KA210-SCH - Small-scale partnerships in school education
Communicating and Learning Is Life-changing - C.L.I.L.
Ref. Number: 2022-1-EL01-KA210-SCH-000082125

E-book of 9 learning scenarios based on CLIL Methodology

Nine Learning Scenarios

S.A.P.L.Le
Scientific Association for the Promotion of LifeLong Learning

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Scientific Association for the Promotion of Lifelong Learning
Address: 36 Achilleos str, 421 00, Trikala - Greece
e-mail: : association.saplle@gmail.com

SCENARIO TITLE

An introduction to the world's primary religions

SUBJECT

Religion/English

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The present lesson scenario has been developed within the framework of a European Erasmus+ KA210-SCH - Small-scale partnerships in school education project entitled "Communicating and Learning Is Life-changing - C.L.I.L.", Reference code: 2022-1-EL01-KA210-SCH-000082125.

The following partner organizations are involved in the project:

a) 6o GENIKO LYKEIO TRIKALWN, Trikala - Greece

b) Scientific Association for the Promotion of Lifelong Learning, Trikala - Greece

c) Lukioliikelaitos Tavastia Hämeenlinnan lyseon lukio, Hämeenlinna - Finland

d) Bilingual Junior High School, Wiener Neustadt - Austria

Project coordinator is 6o GENIKO LYKEIO TRIKALWN, Trikala - Greece.

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1. Title

An introduction to the world's primary religions

2. Estimated duration

45 minutes

3. Inclusion in the curriculum

The relevant topic is included in the Greek secondary education curriculum of 2nd Senior High school (In the subject of Religion). The relevant topic can be also used within an interdisciplinary lesson plan with the subject of History and the topic "The Religious Reform" combined with "the Religious map of Europe at the end of the 16th century" also included in the curriculum of B class of Senior High. It can be used by younger and older students with the relevant adjustment of text and activities.

4. Aims and objectives

a. Content:

- ✔ To gain a general perspective of the world's primary religions
- ✔ Definition of basic religious terms
- ✔ To understand the main differences of these religions

b. Language:

- ✔ To listen and keep notes

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✔ To read and comprehend a text about religions

✔ Give opinions and make comparison orally and in writing

✔ To learn specific terminology about religion

c. Cognition:

✔ Remembering: previous Knowledge on the topic

✔ Understanding: through questioning about the topic, explaining and describing

d. Culture

✔ Applying the knowledge gained in today's world and understanding the contemporary multicultural European world. Expression of thoughts.

5. Brief description of the scenario

This scenario is an effort to implement the CLIL methodology combining the subject of religion with the English language in a class of 20-25 students. It is implemented in one didactic hour and aims at complying with **4 Cs, Content, Communication**, **Cognition, Culture** of the CLIL methodology. The means used are digital tools, the internet, video, listening, reading, writing, speaking, evaluation rubrics and most important cooperation and teamwork of students**.** The activities included are indicative. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

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6. Is there an additional value in using the CLIL method?

CLIL involves teaching a curricular subject through the medium of a language other than that normally used. The key issue is that the learner is gaining new knowledge about the subject matter while encountering, using and learning the foreign language. CLIL is inspired by a twofold objective. It is meant to ensure first that students acquire knowledge of curricular subject matter and secondly develop their competence in a language other than the normal language of instruction. Due to the fact that these two disciplines –foreign language learning and the given subject matter– may rely on different approaches to knowledge acquisition and teaching methodologies, **both the language and the subject-matter specialist** have to design learning tasks and activities that complement each other, serve both purposes and are well balanced. Therefore in every Clil Lesson the teacher should keep in mind the **4 Cs, Content, Communication**, **Cognition, Culture** as depicted in the following picture. Summarizing, the goal is to **make students aware of the language** they are using **in combination with learning new content**.

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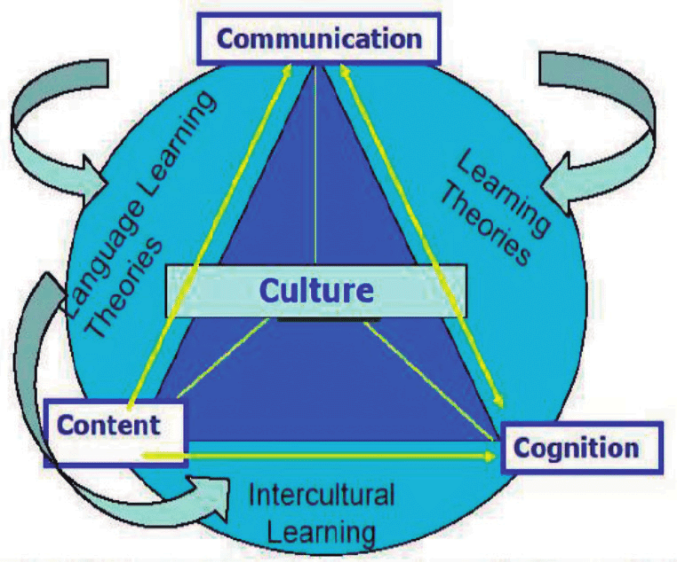

7. Description and analysis of worksheets (or other teaching material)

This scenario is easily implemented in class with the help of an interactive panel or projector or in the computer lab. Initially students are divided into 4 different groups. The teacher informs them about the topic they are going to discuss today. Students are asked to write down some of "the world's primary religions" and their characteristics if they know any. They discuss them with their group and start a conceptual map/diagram (brainstorming activity). While watching the video An introduction to World Religions they are asked to keep notes and improve their conceptual map.

Next, they are given a text: "The world's primary religions". The teacher can guide them to look for the meaning of the most important words using a word cloud or assigning them to do it themselves. An easy online tool is available at: https://www.wordclouds.com/ The students can look up the words on an online

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dictionary: https://www.collinsdictionary.com/dictionary/english https://www.wordreference.com/ (team work, shared activity). Then they check and enrich their conceptual map.

In the next step to consolidate basic knowledge about the cognitive object they check their Knowledge with a short quiz

In the last phase of the didactic hour each team using the following maps:

a) "Animated map shows how religion spread around the world"
b) "Geographical distribution of the religions of the world in the early 1980s"
c) PREVAILING BELIEFS

is asked to prepare a small text about the prevailing religions in their country or their origin country and justify the distribution of religions by arguments. At first, the teams discuss and decide which country they will present, if the members are of different origins. They keep notes. Each team presents orally their examples to the rest of the teams. –Alternatively and within the framework of the specific Erasmus+ project, each partner school can present the religions of the other two.

Assessment:

Alternatively proceed with the self –assessment rubric. A sample of teacher's assessment is following.

✔ Teacher's assessment sample

Assesment	Scores	Descriptors

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	Not satisfactory	Student shows non Knowledge of the subject and specific vocabulary /use of language
	Almost satisfactory	Student is lacking necessary background knowledge and uses specific vocabulary /language correctly
	Satisfactory	Student has essential Knowledge of the subject. He uses specific vocabulary and language correctly.
	Good	Student has a complete essential Knowledge of the subject. He properly uses specific vocabulary and language.
	Excellent	Student shows a complete and thorough Knowledge of the subject. He uses specific vocabulary and language in an excellent way.

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Worksheet

1. Brainstorming: Write down some of "the world's primary religions" and their characteristics if you know any. Then discuss them with your group and start a conceptual map/diagram (online or written). Suggested on line tools https://cmap.ihmc.us/ https://bubbl.us/ (brainstorming activity). (5 minutes)
2. While watching the video "An introduction to World Religions" you are asked to keep notes and improve their conceptual map. (5-7 minutes)
3. Read the text: "The world's primary religions". (10 minutes)

✔ Create a word cloud of the text using the easy online tool https://www.wordclouds.com/

✔ Look up for the meaning of the most important words of your word cloud and provide the definitions found in an online dictionary: https://www.collinsdictionary.com/dictionary/english https://www.wordreference.com/

✔ Now check and enrich your conceptual map.

4. Check the basic knowledge about the cognitive object with a short quiz . (5 minutes)
5. In the last phase of the didactic hour each team using the following maps:
   a) "Animated map shows how religion spread around the world"
   b) "Geographical distribution of the religions of the world in the early 1980s"
   c) PREVAILING BELIEFS

[10]

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is asked to prepare a small text about the prevailing religions in your country or your origin country and justify the distribution of religions by arguments. At first, discuss with your team and decide which country you will present, if the members are of different origins. Keep notes. Each team will present orally their examples to the rest of the teams. –Alternatively and within the framework of the specific Erasmus+ project, each partner school can present the religions of the other two.

6. Now try to evaluate the knowledge you gained using the Self-assessment rubric!

8. Evaluation

The teaching material drew ideas from existing lesson plans. However, the lesson design attempted to adjust the subject of Religion from the Greek school curriculum to a lesson using the CLIL method and several digital sources and tools. A topic was chosen that is likely to be of broad interest and can be used by the two other project partners (Austria and Finland) with the possibility of selective use and modification or enrichment of the activities according to the language level of the students. At the same time, students are given the opportunity to work in groups using digital tools and to develop their critical ability by applying the basic knowledge they gained for the primary religions of the world in contemporary everyday life. This way students are given the opportunity to express themselves not only critically but also using a foreign language in a topic of religion. The specific scenario is promoting coexistence and respect of different religions, necessary for a multicultural community. Moreover skills such as communication, cooperation are cultivated while self- assessment

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initiates students to reflection. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

Special notice: The difficulty language level of the text according to the Common European Framework or CEFR Levels was calculated by two online tools Flesch Kincaid Calculator and Road to Grammar and was detected as upper intermediate (C1). The texts included in the English books of the Greek curriculum of senior high school are of level C1 to C2.

Advice: According to the aforementioned calculators the level of text can become B2 as soon as we break the text in smaller pieces. Therefore teachers applying the specific lesson plan can adjust it to the language level of the students and accordingly adjust the activities included.

9. Sources and Tools

1. https://www.britannica.com/story/what-is-the-most-widely-practiced-religion-in-the-world
2. https://www.britannica.com/summary/Judaism
3. Geographical distribution of the religions of the world in the early 1980s https://cdn.britannica.com/31/3731-050-CE6187E6/distribution-religions-world.jpg
4. Animated map shows how religion spread around the world Insider Business https://youtu.be/AvFl6UBZLv4\

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5. PREVAILING BELIEFS
   https://contrib.pbslearningmedia.org/WGBH/sj14/sj14-int-religmap/index.html#
6. https://www.wordclouds.com/
7. Collins online dictionary.
   https://www.collinsdictionary.com/dictionary/english
8. https://www.wordreference.com/
9. https://h5p.org/
10. https://create.kahoot.it/
11. https://rubric-maker.com/
12. Road To Grammar http://www.roadtogrammar.com/textanalysis/
13. Flesch Kincaid Calculator
    https://goodcalculators.com/flesch-kincaid-calculator/
14. https://cmap.ihmc.us/
15. https://bubbl.us/

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Scientific Association for the Promotion of Lifelong Learning
Address: 36 Achilleos str, 421 00, Trikala - Greece
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SCENARIO TITLE

The Four Cardinal Virtues of Stoicism

SUBJECT

Philosophy/Ethics/English

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The present lesson scenario has been developed within the framework of a European Erasmus+ KA210-SCH - Small-scale partnerships in school education project entitled "Communicating and Learning Is Life-changing - C.L.I.L.", Reference code: 2022-1-EL01-KA210-SCH-000082125.

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d) Bilingual Junior High School, Wiener Neustadt - Austria

Project coordinator is 6o GENIKO LYKEIO TRIKALWN, Trikala - Greece

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1. Title

Stoicism / The Four Cardinal Virtues

2. Estimated duration

45 minutes

3. Inclusion in the curriculum

The relevant topic is included in the Greek secondary education curriculum of 3rd Junior High school (In the subject "Principles of philosophy" (14-15 years old). The relevant topic is also included in the curriculum of B class of Senior High school-chapter 1-Final questions. Therefore it can be used by younger and older students with the relevant adjustment of text and activities.

4. Aims and objectives

a. Content:

✔ To gain philosophical perspective of Stoicism and its main principles

✔ Definition of the term stoicism

✔ To understand the philosophic theory behind stoicism

b. Language:

✔ To listen and keep notes

✔ To read and comprehend a text about philosophy

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✔ Give opinions and make comparison orally and in writing

✔ To learn specific terminology about philosophy and ethics

c. Cognition:

✔ Remembering: previous Knowledge on the topic

✔ Understanding: through questioning about the topic, explaining and describing

d. Culture

✔ Applying the ideas of stoicism in today's world. Expression of thoughts.

5. Brief description of the scenario

This scenario is an effort to implement the CLIL methodology combining the subject of philosophy/ethics with the English language in a class of 20-25 students. It is implemented in one didactic hour and aims at complying with **4 Cs, Content, Communication**, **Cognition, Culture** of the CLIL methodology. The means used are digital tools, the internet, video, listening, reading, writing, speaking, evaluation rubrics and most important cooperation and teamwork of students**.** The activities included are indicative. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

6. Is there an additional value in using the CLIL method?

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CLIL involves teaching a curricular subject through the medium of a language other than that normally used. The key issue is that the learner is gaining new knowledge about the subject matter while encountering, using and learning the foreign language. CLIL is inspired by a twofold objective. It is meant to ensure first that students acquire knowledge of curricular subject matter and secondly develop their competence in a language other than the normal language of instruction . Due to the fact that these two disciplines –foreign language learning and the given subject matter– may rely on different approaches to knowledge acquisition and teaching methodologies, **both the language and the subject-matter specialist** have to design learning tasks and activities that complement each other, serve both purposes and are well balanced.Therefore in every Clil Lesson the teacher should keep in mind the **4 Cs, Content, Communication**, **Cognition, Culture** as depicted in the following picture. Summarizing, the goal is to **make students aware of the language** they are using **in combination with learning new content**.

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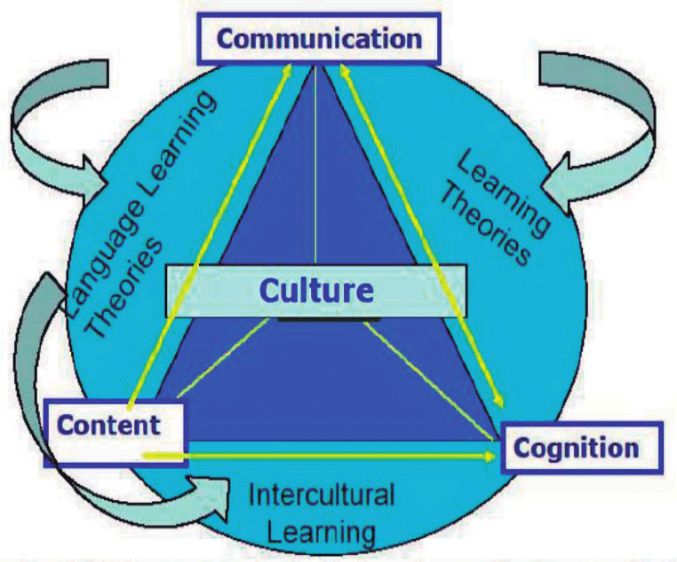

7. Description and analysis of worksheets (or other teaching material)

This scenario is easily implemented in class with the help of an interactive panel or projector or in the computer lab. Initially students are divided into 4 different groups. The teacher informs them about the topic they are going to discuss today. Students are asked to write down some thoughts about the meaning of stoicism, discuss them with their group and start a conceptual map/diagram (online or written). Suggested on line tools https://cmap.ihmc.us/ https://bubbl.us/ (brainstorming activity). While watching the video "Stoicism Explained In 3 Minutes", they are asked to keep notes and improve their conceptual map.

Next, they are given a text: "What Are the Four Cardinal Virtues of Stoicism?" The teacher can guide them to look for the meaning of the most important words using a word cloud or assigning them to do it themselves. An easy online tool is available at: https://www.wordclouds.com/ The students can look up the words on an online

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dictionary:https://www.collinsdictionary.com/dictionary/english https://www.wordreference.com/ (team work, shared activity). Then they check and enrich their conceptual map.

In the next step to consolidate the cognitive object the students get to play with the dialogue cards game.

In the last phase of the didactic hour each team is asked to prepare a small text with examples of contemporary situations where the 4 cardinal virtues of stoicism might seem useful or should be applied. Each team presents orally their examples to the rest of the teams.

Finally, if there is time, the last 5 minutes the students take part in a kahoot game for stoicism.

Assessment:

Alternatively proceed with the self –assessment rubric. A sample of teacher's assessment is following.

✔ Teacher's assessment sample

Assesment	Scores	Descriptors
	Not satisfactory	Student shows non Knowledge of the subject and specific vocabulary /use of language
	Almost satisfactory	Student is lacking necessary background knowledge and uses specific vocabulary /language correctly

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	Satisfactory	Student has essential Knowledge of the subject. He uses specific vocabulary and language correctly.
	Good	Student has a complete essential Knowledge of the subject. He properly uses specific vocabulary and language.
	Excellent	Student shows a complete and thorough Knowledge of the subject. He uses specific vocabulary and language in an excellent way.

Worksheet

1. Brainstorming: Write down some thoughts about the meaning of stoicism, discuss them with your group and start a conceptual map/diagram (5 minutes)
2. While watching the video "Stoicism Explained In 3 Minutes", keep notes and improve your conceptual map. (5-7 minutes)
3. Read the text "What Are the Four Cardinal Virtues of Stoicism?" (10 minutes)

✔ Create a word cloud of the text using the easy online tool https://www.wordclouds.com/

✔ Look up for the meaning of the most important words of your word cloud and provide the definitions found in an online dictionary. i.e. https://www.collinsdictionary.com/dictionary/english
https://www.wordreference.com/

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✔ Now check and enrich your conceptual map.

4. To consolidate your knowledge play within your team with the dialogue cards game (5 minutes)

5. Finally each team is asked to prepare a small text with examples of contemporary situations where the 4 cardinal virtues of stoicism might seem useful or should be applied. Each team presents orally their examples to the rest of the teams. (7 minutes plus 2 minutes per team per presentation) (15 minutes)
6. Finally, if there is time, the last 5 minutes the students take part in a kahoot game for stoicism.
7. Now try to evaluate the knowledge you gained using the Self-assessment rubric!

8. Evaluation

The teaching material drew ideas from existing lesson plans.However, the lesson design attempted to adjust the subject of Philosophy from the Greek school curriculum to a lesson using the CLIL method and several digital sources and tools. A topic was chosen that is likely to be of broad interest and can be used by the two other project partners (Austria and Finland) with the possibility of selective use and modification or enrichment of the activities according to the language level of the students. At the same time, students are given the opportunity to work in groups using digital tools and to develop their critical ability by applying the basic principles of stoicism in contemporary everyday life.This way students are given the opportunity to express themselves not only critically but also using a foreign

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language in a topic of philosophy. Moreover skills such as communication, cooperation are cultivated while self- assessment initiates students to reflection. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

Special notice: The difficulty language level of the text according to the Common European Framework or CEFR Levels was calculated by two online tools Flesch Kincaid Calculator and Road to Grammar and was detected as upper intermediate (C1). The texts included in the English books of the Greek curriculum of senior high school are of level C1 to C2.

Advice: According to the aforementioned calculators the level of text can become B2 as soon as we break the text in smaller pieces. Therefore teachers applying the specific lesson plan can adjust it to the language level of the students and accordingly adjust the activities included.

9. Sources and Tools

1. Stoicism Explained In 3 Minutes https://youtu.be/Rxzx5x7TY5M
2. What **Are the Four Cardinal Virtues of Stoicism?** https://www.thecollector.com/what-are-the-four-cardinal-virtues-of-stoicism/
3. https://www.wordclouds.com/
4. Collins online dictionary. https://www.collinsdictionary.com/dictionary/english
5. https://h5p.org/
6. https://create.kahoot.it/

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7. https://rubric-maker.com/
8. Road To Grammar http://www.roadtogrammar.com/textanalysis/
9. Flesch Kincaid Calculator
   https://goodcalculators.com/flesch-kincaid-calculator/
10. https://cmap.ihmc.us/
11. https://bubbl.us/

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Scientific Association for the Promotion of Lifelong Learning

Address: 36 Achilleos str, 421 00, Trikala - Greece e-mail: : association.saplle@gmail.com

SCENARIO

TITLE

Athenian Democracy in Ancient Greece: The main institutions and their influence in contemporary democracy.

SUBJECT

Co-funded by the European Union

History/English

Charikleia
Rousoulioti

12/4/2023

The present lesson scenario has been developed within the framework of a European Erasmus+ KA210-SCH - Small-scale partnerships in school education project entitled "Communicating and Learning Is Life-changing - C.L.I.L.", Reference code: 2022-1-EL01-KA210-SCH-000082125.

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c) Lukioliikelaitos Tavastia Hämeenlinnan lyseon lukio, Hämeenlinna - Finland d) Bilingual Junior High School, Wiener Neustadt – Austria

Project coordinator is 6o GENIKO LYKEIO TRIKALWN, Trikala - Greece

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1. Title

Athenian Democracy in Ancient Greece: The main institutions and their influence in contemporary democracy.

2. Estimated duration

45 minutes+45 minutes

3. Inclusion in the curriculum

A class of General Lyceum (General education curriculum of History)(15-16 years old). The relevant chapter is also included in the curriculum of A class of Junior High school. Therefore it can be used by younger students with the relevant adjustment of text.

4. Aims and objectives

a. Content:

To gain historical perspective of the Athenian Democracy and its institutions
Definition of the term democracy as opposed to other forms of government

To understand the function of the main Athenian Democracy's institutions

b. Language:

To listen and keep notes

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To read and comprehend a text about history

Give opinions and make comparison orally and in writing

To make descriptions

Specific terminology about political institutions and historical events

c. Cognition:

Remembering: previous Knowledge on the topic

Understanding: through questioning about the topic, explaining and describing

d. Culture

Finding similarities and Comparing differences between ancient democracy and present types of government

5. Brief description of the scenario

This scenario is an effort to implement the CLIL methodology combining the subject of History with the English language in a class of 20-25 16 years old students. It is implemented in two didactic hours and aims at complying with **4 Cs, Content, Communication**, **Cognition, Culture** of the CLIL methodology. The means used are digital tools, the internet, video, listening, reading, writing, speaking, evaluation rubrics and most important

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cooperation and teamwork of students**.** The activities included are indicative. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

6. Is there an additional value in using the CLIL method?

CLIL involves teaching a curricular subject through the medium of a language other than that normally used. The key issue is that the learner is gaining new knowledge about the subject matter while encountering, using and learning the

foreign language. CLIL is inspired by a twofold objective. It is meant to ensure first that students acquire knowledge of curricular subject matter and secondly develop their competence in a language other than the normal language of instruction. Due to the fact that these two disciplines –foreign language learning and the given subject matter– may rely on different approaches to knowledge acquisition and teaching methodologies, **both the language and the subject- matter specialist** have to design learning tasks and activities that complement each other, serve both purposes and are well balanced.Therefore in every Clil Lesson the teacher should keep in mind the **4 Cs, Content, Communication**, **Cognition, Culture** as depicted in the following picture. Summarizing, the goal is to **make students aware of the language** they are using **in combination with learning new content**.

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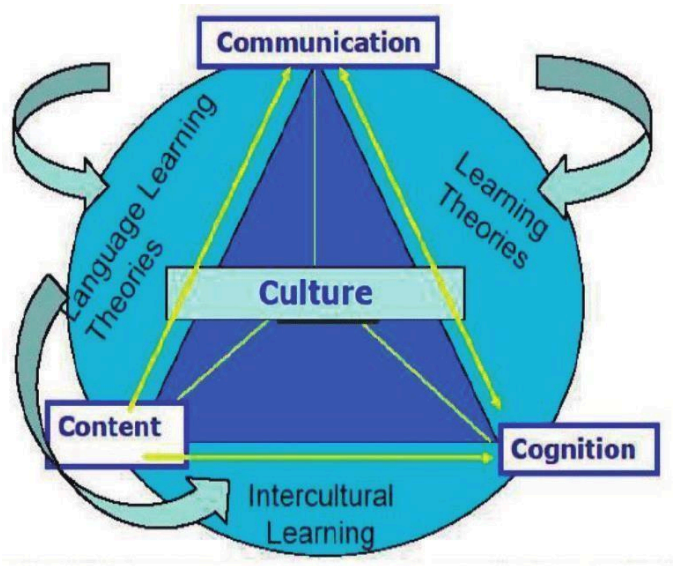

7. Description and analysis of worksheets (or other teaching material)

This scenario is easily implemented in class with the help of an interactive panel or projector or in the computer lab. During **the 1st didactic** hour initially students are divided into 4 different groups. The teacher informs them about the topic they are going to discuss today. Students are asked to write down some thoughts about the characteristics of a democracy, discuss them with their group and start a conceptual map/diagram (brainstorming activity). While watching the first 5 minutes of the video "Uncovering the Roots of Democracy An Exploration of the Political Institutions of Athenian Democracy" (1-5 minutes), they are asked to keep notes and improve their conceptual map.

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Next, they are given a text about Athenian Democracy or here (online text or pdf file format) and they are also given a tool that will help them find the meaning of unknown words. The teacher spends a few minutes to show them how the following tools work. https://clilstore.eu/wordlink. https://clilstore.eu/multidict/ Students are asked to work with definitions of words found in the dictionary. (team work, shared activity)

In the last phase of the 1st didactic hour each team is asked to answer specific

questions assigned to them by the teacher and include them in the common google doc.(consolidation of the cognitive object)

During the **2nd didactic hour** at first students respond to the "fill in the blanks" and the "crossword puzzle", "use the specific words in sentences" activities integrated in the moodle platform of the project. Then students are called to answer within their team the open ended questions included in the 2nd worksheet. The teacher proceeds with assessment and gives the students a self-assessment table to fill in created by https://rubric-maker.com/

1. Assessment:

Teacher's assessment sample

Assessment	Scores	Descriptors
	Not satisfactory	Student shows non Knowledge of the

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		subject and specific vocabulary /use of language
	Almost satisfactory	Student is lacking necessary background knowledge and uses specific vocabulary /language correctly
	Satisfactory	Student has essential Knowledge of the subject. He uses specific vocabulary and language correctly.

	Good	Student has a complete essential Knowledge of the subject. He properly uses specific vocabulary and language.
	Excellent	Student shows a complete and thorough Knowledge of the subject. He uses specific vocabulary and language in an excellent way.

1st worksheet

1. Brainstorming: What principles, procedures, and institutions do you think are characteristic of a democracy? Write down some thoughts. Then, discuss them with your team and start a conceptual map/diagram (online or written)suggested on line tools https://cmap.ihmc.us/ https://bubbl.us/ (5-10 minutes)

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2. While watching the first 5 minutes of the video "Uncovering the Roots of Democracy An Exploration of the Political Institutions of Athenian Democracy" (1-5 minutes) keep notes and improve your conceptual map.(include definitions and functions)(5-7 minutes)

3. Read the text about Athenian Democracy or here and (15 minutes presentation and use of the tools)

https://clilstore.eu/wordlink. or https://clilstore.eu/multidict/ Using the aforementioned tools find the meaning of unknown words.

Each team is asked to work with specific words (i.e 5 per team) and provide the definitions found in the dictionary-definitions of the first 3 words are provided as an example from the teacher. (Students work in a common Google doc)

1. **Sovereign** (adj.) having supreme power or authority:

2. **institutions** an organization devoted to the promotion of a cause, program, etc., esp. one of a public or educational character:[countable]Large institutions have big bureaucracies

3. **council n. [countable]**

a meeting for consultation, discussion, or advice: a church council.

body appointed or elected to give advice, to make rules, or to administer an organization: the governor's council on housing

4. **representatives**
5. **courts**
6. **invention**

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7. **direct**
8. **equality**
9. **abolished**
10. **aristocrats**
11. **assembly**
12. **revised**
13. **condemned**
14. **ambassadors**
15. **dictated**
16. **chosen by lot**
17. **random**
18. **establishment**
19. **jurors**
20. **prosecution**
21. **verdicts**
22. **officials**
23. **appointed**

4. Now answer within your team 2 of the following questions assigned to your team by your teacher (use the common Google doc)(5 minutes)

a. Name the three separate institutions comprised in the Athenian Democracy. b. Who is considered to be “The Father of Democracy?

[35]

c. Who Could Vote in Ancient Greece?

d. Which was the most splendid of virtues?

e. What kind of decisions did the ekklesia make?

f. What does Ostracism mean?

g. Which was the main function of Boule?

h. Describe the way jurors were chosen for the popular courts, or dikasteria, every day.

2nd worksheet

Team work: https://h5p.org/node/1373702

1. Fill in the missing words

This system was comprised of three separate : the ekklesia, a sovereign governing body that wrote laws and dictated foreign policy; the boule,

a of representatives from the ten Athenian tribes and the dikasteria,

the popular in which citizens argued cases before a group of

lottery-selected

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jurors. Although this Athenian democracy would survive for only two centuries,

its by Cleisthenes, "The Father of Democracy," was one of ancient

Greece's most enduring contributions to the modern world. The Greek system

of democracy would pave the way for representative democracies across the globe.

(*the activity may be expanded with all the defined words from the previous didactic hour*)

2. Write five sentences referring to your own country form of government.

   Each sentence should have one of the words of the following list:

officials, appointed, equality, **representatives, assembly**

3. Fill in the crossword puzzle

4. Discuss with your team the following questions and stand for your opinion with arguments. One of you should be able to present it in the classroom. (One of the first four questions assigned per team. Last question is common for all teams.)

   What are some examples of ways in which current societies that claim to be democracies are not truly democratic?

   Are there any modern societies that seem to share Athens'

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fundamental democratic values?

Is democracy inherently or always good?

Think about one change you would make to the Athenian government in order to make it more democratic.

Research the basic structure of your own country's government and write down ways in which it appears to be more or less democratic than Athenian democracy.

5. Now try to evaluate the knowledge you gained!

8. Evaluation

The teaching material drew ideas from existing lesson plans. However, the lesson design attempted to adjust a history lesson from the Greek general Lyceum school curriculum to a lesson using the CLIL method and several digital sources and tools. A topic was chosen that is likely to be of broad interest and can be used by the two other project partners (Austrian and Finnish school) with the possibility of selective use and modification or enrichment of the activities according to the language level of the students. At the same time, students are given the opportunity to work in groups using digital tools and to develop their critical ability by making well- reasoned judgements about governance in their country by linking and comparing it with the Athenian democracy. This way students are given the opportunity to express

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themselves not only critically but also using a foreign language in a topic of civic engagement. Moreover skills such as communication, cooperation are cultivated while self- assessment initiates students to reflection. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

Special notice: The difficulty language level of the text according to the Common European Framework or CEFR Levels was calculated by two online tools Flesch Kincaid Calculator and Road to Grammar and was detected as upper intermediate (C1). The texts included in the English books of the Greek curriculum of senior high school are of level C1 to C2.

Advice: According to the aforementioned calculators the level of text can become B2 as soon as we break the text in smaller pieces. Therefore teachers applying the specific lesson plan can adjust it to the language level of the students and accordingly adjust the activities included.

9. Sources and tools

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- Uncovering the Roots of Democracy An Exploration of the Political

  Institutions of Athenian Democracy
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- https://h5p.org/
- https://rubric-maker.com/
- https://hotpot.uvic.ca/
- Road To Grammar http://www.roadtogrammar.com/textanalysis/
- Flesch Kincaid Calculator
  https://goodcalculators.com/flesch-kincaid- calculator/
- https://cmap.ihmc.us/
- https://bubbl.us/

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KA210-SCH - Small-scale partnerships in school education
Communicating and Learning Is Life-changing - C.L.I.L.
Ref. Number: 2022-1-EL01-KA210-SCH-000082125

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SCENARIO TITLE

Adding positive negative numbers

SUBJECT

Math/Sciences/English

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The present lesson scenario has been developed within the framework of a European Erasmus+ KA210-SCH - Small-scale partnerships in school education project entitled "Communicating and Learning Is Life-changing - C.L.I.L.", Reference code: 2022-1-EL01-KA210-SCH-000082125.

The following partner organizations are involved in the project:

a) 6o GENIKO LYKEIO TRIKALWN, Trikala - Greece

b) Scientific Association for the Promotion of Lifelong Learning, Trikala - Greece

c) Lukioliikelaitos Tavastia Hämeenlinnan lyseon lukio, Hämeenlinna - Finland

d) Bilingual Junior High School, Wiener Neustadt - Austria

Project coordinator is 6o GENIKO LYKEIO TRIKALWN, Trikala - Greece

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1. Title

Adding positive negative numbers

2. Estimated duration

45 minutes (1 teaching hour)

3. Inclusion in the curriculum

The relevant topic is included in the Greek secondary education curriculum of 1st class of Junior High school (In the subject "**Mathematics**", chapter "**Adding positive negative numbers**", (12-13 years old). It can be used also by younger and older students with the relevant adjustment of text and activities.

4. Aims and objectives

a. Content:

- To clarify the representation of numbers on the number line
- To understand the meaning of addition through the use of teaching models
- To look for logical links, explanations
- To formulate and adopt the rules for adding integers
- To practice in operations with decimal numbers and fractions

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b. Language:

- To listen and keep notes.
- To read and comprehend a text about Mathematics.
- Give opinions and make comparison orally and in writing.
- To learn specific terminology about Mathematics and Geometry.

c. Cognition:

- Building knowledge through: experimentation, creation and control speculation, conclusions and generalization
- Develop communication and argumentation practices with their classmates

d. Culture

- Opportunities for engaging students in self-made manufacturing processes mathematical meanings

5. Brief description of the scenario

The purpose of the scenario is to introduce the addition of positive and negative numbers by exploiting students' empirical knowledge. Two models will be used at the same time. We will first use the model of successive representation of two

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numbers on the number line and then the model of discrete positive - negative cards. By using models and “bargaining” within the classroom, students will formulate and become familiar with the rules of adding integers and then practice in decimal numbers and fractions.

6. Is there an additional value in using the CLIL method?

There can be additional value in using the CLIL (Content and Language Integrated Learning) method to teach the subject of "Adding positive and negative numbers." CLIL is an educational approach that combines the teaching of content and language, often in a bilingual setting, where students learn a subject while simultaneously developing their language skills.

Here are some potential benefits of using the CLIL method for teaching this subject:

Language Proficiency: CLIL helps students improve their language proficiency in both the target subject (mathematics in this case) and the language used for instruction (e.g., English). This is especially valuable in subjects like math, where precise language and terminology are crucial.

Contextual Learning: CLIL provides a real-world context for learning. Students are not just learning abstract mathematical concepts but are applying them to real-life situations, which can enhance their understanding and retention of the material.

Cognitive Skills Development: CLIL encourages critical thinking, problem-solving, and analytical skills. This is particularly relevant in math, where students need to understand and apply concepts rather than just memorize formulas.

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Multidisciplinary Learning: CLIL often involves integrating different subjects or disciplines. In this case, students may also be learning about language and math simultaneously, which can lead to a deeper understanding of both.

Increased Motivation: Engaging students with content that has real-world applications can increase their motivation to learn. Understanding how adding positive and negative numbers applies in various situations can make the subject more interesting and relevant to students.

Cultural Awareness: If the CLIL method involves learning in a second language, it can also promote cultural awareness and understanding, as students are exposed to different linguistic and cultural contexts.

Preparation for Globalization: In an increasingly interconnected world, proficiency in a second language and the ability to learn and apply concepts in multiple languages can be a valuable skillset.

Inclusivity: CLIL can be adapted to accommodate diverse learners, including those who may have different learning styles or may come from various linguistic backgrounds.

However, it's important to note that the effectiveness of CLIL depends on various factors, including the quality of instruction, the proficiency of the teacher in both content and language, the relevance of the content, and the level of language proficiency of the students. Additionally, it's crucial to strike a balance between content and language instruction to ensure that both are effectively integrated.

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In summary, using the CLIL method to teach "Adding positive and negative numbers" can offer numerous benefits, particularly in terms of language development, contextual learning, and cognitive skill development.

7. Description and analysis of worksheets (or other teaching material)

In our scenario we emphasize at empirical situations and aim at the active attitude of students. It will be conducted in the computer lab in groups of two or three students.

The geogebra file add_en.ggb will be used. In the first activity the number line will be used to introduce the addition of positive negative numbers through a real frame. This activity will take approximately 10 minutes. The final position of a packet which starts from zero and looks at the positives is the object of the scenario. We assume that the package moves forward if the number is positive and backwards if it is negative. In the number line, the sum of two numbers is the final position of a point moving to the right (we can assume that a point is moving in the direction of the vector) if the number is positive and to the left if it is negative. Its final position is the sum of the two numbers.

In the second activity we will ask to see a video about adding positive negative numbers through the number line (Duration 5 minutes).

The third activity will introduce the addition of positive negative numbers via cards (Duration 10 minutes). In the model of positive negative cards, a positive number is represented by "+" cards and a negative by "-" cards. An equal number of positive and negative cards are canceled out. On the positive - negative cards the real context for adding, could be finding the final score of a group of students, when in a

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classroom game the teacher gives a "+" card in the correct answer or "-" card in the wrong answer.

In the fourth activity we will ask students to generalize and formulate the models that were worked out in previous activities. Results will be presented at the class.

At the fifth activity we will aim our students to practice the rules that they created and apply it at decimal numbers and fractions.

At the last activity, students will have to fill in a “language” crossword.

Prerequisite Student Knowledge:

Concerning mathematics students should be aware of:

• The concept of positive-negative numbers.

• Represent the positive-negative numbers with points of a straight line.

In terms of technology, students should be familiar with the basic functions of GeoGebra software.

Key words characterizing the theme of the script

representation, adding integers, decimal numbers, fractions, logical links

Classroom organization and logistical infrastructure

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In the context of the scenario, students will work in groups of two (pairs) in the **school's IT lab**. Their roles depend on the activities they will investigate with the main role being that of the **researcher**. The teacher can have the role of the **observer** during the investigation, and s/he can intervene with reflective and prompting comments, as well as contribute as a **co-investigator** while working with the activities. **Communication** between teams will play an important role during and after the completion of the activities. This communication can be carried out with the teacher's coordination. The teacher, during the implementation of the scenario, is important to check the conclusions that arise, to facilitate the argumentation and to provoke discussions in the context of the class when s/he considers that some conclusions are useful for the continuation. Wherever there is an interactive whiteboard, all students can work as one community commenting, suggesting and implementing. The existence and use of the interactive whiteboard can contribute to the implementation of the scenario activities.

Materials:

- worksheet 1

8. Evaluation

The teaching material drew ideas from existing lesson plans. However, the lesson design attempted to adjust the subject of **Mathematics** from the Greek school curriculum to a lesson using the CLIL method and several digital sources and tools. A topic was chosen (**Adding positive negative numbers**) that is likely to be of broad interest and can be used by the two other project partners (Austria and Finland) with

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the possibility of selective use and modification or enrichment of the activities according to the language level of the students. At the same time, students are given the opportunity to work in groups using digital tools and to develop their critical ability by applying the basic knowledge they gained. This way students are given the opportunity to express themselves not only critically but also using a foreign language **in a topic of Mathematics**. Skills such as communication, cooperation are cultivated while self-assessment initiates students to reflection. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

9. Sources and Tools

1. **https://www.mathsisfun.com/positive-negative-integers.html**
2. **https://www.eclipsecrossword.com/**
3. **https://www.thoughtco.com/cheat-sheet-positive-negative-numbers-2312519**
4. **https://www.yourdictionary.com/articles/positive-negative-rules**
5. **https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-negative-numbers-add-and-subtract/x6b17ba59:adding-negative-numbers-fluently/a/adding-negative-numbers-review**

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KA210-SCH - Small-scale partnerships in school education
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Ref. Number: 2022-1-EL01-KA210-SCH-000082125

SCENARIO TITLE

Ohm's Law

SUBJECT

Math/Sciences/English

WORKSHEET

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Worksheet 1

Introduction– connection to previous lessons (5 min)

Watch the presentation of what can happen to us if we touch the poles of an electrical source with our hands. The presentation is about the law discovered by a German scientist named Ohm

It is important to participate in the presentation with questions and provide answers.

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Worksheet2

The investigation of the voltage- current relationship (40 min)

1st Activity (15 min) What should we do (procedure) to find any relationship that connects the physical quantities voltage - current.

In this activity:

You will learn how to scientifically find out whether there is a specific relationship between voltage and current in a simple circuit.

You will work with your group mates and arrive at mutually agreed answers/conclusions to the questions of the worksheet.

At the end you should be able to present and support your views in class.

After what has been discussed so far, do you think there is a specific mathematical relationship that connects the quantities voltage and current? (Yes No)

……

If we - as Ohm did - want to work as scientists to find any relationship that may exist between **current** and **voltage,** what should we do?

You must describe in detail and clearly the steps/process you will need to follow. In case you propose an experiment, you should briefly describe it, say what measurements you will take, with what instruments you will take them and how you will manage the data.

Present/discuss your proposal in class.

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2nd Activity (25 min) The experimental investigation of the voltage and current intensity relationship

In this activity:

You will experiment to discover any relationship between voltage and current in a "simple" electrical circuit (with a resistor).

You will work with your group mates, carry out the experiment together and arrive at mutually agreed answers/conclusions to the questions of the worksheet.

At the end you should be able to present and support your views in class.

Using the materials/elements in front of you, construct/assemble an electrical circuit consisting of a source, a resistor, a switch, and the necessary conductors.

An indicative proposal is that of the image below.

Alternately place the three (3) batteries in the circuit, and for each battery (source) (4.5 – 6 and 9 V) measure with the ammeter the current intensity in the circuit.

Place the pairs of voltage - intensity values that you will get in a digital excel table that you will have to construct.

An indicative form of the table is as follows

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Voltage V (Volt)	Current I (A)	Ratio V/I
4,5		
6		
9		

Give Excel the command to calculate the V/I ratios and automatically fill in the 3rd column of the table.

Then instruct Excel to create the V-I chart based on the data in the first two columns of the table. Select **'X Y Scatter'** as the chart type.

Observe the shape of the chart curve that emerges, as well as the values of the V/I ratio in the third column of the Excel table.

The voltage and current are related by what relationship?

Discuss your conclusions in class. By the end of the discussion, you should be able to define the terms "electrical resistance" and understand why the unit of measurement for resistance is called 1 Ohm.

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Worksheet3

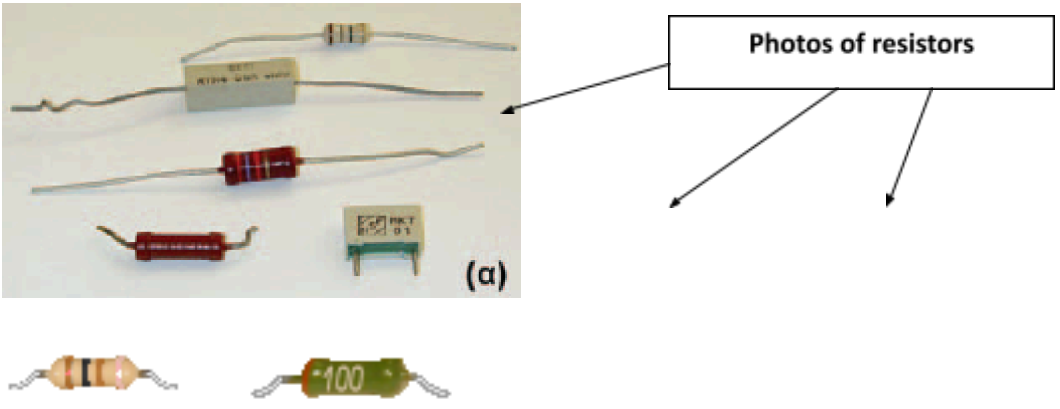
The usefulness of Ohm's law and its use in practice (35 min)

3rd Activity (15 min) The usefulness of Ohm's law.

The purpose of this activity is to understand the usefulness of Ohm's Law in everyday life.

In collaboration with your classmates in your group, after studying the texts in the following paragraphs, you will attempt to find the utility of Ohm's Law. You should arrive at a common prediction/proposal, which you will present to the class.

In the market, there are **resistors** of specific resistance values which are essential because they are used in almost every electrical circuit found in every electrical or electronic device. There are many forms of resistors. You can see the resistors in front of you and some other forms in the following images which are displayed.



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The value of the resistance can be indicated on the resistor itself or inferred from the color bands present on its surface.
As you understand, the **relationship V/I=R** (Ohm's Law) gives us the ability to calculate the value of the third variable when we know two out of these three quantities.

What do you think is the usefulness of Ohm's Law in our daily life?

Present/discuss your statement in class.

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4th Activity (20 min) Applications of Ohm's law

The purpose of this activity is to learn how to apply Ohm's Law in simple problem-solving situations.

In collaboration with your fellow students, you should solve the following two problems, and when you're done, you should be able to present and support your answers in class.

If we are given a resistor with a specific resistance, **e.g., 100 Ω**, and asked to connect it to a power source with a specific voltage, e.g., **6 V**, can we predict the current that will appear in the circuit? Calculate how much the current will be in this case.

If we apply a specific voltage, e.g., **4 V**, across the terminals of a resistor and measure the current, e.g., **100 mA** (0.1A) through the resistor, can we calculate its resistance? How? What will be the resistance in this specific case?

Discuss your answers in class.

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SCENARIO TITLE

Pythagoras' theorem

SUBJECT

Math/Sciences/English

Co-funded by the European Union

The present lesson scenario has been developed within the framework of a European Erasmus+ KA210-SCH - Small-scale partnerships in school education project entitled "Communicating and Learning Is Life-changing - C.L.I.L.", Reference code: 2022-1-EL01-KA210-SCH-000082125.

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d) Bilingual Junior High School, Wiener Neustadt - Austria

Project coordinator is 6o GENIKO LYKEIO TRIKALWN, Trikala - Greece

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1. Title

Pythagoras' theorem

2. Estimated duration

45 minutes + 45 minutes (2 teaching hour)

3. Inclusion in the curriculum

The relevant topic is included in the Greek secondary education curriculum of 2rd class of Junior High school (In the subject "**Mathematics**", chapter "**Area of flat shapes**", unit "**Pythagoras' theorem**" (14 years old). Therefore, it can be used by younger and older students with the relevant adjustment of text and activities.

4. Aims and objectives

a. Content:

- To formulate the Pythagoras' theorem and the Converse of the Pythagoras' Theorem
- To calculate in a right triangle the third side, given the other two.
- To examine whether a triangle is right-angled based on its sides.

b. Language:

- To listen and keep notes.
- To read and comprehend a text about Mathematics.
- Give opinions and make comparison orally and in writing.

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- To learn specific terminology about Mathematics and Geometry.

c. Cognition:

- Remembering: previous Knowledge on the topic
- Understanding: through questioning about the topic, explaining and describing

d. Culture

- Applying Pythagoras' theorem in our daily life activities.

5. Brief description of the scenario

This scenario is an effort to implement the CLIL methodology combining the subject of **Mathematics** with the **English language** in a class of **20-22 students**. It is implemented in **two (2) teaching hours** and aims at complying with **4 Cs, Content, Communication**, **Cognition, Culture** of the CLIL methodology. The proposed scenario **was designed** for implementation in the IT laboratory or even in the daily classroom as long as the necessary materials are available for all groups. **The means used** are digital tools, the necessary software, internet connection, computers, projector system, videos. **Students** practice reading, writing, listening, speaking, apply self-assessment and learn about collaboration and teamwork. The activities **included** are indicative. **Great assets** of the scenario can be considered flexibility of teaching

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materials, scalability and adaptability. The **main value of the scenario** is to help students become familiar with the scientific way of thinking/research (hypothesis-test-conclusion) and appreciate its effectiveness. That is, to learn the learning process that characterizes **Mathematics**.

6. Is there an additional value in using the CLIL method?

CLIL builds intercultural knowledge and understanding and develops intercultural communication skills. Allows learners more contact with the target language and provides opportunities to study content through different perspectives.

CLIL involves teaching a curricular subject through the medium of a language other than that normally used. The main point is that the learner is gaining new knowledge about the **subject matter** while encountering, using and learning the **foreign language**. Ensures on the one hand that learners acquire knowledge of curricular subject matter and on the other hand that learners develop their competence in a language other than the normal language of instruction. **Both** (the subject matter and the foreign language) have to design learning tasks and activities that complement each other, serve both purposes and are well balanced. Because of the above mentioned, the educator should apply the **4 Cs**, that is **Content, Communication**, **Cognition, Culture**. Finally, we can summarize that the main goal is to make learners **aware of the language** they are using **in combination with learning new content**.

7. Description and analysis of worksheets (or other teaching material)

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The Pythagoras' Theorem enables us to recognize the close association of Algebra with Geometry and to describe the meaning of different representations of a mathematical concept (either geometrically or with the help of a specific algebraic relation).

The algebraic relationship that the Pythagoras' Theorem describes is one of the most important mathematical equations used in the field of **constructions** (buildings, furniture, laying tiles, windows, doors, etc.). By using the Pythagoras' Theorem, **architects** plan foundations, calculate angles with absolute precision, and have designs that are characterized by fidelity. Also, **carpenters** use it to make their constructions have right angles. Finally, it is used by **climbers** and **astronomers** for their measurements.

Prerequisite Student Knowledge:

Students already know how to calculate the area of a square and a triangle and are able to distinguish and explain the right triangle. In addition, they have worked with **GeoGebra software** (use of software and ability to construct geometric shapes). Thus, the activities aim to describe the Pythagoras' Theorem and its converse and apply it to right triangles.

Learning objectives:

- to understand the relationship between the sides of right angled-triangle
- to solve problems using Pythagoras' Theorem
- to define mathematical terms orally and in writing
- to read and summarize a text passage in a group

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Key skills:

- reading comprehension
- knowledge of several mathematical terms
- comprehension of Pythagoras' Theorem
- cooperative skills for group work

Key words characterizing the theme of the script

triangle, square, root, hypotenuse, leg, angle, side, length, equation

Classroom organization and logistical infrastructure

In the context of the scenario, students will work in groups of two (pairs) in the **school's IT lab**. Their roles depend on the activities they will investigate with the main role being that of the **researcher**. The teacher can have the role of the **observer** during the investigation, and s/he can intervene with reflective and prompting comments, as well as contribute as a **co-investigator** while working with the activities. **Communication** between teams will play an important role during and after the completion of the activities. This communication can be carried out with the teacher's coordination. The teacher, during the implementation of the scenario, is important to check the conclusions that arise, to facilitate the argumentation and to provoke discussions in the context of the class when s/he considers that some conclusions are useful for the continuation. Wherever there is an interactive whiteboard , all students can work as one community commenting, suggesting and

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implementing. The existence and use of the interactive whiteboard can contribute to the implementation of the scenario activities.

Materials:

- worksheets 1, 2, 3
- a picture of Pythagoras (to be found on the internet)
- sheet with various shapes to cut-out

Summary of scenario phases

1st teaching hour (45 min)

1st phase (20 min)

Investigation of Pythagoras' Theorem

At first, the students will watch an **educational video related to the biography of Pythagoras** (2.18 min). This will help them get a first contact with the ancient philosopher and mathematician. There will be a first short discussion about the era he lived in, his personal life and his work.

The Pythagoras' Theorem can be formulated through a process of geometric "discovery", which additionally gives the opportunity to illustrate the related theorem. For this reason students will watch **a video to re-approach the Pythagoras'**

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Theorem (5.16 min). Then they are asked to convert the relationship of areas into an algebraic relationship between sides.

Then the students work **in pairs** using the computers of the ICT lab and using the **free software GeoGebra**, to apply the Pythagoras' theorem and understand it better.

2nd phase (15 min)

The Converse of the Pythagoras' Theorem

At this stage of the scenario, we are asked to check:

"If in a triangle the square of the longest side is equal to the sum of the squares of the other two sides, then is the angle opposite the longest side a right angle?"

For this purpose, we will work on **a micro-experiment**, where we will try to approach the way in which in **Ancient Egypt,** they used rope to make right angles.

We will give the students ropes that will have 13 knots (or marks) at equal distances from each other and that form 12 equal straight segments, as shown in the figure:

By holding the end knots (or marks) together and stretching the rope through the red knots (marks), the triangle ABC is formed, which the ancient Egyptians believed to be a right-angle with right angle at vertex B.

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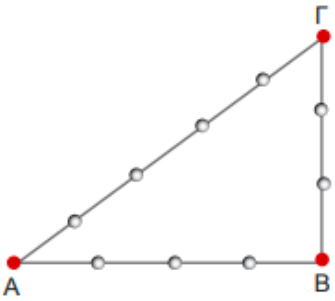

This way students will verify in a practical way the inverse of the Pythagoras' Theorem.

3rd phase (10 min)

Using the Pythagoras' Theorem

Students work on multiple choice problems 1, 2, 3 and exercises 3 and 4 of **worksheet1**.

2nd teaching hour (45 min)

The teacher can choose one of the two **worksheet2** and **worksheet3**. If he considers it necessary and has the corresponding comfort from the existing curriculum, he can apply both and convert the scenario into a three teaching hours scenario.

Assessment:

Alternatively proceed with the self – assessment rubric. A sample of teacher's assessment is following.

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✔ Teacher's assessment sample

Assessment	Scores	Descriptors
	Not satisfactory	Student shows no Knowledge of the subject and specific vocabulary /use of language
	Almost satisfactory	Student is lacking necessary background knowledge and uses specific vocabulary /language correctly
	Satisfactory	Student has essential Knowledge of the subject. He uses specific vocabulary and language correctly.
	Good	Student has a complete essential Knowledge of the subject. He properly uses specific vocabulary and language.
	Excellent	Student shows a complete and thorough Knowledge of the subject. He uses specific vocabulary and language in an excellent way.

8. Evaluation

The teaching material drew ideas from existing lesson plans. However, the lesson design attempted to adjust the subject of **Mathematics** from the Greek school curriculum to a lesson using the CLIL method and several digital sources and tools. A topic was chosen (**Pythagoras' theorem**) that is likely to be of broad interest and can be used by the two other project partners (Austria and Finland) with the possibility of selective use and modification or enrichment of the activities according to the language level of the students. At the same time, students are given the opportunity

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to work in groups using digital tools and to develop their critical ability by applying the basic knowledge they gained for **the application of the Pythagoras' theorem in everyday life**. This way students are given the opportunity to express themselves not only critically but also using a foreign language **in a topic of Mathematics**. Skills such as communication, cooperation are cultivated while self-assessment initiates students to reflection. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

9. Sources and Tools

1. One stop English:

https://www.onestopenglish.com/lessons/lesson-share-clil-pythagoras-theorem/157754.article

2. **https://www.eclipsecrossword.com/**

3. PYTHAGORAS - Meet The Mathematical Mastermind of Ancient Greece:
https://youtu.be/kEmQKXwzSak?si=rmgI9hCA18u6WowV

4. Mini Biography – Pythagoras:
https://youtu.be/HYulFhPtoAo?si=5oIqGeeBiHA4m7qC

5. How many ways are there to prove the Pythagorean theorem?
https://youtu.be/YompsDlEdtc?si=NqWAjzkuWS_zi9aY

6. Pythagorean theorem water demo:
https://youtu.be/CAkMUdeB06o?si=-H5YKG7jH8n1n6Lb

7. Libre Texts Mathematics:
https://math.libretexts.org/Courses/Fullerton_College/Math_100%3A_Liberal_Arts_Math_(Claassen_and_Ikeda)/02%3A_Geometry/2.04%3A_The_Pythagorean_Theorem

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8. **https://kahoot.it/**

9. **https://rubric-maker.com/**

10. Advanced Electronic Scenarios Operating Platform:
https://aesop.iep.edu.gr/node/20435

11. Maths secondary online: **https://clil4mathssecondarycyl.blogspot.com/?m=1**

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KA210-SCH - Small-scale partnerships in school education
Communicating and Learning Is Life-changing - C.L.I.L.
Ref. Number: 2022-1-EL01-KA210-SCH-000082125

SCENARIO TITLE

Arduino - Traffic lights

SUBJECT

Computer Sciences / STEM

The present lesson scenario has been developed within the framework of a European Erasmus+ KA210-SCH - Small-scale partnerships in school education project entitled "Communicating and Learning Is Life-changing - C.L.I.L.", Reference code: 2022-1-EL01-KA210-SCH-000082125.

The following partner organizations are involved in the project:

a) 6^{o} GENIKO LYKEIO TRIKALWN, Trikala - Greece

b) Scientific Association for the Promotion of Lifelong Learning, Trikala - Greece

c) Lukioliikelaitos Tavastia Hämeenlinnan lyseon lukio, Hämeenlinna - Finland

d) Bilingual Junior High School, Wiener Neustadt - Austria

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Project coordinator is 6^{o} GENIKO LYKEIO TRIKALWN, Trikala - Greece

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1. Title

Arduino microcontroller using **Tinkercad** web app simulation. - Traffic lights

2. Estimated duration

45 minutes + 45 minutes (2 teaching hour)

3. Inclusion in the curriculum

The relevant topic is included in the Greek secondary education curriculum of 3rd class of Junior High school (15 years old), in the Detailed Teaching Guidelines of the **Informatics course** in the Axis of expected learning outcomes "**I program computing devices and robotic systems**". Therefore, it can be used by younger students with the relevant adjustment of text and activities.

4. Aims and objectives

a. Content:

- To learn educational robotics using **Arduino**.
- To manage the virtual **Arduino microcontroller**.
- To create an algorithm in the **Tinkercad application.**
- To **simulate** the operation of the project.

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- To design connections in the virtual environment.
- To use **LEDs** in constructions.
- To represent the function of **traffic lights**.

b. Language:

- To listen and keep notes.
- To read and comprehend a text about **Computer science**.
- Give opinions and make comparison orally and in writing.
- To learn specific terminology about **Computer science** and **STEM**.

c. Cognition:

- **Remembering**: previous Knowledge on the topic.
- **Building knowledge through**: experimentation, creation and control speculation, conclusions and generalization.
- **Understanding**: through questioning about the topic, explaining and describing.
- Developing communication and argumentation practices with classmates.

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- Cooperating to create a project.

d. Culture

- To understand the design and programming operation of **traffic lights** in our daily life.

5. Brief description of the scenario

This scenario is an effort to implement the **CLIL methodology** combining the subject of **Computer sciences** with the **English language** in a class of **12-24 students** (the number of students is based on 12 active computers and a maximum of 2 students on each computer). It is implemented in two (2) teaching hours and aims at complying with **4 Cs, Content, Communication**, **Cognition, Culture** of the CLIL methodology. The proposed scenario **was designed** for implementation in the **ICT laboratory** due to the need to use computers. **The means used** are digital tools, the necessary software, internet connection, computers, projector system, videos. **Students** practice reading, writing, listening, speaking, apply self-assessment and learn about collaboration and teamwork. The activities **included** are indicative. **Great assets** of the scenario can be considered flexibility of teaching materials, scalability and adaptability. The **main value of the scenario** is to help students become familiar with the scientific way of thinking/research (hypothesis-test-conclusion) and appreciate its effectiveness. That is, to learn the learning process that characterizes **Computer sciences**.

6. Is there an additional value in using the CLIL method?

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CLIL builds intercultural knowledge and understanding and develops intercultural communication skills. Allows learners more contact with the target language and provides opportunities to study content through different perspectives.

CLIL involves teaching a curricular subject through the medium of a language other than that normally used. The main point is that the learner is gaining new knowledge about the **subject matter** while encountering, using and learning the **foreign language**. Ensures on the one hand that learners acquire knowledge of curricular subject matter and on the other hand that learners develop their competence in a language other than the normal language of instruction. **Both** (the subject matter and the foreign language) have to design learning tasks and activities that complement each other, serve both purposes and are well balanced. Because of the above mentioned, the educator should apply the **4 Cs**, that is **Content, Communication**, **Cognition, Culture**. Finally, we can summarize that the main goal is to make learners **aware of the language** they are using **in combination with learning new content**.

7. Description and analysis of worksheets (or other teaching material)

Educational problem:

Students are familiar with the use of traffic lights from their everyday life. From a very **early age**, they know the importance of red, yellow and green traffic lights for their smooth and safe traffic behavior, either as pedestrians, cyclists or wheeled passengers. Through this **scenario**, students will have the opportunity to **experiment**

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on the sequence, duration and timing of traffic lights and to **discover** the way which their wiring and programming occurs.

Coding and computer **programming** are directly related to **computational thinking** and aims at cultivating and developing skills such as **problem solving** and **systems design**. Therefore, cultivating and developing computational thinking skills and attitudes through teaching programming comes as a natural outcome. It is also worth noting that contemporary era of digital technology and new challenges in students' daily lives requires the redefinition of the learning process. The key to success is not the processes and tools but the people of the school community and the interactions among them.

Prerequisite Student Knowledge:

Students should know the concept of **Arduino microcontroller**, its use and the ability to use it either in real or virtual form. They should also have already been in contact with the **Tinkercad application** and know the simple and necessary actions to operate this application. **The teacher in charge** should have already created a "**new class**" in the application and a **separate account for each student**. Finally, students should know some **physics concepts** related to the connection they will construct, such as what is grounding, how LEDs are connected, connection of resistors, equipotential points (points that have the same voltage).

Learning objectives:

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- ✔ with the application of the teaching scenario, the students, creating the simulation of the operation of a traffic light, they will learn to program using a computer as well as try different techniques for solving a problem.
- ✔ they will get in touch with educational robotics using Arduino.
- ✔ they will understand the basic structure of an Arduino microcontroller.
- ✔ they will be able to build their own automation.
- ✔ they will distinguish the environment and options of a Tinkercad platform.
- ✔ they will create their own programs using the command tiles of the Tinkercad environment.
- ✔ they will learn to modify the code of a program in the Tinkercad platform
- ✔ they will experiment with the program commands on the Tinkercad platform.
- ✔ to define barcodes in writing.
- ✔ to read and summarize a text passage in a group.

Key words characterizing the theme of the script

Arduino – microcontroller – Tinkercad – platform – LED – wires – traffic lights - breadboard – coding – construction.

Classroom organization and logistical infrastructure

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In the context of the scenario, students will work individually or in groups of two (pairs) in the **school's I.T. lab**. Their roles depend on the activities they will investigate with the main role being that of the **researcher**. The teacher can have the role of the **observer** during the investigation, and s/he can intervene with reflective and prompting comments, as well as contribute as a **co-investigator** while working with the activities. **Communication** between teams will play an important role during and after the completion of the activities. This communication can be carried out with the teacher's coordination. The teacher, during the implementation of the scenario, is important to check the conclusions that arise, to facilitate the argumentation and to provoke discussions in the context of the class when s/he considers that some conclusions are useful for the continuation. Wherever there is an interactive whiteboard, all students can work as one community commenting, suggesting and implementing. The existence and use of the interactive whiteboard can contribute to the implementation of the scenario activities.

The tinkercad platform does not require the installation of any software but the use of a **browser** and of course, **internet access**. Finally, there must be active computing units installed in the laboratory.

Materials:

- ✔ worksheets 1, 2, 3, 4, 5

Metacognitive Benefits:

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The cooperative approach of learning helps students understand their potential and gradually upgrade their personality traits (such as self-esteem) that help them develop in the field of learning, but also in future work.

Summary of scenario phases

1st teaching hour (45 min)

1st phase (10 min)

What is S.T.E.M.

First, we will ask the students if they know what the initials **S.T.E.M.** stand for. The purpose is to make them think and stimulate their curiosity. Logically, students at this age are not familiar with the specific term. Next, the students will watch an **educational video related to what the meaning of S.T.E.M. is** (**1.47 min**). Link **worksheet 1 – activity1** in the next hour.

The A-Z of S.T.E.M. careers

We will ask students to think of some **occupations** related to S.T.E.M. and note them down. Next the students will watch an **educational video related to professions about S.T.E.M.** (1.41 min). After viewing the video, we will ask the them to say what they noticed about the **suffixes** in the end of words that usually form professions and a brief report will be made about the most common endings of professions in the English language. Connect with **worksheet1 – activity2** next hour.

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2nd phase (10 min)

What is Arduino?

Arduino is an open-source programmable circuit board and microcontroller that makes it possible for anyone to build digital hardware products. It includes an **ATmega chip** and has inputs and outputs that react based on the code we wrote and loaded onto the chip with the help of the computer. The students will watch an **educational video related to what is Arduino in 100 seconds** (2.22 min).

We will explain to the students that the most important thing is that the entire circuit of the Arduino board is available under a **Creative Commons license**, which means that anyone can build their own board as they want. Also, a big advantage is that it is very **easy to buy** a ready-made Arduino board from the internet which is available at a very **affordable price**. Connection with **worksheet2 - activity3** next hour.

Then, students are asked to think about and find some of the **applications** of Arduino in **everyday life**. The teacher then shows the **website top 10 applications of Arduino in everyday life** on the video projector and gives the students the opportunity to discover some everyday applications of Arduino. This is followed by a class discussion where groups of students present and discuss their views. The discussion is led by the teacher.

3rd phase (10 min)

Use of free web application Tinkercad.

Tinkercad software is a simulation application for electronic circuits and allows the use of Arduino on the computer. Tinkercad is a popular 3D modeling, circuitry-simulating, and block-coding software package that's accessible **for free** via a **web browser**. Its popularity is, no doubt, a result of its user-friendly simplicity. It

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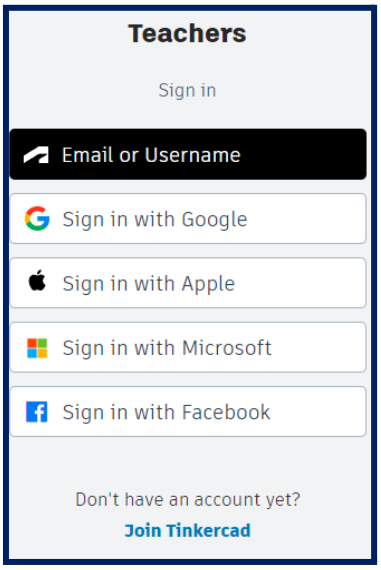
consists of three sections, each of which can be considered its own endeavor and be used for different purposes. Along with us, there is a large global community of users who share their projects and contribute to its functionality. We can find a similar or parts of projects, reconstruct them and compose the project we want to build.

Firstly, the **teacher** must **create** an **account** in **https://www.tinkercad.com/** as an **educator** using her/his personal e-mail or google account or other accounts s/he has.



As long as the teacher is connected as an **educator**, s/he can create as many **classes** as s/he wants and **register** the students with a **name** and a **nickname**. In this way s/he can check and monitor his/her students' works, give them instructions and feedback. Each class has a **class code** that students must know when they want to **log in**.

Students will then type in **https://www.tinkercad.com/**and **log in**. They will select **Students with Class Code**. Then students will type the **code** their teacher shared and **Join with Nickname**.

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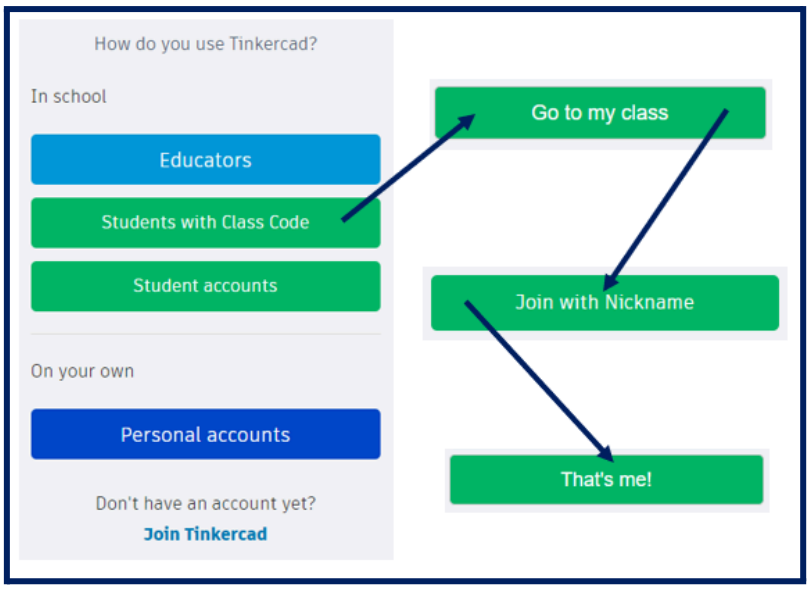

They will select **Designs**, then **Circuits**, then **Create**.

The design environment

● On the right of the drawing window there are all the **electronic components** to create a **circuit**.

● They are grouped in Components: **Basic** - **All**.

● There are still circuits ready to use.

● With **drag and drop** we bring them to the design environment.

● To **connect** the parts together we click on one end move the mouse to the other end where we click again.

4th phase (15min)

Construction of a circuit with an ARDUINO and a LED in the web app TINKERCAD.

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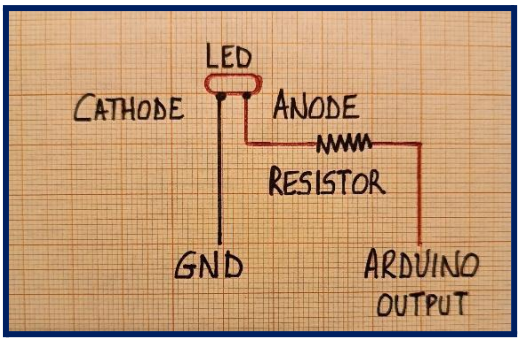

In this phase we will show the students the wiring of a **LED**, with a **resistor** and an **Arduino output**.

The students, based on the specific wiring, will create in the **simulator**, a circuit with a LED that will **blink** according to the **values of the Arduino output** for a certain period of time. To make the connections clearer, a **breadboard** will be used.

The Arduino's GND pin is connected to a hole in the bottom horizontal row (-) of the breadboard. In this way, the entire series has been converted to ground, to which the **cathode** of the LED (**black line**) is connected. The **anode** of the LED is connected to the resistor and this in turn to a digital output of the Arduino (**red line**).

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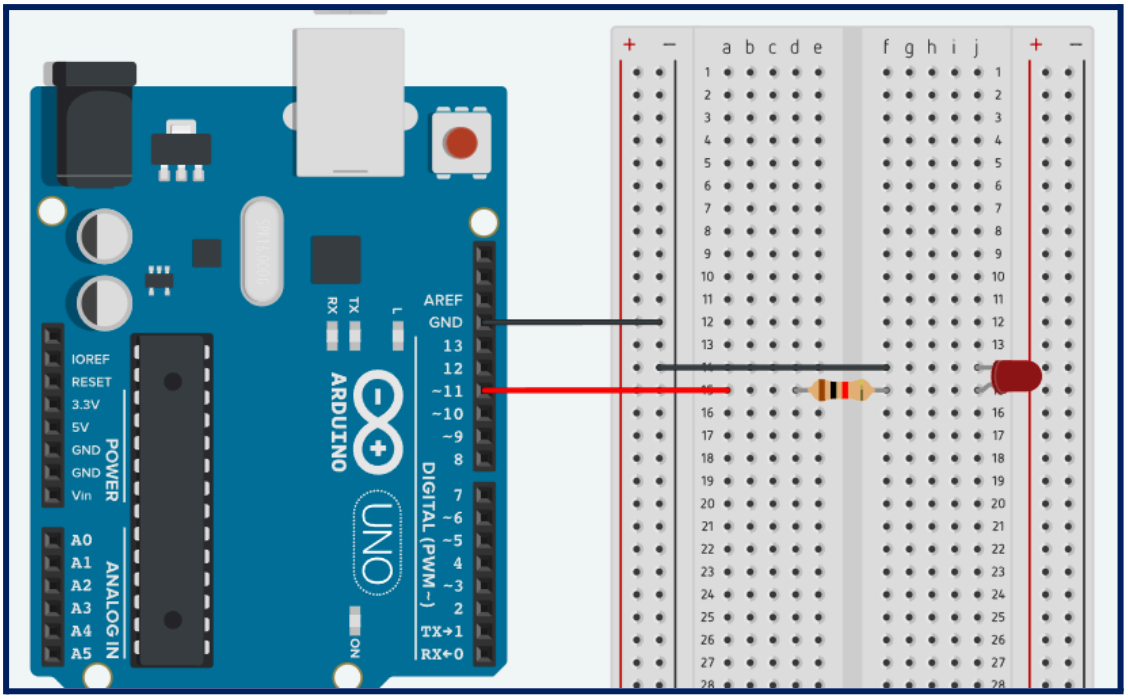
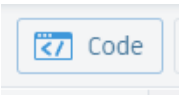


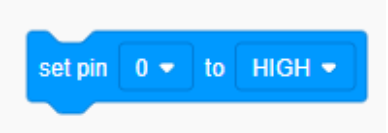
Connection with **worksheet3 – activity4 – activity5** next hour.

The next stage after completing the design part is the **programming part**. They will choose:



That is, showing and hiding the **command blocks** for programming the circuit.

From the **Output category** (blue color) they will choose the command:



and from the **Control category** (orange color) they will choose the command:

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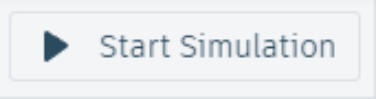
We will explain to the students that they can **change** the commands above

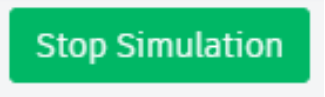
- the number of the pin (output),
- the status (HIGH or LOW)
- and the duration (sec).

Next, we will ask them to make a code that the output on pin11 will be HIGH for 4 sec and LOW for 2 sec.

As long as they write the code correctly then choosing:



they will notice that the red LED turns on for 4 sec and turns off for 2 sec and this repeats until they select:



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Connection with **worksheet4 – activity6** next hour.

2nd teaching hour (45 min)

The teacher will give the students the following **worksheets** to include:

Worksheet1

Activity 1: Find the words hidden behind the acronym STEM

Activity 2: Choose the correct suffixes and find the professions.

Worksheet2

Activity 3: Read this text about Arduino. Then answer the questions.

Worksheet3

Activity 4: Match the shapes with their names and find a derivative word and write a sentence with it.

Activity 5: Find the opposite word.

Worksheet4

Activity 6: Traffic light simulation construction

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Worksheet5

Activity 7: Complete the crossword.

The teacher can adapt **activity6** to the **road traffic code** of his/her country, so that the scenario is comprehensible to his/her students.

If he/she considers it necessary and has the corresponding comfort from the existing curriculum, he/she can **extend activity6** to a combination of vehicular and pedestrian traffic lights.

8. Evaluation

The teaching material drew ideas from existing lesson plans. However, the lesson design attempted to adjust the subject of **Informatics (Computer Sciences)** from the Greek school curriculum to a lesson using the **CLIL method** and several digital sources and tools. A topic was chosen (**Arduino – Traffic lights**) that is likely to be of broad interest and can be used by the two other project partners (**Austria** and **Finland**) with the possibility of selective use and modification or enrichment of the activities according to the language level of the students. At the same time, students are given the opportunity to work in groups using digital tools and to develop their critical ability by designing and understanding **the way traffic lights** operate **in everyday life**. This way students are given the opportunity to express themselves not only critically but also using a foreign language **in a topic of Informatics (Computer Science)**. Skills such as communication, cooperation are cultivated while self-assessment initiates students to reflection. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

9. Sources and Tools

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1. STEM education: https://stem.edu.gr/en/what-is-stem/
2. STEM animation: https://www.youtube.com/watch?v=qqcI8WQCo6M
3. Careers with STEM: https://www.youtube.com/watch?v=7mYRan8lTF8
4. Job Title Suffixes: https://www.english-for-students.com/Job-Title-Suffixes.html
5. Arduino open-source electronics platform: https://www.arduino.cc/
6. Arduino in 100 Seconds: https://www.youtube.com/watch?v=1ENiVwk8idM
7. Techyv, solution provider of Computers and Information Technology: https://www.techyv.com/article/top-10-applications-of-arduino-in-everyday-life/
8. Autodesk Tinkercad: https://www.tinkercad.com/
9. https://share.eclipsecrossword.com/play/3b276945/arduino-traffic-lights

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Ref. Number: 2022-1-EL01-KA210-SCH-000082125

SCENARIO TITLE

Lego Mindstorms EV3 Programming Environment

SUBJECT

Educational robotics

The present lesson scenario has been developed within the framework of a European Erasmus+ KA210-SCH - Small-scale partnerships in school education project entitled "Communicating and Learning Is Life-changing - C.L.I.L.", Reference code: 2022-1-EL01-KA210-SCH-000082125.

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d) Bilingual Junior High School, Wiener Neustadt - Austria

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1. Title

Lego Mindstorms EV3 Programming Environment

2. Estimated duration

The estimated duration of the scenario is two teaching hours (45’ + 45’)

3. Inclusion in the curriculum

Educational robotics and development of computational thinking to solve various problems. This is a cross-cutting scenario, which can be incorporated into Physics, Mathematics and Informatics.

It is aimed at students of the second and third grade of Junior High School, provided the teaching of the prerequisite knowledge listed below is preceded.

4. Aims and objectives

a. Content:

- Identify and name the key stages of visual programming
- Select the appropriate commands
- Be able to compile the program
- Be able to execute and control the program
- Troubleshoot and re-run the program

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- Identify and name the key stages in programming a Lego EV3 robot
- To select commands and compose a program
- Gain the ability to program a robot.
- Define the appropriate parameters in the programming commands they use
- Encode an algorithm in a programming environment.
- Compose and execute simple programs in the Lego Minstorms EV3 programming environment using simple commands.
- Investigate the reasons why an EV3 robot does not behave as expected sometimes and solve the problem

b. Language:

- To listen and keep notes.
- To read and comprehend a text about Robotics.
- Give opinions and make comparison orally and in writing.
- To learn specific terminology about Robotics

c. Cognition:

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- Building knowledge through: experimentation, creation and control speculation, conclusions and generalization
- Develop communication and argumentation practices with their classmates
- To formulate and evaluate conclusions based on the data they have collected
- Use problem-solving techniques.

d. Culture

- Communicate and function better within a team,
- Actively participate in the various activities of a team,
- To hear and evaluate the opinion of other members of a team,
- Help other members of the team to overcome difficulties.
- Accept or better address the diversity of knowledge and skills within a group and adopt a positive and creative attitude within the team;
- Critically address the problems they face and explore ways to solve them

5. Brief description of the scenario

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The purpose of the scenario is to familiarize students with the basic functions of a visual programming environment and to develop problem-solving skills by integrating, in the educational process, educational robotics activities.

At the end of the training process, students will be able to program a robotic construction to perform certain movements using basic Lego Mindstorms commands.

6. Is there an additional value in using the CLIL method?

Employing the Content and Language Integrated Learning (CLIL) method to teach the subject of "Lego Mindstorms EV3 Programming Environment" can offer several additional benefits:

Language Proficiency: CLIL integrates language learning with subject content. Students not only learn about EV3 programming but also improve their language skills in the target language (often English). This is particularly valuable in today's globalized world where proficiency in English is often required for academic and professional success.

Deeper Understanding: By learning about EV3 programming in a language other than their native tongue, students are encouraged to think critically and engage more deeply with the subject matter. This can lead to a more profound understanding of programming concepts and principles.

Cognitive Development: CLIL encourages cognitive development by challenging students to process and comprehend complex information in a language they may

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not be completely fluent in. This can enhance their cognitive abilities, such as problem-solving, critical thinking, and analytical skills.

Cross-Curricular Connections: CLIL fosters connections between different subjects or disciplines. While learning about EV3 programming, students may also learn vocabulary and concepts related to science, technology, engineering, and mathematics (STEM), thereby reinforcing learning across multiple disciplines.

Cultural Awareness: CLIL exposes students to the cultural aspects associated with the target language, which can promote cultural awareness and sensitivity. This is particularly important in an increasingly interconnected world where understanding diverse cultures is essential.

Motivation and Engagement: Integrating language learning with subject content can enhance student motivation and engagement. Learning about EV3 programming in a language they are learning can make the subject more interesting and relevant to students, thereby increasing their enthusiasm for learning.

Real-World Relevance: Many programming languages, including those used in the EV3 environment, have English-based syntax and terminology. By learning EV3 programming in English, students are better prepared to navigate real-world programming environments and resources.

In summary, employing the CLIL method to teach the subject of "Lego Mindstorms EV3 Programming Environment" can provide additional value by enhancing language proficiency, fostering deeper understanding, promoting cognitive development,

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making cross-curricular connections, fostering cultural awareness, increasing motivation and engagement, and improving real-world relevance.

7. Description and analysis of worksheets (or other teaching material)

• At the beginning of the educational process, the teacher presents to the students a video showing a robot performing various activities. https://www.youtube.com/watch?v=2jQp5bM4O88

During the follow-up students will be asked to keep in mind the following:

What theme is featured in the video?

• What are the comments and impressions of what they watched?

• The question to ask ourselves is: "What moves can a robot make, how can they be achieved with a robotic vehicle?"

There is a discussion about how the robot can move and what kind of moves it can make.

Afterwards students work in teams of 3or 4 and try to process out the software by following the worksheets.

Animated robots have already been built into their original “tribot” structure. The robot must be programmed to make various movements back and forth, turning right, left at different speeds and traveling different distances.

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Students, using basic features of Lego Mindstorms software, will take their first steps in programming by giving repetitive movements to a robot.

All of the above will be achieved by combining the fields of Informatics, Robotics, Mathematics and Physics.

Video with Lego Mindstorms EV3 Basic Commands: https://www.youtube.com/watch?v=U00CgMhGkTI&t=18s

At the last activity, students will have to fill in a “language” crossword.

Prerequisite Student Knowledge:

Students are involved in robotic construction and are familiar with the Lego Mindstorms building material. On the contrary, they will first come into contact with the Lego Mindstorms software, so we think that the robot's programming part has no prior knowledge.

Key words characterizing the theme of the script

visual programming, parameters, robot, algorithm, commands, Compose and execute

Classroom organization and logistical infrastructure

In the context of the scenario, students will work in groups of two (pairs) in the **school's IT lab**. Their roles depend on the activities they will investigate with the

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main role being that of the **programmer**. The teacher can have the role of the **observer** during the investigation, and s/he can intervene with reflective and prompting comments, as well as contribute as a **co-investigator** while working with the activities. **Communication** between teams will play an important role during and after the completion of the activities. This communication can be carried out with the teacher's coordination. The teacher, during the implementation of the scenario, is important to check the conclusions that arise, to facilitate the argumentation and to provoke discussions in the context of the class when s/he considers that some conclusions are useful for the continuation. Wherever there is an interactive whiteboard, all students can work as one community commenting, suggesting and implementing. The existence and use of the interactive whiteboard can contribute to the implementation of the scenario activities.

Materials:

- worksheet 1

- worksheet 2

8. Evaluation

The teaching material drew ideas from existing lesson plans. However, the lesson design attempted to adjust the subject of **Robotics** from the Greek school curriculum to a lesson using the CLIL method and several digital sources and tools. A topic was chosen (**Lego Mindstorms EV3 Programming Environment**) that is likely to be of broad interest and can be used by the two other project partners (Austria and

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Finland) with the possibility of selective use and modification or enrichment of the activities according to the language level of the students. At the same time, students are given the opportunity to work in groups using digital tools and to develop their critical ability by applying the basic knowledge they gained. This way students are given the opportunity to express themselves not only critically but also using a foreign language **in a topic of Robotics**. Skills such as communication, cooperation are cultivated while self-assessment initiates students to reflection. Great assets of the scenario can be considered flexibility of teaching materials, scalability and adaptability and its adaptability according to the level of the classroom and the level of education.

9. Sources and Tools

1. https://education.lego.com/en-us/downloads/mindstorms-ev3/software/

2. https://www.eclipsecrossword.com/

3. https://ev3lessons.com/en/

4. https://www.depts.ttu.edu/coe/stem/gear/ev3/documents/EV3-Programming-Tips.pdf

5. https://stem.edu.gr/en/lesson/educational-robotics/

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KA210-SCH - Small-scale partnerships in school education
Communicating and Learning Is Life-changing - C.L.I.L.
Ref. Number: 2022-1-EL01-KA210-SCH-000082125

Scientific Association for the Promotion of Lifelong Learning
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e-mail: association.saplle@gmail.com

SCENARIO TITLE

Robo skier

SUBJECT

Educational robotics

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The present lesson scenario has been developed within the framework of a European Erasmus+ KA210-SCH - Small-scale partnerships in school education project entitled "Communicating and Learning Is Life-changing - C.L.I.L.", Reference code: 2022-1-EL01-KA210-SCH-000082125.

The following partner organizations are involved in the project:

a) 6o GENIKO LYKEIO TRIKALWN, Trikala - Greece

b) Scientific Association for the Promotion of Lifelong Learning, Trikala - Greece

c) Lukioliikelaitos Tavastia Hämeenlinnan lyseon lukio, Hämeenlinna - Finland

d) Bilingual Junior High School, Wiener Neustadt - Austria

Project coordinator is 6o GENIKO LYKEIO TRIKALWN, Trikala - Greece

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1. Title

Robo skier

2. Estimated duration

The estimated duration of the scenario is two teaching hours (45’ + 45’)

3. Inclusion in the curriculum

Educational robotics and development of computational thinking in order to solve various problems. This is a cross-cutting scenario, which can be incorporated into Physics, Mathematics and Informatics.

It is aimed at students of the second and third grade of the Gymnasium, provided the teaching of the prerequisite knowledge listed below is preceded.

4. Aims and objectives

a. Content:

- Use appropriate software to move and control the moving entity with the help of engines
- Define the appropriate parameters in the programming commands they use
- Recognize and describe the type of robot movement
- Choose the appropriate type of calculation of the linear motion of a moving body

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- Encode an algorithm in a programming environment.

b. Language:

- To listen and keep notes.
- To read and comprehend a text about Robotics.
- Give opinions and make comparison orally and in writing.
- To learn specific terminology about Robotics

c. Cognition:

- Plan a moving body using basic Lego Mindstorms software features
- Organize and control the progress of their work
- Formulate and evaluate conclusions based on the data they have collected
- Use problem solving techniques.
- Collaborate and offer their knowledge and skills to the team to accomplish a task
- Respect everyone's uniqueness and views.

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- Strengthen the sense of responsibility through the activities they are called upon to carry out.

d. Culture

- Communicate and function better within a team,
- Actively participate in the various activities of a team,
- To hear and evaluate the opinion of other members of a team,
- Help other members of the team to overcome difficulties.
- Accept or better address the diversity of knowledge and skills within a group and adopt a positive and creative attitude within the team;
- Critically address the problems they face and explore ways to solve them

5. Brief description of the scenario

The purpose of the scenario is to move a robotic vehicle in such a way as to bypass slalom some obstacles placed in a straight line on a track.

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6. Is there an additional value in using the CLIL method?

There can be significant additional value in using the CLIL (Content and Language Integrated Learning) method to teach the subject of "Robo skier." CLIL integrates content from a specific subject area with language learning objectives, typically a second language. Here are some potential benefits of using the CLIL method in teaching about "Robo skier":

Language Development: CLIL provides students with opportunities to learn and practice language skills in a meaningful context. Students can develop vocabulary related to robotics, skiing, mechanics, programming, and other relevant areas while learning about the topic itself.

Contextual Understanding: Learning about "Robo skier" through CLIL allows students to understand the subject matter in context. They can explore concepts related to robotics, automation, and skiing while simultaneously improving their language skills.

Cross-Curricular Learning: CLIL encourages cross-curricular connections by integrating content from different disciplines. In the case of "Robo skier," students can explore principles of physics, engineering, computer science, and sports science, enhancing their understanding of these subjects in a practical context.

Critical Thinking and Problem-Solving: Through CLIL, students can engage in critical thinking and problem-solving tasks related to "Robo skier." They may analyze the design and functionality of the robot, identify challenges in its operation, and propose solutions using both content knowledge and language skills.

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Real-World Application: CLIL enables students to see the real-world application of the language they are learning. By studying "Robo skier," they can explore how robotics technology is used in recreational activities like skiing, connecting theoretical language concepts to practical use cases.

Motivation and Engagement: Teaching "Robo skier" through CLIL can increase student motivation and engagement by providing an interesting and relevant context for language learning. The hands-on nature of the topic and its connection to real-world technology may inspire students to actively participate and pursue further exploration.

Overall, using the CLIL method to teach about "Robo skier" offers a holistic approach that integrates language learning with meaningful content, fostering deeper understanding, language development, and student engagement.

7. Description and analysis of worksheets (or other teaching material)

At the beginning of the training process, the teacher presents to the students a video with a skier who is trying a slalom on a snowy track.

https://youtu.be/VcVXkZH9llU

During the follow-up students will be asked to keep in mind the following:

• What theme is featured in the video?

• What are the comments and impressions of what they watched?

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The question to ask ourselves is: "What is slalom movement, how can it be achieved with a robotic vehicle?"

There is a question about what slalom is in the snow and how it can be done not only on the snow but on any surface.

Afterwards students work in teams of 3or 4 and try to process out the software by following the worksheets.

A track has been created on which there are some obstacles that the moving robot has to bypass in the form of a slalom.

Animated robots have already been built into their original “tribot” structure. The robot must move to the obstacles and bypass them by switching alternately left and right. Robot stops when it bypasses a predetermined number of obstacles.

Students, using basic features of Lego Mindstorms software, will take their first steps in programming by moving a robot.

All of the above will be achieved by combining the fields of Informatics, Robotics, Mathematics and Physics.

Video of a robot doing slalom: :

https://www.youtube.com/watch?v=ckFT7v7xptw

At the last activity, students will have to fill in a “language” crossword.

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implementing. The existence and use of the interactive whiteboard can contribute to the implementation of the scenario activities.

Materials:

- worksheet

8. Evaluation

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