TECHNOLOGY - LESSON PLAN

Grade:	5th - 7th; age 9-13
Subject:	United in Biodiversity - **Invasive Species**
Lesson n°:	4
Topic:	Green Invaders: revealing invasive plant species and their impact on ecosystems in the school garden (or a public garden or doing online research if it's not possible to go on field).
Lessons focus and goals:	**Focus:** involving students in understanding that Invasive Alien Species (IAS) are strictly linked with biodiversity loss issues and that Technology is a tool to protect wild fauna and flora from it. In particular, students' approach to this particular topic is promoted by Technology such as using simple and accessible apps, for instance about plants such as Pl@ntNet. With this platform, which serves as a tool designed to facilitate plant identification through the use of images, students learn specific concepts in a simple and enjoyable manner. They also learn how to use different kinds of software in a proper way and for the required purpose. Furthermore pupils have to learn that the best way to combat Invasive Alien Species is through prevention. Recognizing the importance of individual action and citizen responsibility in protecting the environment through simple habits that prevent the spread of IAS. **Goals:** promoting a sense of beauty and reverence for Nature and human influence on it while introducing them to scientific thinking. Using different apps and technologies students will improve their scientific knowledge in different fields such as biology and ICT. They will also develop their 21st century skills such as those about communication, problem solving, critical thinking and motivation.
Learning objectives:	- Understanding the importance of **biodiversity loss** caused by the invasiveness of certain alien species that compete with native species. Specifically, in the case of plants, competition can occur through reduced light, water deprivation, and/or the release of toxic chemicals into the soil, etc. - Appreciating how the **development of technology** facilitates the dissemination of knowledge in all scientific fields, and particularly, for the activity proposed in this lesson, in the botanical field. Through a free software based on photo recognition, students will practice in

	classification and identification of plant species. They will also learn how, thanks to technology, these actions are now very simple and accessible to everyone, whereas in the past, they were reserved only to scientists. This stimulates curiosity and promotes culture. It will be interesting to reflect with them on the role of students/citizens in science (Citizen Science) and on the role of their active participation when faced with real-life problems that involve them in their community (Service Learning). - Promoting the **knowledge and use of different ICT software and tools** (game-based learning platforms such as Kahoot! that makes it easy to create, share and play learning games or trivia quizzes; 3D printers and others listed above in the Materials Section). - The activities here proposed help to work not only on cognitive topics and physical activities, but also promote **life skills developing**, which are abilities for adaptive and positive behavior that enable individuals to deal effectively with the demands and challenges of everyday life. During the activity pupils will be involved in decision making, problem solving, creative thinking, critical thinking, effective communication (both during the work in group and during the oral presentation in the classroom or even in particular organized school' events), interpersonal relationship skills (during group work), self awareness and empathy.

Materials	For the realization of the activities of this lesson plan is necessary to have: - Dichotomous key for plants (books or some tables at least, videos Dichotomous Key Reading USING A DICHOTOMOUS KEY - Smartphone or tablet; - Internet connection; - Free app to identify plants (Pl@ntNet, iNaturalist, etc.); - Observation sheet; - The Invasive Alien Species in Europe app; - PC or Laptop; - QR Code Generator & QR Creator app (for instance, Canva has different usable and intuitive apps inside); - Photo, video taken from school garden (or public garden); - 3D laser engraver; - Gardening tools.
Structure and activities	**In the classroom (1 hour)** For teachers' reference: different links are insert in the following text - Brainstorming on Invasive Alien Species (creation of a Word cloud); - Study of Pl@ntNet app and comparison with a classical dichotomous key of plant kingdom helping pupils to appreciate the reduction in

	complexity in species classification (in terms of knowledge and necessary tools such as magnifying glasses, optical microscopes, and other field and laboratory instruments). The teacher can show some parts of the following video, in which students can appreciate the difficulty in determining a species without using any app: Plant identification with Dichotomous key practice A brief classroom discussion on how it used to be in the past can be followed, for instance saying that there was no universally accepted method for assigning a name to a living organism. It was Carl von Linné (1707-1778) who devised an initial unique classification system by dividing living beings into kingdoms using binomial nomenclature (each living being is identified by a latin name consisting of the genus and species). In the past, recognizing a living being required several days of study through dichotomous keys, paper tools that guided the scientist in classification through sequential questions based on the observation of details and specific characteristics (in the case of plants, for example, the shape of leaves and their margins, parts of the flower, seeds, etc.). Nowadays, a smartphone or tablet is sufficient to recognize the biotic component of what surrounds us, and this can be done by anyone, not just scientists. If possible include the concept of Citizen Science Citizen Science at the heart for research and innovation EU-Citizen.Science Platform promotional teaser EASIN - European Alien Species Information Network - Become a Citizen Scientist - Reading and discussing with pupils the attached observation sheet used to classify all the garden' plants, both Invasive and non Invasive Alien Species (example of table, editable); **In the garden (1 hour)** - Observing with the app (Pl@ntNet) to discover native and invasive plant species. The platform is structured into various thematic and geographical floras; - Using the smartphone for identification and taking photos; - Reading a dichotomous key and comparing the level of complexity compared to using the app (in terms of knowledge and necessary tools, such as magnifying glasses, optical microscopes, and other field and laboratory instruments). **In the classroom (2 hours)** **1)** All pupils together with their teacher have a discussion about the IAS founded in the garden (observation sheets and web research) and have a small amount of time to complete fulfilling their observation sheet (if they need to);

	2) Students are divided into groups (chosen by teacher) to realize a common project to share with each other as a presentation during the final activity. This part involves cooperative learning: - **Group 1:** Edit video with photos/pictures taken from the garden and then create a presentation (using Google app, Canva or another one); - **Group 2:** Kahoot! create learning games/quizzes about IAS, biodiversity loss and the use of ICT (taking into account scientific and ethical point of view) and then create a presentation; - **Group 3:** Create scientific contents suitable for QR codes (using Canva's app for instance) using the information of the observation sheet used in the garden; then create a presentation; - **Group 4:** Create 3D QR Code using the 3D laser engraver and all the software necessary for it and then create a presentation (while not essential, this step aims to enhance the integration of ICT within the technology lesson plan. Each teacher chooses whether to include this activity based on their own school resources) **3)** Peer-to-peer presentation to other classmates. **In the garden - additional activity (2 hours)** - With the knowledge acquired during web research, put into practice actions to reduce the spread of identified invasive alien species using gardening tools (if possible to do it at school).

Inclusion	- The aim of the lesson and its structure are explained to the students at the beginning of the activity; - Instructions are kept simple and repeated where necessary; - Students are put into mixed ability groups; - Equitable participation is encouraged: ● Ensure that all students have an opportunity to participate actively in the lesson; ● Monitor participation and intervene if certain students are being marginalized or excluded.

Assessments:

#1 - Proper use of technology

1.	**Initiating**	**Developing**	**Excelling**
Description of performance	Use basic technology tools but may struggle with navigation and basic functions.	Can explore the provided resources, conduct some independent research, and	Independent and creative use of software and technology needed for the activities.

	Limited use of technology for research or communication.	organize information coherently, particularly from readily available sources.	Can explore the provided resources, independently seek additional ones, cite sources, and organize information coherently. Demonstrates advanced proficiency in utilizing a variety of technology tools. Effectively leverages technology for in-depth research, collaboration, and communication.
Sample student response	“I use my computer for school, and sometimes I search for information online”	“Technology is important because people can share and spread virtuous behaviors to safeguard biodiversity. In fact, technology comes to our aid because it allows us to reach a large number of people just with one click if ” "I use technology for research. When we had a project about invasive species, I searched for articles and watched videos online to learn more.”	“Technology is important because it helps to monitor the spread of Invasive Species, to share these scientific and specific topics between citizens and to find applicable solutions. Moreover it helps to realize creative things and to better engage the audience.” "I leverage various technology tools for my research, including databases, GIS mapping, and collaborative platforms. In a recent project, I created a multimedia presentation incorporating data visualizations to highlight the impact of invasive species on biodiversity."

#2 - Presentation

2.	Initiating	Developing	Excelling
Description of performance	Uses basic digital tools to create a presentation. Limited use of visual elements; may lack organization.	Utilizes digital tools effectively, presenting a well-organized and visually appealing presentation. Incorporates some multimedia elements to enhance engagement.	Demonstrates advanced proficiency in digital tools, creating a polished and visually compelling presentation. Incorporates sophisticated multimedia elements, enhancing both clarity and engagement.
Sample student response	“Invasive species are bad for the environment. They can cause problems. Here is a simple Presentation slide with a picture of an invasive plant."	"Invasive species can be a serious threat to ecosystems. For example, the Asian carp in the United States is causing issues in water bodies. They outcompete native fish. In my presentation, I used a few slides to explain how invasive species can disrupt ecosystems and showed images of affected areas, especially talking about the IAS of our school garden."	"Invasive species pose a significant risk to biodiversity. Take the cane toad in Australia—it was introduced to control pests, but it ended up harming native species. In my presentation, I used data visualizations and maps to illustrate the spread of invasive species globally. I also discussed the importance of early detection and control strategies, engaging the audience with a compelling narrative."

Observation sheet: https://docs.google.com/document/d/1ctXuP5VFHWCkb1nOrQM7-CcwB3fLIJWV/edit?usp=sharing&ouid=114050096833791457093&rtpof=true&sd=true

Quantitative Assessment Rubric:

Criteria	Initiating	Developing	Excelling

Description of Performance			
Proper use of technology			
	1-3 points	4-6 points	7-10 points
	1-3 points	4-6 points	7-10 points
	1-3 points	4-6 points	7-10 points
Presentation			
	1-3 points	4-6 points	7-10 points
	1-3 points	4-6 points	7-10 points
	1-3 points	4-6 points	7-10 points

Total Points Calculation:

- Total points for each criterion can be calculated by summing up the points awarded in each category.

Assessment Table: Inclusion and Diversity - Invasive Species

Criteria	Check
Information offered in multiple formats	
- Variety of learning materials provided	
- Text, visual, auditory resources	
Inclusive methodologies like peer-to-peer learning	
- Opportunities for collaborative activities	
- Group discussions, peer teaching	
Use of ICT tools	
- Integration of technology in learning activities	
- Use of online platforms, interactive tools	
Overall Inclusion and Diversity	
- Integration of diverse perspectives	
- Opportunities for student engagement	
- Promotion of equitable participation	

Explanation of Criteria:

- **Information offered in multiple formats:**
  - Assess whether the lesson plan provides learning materials in various formats such as text, visuals, and auditory resources to cater to diverse learning styles.

- **Inclusive methodologies like peer-to-peer learning:**
  - Evaluate if the lesson plan incorporates inclusive methodologies like peer-to-peer learning, group discussions, and collaborative activities to encourage interaction and engagement among students.

- **Use of ICT tools:**

- Determine if the lesson plan utilizes ICT tools such as online platforms and interactive resources to enhance learning experiences and accessibility.

- **Overall Inclusion and Diversity:**
  - Summarize the overall assessment of inclusion and diversity in the lesson plan, considering the integration of diverse perspectives, opportunities for student engagement, and promotion of equitable participation.

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