LEARNING & CREATIVITY PLAN (L&C PLAN):
ALL EQUAL ALL DIFFERENT

S	T	E_{ng}	A	M	E_{nt}
☒	☒	☐	☐	☒	☐

1. Overview

Title	All equal, All different
Driving Question or Topic	Does the length of the leaves of the Prunus pissardii plant follow a precise law of frequency distribution?
Ages, Grades, …	AGES:15-16 9th - 10th grade
Duration, Timeline, Activities	3 LEARNING HOURS 3*60 MINUTES 8 ACTIVITIES
Curriculum Alignment	Frequency distribution
Contributors, Partners	
Abstract - Synopsis	The first 60-minute lesson is held by the science teacher who illustrates the kingdom of plants, the characteristics, the main divisions of plants and how to recognize them. In the second lesson (60 min) the class is divided into four groups and, in the school garden, the different groups look for and collect the Prunus pissardii plant (about 500 per group). Each group then proceeds to measure the collected leaves. In this phase, students learn to recognize and distinguish the different plant species. The collected data will then be included in an excel prospectus for their final processing and analysis based on the frequency distribution.
References, Acknowledgements	● Scienze Biologiche Livello base – Autori: A. Sparvoli, F. Sparvoli, A. Zullini . Casa editrice Atlas (attività 1) ● Matematica bianco multimediale 1 – Autori: Bergamini, Barozzi . Casa editrice: Zanichelli (attività 5 e 6)

2. STEAME Framework[*]

Teachers' Cooperation	1st Teacher: Sciences 2nd Teacher: Mathematics 3nd Teacher: Technology Specialist and/or Computer Scientist (the teachers of Technology and Mathematics can work together during the third lesson)
SiL organisation	A final poster will be published on the school's Facebook page

Action Plan Formulation	Stage I : preparation by 3 teachers Stage II : Action Plan formulation : The 3 teachers collaborate to the creation of the learning plan and define how relate the students' outcomes to the curriculum. They guide the students during the phases of the project, according to their specific competences (STEPS 1-2) and they collaborate for the final assessment step.

3. Objectives and Methodologies

Learning Goals and Objectives	Students will have to define and calculate: ● The total length of each leaf ● The frequency distribution for each group and the total and they will ● Graphically represent the phenomenon
Learning Outcomes and expected Results	The project aims to demonstrate how, starting from a simple datum such as the length of a leaf, it is possible to define a much more complex concept linked to the distribution of frequencies and the demonstration of how, even if starting from different data, all these tend to approach an average value so as to form a curve called Gaussian. Students will then be led to reason about the usefulness of this scientific approach in the real world
Prior Knowledge and Prerequisites	Basic knowledge of mathematics and spreadsheets software
Motivation, Methodology, Strategies, Scaffolds	The main methodologies and techniques of the project are based on inquiry-based learning. In this way, students are encouraged to explore the material, organize the work, ask questions. Students are involved in conducting their own scientific research. Specifically, students learn by making their own research, instead of memorizing facts and content. This allows them to build knowledge through exploration, experience and discussion. As they explore this Learning Plan, students build critical thinking and communication skills.

4. Preparation and Means

Preparation, Space Setting, *Troubleshooting Tips*	A shared calculation document will be the basic tool and with the use of spreadsheet document, children will make the appropriate calculations for the final frequency calculation. Laptops in the classroom, will be necessary for each group of students, in order to classify and sort the data . According to lesson activities students will work in groups of 4-5 students.

Resources, Tools, Material, Attachments, Equipment	● Textbook and youtube video for science and math concepts:
	   https://youtu.be/QqCOA1OsXx4
	   http://web.booktab.it/BooktabWeb/ (libro matematica)
	
	● Excel sheet for calculating the frequency distribution
	
	● Kahoot: kahoot.it/
	
	● Adobe Spark for the creation of the digital poster

5. Implementation

Instructional Activities, Procedures, Reflections	The plan can be completed in three learning hours, the first hour with 3 activities related to the understanding and analyzing the kingdom of plants, and the following 2 hours of data collection and processing, concluding with the creation of graphs and their analysis.

STEP 1

1. Brainstorming (35 minutes)

First of all, students are divided into groups of 4-5 persons. The teacher, through videos and images, illustrates the kingdom of plants and gives indications on how to recognize the different types of plants.
https://youtu.be/QqCOA1OsXx4

Through the internet, the teacher shows images of Prunus pissardii

2. Playing with quizzes (10 minutes)

Working either individually or in small groups, the students play a Kahoot quiz-game prepared by the teacher. They try to answer multiple choice questions on the different types of plants

3. Data search (15 minutes)

The students, in the school garden, look for the plant and collect the leaves for a total of about 500 per group.

Step 2
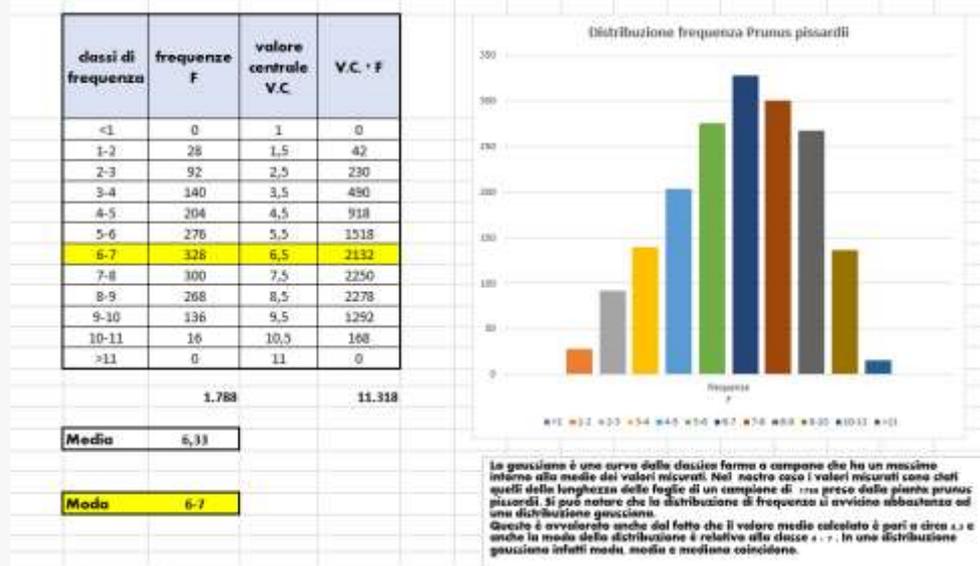
4. Processing of collected data (60 minutes)

In the second lesson of computer technology, the students proceed, by groups, to divide the leaves by length and insert the data into an excel sheet created by them and organized by class of frequency.

5. Meaning of some statistical concepts (20 minutes)
The mathematics teacher explains, with examples, the concepts of mode, mean and median.

6. Calculation of average data and creation of graphs (40 minutes)

Students then have to figure out how to complete the excel sheet previously created to find these values. They also need to create the final chart.

classi di frequenza	frequenze F	valore centrale V.C	V.C. * F
<1	0	1	0
1-2	28	1,5	42
2-3	92	2,5	230
3-4	140	3,5	490
4-5	204	4,5	918
5-6	276	5,5	1518
6-7	328	6,5	2132
7-8	300	7,5	2250
8-9	268	8,5	2278
9-10	136	9,5	1292
10-11	16	10,5	168
>11	0	11	0
	1.788		11.318
Media	6,33		
Moda	6-7		

7. Analysis of the result obtained (30 minutes)

The teacher makes a reflection on the result achieved by each group.
He offers students images of different frequency distributions and asks them to choose if there is an analogy with the results obtained with their research.

8. In-depth study, discussion and conclusion (30 minutes)
The teacher explains the meaning of the Gaussian curve; asks students to carry out a research to understand its use in the real world.

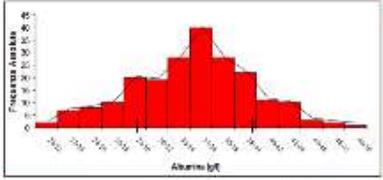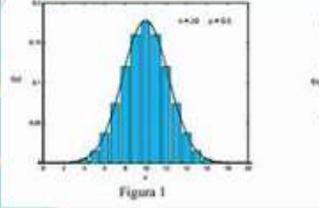|	
Assessment - Evaluation	▪ A self-assessment with immediate results, is the Kahoot game (activity 2). ▪ A group-assessment is the final research activity at the end of activities 7 and 8 In addition the teachers will monitor students' collaboration skills during the activities, their individual organizational skills and interaction with the group
Presentation - Reporting - Sharing	A presentation by each group takes place at the end of activity 8 (an additional 30 minute lesson), analyzing the cases found, Creating posters with Spark Adobe. The poster will then be published on the school's Facebook page.

STEAME Prototype/Guide for Learning & Creativity Approach
Action Plan Formulation - *Steps provided by Kypriaki Mathimatiki Etaireia*

Major steps in the STEAME learning approach:

STAGE I: Preparation by one or more teachers

1. Formulating initial thoughts on the thematic sectors/areas to be covered
2. Engaging the world of the wider environment / work / business / parents / society / environment/ ethics
3. Target Age Group of Students - Associating with the Official Curriculum - Setting Goals and Objectives
4. Organization of the tasks of the parties involved - Designation of Coordinator - Workplaces etc.

STAGE II: Action Plan Formulation (Steps 1-18)

Preparation (by teachers)

1. Relation to the Real World – Reflection
2. Incentive – Motivation
3. Formulation of a problem (possibly in stages or phases) resulting from the above

Development (by students) – Guidance & Evaluation (in 9-11, by teachers)

4. Background Creation - Search / Gather Information
5. Simplify the issue - Configure the problem with a limited number of requirements
6. Case Making - Designing - identifying materials for building / development / creation
7. Construction - Workflow - Implementation of projects

8. Observation-Experimentation - Initial Conclusions
9. Documentation - Searching Thematic Areas (STEAME fields) related to the subject under study – Explanation based on Existing Theories and / or Empirical Results
10. Gathering of results / information based on points 7, 8, 9
11. First group presentation by students

Configuration & Results (by students) – Guidance & Evaluation (by teachers)

12. Configure mathematics or other STEAME models to describe / represent / illustrate the results
13. Studying the results in 9 and drawing conclusions, using 12
14. Applications in Everyday Life - Suggestions for Developing 9 (Entrepreneurship - SIL Days)

Review (by teachers)

15. Review the problem and review it under more demanding conditions

Project Completion (by students) – Guidance& Evaluation (by teachers)

16. Repeat steps 5 through 11 with additional or new requirements as formulated in 15
17. Investigation - Case Studies - Expansion - New Theories - Testing New Conclusions
18. Presentation of Conclusions - Communication Tactics.

STAGE III: STEAME Actions and Cooperation in Creative Projects for school students

Title of STEAME Project : ALL EQUL, ALL DIFFERENT
Brief Description/Outline of Organizational Arrangements / Responsibilities for Action

STAGE	Activities/Steps Teacher 1(T1) Cooperation with T2, T3 and student guidance	Activities /Steps By Students Age Group: 15-16	Activities /Steps Teacher 2 (T2) Cooperation with T1 ,T3 and student guidance	Activities/ Steps Teacher 3 (T3) Cooperation with T1 ,T2 and student guidance
A	Preparation of steps 1,2		Cooperation in Steps 1,2	Cooperation in Steps 1,2
B	Guidance in Act. 1-3	1.2.3.4.5.6.7.8	Guidance in Act. 5,6,7,8	Guidance in Act. 4,6
C	Creative Evaluation Act. 2	2,8	Creative Evaluation Act. 8	Creative evaluation Act. 8
F	Organization (SIL) STEAME in Life	Publication of poster on Facebook	Organization (SIL) STEAME in Life	Organization (SIL) STEAME in Life