CLIL Module Plan

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School Grade	○ Primary		○ Middle		◉ High
School Year	◉ 1	○ 2	○ 3	○ 4	○ 5
Subject	Scienze naturali		**Topic**	Astronomy	
CLIL Language	◉ English		○ Deutsch		

Personal and social-cultural preconditions of all people involved	Natural Sciences in the first class includes an astronomy course of about 3 months which includes: the Planet Earth, the Solar System, Stars and the Universe, with links to the history of science, discoveries and the scientific method. Class context: 24 students, with 2 DSA. The class is quite easy to engage because students are curious and interested in science. I decided to start from the Artemis program and presented lots of NASA original materials, that makes them feel like they were studying something real and not "scholastic". Some of them may experience difficulties or frustration, because of the lack of learning strategies, but despite finding it hard to reach good results, they remain curious about the topics. Participating and cooperating during the lessons have been encouraged since the beginning of the school year, and students were guided to develop good relational skills. Concerning the language, the level is heterogenous and I considered an average B2 level for the planning of the activity, code switching is allowed whenever needed. Some students may love CLIL while others had previous bad experiences... however, using English randomly during non-CLIL lessons makes them feel more confident. Also, using English original materials (video, figures, websites...) in non-CLIL lessons - providing translation or any language support - makes them aware of the fact that lots of science information are available in English.

	Subject	**Language**
Students' prior knowledge, skills, competencies	Astronomy-specific knowledge: Earth's motion, Sun's apparent motion, orbit and Keplero's first low, Aphelium and perihelium, Apogee and perigee, Newton's gravity low. General scientific competencies: concepts of mass, distance, measures, cardinal directions, uses of models, reasoning, inquiry, discussion, and hypothesis. General skills: pair and group working, digital competences, communication competencies.	present tense, modals, conditionals, comparatives, giving opinions, giving instructions, agreeing and disagreeing

Timetable fit	◉ Module	Length 4 lessons

Description of teaching and learning strategies	Pair and group work (max 4 students). Structured tasks (often with iteration and gradually increasing difficulties). Collective sharing of learning progresses. Strong connections among the lessons of the unit: you learn something that you will need later. Students' autonomous pace. Students' responsibility in the learning process: learn from peers, ask the teacher, and try to do/say what they think. Use of digital supports (Presentation, Gclassroom, MIRO).

Overall Module Plan

Unit: 1 Earth-Moon-Sun system **Unit length:** 50+100+50+100 minutes	**Lesson 1** What a model!
	Lesson 2 LAB: discovering the Moon
	Lesson 3 LAB: follow up
	Lesson 4 DigiLAB: testing hypotheses

CLIL Lesson Plan

Unit number	1	**Lesson number**	1	**Title**	What a model!

Activity	**Timing**	**Learning Outcomes**	**Activity Procedure**	**Language**	**Interaction**	**Materials**	**Assessment**

1	10'	to think about their own thoughts about the relative size and distance of the Moon and the Sun; to interprete figures and schemes; to evaluate the reliability of a model; oral communication skills	The teacher introduces the CLIL module showing a 3D rendering of the Earth-Moon-Sun system and asks the students what we need to know in order to describe it: what can you say about these three celestial bodies? or what you would ask about them? The students will figure out at least the following: - relative size (how big is the Moon in comparison to the Earth?) - distances (the Moon is closer than the Sun, but how much?) - motion (the Moon rotate around the Earth, and the Earth around the Sun... what's more?) In order to study and understand such a large-scale system we need a model, they know a model is a partial and oriented representation of reality. So in pairs, the students observe different models and discuss which one they will consider the best. They can also refuse all models and propose how to define a good one. (Figures provided via Gclassroom, students use their smartphone - BYOD) Brief collective final discussion leading to activity 2, while the teacher displays some balls on the table: marble, ping pong, tennis, soccer...	**Skills** L S R W **Key vocabulary** Sun, Moon, Earth, size, diameter, distance, proportion **Communicative structures** Giving opinions, agreeing and disagreeing, comparatives, modals	☑ Whole class ☐ Group work ☑ Pair work ☐ Individual work	• Figures.pdf • Supporting presentation.pptx supporting presentation (slide 1) figures	While the students discuss in pairs the teacher moves around to listen to chunks of conversations and to provide support if needed (formative assessment)

2	15'	to work out proportion and calculation; to understand the difference between a model and a scale model; to build a scale model; to realize the real proportion in size and distance in the M-E-S system (in comparison with previous expectations)	Let's think about how we can build a scale model. If the Moon were the size of a… ping pong ball, can you guess the size of the Earth? Students will try to find a comparison with well-known objects (soccer ball, watermelon, tape, clock...) some of them are displayed on the table and some others are shown on the slide. The students guess the corresponding size of the Earth and then the teacher reveals a plastic ball whose diameter is 14,5 cm, this is the relative size of the Earth in comparison with the ping pong Moon. The teacher helps the students to figure out the proportion needed to calculate this ratio, using the blackboard and providing the real measures of the mean diameters. Then the students guess the distance: one student keeps the ping pong ball and another the plastic ball representing the Earth, they move from each other according to the others' opinions until they all agree on the distance M-E. The teacher will then show the solution using a string of 4,40 m. This will come as a surprise since the Moon is expected to be closer! And following this, the teacher adds the Sun to the model: it would be large as a huge building 16 m high and far 1,7 km! Some sentences expressing surprise are shown.	**Skills** L S R W **Key vocabulary** scale model, lenght measure (mm, cm, m, km), common objects' names **Communicative structures** conditionals, giving instructions, expressing surprise	☑ Whole class ☐ Group work ☐ Pair work ☐ Individual work	supporting presentation (slides 2-5) Earth-Moon model different types of balls blackboard	/

3	25'	to work out proportion and calculation; to build a scale model; to realize the real proportion in size and distance in the M-E-S system (in comparison with previous expectations); communication skills orally and in writing	The teacher gives the instructions for the core activity: in pairs the students will choose an object to represent the Moon, measure the diameter, and then calculate the relative size of the Earth (possibly finding an object of that size) and the Sun. They calculate the distances too and organize the results in a table (depending on the scale, they can display the model). Finally, they write some sentences describing their model using the language learned in the lesson. They can also look it up on the internet. They must upload their work to a shared board on MIRO (or any other collaborative platform). This can also be completed at home, individually, since each group works at a different pace.	**Skills** L S R W **Key vocabulary** see above **Communicative structures** see above	☐ Whole class ☐ Group work ☑ Pair work ☐ Individual work	supporting presentation (slides 6-7)	The teacher reviews the pair work and the individual sentences, checking the correctness of the scale and providing feedback both on content and language (formative assessment)

CLIL Lesson Plan

Unit number	1	**Lesson number**	2	**Title**	LAB: discovering the Moon

Activity	**Timing**	**Learning Outcomes**	**Activity Procedure**	**Language**	**Interaction**	**Materials**	**Assessment**

1	10'	to revise prior knowledge; to visualize the tilted orbit of the Moon	The teacher turns off the light and uses realia to help students get some facts before they explore: - what happens when a spherical object is illuminated? - can anybody say how long time the Earth's rotation takes? - how about the Moon moving around the Earth: can you name this motion? how long it takes? - still on the revolution of the Moon, its orbit is tilted (demonstration and figures) After that, the students work in groups on one of the different activities, each group can work at a different pace. Once a group completes the activity the teacher gives new instructions for a different one (each group should work on the three different phenomena, but since the pace can be different some students may need to complete part of the work individually at home). The teacher will provide support during the activity and monitor how they work, think, and communicate. The teacher encourages the students to take pictures and videos to show what they have found. Before the end of the lesson, the teacher informs the students they will report to the whole class what they have discovered and provides them with a shared folder to upload pictures and videos (Gclassroom). Differentiation of the worksheet for less able learners.	**Skills** L S R W **Key vocabulary** rotation, revolution, orbit, node, tilt, plane **Communicative structures** present tense	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	supporting presentation (slides 8-11) setting: darkness, each group can use the flashlight of the smartphone realia: a big sphere, a small sphere, wood ring	/

2	90'	to describe and understand the phases of the Moon; to analyse causes and consequencies; to develop reasoning and hypotesizing skills; communication skills orally and in writing	The group of students realizes a model of the Moon pahses and then answer simple questions related to the motion of the Moon. They are also involved in making some hypothesis.	**Skills** L S R W **Key vocabulary** phases of the Moon, position, ephemeris, moonrise/moonset **Communicative structures** present tense, giving opinions, agreeing and disagreeing, conditionals	☐ Whole class ☑ Group work ☐ Pair work ☐ Individual work	• Worksheet A.pdf • Worksheet A - less able learners.pdf supporting presentation (slide12) worksheet A	While the students work in group the teacher moves around to listen to chunks of conversations and to provide support if needed (formative assessment)
3	90'	to describe and understand the dark side of the Moon phenomenon; to analyse causes and consequencies; to develop reasoning and hypotesizing skills; communication skills orally and in writing	The group of students realizes a model of the Moon rotation and revolution, and then answer simple questions related to the motion of the Moon. They are also involved in making some hypothesis.	**Skills** L S R W **Key vocabulary** dark side, near/far side, period, simultaneous **Communicative structures** see above	☐ Whole class ☑ Group work ☐ Pair work ☐ Individual work	• Worksheet A.pdf • Worksheet A - less able learners.pdf supporting presentation (slide12) worksheet A	While the students work in group the teacher moves around to listen to chunks of conversations and to provide support if needed (formative assessment)

4	90'	to describe and understand the eclipses; to analyse causes and consequencies; to develop reasoning and hypotesizing skills; communication skills orally and in writing	The group of students realizes a model of the E-M-S system and visualizes the eclipses, then answer simple questions related to the motion of the Moon. They are also involved in making some hypothesis.	**Skills** L S R W **Key vocabulary** eclipse, syzygy, ephemeris, frequency, node, to transit, to cross **Communicative structures** see above	☐ Whole class ☒ Group work ☐ Pair work ☐ Individual work	• Worksheet A.pdf • Worksheet A - less able learners.pdf supporting presentation (slide12) worksheet A	While the students work in group the teacher moves around to listen to chunks of conversations and to provide support if needed (formative assessment)

CLIL Lesson Plan

Unit number	1	**Lesson number**	3	**Title**	LAB: follow up

Activity	**Timing**	**Learning Outcomes**	**Activity Procedure**	**Language**	**Interaction**	**Materials**	**Assessment**
1	15'	to revise and share acquired knowlege	The students receive back their previous worksheets with the teacher's feedback. The teacher organizes the students into 3 groups of experts about the 3 topics explored in the LAB, they have a short time to revise the main points and organize how to share with the whole class what they had discovered. They should also identify 3-5 speakers.	**Skills** L S R W **Key vocabulary** rotation, revolution, orbit, node, tilt, plane, phases of the Moon, position, ephemeris, moonrise/moonset, dark side, near/far side, period, simultaneous, eclipse, syzygy, ephemeris, frequency, node, to transit, to cross **Communicative structures** present tense, giving opinions, agreeing and disagreeing, conditionals	☐ Whole class ☑ Group work ☐ Pair work ☐ Individual work	The students use their notes and worksheets	/

2	35'	to explain and justify astonomic phenomena; communication skills orally	Each group shares with the whole class (about 10 minutes for each group). The teacher can provide support, students are invited to ask questions and check what they have done. Differentiation: code switching is encouraged if needed	**Skills** L S R W **Key vocabulary** see above **Communicative structures** see above	☑ Whole class ☐ Group work ☐ Pair work ☐ Individual work	Pictures and videos potentially produced by the students (see examples in the supporting presentation, slides 13-15)	The teacher listens to the presentations and collects elements for the summative assessment: level of comprehension of the phenomena, communication skills

CLIL Lesson Plan

Unit number	1	**Lesson number**	4	**Title**	DigiLAB: testing hypotheses

Activity	**Timing**	**Learning Outcomes**	**Activity Procedure**	**Language**	**Interaction**	**Materials**	**Assessment**
1	15'	to become familiar with the simulation platform	The students work in pairs on a pc. Once they had reached the home page of PHET Colorado the teacher introduces the activity showing the main characteristics of the simulation platform.	**Skills** L S R W **Key vocabulary** simulation **Communicative structures** present tense	☑ Whole class ☐ Group work ☐ Pair work ☐ Individual work	pc and internet link	/

2	60'	to describe and understand Moon's motion and gravity; to analyse causes and consequencies; to develop reasoning and hypotesizing skills; to deveop digital skills; communication skills orally and in writing	The students work on several tasks and answer questions after observing the simulations.	**Skills** L S R W **Key vocabulary** gravity, mass, barycentre, revolution, orbit, period, parameter, apogee/perigee, trajectory, translation **Communicative structures** present tense, giving opinions, agreeing and disagreeing, conditionals	☐ Whole class ☐ Group work ☑ Pair work ☐ Individual work	• Worksheet B.pdf worksheet B	While the students work in pairs the teacher moves around to listen to chunks of conversations and to provide support if needed (formative assessment)

3	25'	to explain and justify hypotheses about gravity; communication skills orally	Final plenary where the the students share their results and check. They can discuss and compare their answers and justify possible differences while the teacher shows the simulations on the screen and provide feedback.	**Skills** L S R W **Key vocabulary** see above **Communicative structures** see above	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	/	The teacher listens to the students and collects elements for the summative assessment: level of comprehension of the phenomena, reasoning, hypothesizing, and communication skills. Final summative assessment can be based on: pair work on scale model building and individual sentences (lesson 1); group work lab activity and presentation (lesson 2 and 3); pair work and collective sharing (lesson 4); structured test at the end of the whole course of astronomy including questions in Italian and in English (concerning the CLIL module)