers.
- Explain the different tools and features available for monitoring forest cover and changes.

Exploring Forest Cover and Changes

- Assign participants to explore a specific region or country of interest using GFW.
- Instruct them to analyze forest cover, deforestation rates, and reforestation efforts over a specific time period.
- Encourage participants to take notes on key findings, trends, and areas of concern.

Data Analysis and Interpretation

- Gather participants to discuss their findings and observations from GFW.
- Facilitate a discussion on the factors contributing to deforestation and forest degradation in their selected regions.
- Discuss the implications of these changes on biodiversity, climate change, and local communities.

Reflection and Discussion

- Reflect on the significance of using GFW for monitoring forest cover and changes.
- Discuss potential actions individuals and communities can take to address deforestation and promote forest conservation.
- Encourage participants to share their thoughts on the activity and any insights gained.

Follow-Up Activities:

- **Action Plan**: Develop an action plan based on insights from the activity, outlining steps for local advocacy or community engagement in forest conservation.
- **Case Studies**: Research and present case studies where GFW data has been instrumental in influencing policy decisions or conservation efforts.
- **Mapping Exercises**: Conduct mapping exercises using GFW to track changes in forest cover over time in different regions or ecosystems.

Training Material:

- Computer or laptop with internet access
- Global Forest Watch (GFW) website access: https://www.globalforestwatch.org
- Pen and paper for notes (optional)

Assessment:

Assessment using GFW for monitoring forest cover and changes not only assesses participants' skills and understanding but also enhances their ability to use data-driven tools for environmental monitoring and conservation. It encourages critical thinking, data literacy, and active engagement in global efforts to protect forests and biodiversity.

Evaluation Criteria:

 Understanding: Assess participants' understanding of key concepts related to forest cover, deforestation, and conservation based on their exploration and discussion.

 Data Analysis: Evaluate the accuracy and depth of their data analysis using GFW tools and features.

 Engagement: Measure the level of engagement and participation in discussions and reflections on forest monitoring and conservation.

Resources:
Global Forest Watch Website: https://www.globalforestwatch.org/ This is the primary platform where can be found interactive maps, data layers, tools for analysis, and educational resources, educational materials and tutorials. **GFW Tutorials**: Comprehensive tutorials and guides are available on the GFW website, covering topics such as how to use the platform for monitoring forest cover, deforestation alerts, and reforestation efforts. **Educational Resources**: GFW offers educational materials suitable for various audiences, including educators, students, researchers, and conservation practitioners. These resources include case studies, lesson plans, and activities designed to enhance understanding of forest monitoring and conservation. **GFW Community Forum**: Engage with a global community of users, including researchers, practitioners, and enthusiasts, to discuss topics related to forest monitoring, share best practices, and collaborate on projects. **Webinars and Workshops**: Participate in webinars and training workshops hosted by GFW experts. These sessions provide insights into advanced features, data interpretation techniques, and practical applications of GFW for monitoring forest dynamics.
Integration:
Students will exchange their results and conclusions to other people by: • Local newspapers, radio, and TV stations. • Social Media (Facebook, WhatsApp, and Instagram) to share updates and engage with the community. • Flyers and posters in common areas like community centers, schools, and local businesses.

Module 8: Digital Tools

Activity 8: Using EcoFootprint Calculator for Sustainability

Learning Outcomes:
To provide students with practical experience using the EcoFootprint Calculator to assess their environmental impact and to develop strategies for reducing their footprint.
Time:
2 hours
Description of Activity:
Introduction Teacher • Briefly discuss the concept of ecological footprints and their significance in sustainability. • Makes a presentation on EcoFootprint Calculator: ○ Overview of the Tool: Provide a brief overview of the EcoFootprint Calculator, its purpose, and its features.

- Demonstration: Show how to navigate the calculator, input data, and interpret results.

Hands-On Exploration

Students makes a hands-on exploration by using the EcoFootprint Calculator to assess their own ecological footprint.

They follow the steps:

- Go to the EcoFootprint Calculator website or open the app.
- Input personal data related to daily habits, such as energy use, transportation, diet, and waste production.
- Review the results, which typically include the number of Earths required if everyone lived like them, and breakdowns of various categories.

Group Discussion and Analysis

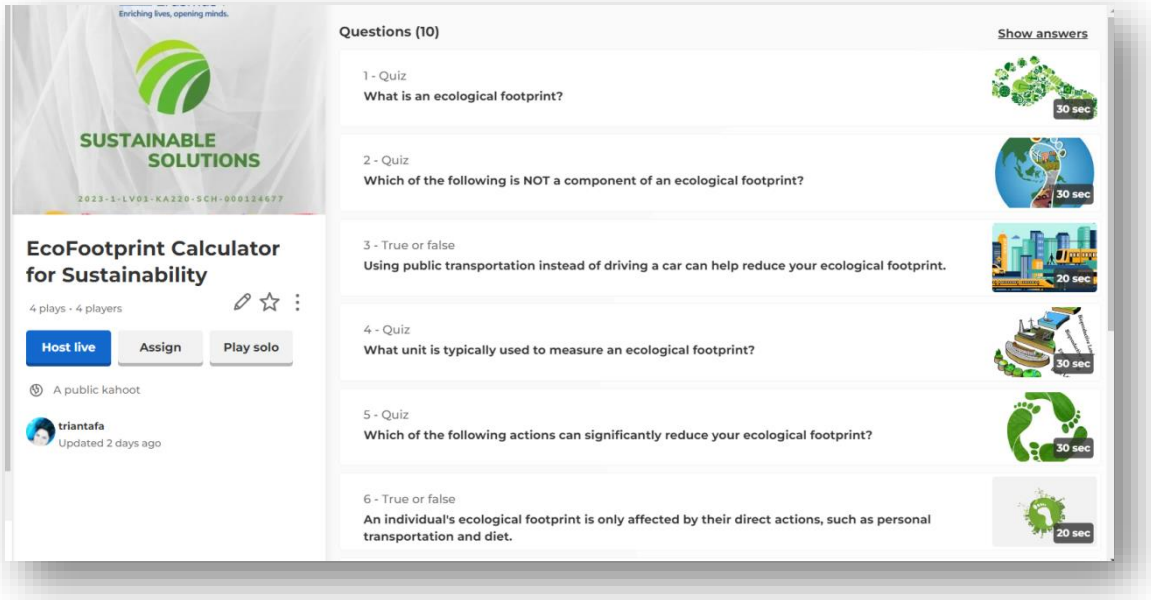
- Students are divided into small groups to discuss their findings.
- They compare footprints and identify which activities contribute most to their ecological footprint.
- They discuss any surprises or insights gained from the results.
- They brainstorm practical steps to reduce their footprints in different categories (e.g., energy, transportation, diet).
- The data of footprints are analyzed in a suitable datasheet program.

Strategy Development

- Each group develops a set of strategies or an action plan to reduce their ecological footprint.
- Task Instructions:
  - Identify at least three areas where they can make changes to reduce their footprint.
  - Develop specific, actionable steps for each area.
  - Consider any potential barriers and how to overcome them.
  - Discuss the ethical implications of their actions and how they can encourage others to adopt sustainable practices.
  - Make a list of ethical considerations when assessing and reducing ecological footprints.
  - Make an action plan for your future steps.

Quiz

A hard copy of the Quiz 8.2 or https://forms.gle/jqGiWpdMZKdAigXW9 is given to students in order to assess the comprehension of the eco footprint issue.



Presentation and Feedback

- Each group presents their action plan to the whole class.
- Encourage participants to provide constructive feedback and share additional ideas.

Conclusion

- Groups summarize key points from the activity and the importance of reducing ecological footprints.
- Encourage participants to implement their action plans and share their experiences with others.

Training Material:

- Computers or tablets with internet access
- Projector and screen
- Printed handouts with instructions and ethical guidelines
- Notepads and pens

- EcoFootprint Calculator website or app access
- Hard copy of the quiz 8.2 or https://forms.gle/nddj8tYLo7Z31m7i8

Assessment:

The peer evaluation aims to provide constructive feedback on the use of the EcoFootprint Calculator and the sustainability actions proposed by participants. This process helps participants learn from each other and improve their sustainability practices.

The usage of a quiz demonstrates retention and understanding of key concepts and theories, applies theoretical knowledge to answer quiz questions accurately and shows critical thinking and problem-solving abilities of students in quiz responses.

Evaluation Criteria:

Understanding of Concepts:

- Knowledge of Ecological Footprint: Participants should demonstrate an understanding of what an ecological footprint is and its significance.
- Components of Ecological Footprint: Ability to identify and explain the various components such as food, housing, transportation, and goods/services.

Data Collection and Input:

- Accuracy of Data Provided: Participants should accurately report their lifestyle and consumption data.
- Comprehensiveness of Data: Ensure all relevant data categories are filled out completely.

Interpretation of Results:

- Analysis of Ecological Footprint: Ability to interpret the results provided by the EcoFootprint Calculator.
- Identification of Key Impact Areas: Participants should identify which areas of their lifestyle contribute most to their ecological footprint.

Actionable Insights:

- Proposed Changes: Participants should suggest at least three actionable changes to reduce their ecological footprint based on their results.
- Feasibility of Changes: Assess the practicality and potential impact of the proposed changes.

Reflection and Learning:

- Reflection on Learnings: Participants should reflect on what they learned from the activity.
- Commitment to Change: Participants should express a commitment to implement some or all of the proposed changes.

Resources:

Suitable resources for this activity can be found on:

websites:

- EcoFootprint Calculators: A comprehensive tool that calculates personal ecological footprints based on lifestyle choices.

https://www.footprintnetwork.org/resources/footprint-calculator/

- WWF Footprint Calculator: Provides insights into personal and national ecological footprints and offers suggestions for reducing them.

https://footprint.wwf.org.uk/

- Carbon Footprint Calculator by the EPA: A user-friendly tool that helps individuals estimate their carbon footprint.

https://www3.epa.gov/carbon-footprint-calculator/

- EcoChallenge: An interactive platform where participants can take on sustainability challenges.

https://ecochallenge.org/

Educational Resources:

Lesson Plans and Activities:

- Eco-Schools USA: Offers a variety of lesson plans and activities focused on sustainability and ecological footprint.

https://www.nwf.org/

- Facing the Future: Provides curriculum materials and resources for teaching about sustainability and global issues.

https://www.facingthefuturegroups.org/

Books and Articles:

- "The Ecological Footprint: New Developments in Policy and Practice" by Philip W. Sutton: A comprehensive guide to understanding and applying the ecological footprint concept.
- Articles from Environmental Science Journals: Use academic databases like JSTOR, ScienceDirect, or Google Scholar to find relevant research articles.

Visual and Interactive Resources:

Documentaries and Videos:

- "The Story of Stuff": A short film exploring the lifecycle of material goods and the impact on the environment.

https://youtu.be/9GorqroigqM

- "Before the Flood": A documentary on climate change and the importance of reducing ecological footprints.

https://youtu.be/zbEnOYtsXHA

Tools for Data Collection and Analysis:

- Google Forms: Create custom surveys to collect data on participants' lifestyles and consumption patterns.

https://docs.google.com/forms/u/0/

- Microsoft Excel or Google Sheets: For analysing and visualizing collected data.

Online Forums and Groups:

- Reddit - Sustainability: A community for discussing sustainability practices and sharing resources.

https://www.reddit.com/r/sustainability/?rdt=55627

- Local Environmental Organizations: Partner with local NGOs or environmental groups for support and additional resources

Templates and Guides

Description: Use templates to help participants create actionable plans to reduce their ecological footprints. Templates can be found on:

https://business.gov.au/environmental-management/develop-your-sustainability-action-plan

https://www.ibm.com/blog/sustainability-action-plan-guidance-and-template/

https://greenlit.org.nz/sustainability-action-plan/

https://www.slideteam.net/blog/top-10-sustainability-plan-templates-with-samples-and-examples

Integration:

- This hands-on activity will help participants understand their ecological impact and empower them to make more sustainable choices in their daily lives.
- Students will create an online forum or group where participants can continue to discuss digital tools and ethical considerations regarding sustainability.
- Students will organize regular follow-up sessions to track progress and provide additional support through workshops and seminars.

Appendix
Module 8
8.1

Quiz: Basics of Environmental Monitoring

Multiple Choice Questions

1. What is the primary purpose of environmental monitoring?
    A. To track weather patterns
    B. To observe and assess the health of the environment
    C. To predict natural disasters
    D. To monitor wildlife behavior
2. Which of the following is NOT a method of environmental monitoring?
    A. Satellite imagery
    B. Soil sampling
    C. Social media surveys
    D. Water quality testing
3. What tool would you use to analyze geographic data and create detailed maps?
    A. Microsoft Word
    B. ArcGIS Online
    C. Adobe Photoshop
    D. Google Translate
4. Remote sensing involves collecting data from:
    A. Ground-based sensors
    B. Satellites or aircraft
    C. Underwater drones
    D. Weather balloons
5. Which environmental monitoring tool is most commonly used to measure air quality?
    A. Seismograph
    B. Anemometer
    C. Hygrometer
    D. Air quality sensor
6. Noise pollution is a concern in environmental monitoring. What unit is used to measure noise levels?
    A. Decibels (dB)
    B. Pascals (Pa)
    C. Hertz (Hz)
    D. Lumens (lm)

True or False Questions

7. True or False: Google Earth can be used to observe changes in land use and deforestation over time.
    A. True

B. False

8. True or False: Environmental monitoring only focuses on natural environments and does not include urban areas.
   A. True
   B. False
9. True or False: Waterkeeper is an app that can be used to monitor water quality.
   A. True
   B. False
10. Citizen science plays no role in environmental monitoring.
   A. True
   B. False

Short Answer Questions

11. Name two key reasons why environmental monitoring is important.

12. Describe one example of how remote sensing can be used to monitor environmental changes.

Answer Key

1. B
2. C
3. B
4. B
5. D
6. A
7. A
8. B
9. A
10. B
11. Possible answers: To assess the health of the environment, to detect changes or trends in environmental conditions, to ensure compliance with environmental regulations, to provide data for research and decision-making.
12. Possible answer: Remote sensing can be used to monitor deforestation by using satellite imagery to observe changes in forest cover over time. This helps in identifying areas of illegal logging and assessing the impact of deforestation on biodiversity and climate change.

8.2

Quiz: EcoFootprint Calculator for Sustainability

1. What is an ecological footprint?

a) The measure of human demand on Earth's ecosystems

b) The measure of an individual's carbon emissions

c) The amount of physical space an individual occupies

d) The measure of water usage by an individual

2. Which of the following is NOT a component of an ecological footprint?

a) Housing

b) Transportation

c) Education level

d) Food consumption

3. True or False: Using public transportation instead of driving a car can help reduce your ecological footprint.

4. What unit is typically used to measure an ecological footprint?

a) Kilograms

b) Hectares

c) Liters

d) Miles

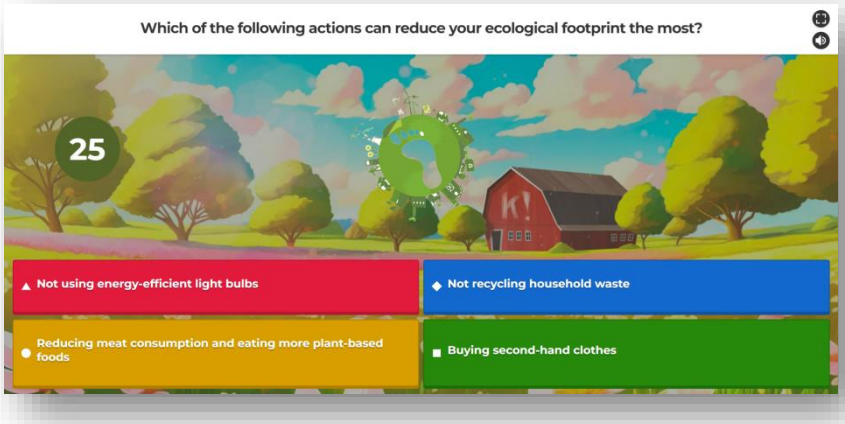
5. Which of the following actions can significantly reduce your ecological footprint? (Select all that apply)

a) Eating a plant-based diet

b) Flying frequently

c) Recycling waste

d) Using energy-efficient appliances



6. True or False: An individual's ecological footprint is only affected by their direct actions, such as personal transportation and diet.

7. Which type of housing does typically have the lowest ecological footprint per person?

a) Large single-family homes

b) Small apartments

c) Suburban houses

d) Rural farmhouses

8. True or False: Reducing meat consumption can have a significant impact on lowering your ecological footprint.

9. How can help the usage of public transportation the reduction of your ecological footprint??

a) It increases the use of fossil fuels.

b) It reduces the amount of greenhouse gases emitted per person compared to individual car use.

c) It is more expensive than using a personal vehicle.

d) It decreases physical activity and thus reduces energy consumption.

10. Which of the following actions can reduce your ecological footprint the most? (Select all that apply)

a) Using energy-efficient light bulbs

b) Recycling household waste

c) Reducing meat consumption and eating more plant-based foods

d) Buying second-hand clothes

Answer Key:

1. A
2. C
3. A
4. B
5.A, C, D
6. B
7. B
8. A
9. B
10A,B,D