CLIL Module Plan

Author(s)	Leonarda Raffoni		
School	ITT Michelangelo Buonarroti, Trento		
School Grade	○ Primary	○ Middle	◉ High

School Year	○ 1	○ 2	○ 3	◉ 4	○ 5

Subject	Informatica	Topic	Abstract Data Type
CLIL Language	◉ English		○ Deutsch

Personal and social-cultural preconditions of all people involved	The involved class is a 4th class in the Computer Science course of the technical technological education. The class is composed of 18 students, a collaborative and interested group. Two students have particular difficulties, one of them with special needs; both students have relational problems and have many difficulties in the subject of the module (Computer Science). However, they have sufficient/good results in English. Another group of students have difficulties in abstract thinking, a key competence for this module. The class is used to work in groups and, when motivated and supported, is willing to learn both in class and in IT lab. The module is taught by the Computer Science teacher. Average CEFR Level of the student group: B1. They already had experiences in CLIL, also in Computer Science, showing difficulties in productive skills (speaking and writing) and confidence in receptive skills (listening and reading).

Students' prior knowledge, skills, competencies	Subject	Language
	The class needs competences in Algorithms, Arrays, Data Structures and OOP (Object Oriented Programming), essential topics for this module. Students need some knowledge of algorithms' efficiency. They need competences in software development and programming. They should have group work skills.	The class needs the basic Computer Science glossary. They should know the most important grammar structures, know how to comunicate, discuss and collaborate in groups using the English language. This particular group tends to use simple grammar structures and very short sentences, therefore the module is aimed at evolving their use of English.

Timetable fit	◉ Module	Length 11 lessons of 50 minutes each

Description of teaching and learning strategies	The main characteristic of this module is its highly technical and specific content, which needs a good cognitive effort to be fully acquired. Therefore the main methodological approaches are task based learning and cooperative learning; cognitive scaffolding is offered with many consolidation activities, also useful for language consolidation, and with scaffolding materials designed to support the HOTS during the most technical phases of the module. Differentiation is applied to support independent learning for both more and less able students. Communication is facilitated letting students work in pairs instead of bigger groups. This is essential for students with relational problems and for those less inclined to speak English. Moreover, working in small groups facilitates less able students thanks to a dedicated peer support. The teacher supports speaking skills offering hints, suggesting starting arguments and providing listening and writing models. The latter are also used together with sentence templates to develop writing skills. Plenary activities offer an additional speaking situation; they are deployed to activate and stimulate the class, to recap, to check the results of group activities or to give feedback. Being a Computer Science module, intrinsically including digital activities, it has been chosen to limit the use of additional ICT learning tools. Anyhow materials include youTube videos and websites. Demanding activities, in terms of cognitive objectives, are proposed at the end of the lesson so that, in case of significant difficulties or when more wait time is needed, students can complete them at home or during a following lesson (augmenting the overall duration of the module). Learning outcomes are closely connected with the proposed activities and are the basis of formative and summative assessment.

Overall Module Plan

Unit: 1 ADT Introduction **Unit length:** 2 lessons (50 minutes each)	**Lesson 1** Key concepts
	Lesson 2 Consolidation of ADT key concepts

Unit: 2 ADT List and ADT Queue **Unit length:** 3 lessons (50 minutes Lesson 1 and 2, 100 minutes Lesson 3)	**Lesson 1** Introduction to List and Queue
	Lesson 2 Errors management in the Queue
	Lesson 3 Two different CDTs for the Queue

Unit: 3 The Stack **Unit length:** 2 lessons of 50 minutes each	**Lesson 1** ADT Stack
	Lesson 2 CDT Stack

Unit: 4 The most important ADTs **Unit length:** 2 lessons (50 minutes each)	**Lesson 1** Characteristics and operations
	Lesson 2 Applications

Unit: 5	**Lesson 1**
Create your own ADT: Panoramic Wheel	ADT Panoramic Wheel
Unit length: 2 lessons (50 minutes each)	**Lesson 2**
	CDT Panoramic Wheel

CLIL Lesson Plan

Unit number		1	Lesson number		1	Title	Key concepts

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	10 minutes	Activate prior knowledge. Review introductory key concepts.	The teacher asks some questions to the class and collects the answers on the board or in a shared document.	**Skills** | L	S	R	W | (L and S selected) **Key vocabulary** data type data structure array integer char string class OOP (Object Oriented Programming) **Communicative structures** Which …do you know? Who remembers …. ? I think … I suppose …	☑ Whole class ☐ Group work ☐ Pair work ☐ Individual work	Questions for the class: - Which data type do you already know? - Which data structures do you already know? - What's the difference between data type and data structures? - In the OOP, can the class concept be assimilated to a data type or to a data structure?	Ongoing assessment of the concepts correctness.

2	10 minutes	Identify the module key terms.	The teacher involves the class in order to focus on the main terms of the module introducing them before watching the video in activity 3.	**Skills**	☑ Whole class	Main keywords and possible ways to introduce them to the students with their involvement and collaboration: Abstract: explain it using its opposite Concrete; ADT: provide the acronym Abstract Data Type; CDT: provide the acronym Concrete Data Type; Building block: example: a brick is a building block for houses or other constructions. Ask other examples of building blocks. To store: explain it using the opposite 'to retrieve'. Ask for examples of situations when they store or retrieve something.	Ongoing language assessment during the discussion.
					☐ Group work		
					☐ Pair work		
					☐ Individual work		

Skills

L	S	R	W

Key vocabulary
Abstract Concrete Acronym Abstract Data Type Concrete Data Type Building block To store To retrieve

Communicative structures
Could you tell me...? Do you know...? What's the opposite of...? Can you make an example of ....?

| 3 | 30 minutes | Learn the main concepts related to ADT (Abstract Data Type) and CDT (Concrete Data Type). Life skills: collaboration. | The class watches a YouTube video (see materials). The teacher introduces the video explaining that the Indian presenter has a peculiar accent: getting used to the Indian accent is very important for a computer scientist since it is very common to collaborate with Indian IT professionals. While watching the video, students take notes for an open comprehension task (see U1_L1_ALL1). After the video, they work in pairs to check the fill-in-the-gap and the answers in order to focus on the main concepts presented in the video. The teacher invites the students to watch the video again if needed, promoting autonomous learning. | **Skills**

 | L | S | R | W |

 Key vocabulary
 ADT CDT data structure mathematical and logical model implementation

 Communicative structures
 Try to identify ... Please complete .... Let's put ... Should we ....? | ☑ Whole class
 ☐ Group work
 ☑ Pair work
 ☐ Individual work | • U1_L1_ALL1.docx

 YouTube Video 'Introduction to data structures' (6:33 min): link ALL1: comprehension task easing focus on the main concepts. | Formative assessment: the words used to fill in the gap and the answers given to the questions are checked in a plenary. In turn, each group is asked to give their answer to the current gap/question; the rest of the class confirms or gives an alternative key. |

CLIL Lesson Plan

Unit number	1	Lesson number	2	Title	Consolidation of ADT key concepts

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	10 minutes	Identify the main concepts related to ADT and CDT.	Students watch two YouTube videos (5 minutes and 2 minutes long respectively) featuring the main ADT concepts. The teacher invites them to take notes.	**Skills** [L] S R [W] **Key vocabulary** Interface Programming language Properties Operations **Communicative structures** imperative form to express rules Possibility: 'can be' form	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	YouTube videos: - "Data Structures: Abstract Data Type (ADT)" - 5 minutes: link - "Basic Data Structures 1.2 - Abstract Data Type" - 2 minutes: link	
2	40 minutes	Create a diagram, schema or	Students work in pairs and create a schema or a mind map or a poster of the main concepts related to ADT.	**Skills**	☒ Whole class		Peer review: students vote the other

| | | mind map presenting the main concepts related to ADT and CDT. Life skills: collaboration, presentation, time management, creativity. | They are invited to work creatively, freely selecting appearance and tools. They can use digital tools or work with paper and pencils. Students are invited to eventually review the videos already watched during the previous activities. After 30 minutes each group hang up their schema on the walls, in case of paper work, or post them on a padlet (www.padlet.com). | **L** **S** R **W** **Key vocabulary** ADT CDT implementation example data structure mathematical model logical model **Communicative structures** In my opinion... I suggest ... I would .... Why don't we ... I think it is better ... | ☐ Group work ☑ Pair work ☐ Individual work | | groups' diagrams giving a sticker or a like to the ones considered clear and complete. The teacher performs a formative assessment on the learning outcomes (the schemas) with the following criteria: contains all the main concepts of ADT and CDT; contains examples; contains the links between the concepts and the examples. |

CLIL Lesson Plan

Unit number		2	Lesson number		1	Title	Introduction to List and Queue

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	15 minutes	Identify the List: ADT and CDT	The class watches the first 13:07 minutes of the YouTube video 'List as abstract data type' (see materials). The teacher invites the students to take notes about the List: - ADT definition - CDT definition	**Skills** ☑ L ☐ S ☐ R ☑ W **Key vocabulary** List Element Insertion Removal Implementation Resize Length Empty Full **Communicative structures** To define … we have to ….	◉ Whole class ☐ Group work ☐ Pair work ☐ Individual work	You Tube Video 'List as abstract data type'(until min.13:07): link	Ongoing assessment: the teacher interrupts the video at key points and verifies if students are following. The video is watched again if needed.

| 2 | 40 minutes | Apply the knowledge about the List to articulate the Queue. Social skills. | Students work in pairs: using the video about the List as a model (see previous activity), they are required to define the Queue, both ADT and CDT. The general functioning of the Queue is introduced to the students through a written text (see attached document, the first page). The written form is selected to promote abstract thinking. In case some students need more support to understand how a Queue works, in the second page of the attached document can be found scaffolding material (visual organizers and schemas). The teacher promotes autonomous reflection giving hints and eventually providing the scaffolding material in order to differentiate between more and less able learners. | **Skills**

 `L` `S` `R` `W`

 Key vocabulary
 enqueue dequeue head tail/bottom FIFO (First In First Out) empty full resize

 Communicative structures
 In case .... then .... When .... the result is ... If ... then.... We have supposed that .... We propose ... Our design includes ... How would you .....? Can you explain how ...? | ☑ Whole class
 ☐ Group work
 ☑ Pair work
 ☐ Individual work | • U2_L1_ALL1.docx | Formative and peer assessment: one pair writes on the board the definition of the ADT Queue and explains how they would implement it with the CDT. The other pairs give feedback and eventually go to the board to present their own design. |

CLIL Lesson Plan

Unit number	2	Lesson number	2	Title	Errors management in the Queue

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment

| 1 | 50 minutes | Extend the Queue with the error situations that can occur in the ADT and in the CDT. Correlate List and Queue. Social skills (group work). | Students work in pairs for the first 20 minutes (no need to keep the same pairs as before). Students reflect on the Queue following the teacher's questions (see attached document). Students are invited to refer to the List presented in the YouTube video during lesson 1. The video is in fact proposed not only for learning about the List, but also to represent a model for the procedure to be followed to define ADT and CDT. The teacher helps the students using the List as an example, fostering the acquisition of a mental schema to be reused in similar situations. At the end, a significative amount of time is left for assessment (see below). | **Skills**

L S R W

Key vocabulary
array full empty resize

Communicative structures
The error can occur when ... if ... How would you ...? To give rise to ... To pertain to .... | ◪ Whole class
◪ Group work
◪ Pair work
☐ Individual work | • U2_L2_ALL1.docx

Reflecting questions to spot the Queue error situations. | Formative peer assessment: after 20 minutes new groups of 4 students are created joining the initial pairs. Students discuss the results obtained working in pairs and agree on a group solution. After 10 minutes, a representative of each group reports to the class their findings. The teacher gives a final feedback. |

CLIL Lesson Plan

Unit number	2	Lesson number	3	Title	Two different CDTs for the Queue

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	50 minutes	Analyze and understand a CDT. Compare two CDTs. Computational thinking skills. Group work skills. Presentation skills.	This lesson involves implementing a Queue with a CDT (called CDT2) which is not the most straightforward one, already analyzed in lesson 2 of this unit, but a less intuitive one. Students need to reflect on the proposed CDT2 in order to better understand its structure before implementing it. For this reason they are asked to initially work on this first reflection task (see U2_L3_ALL1). This task involves higher order thinking skills (abstract thinking) and some students may need support: document U2_L3_ALL2 provides scaffolding	**Skills** L S R W **Key vocabulary** array index bottom/head enqueue/dequeue **Communicative structures** Grammar: ing forms and present tense. What is gained/lost? Can you ...? How would you ...? I suggest .... If .... then .... else .... In the first case .....; in the second case, on the contrary, ...	▣ Whole class ☐ Group work ▣ Pair work ☐ Individual work	• U2_L3_ALL1.docx • U2_L3_ALL2.docx ALL1: document with tasks ALL2: scaffolding material	Formative assessment: in turn, every group presents their findings to the class. Students might be invited at the board in order to represent and clarify their reasoning.

			provides scaffolding material that can be used to recap the main concepts and the methodological steps and to support the analysis of the proposed CDT2. Students work in pairs. The teacher gives support differentiating among the groups, promoting autonomous reasoning and eventually providing the scaffolding material (U2_L3_ALL2).				
2	50 minutes	Design an algorithm. Implement a CDT using a pseudocode and/or a programming language. Social skills. Digital skills and computational thinking skills.	During this activity students implement a CDT (namely CDT2, analyzed in the previous activity; see attached material). They will use OOP (Object Oriented Programming). They will be asked to design and implement a class QUEUE. Students work in pairs (the same as activity 1), preferably in IT Lab. If the lab is not available they can implement the CDT in pseudocode. If more time is needed,	**Skills** L S R W **Key vocabulary** pseudocode programming language array index variable attribute method structure instruction	☐ Whole class ☐ Group work ■ Pair work ☐ Individual work	• U2_L3_ALL1.docx • U2_L3_ALL2.docx The CDT2 to be implemented was defined in the previous activity: the same ALL1 is also useful here. Scaffolding material of previous task (ALL2) could be useful to support also this programming phase.	Self assessment: the students test their implemented CDT using data provided by the teacher (values and operations for unit test are in ALL2). In case of difficulties, a plenary might help for unresolved

| | | | students could finish the activity at home, gaining a longer wait time and challenging themselves completing the task individually. Alternatively, if students need support from peers or from the teacher, additional time could be allocated to the task at school, augmenting the length of the activity (another 50 minutes would be fine). The teacher supports the groups giving hints and eventually providing the scaffolding material of previous activity. | **Communicative structures** Why don't we ...? It can't work because ... We must... We should ... I agree/don't agree because ... To make it work we have to... | | | | errors: more able students suggest the solution with the teacher support. |

CLIL Lesson Plan

Unit number	3	Lesson number		1	Title	ADT Stack

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	10 minutes	Activate previous knowledge about stacks.	The teacher activates the class previous knowledge asking about the situations where they already met a stack. The stack is used in many other contexts related to ICT and the teacher will stimulate students recognition.	**Skills** L S R W **Key vocabulary** stack LIFO activation records memory pile **Communicative structures** Have you ever heard …? Could you tell me…? How does it work …?	☑ Whole class ☐ Group work ☐ Pair work ☐ Individual work		

| 2 | 40 minutes | Determine the characteristics of a Stack. Define the ADT Stack. Define a CDT for the Stack. Collaboration and social skills. Learning to learn. | Students work in pairs and initially focus on the characteristics of a Stack researching and/or using their previous knowledge. Then they define the ADT Stack and describe the characteristics of the CDT, choosing a data structure and outlining how it would support stack operations. The teacher gives the work directions following the attached document (see U3_L1_ALL1). Other than defining the Stack, this activity has the additional aim of consolidating the approach to be used when defining an ADT and a CDT. The teacher supports the students giving additional hints when needed. After about 20 minutes, a final individual task will help students self assess their learning (see document U3_L1_ALL2). | **Skills**

L S R W

Key vocabulary
stack LIFO (Last In First Out) mathematical and logical model data structure pop push peek top

Communicative structures
Can you identify ....? Do not forget to .... Remember to define .... Use present tense to describe properties. If ... when ... then ... We should/must .... | ▣ Whole class
☐ Group work
▣ Pair work
▣ Individual work | • U3_L1_ALL2.docx
• U3_L1_ALL1.docx

Work directions: U3_L1_ALL1 Self assessment: U3_L1_ALL2 | Students self assess their learning performing the tasks in U3_L1_ALL2. The self assessment is also aimed at ensuring that everyone in the class has reached the same basic knowledge during pair work. After a final plenary check about self assessment tasks, students are invited to self evaluate and reflect on their performance. |

CLIL Lesson Plan

Unit number	3	Lesson number		2	Title	CDT Stack

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment

| 1 | 10 minutes | Compare and contrast different designs for the same ADT and CDT. Time management. Social skills. | Students work in pairs, which have to be different from the ones used in lesson 1 of this unit ('ADT Stack'). This is important in order to stimulate comparison and discussion of previous work. Students agree on the design of the CDT, sketched during lesson1 of this unit while working in a different pair. The teacher supports the groups during their discussion helping to resolve contrasting ideas. The time constraint here is very important to favor concreteness. | **Skills**

L **S** R W

Key vocabulary
operations data properties data structure error situations

Communicative structures
Why don't we ....? We should .... It can't work because ... We must .. We might ... | ☐ Whole class
☐ Group work
☒ Pair work
☐ Individual work | | The agreement on the design of the CDT works as a peer review of each other previous work. |
| 2 | 40 minutes | Design an algorithm for the Stack. Implement the algorithm with a programming language. Group work and social | This task is best developed in a Computer Science Lab where the implementation can be done using a programming language. If computers are not | **Skills**

L **S** **R** W

Key vocabulary
variable structure type instruction cycle class method attribute | ☐ Whole class
☐ Group work
☒ Pair work
☐ Individual work | • U3_L2_ALL1.docx

To support less able students, the following web page provides additional explanations and an initial development of the Stack that students will need to | A summative assessment is performed on the outcome of the lesson, i.e. the ADT, the CDT and the software implementation of the Stack; |

		skills. Digital skills and computational thinking skills.	available, it is possible to implement the algorithm with a pseudocode. Students work in pairs, the same as in activity 1 of this lesson. Students implement the CDT using a programming language or a pseudocode. If working with PCs, students swap at the keyboard every 10 minutes, to ensure everyone's active contribution. The teacher supports the groups during their work and assures active contributions from all. In case some differentiation is needed, the teacher provides additional scaffolding to the less able groups (see Materials).	**Communicative structures** Why don't we ....? We should .... It can't work because ... We must ... We might .... Let's ...		complete: link U3_L2:ALL1: Assessment criteria for summative assessment.	for assessment criteria see attached file U3_L2_ALL1. Additional assessment can be performed on the students' attitude while working in pairs; possible criteria: concentration, cooperation, interaction, initiative.

CLIL Lesson Plan

Unit number	4	Lesson number	1	Title	Characteristics and operations

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	25 minutes	Identify the main characteristics of trees and binary trees. Identify the main characteristics of graphs and weighted graphs. Compare and contrast the most important ADTs. Group work.	Students work in groups of 3 or 4. The main task here is analyzing the material provided by the teacher (see U4_L1_ALL1). Students are invited to discuss about it, comparing and contrasting the presented ADTs. The teacher answers to questions, clarifies concepts and supports the discussion among the groups.	**Skills** L S R W **Key vocabulary** Tree Binary Tree Root Leaf Children Parent Node Edge Arch Branch Weight Path Insert Remove Search **Communicative structures** Look at ... Compare ... Contrast .... Can you explain how/what/why....?	☐ Whole class ☑ Group work ☐ Pair work ☐ Individual work	• U4_L1_ALL1.docx Textual descriptions and visual organizers presenting ADTs tree, binary tree, graph, weighted graph.	

| 2 | 25 minutes | Make a table to recap the main characteristics of ADTs List, Queue, Stack. Group work and social skills. | Students recap the three ADTs investigated during units 2 and 3 (List, Queue and Stack), following the model presented in the previous task. Students work in the same groups as in activity 1. They complete the table provided by the teacher (see U4_L1_ALL2). The teacher observes group work and gives feedback during the task. | **Skills**

 L S R W

 Key vocabulary
 sequence order LIFO FIFO element pop push enqueue dequeue top peek cardinality empty full

 Communicative structures
 I think we should .... Why don't we ... Let's .... We don't have to ... We have to .... | ☐ Whole class
 ☒ Group work
 ☐ Pair work
 ☐ Individual work | • U4_L1_ALL2.docx

 The material presents a table to be completed together with the table learned in activity 1, which serves as a template for this second task. | This task recaps previous learning. The teacher performs a formative ongoing assessment visiting the groups while they work. |

CLIL Lesson Plan

Unit number		4	Lesson number		2	Title	Applications

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	20 minutes	Reflect on the ADTs learned so far. Detect the best ADT suitable to support the solution to a problem. Group work and social skills.	The teacher provides a list of familiar situations related to real life or to IT world. The students work in groups and identify the best ADT to represent or support each of these situations. Students keep on working in groups. The teacher facilitates shared reflection and open discussion inside the groups.	**Skills** L S R W **Key vocabulary** Interrupts Pile Autocompletion Spell-checking Activation record Recursive function IP routing Spooling Buffer **Communicative structures** I suggest ... I believe .... I agree / don't agree because ...	☐ Whole class ☑ Group work ☐ Pair work ☐ Individual work	• U4_L2_ALL1.docx List of situations to be supported with an ADT.	

| 2 | 30 minutes | Evaluate other groups decisions about ADT applications. Presentation skills. | This second activity aims at reviewing the outcome of activity 1 while promoting traversal and cognitive skills. In turn, a representative of each group presents to the class the identified ADT for one of the situations analyzed during activity 1. The students have to explain why their group have made that choice. The rest of the class openly agrees or disagrees; in case of disagreement, it has to be explained why. The teacher supports reflection showing that in some cases there might be more than one solution. At the end, all the situations examined during activity 1 will have been discussed. | **Skills**

L S R W

Key vocabulary
stack queue list tree binary tree graph weighted graph

Communicative structures
In our opinion ... We rather suggest ... We don't agree because ... If .... then .... | ☒ Whole class
☐ Group work
☐ Pair work
☐ Individual work | | Ongoing assessment is performed by the teacher during the whole activity to evaluate students achievement. |

CLIL Lesson Plan

Unit number	5	Lesson number	1	Title	ADT Panoramic Wheel

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	20 minutes	Create a personalized ADT. Group work.	Students learn how to build their own ADT. Working in pairs, they develop an ADT to implement a panoramic wheel. The teacher provides scaffolding material to support the development process (see U5_L1_ALL1) and supervises the work. The teacher informs the students that their work will be validated by another group during the following activity in order to encourage completeness, clearness and preciseness of their work.	**Skills** L S R W **Key vocabulary** Panoramic wheel Carriages Rotation ADT CDT Data Structure **Communicative structures** We should ... Why don't we ...? Let's .... I would suggest .... I propose ...	☐ Whole class ☐ Group work ☑ Pair work ☐ Individual work	• U5_L1_ALL1.docx Scaffolding material for the development process.	

| 2 | 15 minutes | Make a timeline of the panoramic wheel operations. Validate the design of the ADT panoramic wheel. Social skills. | In the same pairs as in activity 1, the students exchange with another pair the design made during activity 1, in order to validate each others work. Every group simulates the functioning of the other pair's panoramic wheel, sequencing the identified operations on a timeline to verify the correctness of the model. The teacher gives support, paying particular attention to the methodological approach which requires to strictly adhere to the ADT as defined and described by the other group. Possibly the teacher will need to explain again the purpose of the activity and the approach to be used; scaffolding here could be eventually done using L1, because of the particular difficulty of the process and because of the importance of the learning outcome for the subsequent development of the unit. | **Skills**

 L S R W

 Key vocabulary
 Rotation Enter Exit Empty Full

 Communicative structures
 Is it possible to ....?
 What happens when ...?
 It is correct/not correct to .... What if ....? | ☐ Whole class
 ☐ Group work
 ☑ Pair work
 ☐ Individual work | • U5_L1_ALL2.docx

 U5_L1_ALL2: Procedure to be followed to create the timeline for the validation of the Panoramic Wheel. | This validation activity also represents a peer assessment of activity 1 learning outcome. |

| 3 | 15 minutes | Review a timeline to see if the operations have been well sequenced. Social skills. | The pairs who reviewed each others work are grouped together. They discuss about their findings and give feedback to each other using the timeline identified in the previous task. The teacher is available to intervene in case of difficulties. At the end of this activity each pair has a validated Panoramic Wheel design. | **Skills** L S R W **Key vocabulary** rotation rotating functioning entering exiting **Communicative structures** Why didn't you...? How did you ...? We believe ... We suggest ... | ☐ Whole class ▣ Group work ☐ Pair work ☐ Individual work | | Peer feedback. |

CLIL Lesson Plan

Unit number	5	Lesson number	2	Title	CDT Panoramic Wheel

Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	50 minutes	Design an algorithm for the Panoramic Wheel. Implement the algorithm with a programming language. Group work and social skills. Digital skills and computational thinking skills.	This task is best developed in a Computer Science Lab where the implementation can be done using a programming language. If computers are not available, it is possible to implement the algorithm with a pseudocode. Students work in pairs, the same as in lesson 1 'ADT Panoramic Wheel'. Students implement the CDT Panoramic Wheel using a programming language or a pseudocode. If working with PCs, the teacher asks students	**Skills** **L** **S** R W **Key vocabulary** variable data structure type instruction array cycle interface class method attribute **Communicative structures** Why don't we ....? We should .... It can't work because ... We must ... We have to	☐ Whole class ☐ Group work ▣ Pair work ☐ Individual work	• U3_L2_ALL1.docx Assessment criteria: U3_L2_ALL1.	Summative assessment of the learning outcome of the unit, i.e. the ADT, the CDT and the implementation of the panoramic wheel. For assessment criteria see U3_L2_ALL1, the same used to assess analogous outcome related to the Stack. Using the same criteria helps students gain confidence with

			teacher asks students to swap at the keyboard every 10 minutes, to ensure everyone's active contribution. The teacher supports the groups during their work.				confidence with the standards related to this difficult task. For individual summative assessment of content and language: each student individually adds to the code comments explaining the Panoramic Wheel data properties and operations.