CLIL Module Plan

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

Personal and social-cultural preconditions of all people involved	This module is designed for a 3rd year class of a Liceo Scientifico. The class has 12 students (7 females and 5 males). All students were born in Italy and have been experiencing CLIL methodology in English for two years, up to now, in Drawing and Art history: these are the first CLIL in Science lessons. The mean English level of the class is upper intermediate, ranging from upper B1 to B2 according to CEFR, except for two students who barely reach a B1 level. The average level in Natural Sciences is good and the group is motivated when it comes to cooperative activities guided by the teacher. There are no learners with special needs. During this school year, COVID-19 pandemic still poses new challenges and lessons can take place in three learning environments: the classroom, science laboratory and students' homes through the use of distance learning. The CLIL Science teacher (English level C1) will run the module cooperating in the planning with the class teacher of Natural sciences (English level A2): the former will teach each lesson while the latter will provide support during cooperative learning and online activities and may possibly facilitate inter-modules links or seldom supply some L1 scaffolding to assist L2 vocabulary acquisition.

Students' prior knowledge, skills, competencies	Subject	Language
	Students start studying biology from the first year and are familiar with basic scientific terminology in English. They know that chromosomes and genes are made of DNA, that genes are inherited from one generation to the next and that mutations are changes in the DNA sequence. Students have a basic understanding of DNA replication and the central dogma (DNA is transcribed to RNA and RNA is translated into proteins).	Grammar structures: WH questions; Conditional forms; Phrasal modal verbs; Reporting verbs; Passive form; Basic tenses (simple present, present perfect, present continuous, past simple, past perfect, past continuous, present perfect continuous, futures tenses); Linkers and connectors. Skills and competencies: To be able to listen and understand the main concepts/meaning of a new video/speech; To be able to read and understand the main concepts/meaning of a new text; To take notes while listening; To take part in a discussion; To be able to express an opinion; To make hypothesis; To describe, compare and contrast features; To simply answer open questions; To be able to work in team; To persuade people to work collectively within the group.

Timetable fit	◉ Module	Length 6 teaching hours of 45 minutes (in presence) or 40 minutes (at distance)

Description of teaching and learning strategies	Every classroom in the school is equipped with a computer, projector and audio system along with internet connectivity to facilitate ease in ICT usage for teaching-learning process. Students can use tablets and smartphones to research facts, use learning apps and take notes. Due to the pandemic, in the current as in the previous term many lessons will be conducted through distance learning (via Meet or Zoom). The module is structured on task-based activities and organized according to cooperative learning methodology either in pairs, groups or as a whole class. YouTube videos, texts and images will be used as sources; Google Docs and Forms will be employed as frameworks to support student acquisition of skills such as building vocabulary, reading comprehension, organizing information, researching and higher order thinking skills. A pre-lesson assignment (online homework) will give start to the module: following a flipped classroom approach, students will connect and work in groups of three performing a cooperative task. The results will be discussed during the first lesson. Specific differentiation measures can be adopted in favor of that students who miss a lesson because of unforeseen issues or technical problems.

Overall Module Plan

Unit: 1 Selective breeding and Genetic modification **Unit length:** two lessons of two teaching hours in presence and one lesson of two teaching hours in remote	**Lesson 1** Golden Rice: sharing and collective elaboration of Pre-lesson Assignment; Selective breeding and GM
	Lesson 2 Distance Learning Lesson: Model organisms; Video extract: Glowing Fish; GCSE Selective Breeding
	Lesson 3 Oral Presentations; Guided viewing of "Why would anyone want to make fish glow?"; Interaction

CLIL Lesson Plan

Unit number	1	**Lesson number**	1	**Title**	Golden Rice: sharing and collective elaboration of Pre-lesson Assignment; Selective breeding and GM

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

1	5 minutes	To recap pre-lesson cooperative online assignment. To be able to apply information technology. To be prepared for the new activity.	Students are invited to open the filled in homework file on the tablet (L1_Act1_All1, link) and be prepared to copy and paste their own answer paragraph in a new shared Google Document (L1_Act2_All1). Teacher recalls the purpose of the previous assignment and shares the link with the class for the new activity (L1_Act2_All1, link). Every student opens the new document and the teacher reads the instructions projected on the classroom screen.	**Skills** L S R W **Key vocabulary** ICT common commands (open/ copy/paste/cut/save/insert/ close); Golden Rice; DNA; technique; web resources; references. **Communicative structures** Today we are going to talk about...; We will collaborate through several activities...; Feel free to ask for explanations.	☑ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• L1_Act1_All1 - GOLDEN RICE - Pre-lesson assignment - Online Group Homework - file preview.pdf • L1_Act2_All1 - GOLDEN RICE - Homework sharing and collective elaboration - Pre-reading team activity - file preview.pdf L1_Act1_All1: link L1_Act2_All1: link	Ongoing assessment.
2	15 minutes	To know what Golden Rice is and why it was developed. To build a collaborative list of keywords.	Team leaders of the four groups (three students each) copy and paste the result of the homework activity on the new file (L1_Act2_All1,	**Skills** L S R W	☑ Whole class ☑ Group work ☐ Pair work	• L1_Act2_All1 - GOLDEN RICE - Homework sharing and collective elaboration -	Formative assessment.

		To develop the ability to work cooperatively.	link). A group reads his paragraph alternating the reader with every sentence; other students listen, choose words and write a “List of Keywords” cooperatively on the bottom part of the file. The list of keywords is developed, simplified and updated while the activity takes place, until all the groups have read their answers. Teacher provides support during cooperative learning and online activities and supplies some scaffolding to assist vocabulary organization and acquisition. Teacher poses stimulating questions during the activity.	**Key vocabulary** Golden rice; GMO/GMOs, genetically modified organisms; genetic engineering; agricultural biotechnology; vitamin A deficiency; provitamin A, β-carotene; gene patent and licensing. **Communicative structures** What is the correct spelling of this word? Can you explain...? What do you think about...? Why did you choose that instead of...? Did you understand...? Could you repeat the word please? Would you mind trying to rephrase...? What’s the meaning of...? Which is the main point of this sentence? The correct pronunciation is...; In my opinion...; I agree/disagree; I suppose this means...; Giving reasons for choices (it matches with... because...).	▣ Individual work	Pre-reading team activity - file preview.pdf L1_Act2_All1: link	

3	30 minutes	To increase global citizenship awareness. To help develop a sense of collective responsibility. To show practical concern for the welfare and dignity of others. To be able to interpret nutrition concepts to evaluate and improve the nutritional health of communities.	Teacher illustrates two posters about Golden Rice (L1_Act3_All1; L1_Act3_All2): the first allows to situate Golden Rice in the context of a humanitarian project to address malnutrition of poor populations, particularly children, in developing countries; the second shows Golden Rice nutrient compositional analysis and refers to estimated average requirement (EAR) of vitamins. Teacher poses stimulating questions and facilitates interaction between students, alternating explanation and discussion. Students take notes on paper or tablet.	**Skills** L S R W **Key vocabulary** World Health Organization (WHO); vitamin deficiency; blindness; staple crops; biofortification; compositional analysis; estimated average requirement (EAR); carbohydrates; proteins (amino acids); fatty acids; anti-nutrients; U.S. National Institutes of Health (NIH). **Communicative structures** What do you think about...? Can you imagine...? How would your life be if you were born in...? Do you know how to...? Try to put all these points together in a sentence (linking words: conjunctions and connectors).	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• L1_Act3_All1 - WHO_NIH - Bio-Fortified Golden Rice Could Reduce Vitamin A Deficiency Saving Lives.png • L1_Act3_All2 - IRRI - Golden Rice_flyer.jpg	Formative assessment.
4	40	To be able to					Formative

	minutes	determine ways that traits can be influenced by humans. To introduce the processes of selective breeding and genetic modification. To provide another example of genetic modification. To be able to compare and contrast important points of two biotechnological processes.	Teacher explains the purpose of the activity projecting a reading (L1_Act4_All1) and a T-chart task (L1_Act4_All2) on the classroom screen. Students open the task file on the tablet and prepare for a talking time with the nearest classmate just after the reading. Social distancing and mask-wearing are maintained as usual. First: alternating the reader with every sentence, students read to the class the introduction, learning objectives and instructions for the T-chart activity and the reading text about genetic modification and selective breeding. Second: in pairs (nearest classmates; distancing and	**Skills** L S R W **Key vocabulary** Trait definition; genetic modification; laboratory process; flounder species; selective breeding; inheritance; farming; comparing and contrasting words (unlike, similarly, in the same way, likewise, also, compared to, in contrast, on the contrary, however, although, nevertheless, conversely, at the same time, regardless, despite, while, on the one hand, ...). **Communicative structures** What are they about? Who created them? What is the central focus or goal of each? How are the techniques applied to plants/animals? What is similar among...? Try to explain the difference between...; Giving reasons for choices.	☒ Whole class ☐ Group work ☒ Pair work ☒ Individual work	• L1_Act4_All1 - Reading - Selective breeding and Genetic modification.png • L1_Act4_All2 - Reading - T chart pairs activity.docx • L1_Act4_All3 - Exercise - Selective breeding and Genetic modification - file preview.png L1_Act4_All3: link	and peer assessment.

			masks as usual), students carry out the task under the active supervision of the teacher; not repeated outcomes are read and spread through the class by the learners themselves; Third: the first part of an individual exercise (GM or selective breeding?) is performed shortly thanks to the class link shared by the teacher (L1_Act4_All3, link); the second part (giving reasons for the answers) is left as a homework assignment.				

CLIL Lesson Plan

Unit number	1	**Lesson number**	2	**Title**	Distance Learning Lesson: Model organisms; Video extract: Glowing Fish; GCSE Selective Breeding

Activity	**Timing**	**Learning Outcomes**	**Activity Procedure**	**Language**	**Interaction**	**Materials**	**Assessment**
1	15 minutes	To provide an effective alternative path to wider opportunities in education (Distance Learning Lesson via Zoom). To recap information presented in previous lesson. To work cooperatively on a task applying information technology. To specify references	The Distance Learning lesson is delivered through Zoom virtual classroom. Teacher reviews the information presented in the previous lesson while correcting homework with the help of students, who can share their screen. Students open the class link posted on the chat box by the teacher and prepare to work in groups of three for the new activity (breakout rooms): all groups work on the same Google Document (L2_Act1_All1a, link) and write a number of choice between 111 and 999 at the beginning of the answer, to identify the paragraph they are compiling. The activity consists in a "Not only	**Skills** L S R W **Key vocabulary** Model organism; non-human species; laboratory; biological processes; experimental system; ease of manipulation; rapid life cycle; genome; sequenced genome.	☒ Whole class ☒ Group work ☐ Pair work ☐ Individual work	• L2_Act1_All1a - Distance Learning Lesson - MODEL ORGANISMS - Pre-viewing Group Task - file preview.pdf • L2_Act1_All1b - Distance Learning Lesson - MODEL ORGANISMS - Simplified differentiated pre-viewing Pair Task - file preview.pdf	Formative and peer assessment.

		references after a web search. To examine and compare the sources of a piece of information.	consists in a "Not only Wikipedia" web search in order to write a suitable definition of “model organism” without using Wikipedia as a source. Students have to compare at least two different sources answering the task, specifying the chosen references in brackets. In the case of absent students (as homework for the next class, L2_Act1_All1c: link) or in presence of less able students (in pair with a classmate or support teacher, L2_Act1_All1b: link) a differentiated/simplified task can be prepared and delivered, preselecting a list of reliable web sources. At the end of the activity, the not repeated outcomes are read and spread through the class by the learners themselves. Teacher highlights the most reliable, effective and thorough sources about model organisms and stimulates audience attention and curiosity mentioning new intriguing features and applications. Interested students have the opportunity to further	**Communicative structures** Do you remember this word/concept? Today we are going to talk about...; We will collaborate through...; Feel free to ask for explanations. What do you think about...? Can you compare...?	• L2_Act1_All1c - Homework - MODEL ORGANISMS - Differentiated pre-viewing Task - file preview.pdf L2_Act1_All1a: link L2_Act1_All1b: link L2_Act1_All1c: link	

			deepen the topic.				
2	30 minutes	To start learning the process and reasons for genetic modification. To investigate the origin of important scientific discoveries. To organize information and analyze for relevant content. To familiarize with biomedical terminology.	To introduce the activity, teacher informs the students they will be hearing what they learned about model organisms in a new context. Teacher posts the link of a video on the Zoom chat box, anticipating some topic-specific terms concerning the process of creating a glowing fish (gene transfer, DNA transcription, RNA translation into proteins, fluorescent proteins) while creating expectation (YouTube video “Why would anyone want to make fish glow?”, link). Sharing the screen, the first three minutes of the video are watched three times (1st with no subtitles - 2nd with English subtitles - 3rd with no subtitles) pausing from time to time to encourage learners to ask for clarification and comment. A one-minute quiz is performed individually through a Google Form to test comprehension quickly (L2_Act2_All1, link) and the	**Skills** L S R W **Key vocabulary** Zebrafish; jellyfish; gene; fluorescent protein; embryo; model organism; drug research; fruit flies; bacteriophage; nervous system; vertebrates. **Communicative structures** Did you understand...? What do you think about...? Which is the main point of...? Could you try to repeat the steps of the procedure with your own words? Could you repeat the word/sentence/question, please?	☑ Whole class ☐ Group work ☑ Pair work ☑ Individual work	• L2_Act2_All1 - 1st Video One Minute Quiz - Glowing Zebrafish Video - file preview.png • L2_Act2_All2 - 1st Video Glowing Zebrafish - Pairs activity.docx YouTube video “Why would anyone want to make fish glow?”: link ; L2_Act2_All1: link	Formative and peer assessment.

			overall result is displayed in form of cake diagrams on the classroom screen and discussed. A new task is presented (L2_Act2_All2) and working in pairs (breakout rooms) the students describe briefly how scientists made zebrafish glow and which important advances were needed in order to realize it. The six answer files are displayed and commented on, inviting students to help each other in correcting or completing the task.				
3	35 minutes	To learn the process and reasons for selective breeding. To assign relevant individual homework that will be the core of the next lesson.	Teacher projects on the classroom screen the previously analyzed reading about selective breeding and GM (L1_Act4_All1) and the most complete T-chart filled in by students during the first lesson (L1_Act4_All2): a review of the most important concepts is carried out. The link of a new video is posted on the Zoom chat box and, sharing the screen, the three and a half minutes video is watched three times, pausing from time to	**Skills** L S R W **Key vocabulary** population biology; agriculture origin; crop resistance; generations; sweet corn; advantages and drawbacks; gene pool; alleles; trait coding; genetic close-relation; inbreeding; inherited defects; population variation in genes and genomes; pathogens.	☑ Whole class ☐ Group work ☑ Pair work ☑ Individual work	• L2_Act3_All1 - 2nd Video One Minute Quiz - Selective breeding Video - file preview.png • L2_Act3_All2 - 2nd Video Selective breeding process - Pairs activity.docx • L2_Act3_All4 - 1st Video -	Formative and peer assessment.

			time to encourage learners to ask for clarification and comment (YouTube video “GCSE Biology - Selective Breeding #53”, link). A one-minute quiz is performed individually through a Google Form to test comprehension quickly (L2_Act3_All1) and the overall result is displayed on the classroom screen and discussed. A new task is presented (L2_Act3_All2) and working in pairs (breakout rooms) the students summarize the process of selective breeding, as shown in the video, in a short paragraph or a list of bullet points. The six answer files are displayed and commented on, inviting students to help each other in correcting or completing the task. Teacher assigns to students four different kinds of homework instructions. Three students ("Homework A", L2_Act3_All4) will have to watch individually the second part of "Why would anyone want to make fish glow?" video from minute 2:50 to minute 3:50; three	**Communicative structures** Did the technique originate at some particular time? Did you understand...? What do you think about...? Which is the main point of...? Could you try to repeat the steps of the procedure with your own words? Could you repeat the word/sentence/question, please? How does it actually work?		Homework A.docx • L2_Act3_All5 - 1st Video - Homework B.docx • L2_Act3_All6 - 1st Video - Homework C.docx • L2_Act3_All7 - 1st Video - Homework D.docx YouTube video “GCSE Biology - Selective Breeding #53”: link ; L2_Act3_All1: link ; YouTube video “Why would anyone want to make fish glow?”: link	

			students ("Homework B", L2_Act3_All5) from 4:23 to 5:25; other three ("Homework C", L2_Act3_All6) from 6:49 to 7:46 and the last three ("Homework D", L2_Act3_All7) from 8:05 to 9:06. Every student will have to understand the main concepts, not every little detail, and choose one feature, aspect or concept that caught his attention. Consequently, he'll have to prepare one PowerPoint slide with a clear Title, adding still frames from the video or other images from the Internet and some short text information to explain the chosen notion and what he liked the most. In the following lesson, each student will present the slide to the class in two minutes or less.				

CLIL Lesson Plan

Unit number	1	**Lesson number**	3	**Title**	Oral Presentations; Guided viewing of "Why would anyone want to make fish glow?"; Interaction

Activity	**Timing**	**Learning Outcomes**	**Activity Procedure**	**Language**	**Interaction**	**Materials**	**Assessment**
1	55 minutes	To develop ability to analyze and synthesize information and present to an audience. To understand the key elements of delivery of messages in oral presentations. To recap information presented in previous lessons. To shed light on and arrange indirectly significant	At the beginning of the lesson, teacher reminds students of the purpose of homework assignments and explains the sequence and timing of the next activity: students who were assigned "Homework A" will start presenting their slide, followed by "Homework B", "C" and "D" allocated classmates. In this way the natural sequencing of significant moments in the whole video will be induced and arranged indirectly in each student mind. Two minutes (or less, as previously agreed) will be given to each speaker; other two to three minutes will be reserved each turn for questions, answers and	**Skills** L S R W	☑ Whole class ☐ Group work ☐ Pair work ☑ Individual work	• L3_Act1_All1 - Oral Presentation Self Evaluation Form.pdf	Ongoing and formative assessment; self assessment.

		significant moments of the second part of the video in each student mind. To create expectation toward the whole viewing of the video.	for questions, answers and commenting, for involving the whole class slide after slide. Teacher guides the interaction, offers encouragement and highlights the positive/more useful in perspective instances while proposing tips for improvement. At the end of the activity teacher recaps the most important features, aspects and concepts emerged during the presentations and introduces the viewing of the whole "Why would anyone want to make fish glow?" Video. At the end of the lesson a homework assignment is given to students to make them capable of self assessing and reflecting after the oral presentation (L3_Act1_All1 - Oral Presentation Self Evaluation Form).	**Key vocabulary** Fluorescent fish; Aequorea Victoria jellyfish; bioluminescence; green, yellow and red fluorescent proteins; Nobel Prize; light excitation fluorescence; luciferase; enzyme; glow-in-the-dark mushrooms; gene transfer between species; essential cellular functions; bacterial cell's machinery; synthetic DNA; GloFish®; biosensors.			

				Communicative structures Hello everyone..; Today I'm going to talk about..; Today I would like to outline...; I was impressed by...; My talk is divided into x parts; I'll start with... then I will look at... next... and finally; So the first point is..; To summarize..; WH questions; Could you repeat the word/sentence/question, please? How do I deliver my message clearly? Can I achieve the objective I have set in the time given? Have I been able to arouse curiosity and interest?			
2	35 minutes	To connect the homework parts pre-organized by students. To help students respond to a video as a whole as we do in our first language. To familiarize with	To endow with meaning and connect the homework parts pre-organized by students, teacher guides the viewing of the whole "Why would anyone want to make fish glow?" video. Before the beginning of the activity a glossary of genetic terms is provided, whose content is projected	**Skills** L S R W	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• L3_Act2_All1 - Scaffolding - Glossary Of Genetic Terms.pdf YouTube video “Why would anyone want to make fish glow?”: link	Formative assessment.

		biomedical terminology. To consolidate subject-specific vocabulary.	on the screen and illustrated (L3_Act2_All1 - Scaffolding - Glossary Of Genetic Terms). The viewing of the video starts. After watching the first three well known minutes, second part (from minute 2:52 to minute 9:08) is watched three times during the second of which teacher pauses from time to time to encourage learners to ask for clarification and comment. Pre-activities presented by classmates help students respond to the video as a whole - as we do in our first language - rather than study it discretely. At the end of the lesson, teacher highlights the different potential applications of GM technology explained in the video in order to stimulate students attention and curiosity and possibly facilitate academic and/or career orientation. The class is invited to ask for curiosity's sake and in-depth details and teacher may provide further elucidation, tips and links to interested students.	**Key vocabulary** Barrel shaped proteins; luciferase; gene transfer technique; human insulin protein; Escherichia coli bacteria; promoter; myosins; amino acids; patent; heavy metals; toxin; biosensor; environmental monitoring; toxicology; cancer biology; developmental biology. **Communicative structures** Did you understand...? What do you think about...? Which is the main point of...? Could you try to paraphrase the passage with your own words? Could you repeat the word/sentence/question, please? Could you imagine it was possible to...? Did you know that...? Have you ever heard about...? Do you think you might like...?			