LEARNING FOR LIFE

TEACHERS' GUIDELINE

INFLUENCE OF ABIOTIC FACTORS ON THE DEVELOPMENT OF LIVING BEINGS

Co-funded by the Erasmus+ Programme of the European Union

Project number: 2016-1-ESO1-KA201-025091

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MULTIPLE INTELLIGENCES

INTELLIGENCE	TASKS
1. Interpersonal	1-3-4-13-14-15-16-17
2. Intrapersonal	3-4-5-13-14
3. Visual-spatial	5
4. Bodily-kinesthetic	
5. Musical-rhythmic	
6. Verbal-linguistic	2-12-15-16
7. Logical-mathematical	8
8. Naturalistic	6-7-9-16

DISCIPLINARY OBJECTIVES and CROSS-DISCIPLINARY OBJECTIVES

What do we want students to understand?

(COMPREHENSION GOALS)

DISCIPLINARY OBJECTIVES and CROSS-DISCIPLINARY OBJECTIVES

MAIN OBJECTIVE:

To Identify the factors that influence the development of living things.

0.General objectives

0.1. To Work as a team and take responsibility

1.Science

1.1. Understand the influence of light, humidity, temperature on growth, behaviour and development of living things

2.Mathematics

2.1. Collect and process data (charts, tables…)

3.Foreign language; English

3.1. Learn specific vocabulary: Light, humidity, temperature, pH…

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	4. Physics-chemistry 4.1. Learn the chemical character of materials 4.2 Know the pH scale **5. Geography** 5.1. Understand the characteristics of biomes and their importance for the maintenance of life on Earth **6.ITC** 6.1. Understand the various steps in producing a multimedia document on the activities developed. 6.2 Know how to use various computer tools for the development of multimedia documents.
PROJECT PRESENTATION	Project presentation in library school and the social networks
FINAL PRODUCT	**Together:** Multimedia document with all activities developed

SEQUENCE OF TASKS

Tasks in bold are necessary, and the rest are optional. They depend on the teachers involved in the project and the school facilities.

A. PREVIOUS TASKS

1. **Task: Task: Team dynamics**
2. Task: Project presentation in library school and the social networks.
3. **Task: Team planning**
4. **Task: What I know-What I need to know**
5. **Task: Specify the pages and appoint the responsibilities**

B. RESEARCH / DEVELOPING TASKS

6. **Task: How do living beings adapt to the environment in which they live?**
7. **Task: Research on morphological and behavioural adaptations that living beings adopt to survive**
8. **Task: Use of ICT to collect (photo, video, spreadsheet, text, ...), organization and processing of the obtained data (text, tables, graphics, video, ...)**
9. **Task: What is the influence of abiotic factors (light, humidity, temperature and pH) on the behaviour of living beings?**
10. **Task: Research on the main biomes on the planet**
11. **Task: Construction of a multimedia document with the results obtained in the various laboratory activities**
12. **Task: Learn vocabulary in English**
13. **Task: Team planning assessment**
14. Task: Visit “A protected area” in region

C. FINAL TASKS

15. **Task: multimedia document presentation**
16. **Task: multimedia document dissemination**
17. **Task: Final team planning assessment**

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INDICATORS

MAIN OBJECTIVE

Identify the factors that influence the development of living things

0. General objectives

0.1.1. The student achieves team objectives

0.1.2. The students achieves individual objectives

0.1.3. The student fulfils his/ her responsibilities

1. Science

1.1.1. Identifies the abiotic factors

1.1.2. Identifies the morphological and behavioural adaptations that living beings adopt to survive

1.1.3. Identifies the main Environments on the planet

1.1.4. Understands the importance of preserving biodiversity

2. Mathematics

2.1.1. Collects, organizes and processes the data

2.1.2. Construct tables, graphs, diagrams or lists for visualization of results

3. Foreign language; English

3.1.1. States the names of abiotic factors in foreign language.

3.1.2. States the names of animals and plants in the foreign language.

3.1.3. Expresses technical verbs in the foreign language.

4. Physics-Chemistry

4.1.1. The chemical character of materials

4.2.1. Uses the pH scale

5. Geography

5.1.1. Identifies the characteristics of biomes

5.1.2. Understands the importance of preserving of life on Earth

6. ITC

6.1.1. Use the various steps in producing a video or multimedia document on the activities developed.

6.2.1. Use various computer tools for the development of multimedia documents.

TOOLS:

- **Rubrics**

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The tables / worksheets filled in by each student (Tasks: 4º; 6º ; 7º ; 10º ; 11º ; 12º ; 17º)

The report filled in by each student (Task: 9º)

Report with a qualitative analysis of the multimedia document (Task: 15º)

- **Reflections and evidences**

  Reflection (Tasks: 3º; 9º; 13º; 17º)

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TASKS

PREVIOUS TASKS

1. Task: Team dynamics			**Session:** 20 min
COMPETENCES	Social and civic	**INTELLIGENCES**	Interpersonal
GOALS	Learning to work in teams		

Task description:

We will suggest a team dynamics so that students get to know each other.

Teacher's notes:

In order to know each other, the teacher will ask students several questions and everyone will have to write down their answers. Then, students will talk about their answers in groups.

Example:

WHO AM I?

Objectives: To make known group members quickly, in a relatively non-inhibiting environment.

How to make:

1. Each one receives a sheet entitled "Who am I?"
2. For 10 minutes each one writes five items in relation to himself, that facilitate the knowledge.
3. The written sheet will be affixed to the participants' blouses.
4. The members of the group circulate freely and quietly around the room to the sound of soft music as they read about each other and let others read what he wrote about himself.
5. Soon after gathering 2 to 3 colleagues, with whom they would like to talk to get to know each other better. At this point you can ask questions that you would ordinarily not ask.

Evaluation:

a) What was the exercise for?
b) How do we feel?

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2. Task: Project presentation in library school and the social networks			**Session:** 25 min
COMPETENCES	Social and civic	**INTELLIGENCES**	Verbal-linguistic
GOALS	To motivate students		

Task description:

Public presentation in the school library and reporting on social networks. The headmaster is worried about the environment in our school and our community. For that very reason, the headmaster wants to publish a multimedia document about the factors that influence the biodiversity of living beings and the appropriate behaviours to protect the environment.

At the end of the project, the multimedia document will be presented at school, as well as to the media and social networks.

Your class is responsible for this assignment.

Teacher's notes:

When we present the project we need to motivate the students. The presentation of the project needs to be appealing. It is very important to create a special atmosphere to attain motivation. This is the moment when we can boost their interest.

The teachers that will take part in the project will also be present in the project presentation, explaining their role in the project.

3. Task: Team planning			**Session:** 45 min
COMPETENCES	Social and civic Sense of initiative and entrepreneurship Digital	**INTELLIGENCES**	Interpersonal Intrapersonal
GOALS	Learning to work in teams and to control teamwork		

Task description:

Each team will define its team planning, which will consist of three parts: team objectives, individual objectives and responsibilities.

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Team objectives:

All teams will have objectives: Each team will be responsible for their own task concerning the abiotic factors and will be responsible, as well, to add their presentation in the multimedia document.

Individual objectives:

Each student will have two individual objectives: one about their role in the task and another about the deadlines accomplishments.

Responsibilities: Responsibilities will be assigned by the teacher.

Assessment tools (rubrics …):

- Checklist; TEAM PLANNING_Task1_Portugal.xlsx

Checklist Example:

Date: Work Checklist (Name): Classe: N.º:						
Did you…	Check		Evaluation			Comments
	Yes	No				
Personal Objectives: 1. 2. 3.						
Team Objectives: 1. 2. 3.						
Responsibilities: 1. 2. 3.						
Self-evaluation: 1. I stay focused while doing my work 2. I did work I am proud of 3. I am confident that I did my best 4. 5.						

4. Task: What I know – What I need to know			**Session:** 30 min
COMPETENCES	Learning to learn Sense of initiative and entrepreneurship Digital	**INTELLIGENCES**	Interpersonal Intrapersonal
GOALS	Learning to work in teams		

Task description:

Each team will consider what they already know about the task and what they need to know in order to carry it out.

Assessment tools (rubrics …):

The teacher will pay special attention to students' answers, and based on these answers he / she will suggest suitable tasks to carry out the project.

Example

Definition:

_____

_____

While walking around your neighbourhood or school, write at least 3 biotic factors you see:

1.

2.

3.

Assessment tools (rubrics…):

See annex 4T-8T-9T-13T WHAT I KNOW - WHAT I NEED TO KNOW - WHAT I'VE LEARNT_Task1_Portugal.xlsx

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5. Task: Specify the parts of multimedia document and appoint the responsibilities			**Session:** 30 min
COMPETENCES	Sense of initiative and entrepreneurship Digital	**INTELLIGENCES**	Interpersonal Visual-spatial
GOALS	Learning to work in teams		

Task description:

After specifying the amount parts of multimedia document (each abiotic factor - temperature; light; humidity; pH).

Each team will designate one member of the group to take part of another team who will do the final version of the multimedia document.

In order to do that, it is necessary that all the students reach an agreement.

RESEARCH / DEVELOPING TASKS

6. Task: How do living beings adapt to the environment in which they live?			**Session:** 1 h
COMPETENCES	Mathematical, scientific and technological	**INTELLIGENCES**	Naturalistic
GOALS	Identify the main Environments on the planet Identify the abiotic factors		

Task description:

Students watch videos about different regions of the planet and, in a group, observe differences of the several environments and living beings that live in these places. The students record in a table the differences related to the topics "environment" and "living beings".

Assessment tools (rubrics…):

The table filled in by each student will be used for an intermediate assessment (see annex: Influence of abiotic factor project rubric_portugal.xlsx)

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This task is very important for the next tasks, because it allows the students to verify the different conditions of the environment (temperature, humidity ....) and different types of living beings that live there.

Teacher's notes:

Example:

Region of earth	Conditions (Temperature; Humidity; Light; Wind..)	Animals	Plants

Sites to explorer:

https://www.youtube.com/watch?v=c8aFcHFu8QM

https://www.youtube.com/watch?v=h8yo_Sp-rGY

https://www.youtube.com/watch?v=6v2L2UGZJAM

7. Task: Research on morphological and behavioural adaptations that living beings adopt to survive			**Session:** 1 h
COMPETENCES	Mathematical, scientific and technological	**INTELLIGENCES**	Naturalistic
GOALS			

Task description:

Students locate resources to use for animal adaptations research., for example, locate an article about how animals are successful in their habitat, and define what animal adaptation means. Choose some animals that you want to know more about. Make a chart and classify how the animals' adaptations help them survive in their habitat.

Teacher's notes:

Example:

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Animal	The Animal's Habitat	A Physical or Behavioural Adaptation	How the Adaptation Helps the Animal

Sites to explorer:

https://www.americangeosciences.org/education/k5geosource/content/fossils/how-are-living-things-adapted-to-their-environments

http://wwf.panda.org/about_our_earth/teacher_resources/webfieldtrips/hab_adaptation/

http://www.uen.org/themepark/habitat/animal.shtml

http://www.desertusa.com/survive.html

https://www.youtube.com/watch?v=wrY8nZuZMFY

https://www.youtube.com/embed/fRX2JtKFUzk?rel=0

Assessment tools (rubrics…):

The table filled in by each student will be used for an intermediate assessment (see annex: Influence of abiotic factor project rubric_portugal.xlsx)

8. Task: Use of Maths to collect, organization and processing of the obtained data (text, tables, graphics ...). Use of ICT tools for the construction of the multimedia document			**Session:** 4 h
COMPETENCES	Digital Mathematical, scientific and technological	**INTELLIGENCES**	Logical-Mathematical
GOALS	Collect and process data (charts, tables…) Understand the various steps in producing a multimedia document on the activities developed. Know how to use various computer tools for the development of multimedia documents.		

Task description:

Using a tool such as Excel, Adobe Spark Video, Glogster, Wevideo, NCES Kids Zone, etc. Students will collect data, choose how to process and present data (Students will be able to design a

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presentation about the behaviour of living beings). Task 8 and 9 will be developed at the same time as the data that will be obtained with the development of the experimental activities will have to be recorded. In task 8 the students will have contact with various computer tools (Excel, Adobe Spark Video, Glogster, Wevideo, NCES Kids Zone, etc.) to be exploited so that they can be used to build a multimedia document. The objective will be to understand the main commands of the different exploited software and apply this knowledge in the construction of a multimedia document.

Assessment tools (rubrics…):

See: Checklist, TEAM PLANNING_Task1_Portugal.xlsx - 3. Task: Team planning;

4T-8T-9T-13T WHAT I KNOW - WHAT I NEED TO KNOW - WHAT I'VE LEARNT_Task1_Portugal.xlsx

Teacher's notes:

Sites to explorer:

https://wevideo.zendesk.com/hc/en-us/articles/211373138-Project-Types

https://sparktutorials.github.io/2015/08/04/spark-video-tutorials.html

http://edu.glogster.com/glog/glog-edu/r39dpk9i8

https://nces.ed.gov/nceskids/createagraph/

9. Task: What is the influence of abiotic factors (light, humidity, temperature and pH) on the behaviour of living beings?			**Session:** h
COMPETENCES	Mathematical, scientific and technological	**INTELLIGENCES**	Naturalistic
GOALS			

Task description:

Students will do an experimental activity to test some of the abiotic factors in seeds germination.

Example:

Material

- Seeds (beans, peas, chickpea, mongo beans)
- 6 plastic glasses
- cotton
- water pouring
- Water
- Labels/ hang tags

Procedures

To identify the plastic glasses using the hang tags /labels (A, B, C; D; E; F; H)

- Glass A – Put cotton in the bottom of the glass and put 2 to 3 seeds. Add a little water and bring it to light, at room temperature.
- Cup B - Put cotton in the bottom of the glass and put 2 to 3 seeds. Add a little water and place it in a place with no light at room temperature.
- Cup C - Put cotton in the bottom of the glass and put 2 to 3 seeds. Add a little water and put it in the refrigerator.
- Cup D - Put cotton in the bottom of the glass and put 2 to 3 seeds. Add a little water and place it in a greenhouse at 25 ° C.
- Cup E - Put cotton in the bottom of the glass and put 2 to 3 seeds. Do not add water and place it at room temperature and in a place without light.
- F cup - Put cotton in the bottom of the glass and put 2 to 3 seeds. Add water and place it at room temperature and in a place with no light
- G cup - Put cotton in the bottom of the glass and put 2 to 3 seeds. Add basic water and place it at room temperature and in a place with no light
- Cup H - Put cotton in the bottom of the glass and put 2 to 3 seeds. Add acidic water and place it at room temperature and in a place with no light

Records

Throughout the activity you will need to make written, photographic and video recordings.

Discussion

Identify all abiotic factors involved in this experimental activity

Interpret the results obtained.

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Assessment tools (rubrics…):

The report filled in by each student will be used for an intermediate assessment. (Natural Science; Physics-chemistry).

See annex: Influence of abiotic factor project rubric_portugal.xlsx;

4T-8T-9T-13T WHAT I KNOW - WHAT I NEED TO KNOW - WHAT I'VE LEARNT_Task1_Portugal.xlsx)

Report example:

LAB REPORT ESSENTIALS

Title Page

Not all lab reports have title pages, but if your instructor wants one, it would be a single page that states:

The title of the experiment.

Your name and the names of any lab partners.

Your instructor's name.

The date the lab was performed or the date the report was submitted.

Title The title says what you did. It should be brief (aim for ten words or less) and describe the main point of the experiment or investigation. An example of a title would be: "Effects of Ultraviolet Light on Borax Crystal Growth Rate". If you can, begin your title using a keyword rather than an article like 'The' or 'A'.

Introduction / Purpose Usually, the Introduction is one paragraph that explains the objectives or purpose of the lab. In one sentence, state the hypothesis. Sometimes an introduction may contain background information, briefly summarize how the experiment was performed, state the findings of the experiment, and list the conclusions of the investigation. Even if you don't write a whole introduction, you need to state the purpose of the experiment, or why you did it. This would be where you state your hypothesis.

Materials List everything needed to complete your experiment.

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Methods Describe the steps you completed during your investigation. This is your procedure. Be sufficiently detailed that anyone could read this section and duplicate your experiment. Write it as if you were giving direction for someone else to do the lab. It may be helpful to provide a Figure to diagram your experimental setup.

Data Numerical data obtained from your procedure usually is presented as a table. Data encompasses what you recorded when you conducted the experiment. It's just the facts, not any interpretation of what they mean.

Results Describe in words what the data means. Sometimes the Results section is combined with the Discussion (Results & Discussion).

Discussion or Analysis The Data section contains numbers. The Analysis section contains any calculations you made based on those numbers. This is where you interpret the data and determine whether or not a hypothesis was accepted. This is also where you would discuss any mistakes you might have made while conducting the investigation. You may wish to describe ways the study might have been improved.

Conclusions Most of the time the conclusion is a single paragraph that sums up what happened in the experiment, whether your hypothesis was accepted or rejected, and what this means.

Figures & Graphs Graphs and figures must both be labelled with a descriptive title. Label the axes on a graph, being sure to include units of measurement. The independent variable is on the X-axis. The dependent variable (the one you are measuring) is on the Y-axis. Be sure to refer to figures and graphs in the text of your report. The first figure is Figure 1, the second figure is Figure 2, etc.

References If your research was based on someone else's work or if you cited facts that require documentation, then you should list these references.

Teacher's notes:

Another work possibility:

Development of an experimental activity where students will observe the behaviour of earthworms under the influence of light, temperature, humidity and pH. Here, students will be able to see different behaviours that prove that living beings adapt more easily to certain abiotic factors. https://www.youtube.com/watch?v=R8-mYm7uli0

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10. Task: Research on the main biomes on the planet			**Session:** 90 min
COMPETENCES	Mathematical, scientific and technological	**INTELLIGENCES**	Naturalistic
GOALS	To be aware of the importance of the adaptations of the living beings to the conditions of the environment, which allow them to survive To be aware of the importance of biomes in the distribution of living beings byvarious regions of the planet		

Assessment tools (rubrics …):

The table filled in by each student will be used for an intermediate assessment (see annex: Influence of abiotic factor project rubric_portugal.xlsx)

Teacher's notes:

1. Geography teacher will show students a map of the distribution of the world biomes: students will be asked to relate the biomes with the distribution of the climate. They will do a table where they will register the conclusions (for this task they will search in internet)

Climate	Characteristics	Biomes	Characteristic	Image

2. Students will present Geography teacher the team work they've done in previous tasks (1 to 9) and relate their conclusions with the previous table – they will record (film) their conclusions to add to the final video.

11. Task: Construction of a multimedia document with the results obtained in the various laboratory activities			**Session:** h
COMPETENCES	Digital	**INTELLIGENCES**	Naturalistic Logical-mathematical
GOALS	To use various computer tools for the development of multimedia documents		

Task description:

Students will explore the various computer tools for the development of multimedia documents.

Students will develop various multimedia documents (group or individual).

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Organization of a final multimedia document to present and disseminate the work developed in the various activities.

Assessment tools (rubrics …):

The tables filled in by each student will be used for an intermediate assessment (see annex: Influence of abiotic factor project rubric_portugal.xlsx)

Table (Example1):

Consistency	Learnability	Context
-The interface design is harmony; - Clearness of interface easy to understand.	- Provides support information	- Ideas/information presented need to relate to the title/subject

Table (Example 2):

Phases of developing multimedia document (checklist)

Phase		Check: Yes	No
Pre-production	Analyses		
	Design		
Production	Implementation		
Post-production	Testing		
	Evaluation		
	Publishing		

Teacher's notes:

Use tutorials available for Adobe Spark Video, Glogster, Wevideo, NCES Kids Zone, etc

Examples:

https://spark.adobe.com/page/EKAHg/

https://www.wevideo.com/academy

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12. Task: Learn vocabulary in English			**Session:** 1 h
COMPETENCES	Communicating in a foreign language	**INTELLIGENCES**	Verbal-linguistic
GOALS	To improve communicating and writing skills To Improve and enrich vocabulary in English		

Task description:

Students will build and translate texts for multimedia documents.

Recourse to dictionaries for translation. Recording of audio and video in English, whenever warranted.

Assessment tools (rubrics…):

See in "15. Task: multimedia document presentation" - The construction of sentences and the use of correct scientific terms (English).

See annex: Influence of abiotic factor project rubric_portugal.xlsx

13. Task: Team planning assessment			**Session:** 45 min
COMPETENCES	Social and civic	**INTELLIGENCES**	Interpersonal Intrapersonal
GOALS	Learning to work in teams		

Task description:

We will assess all the objectives established in the 3rd task, individual and team objectives as well as the responsibilities to reflect upon the things we are doing well and the issues that must be improved.

Assessment tools (rubrics…):

Students' will self-assess the objectives and responsibilities established in team planning

See Checklist; TEAM PLANNING_Task1_Portugal.xlsx - 3. Task: Team planning;

4T-8T-9T-13T-after 14T WHAT I KNOW - WHAT I NEED TO KNOW - WHAT I'VE LEARNT_Task1_Portugal.xlsxSee annex 4T-13T-14T-13T-23T

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14. Task: Visit "A protected area" in region			Session: h
COMPETENCES	Learning to learn Social and civic	**INTELLIGENCES**	Interpersonal Intrapersonal
GOALS	Identify Protected areas related to environmental protection and biodiversity in your region / country Valuing the work developed by these Protected areas		

Task description:

This activity students will propose a visit to a protected area in their region. They will plan all activity: logistics (budget proposal, transportation proposal, contact survey with the responsible intuition of the protected area ...); Necessary equipment (compass, GPS, camera / video ...); Clothing required; feeding...

Teacher's notes:

The teacher will give some guidelines in order to carry out the activity properly. The teachers will make the contacts and implement the proposed planning together with the students.

FINAL TASKS

15. Task: multimedia document presentation			Session: h
COMPETENCES	Communicating in the mother tongue Communicating in a foreign language	**INTELLIGENCES**	Verbal linguistic Interpersonal
GOALS	To explain what students have worked on and learn throughout the making of the multimedia document.		

Task description:

The students will propose some spokesmen chosen from those who participated in the preparation of the multimedia document, to present the project to parents. Students should try to organize it as much as possible and invite more people than their parents.

Assessment tools (rubrics …):

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Report with a qualitative analysis of the multimedia document: Evaluation of scientific content (Mathematics, Physical-chemical, Natural Sciences, Geography). The construction of sentences and the use of correct scientific terms (English). Use of the main commands of the different software used to construct the multimedia document (ITC). Quality of the document multimedia (Mathematics, Physical-chemical, Natural Sciences, Geography, English, ITC).

See annex: Influence of abiotic factor project rubric_portugal.xlsx

Teacher's notes:

Teachers guide the process of choosing spokespersons (cultural diversity, gender, ...). Teachers pray the task of proposing to other personalities / institutions.

16. Task: multimedia document dissemination			**Session:** h
COMPETENCES	Sense of initiative and entrepreneurship Social and civic Communicating in the mother tongue Mathematical, scientific and technological	**INTELLIGENCES**	Interpersonal Naturalistic Verbal linguistic
GOALS	To improve communicating and writing skills in the mother tongue To be aware of the importance of the adaptations of the living beings to the conditions of the environment, which allow them to survive		

Task description:

Students will have to prepare in the classroom and orally what they will say when the multimedia document is released. Thus, students will also rehearse this disclosure in the classroom.

Students will identify the appropriate places where we could disseminate the multimedia document:

After identifying the places, the students will be divided into groups to complete the task. All groups need to participate in the activity.

Teacher's notes:

Appropriate places where the multimedia document can be released:

- Libraries
- Town hall
- Radio
- TV
- Protected areas

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- Environmental organizations

17. Task: Final team planning assessment			**Session:** h
COMPETENCES	Social and civic	**INTELLIGENCES**	Interpersonal
GOALS	Learning to work in groups		

Task description:

Students will self-assess the objectives and responsibilities established in team planning

See Checklist; TEAM PLANNING_Task1_Portugal.xlsx - 3. Task: Team planning;

- 4T-8T-9T-13T-after 14T WHAT I KNOW - WHAT I NEED TO KNOW - WHAT I'VE LEARNT_Task1_Portugal.xlsx

Afterwards the students will do a reflection on the things they did well and the issues that should be improved.

Teacher's notes:

See annex: Influence of abiotic factor project rubric_portugal.xlsx

Co-funded by the Erasmus+ Programme of the European Union
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