Appendices

Appendix 1: *Table 1-Planning and creation timeline*

Phase	Date	Activity	Explanation	Timing
Planning	09/2021	School	The first step was to look for a school that applied CLIL methodology and was willing to collaborate.	-
	22/09/2021	Contact with school	The school where I studied, B.V.M Irlandesas Leioa, fulfilled these requirements, so I contacted them.	-
	22/10/2021	Selection of the topic	I looked for a topic that was included in their syllabus and that was appropriate for the use of AR: Economic sectors. Then, I selected the basic contents of this topic to be included in the sessions.	-
		Selection of vocabulary	Primary sector (raw material, agriculture, livestock, fishing, forest logging, mining), secondary sector (manufactured material, energy sources, industry, construction), industrial process, tertiary sector (trade and transport, tourism, commerce, business, health, education).	-
		Selection of grammar	Present simple (*The primary/secondary/tertiary sector includes...*) Generic, definite and indefinite articles (***The** X sector includes, **A** raw material is..., This is **an** economic theory*)	-
	12/2021	Session planning	Throughout this month, I organised the different sessions and the activities to be carried out in each one of them, taking into account the timing. I thought about the objectives and contents to be worked on, and so I selected the types of activities.	1 month

Creation	01/2022	Pre- and post-test on content	I designed the pre- and post-test on content for the students. This test would be the guide for the creation of activities.	3 days
	01/2022	Familiarize with the application	Before starting to create the planned activities, it was necessary to test *Augmented Class*, the AR application. I created activities with different numbers of markers and various added multimedia in order to master the application.	1 week
	02/2022	Markers	In order to create the activities in the application, markers had to be created first. Therefore, I created a Word document and, activity by activity, I created the necessary markers.	1 week
	02/2022	Marker printing and lamination	Once the document with the markers had been finalised, they had to be printed and, once printed, they had to be laminated so that they would hold up well over time.	3 days
	02/2022	AR activities	Once I had the markers, I started to design the activities in *Augmented Class*.	2 weeks
	03/2022	Testing	Once the activities had been created, it was necessary to check that everything worked. In the process, some changes had to be made to the markers. Therefore, part of the printing and lamination process had to be repeated.	3 days
	03/2022	Pre- and post-test on technology	Once the creation of the activities was finished, I designed the pre-tests on the use of technology for students, the pre-test for teachers on their opinion about the use of technology in the classroom and the post-test on AR for students.	3 days
	03/2022	Augmented Class application PPT	Finally, I created a PPT that I would use with the students to explain how to use the Augmented Class application.	1 day

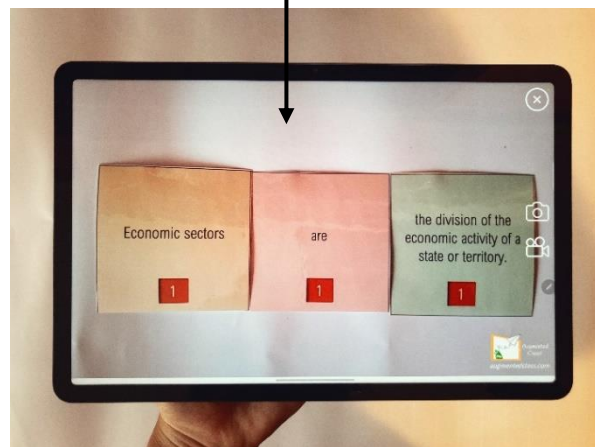**Appendix 2:** *Markers* (For more information see https://youtu.be/TdjDS_CURp0)

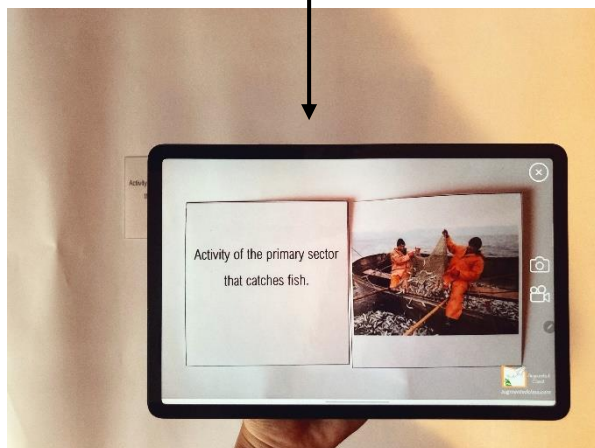**Appendix 2.1:** *1, 2, 3 or 4 markers containing information*

1 marker: In this case, students had to bring the tablet close to the different markers to discover more information about each of them.

2 markers

3 markers

4 markers

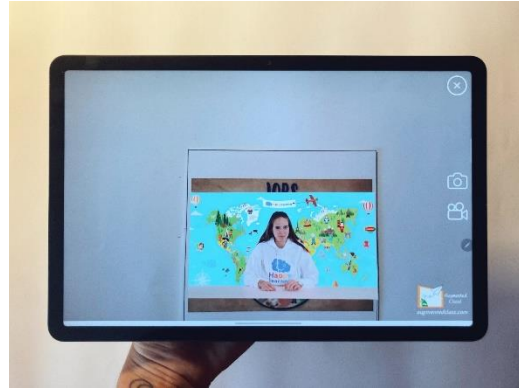**Appendix 2.2:** *Examples of markers with audio, video, image or 3D object*
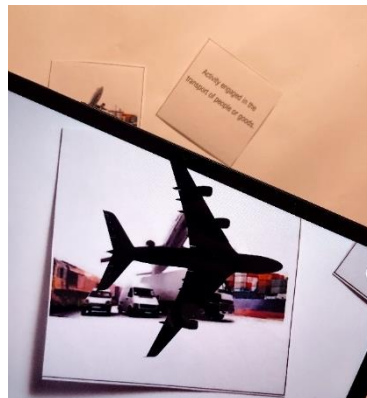
YouTube video

Applying AR

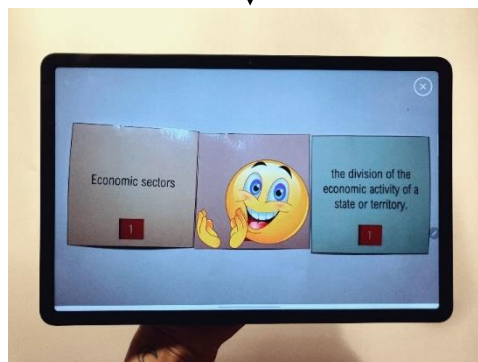3D object

Applying AR

Applying AR

Appendix 2.3: *Completed activity*

In addition to an audio confirming that they had done the activity correctly (*Well done, Excellent, Good job, That's it, etc.*), sometimes an emoji was inserted to go with the audio.

Applying AR

Applying AR

Appendix 3: *Test on technology (Teachers)* (adapted from Abrami and Sclater, n.d.)

QUESTIONNAIRE ON THE USE OF TECHNOLOGY

Block 1. *Background, teaching style and resources*

1. Gender   Female   Male
2. Years of teaching completed
   a. 0. This is my first-year teaching
   b. 1-5 years
   c. 6-10 years
   d. 11-15 years
   e. 16-20 years
   f. 21-25 years
   g. 26-30 years
   h. 31-35 years
   i. Over 35 years
3. Preferred teaching methodology
   a. Largely teacher-directed (e.g., teacher-led discussion, lecture)
   b. More teacher-directed than student-centred
   c. Even balance between teacher-directed and student-centred activities
   d. More student-centred than teacher-directed
   e. Largely student-centred (e.g., cooperative learning, discovery learning)
4. Average class size that you teach
   a. Less than 10 students
   b. 10-15 students
   c. 16-20 students
   d. 21-25 students
   e. 26-30 students
   f. More than 30 students
5. What is the primary language that you teach in?
   a. Basque
   b. Spanish
   c. English

Block 2. *The use of technology…*

	Definitely NO!	No	Yes	Definitely YES!
1. Increases academic achievement (e.g., grades).				
2. Results in students neglecting important traditional learning resources (e.g., library books).				
3. Is effective because I believe I can implement it successfully.				
4. Promotes student collaboration.				
5. Makes classroom management more difficult.				
6. Promotes the development of communication skills (e.g., writing and presentation skills).				
7. Is a valuable instructional tool.				
8. Is too costly in terms of resources, time and effort.				
9. Makes teachers feel more competent as educators.				
10. Is successful only if there is adequate teacher training in the uses of technology for learning				
11. Gives teachers the opportunity to be learning facilitators instead of information providers.				
12. Is successful only if there is the support of parents.				
13. Is an effective tool for students of all abilities.				
14. Enhances my professional development.				
15. Eases the pressure on me as a teacher.				
16. Helps accommodate students' personal learning styles.				
17. Motivates students to get more involved in learning activities.				
18. Promotes the development of students' interpersonal skills (e.g., ability to relate or work with others).				
19. Will increase the amount of stress and anxiety students experience.				
20. Requires extra time to plan learning activities.				
21. Improves student learning of critical concepts and ideas.				

Appendix 4: *Results of the test on technology (Teachers)*

Gender
5 respuestas

- Female
- Male
- Prefer not to say

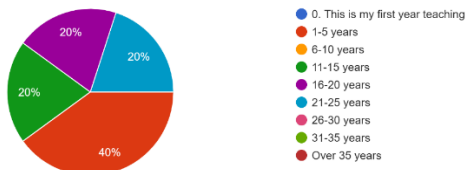80% / 20%
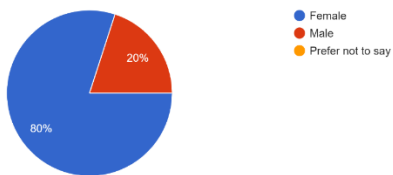
Years of teaching completed
5 respuestas

- 0. This is my first year teaching
- 1-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- 21-25 years
- 26-30 years
- 31-35 years
- Over 35 years

20% / 40% / 20% / 20%

Average class size that you teach
5 respuestas

- Less than 10 students
- 10-15 students
- 16-20 students
- 21-25 students
- 26-30 students
- More than 30 students

100%

What is the primary language that you teach in?
5 respuestas

- Basque
- Spanish
- English

80% / 20%
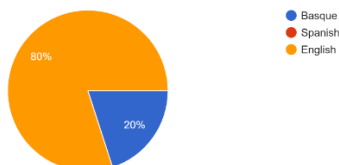
Preferred teaching methodology
5 respuestas

- Largely teacher-directed (e.g., teacher-led discussion, lecture)
- More teacher-directed than student-centred
- Even balance between teacher-directed and student-centred activities
- More student-centred than teacher-directed
- Largely student-centred (e.g., cooperative learning, discovery learning

20% / 20% / 60%
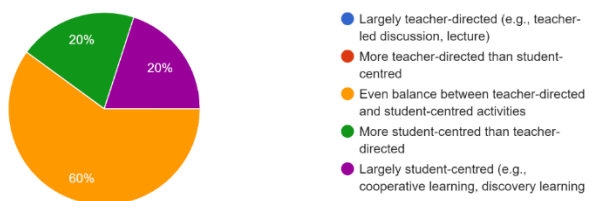
The use of technology...
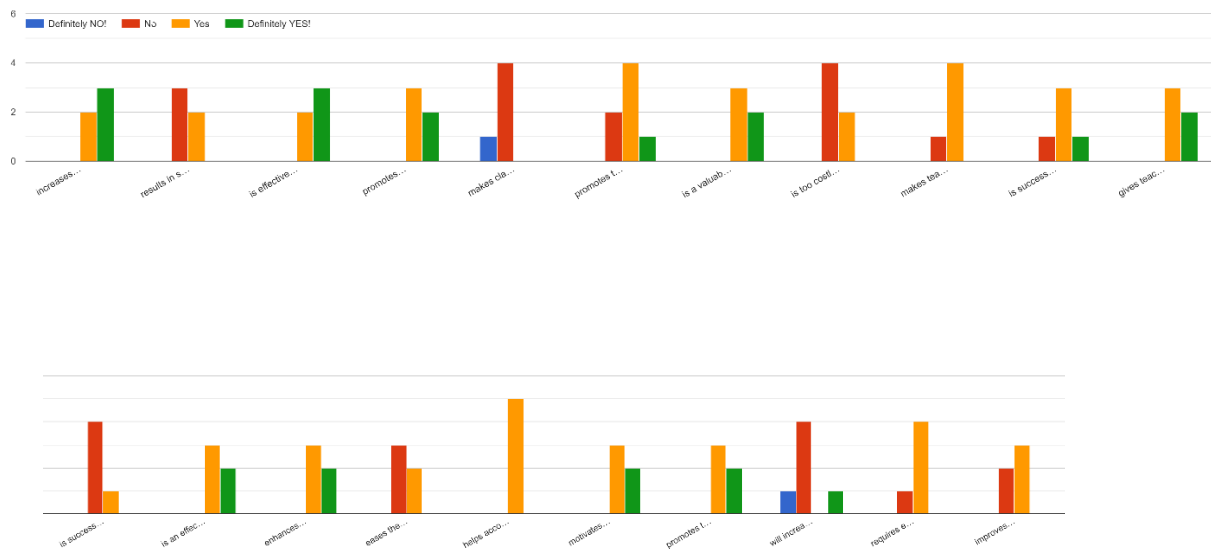
Appendix 5: *Pre-test on technology (Students)* (adapted from Sato et al., 2020)

QUESTIONNAIRE ON THE USE OF TECHNOLOGY

Gender: Female   Male

Age:

Year of study:

Choose one face depending on how much you agree with the following statements.
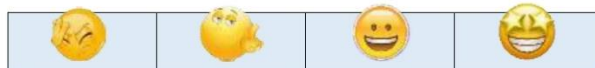
| Definitely NO! | No | Yes | Definitely YES! |

For example, if you like pasta very much, you should choose the following face.

But, if you don't like pasta at all, you should use this face.

REMEMBER! There aren't right or wrong answers, I am just interested in your opinion.

Block 1. *Computer*

	Definitely NO!	No	Yes	Definitely YES!
1. I use the computer (PC)				
2. I use the computer everyday				
3. I use the computer for education				
4. I use the computer to play games				
5. I use the computer to contact friends				
6. I use the computer to browse the Internet				
7. I use the computer to watch videos				

Block 2. *Tablets*

	Definitely NO!	No	Yes	Definitely YES!
8. I use a tablet				
9. I use the tablet everyday				
10. I use the tablet for education				
11. I use the tablet to play games				
12. I use the tablet to contact friends				
13. I use the tablet to browse the Internet				
14. I use the tablet to watch videos				

Block 3. *Smartphones*

	Definitely NO!	No	Yes	Definitely YES!
15. I use a smartphone				
16. I use the smartphone everyday				
17. I use the smartphone for education				
18. I use the smartphone to play games				
19. I use the smartphone to contact friends				
20. I use the smartphone to browse the Internet				
21. I use the smartphone to watch videos				

Block 4. *Augmented reality*

	Definitely NO!	No	Yes	Definitely YES!
22. I know what augmented reality (AR) is				
23. I know some AR applications				
24. I have used an AR application				

If you have used any AR application, did you like the experience? Why or why not? Explain in a few words:

_____

_____

_____

Appendix 6: *Excel with answers of pre-test on technology (Students)*

Gender	Age	Block 1-1	Block 1-2	Block 1-3	Block 1-4	Block 1-5	Block 1-6	Block 1-7	Block 2-8	Block 2-9	Block 2-10	Block 2-11	Block 2-12	Block 2-13	Block 2-14	Block 3-15	Block 3-16	Block 3-17	Block 3-18	Block 3-19	Block 3-20	Block 3-21	Block 4-22	Block 4-23	Block 4-24	Comments
F	11	Yes	Yes	D Yes	No	Yes	Yes	Yes	Yes	No	D Yes	No	Yes	D Yes	Yes	D Yes	Yes	No	D No	Yes	Yes	D No	D No	D No	D No	No
F	11	No	D No	D Yes	D No	No	No	D No	D Yes	D Yes	D Yes	D No	D No	No	D No	D No	D No	D No	D No	D No	D No	D No	D No	No	No	No
M	11	No	D No	Yes	Yes	No	Yes	Yes	D Yes	No	Yes	D Yes	No	D Yes	D Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
F	11	Yes	No	Yes	Yes	No	D Yes	Yes	D Yes	Yes	D Yes	No	D Yes	Yes	Yes	No	No	Yes	D Yes	Yes	No	Yes	No	No	Yes	Yes
F	11	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
F	11	No	D No	D No	D No	D No	No	No	D Yes	D Yes	D Yes	D Yes	D Yes	D Yes	No	D No	D No	D No	No	D No	D No	D No	D No	D No	D No	No
F	11	No	D No	No	No	D No	D No	D No	D Yes	Yes	D Yes	Yes	No	D Yes	Yes	Yes	D No	Yes	D Yes	Yes	No	D No	D No	D No	D No	Yes
F	11	No	No	Yes	No	No	No	No	Yes	No	D Yes	Yes	Yes	D Yes	D Yes	Yes	No	No	D Yes	D Yes	Yes	No	No	D No	Yes	Yes
M	11	No	D No	No	No	No	No	Yes	No	Yes	D Yes	Yes	Yes	D Yes	No	D No	No	No	Yes	No	No	D Yes	Yes	Yes	Yes	Yes
F	11	Yes	No	Yes	Yes	Yes	D Yes	Yes	No	No	Yes	Yes	Yes	D Yes	D Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F	11	No	D No	No	No	D No	D No	No	D Yes	D Yes	D Yes	Yes	Yes	D Yes	D Yes	D No	D No	D No	No	No	No	No	D No	D No	D No	No
F	11	Yes	No	D Yes	Yes	D Yes	Yes	Yes	D Yes	No	Yes	Yes	D Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	D No	D No	No	No
M	11	Yes	No	Yes	D No	Yes	D Yes	No	D Yes	No	D Yes	D No	No	No	D Yes	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No
F	11	Yes	No	Yes	D Yes	D No	No	Yes	D Yes	No	D Yes	Yes	No	Yes	Yes	D Yes	D Yes	No	Yes	D Yes	D Yes	No	Yes	Yes	D Yes	No
M	12	Yes	No	Yes	D Yes	No	Yes	D Yes	D Yes	D Yes	D Yes	D No	No	D Yes	Yes	D No	D No	D No	No	D No	D No	D No	D No	D No	Yes	Yes
M	12	D No	D No	D No	D No	D No	D No	D No	D No	Yes	No	Yes	D Yes	Yes	No	No	No	No	D Yes	Yes	Yes	Yes	D No	D No	D No	No
M	11	D No	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	No	D Yes	Yes	No	Yes	Yes	Yes	Yes	D No	D No	No	No	No
F	11	Yes	D No	No	Yes	Yes	D Yes	D No	Yes	No	D Yes	No	No	D Yes	D No	Yes	No	No	Yes	Yes	Yes	No	D No	D No	D No	No
F	11	Yes	D No	D Yes	No	Yes	Yes	Yes	No	D Yes	No	Yes	Yes	D No	Yes	D No	No	D Yes	Yes	D No	D Yes	No	Yes	D No	No	No
F	11	Yes	No	Yes	Yes	Yes	Yes	D Yes	D Yes	No	D Yes	Yes	Yes	D Yes	D Yes	No	Yes	D Yes	D Yes	D Yes	D Yes	D Yes	No	Yes	No	No
M	11	Yes	D No	No	Yes	No	D Yes	D No	No	No	Yes	No	Yes	Yes	D No	D No	No	D No	No	D No	No	D No	Yes	No	Yes	Yes
F	11	D No	D No	D No	D No	D No	D No	D No	D Yes	D Yes	D Yes	D Yes	No	D Yes	D Yes	No	D No	D No	D No	D Yes	D No	D No	D No	D No	D No	No
M	11	Yes	No	Yes	D Yes	No	D Yes	D Yes	Yes	D Yes	Yes	Yes	No	D Yes	D Yes	Yes	No	D Yes	D Yes	Yes	Yes	Yes	D Yes	D Yes	D No	Yes
F	11	Yes	No	No	D No	No	Yes	D Yes	D Yes	Yes	Yes	D Yes	No	Yes	Yes	D No	D No	D No	D No	D No	No	D No	D No	No	No	No
M	11	D No	D No	D No	D No	D No	D No	D No	D Yes	Yes	Yes	D Yes	D No	Yes	D Yes	No	No	No	No	D Yes	No	No	No	No	No	No

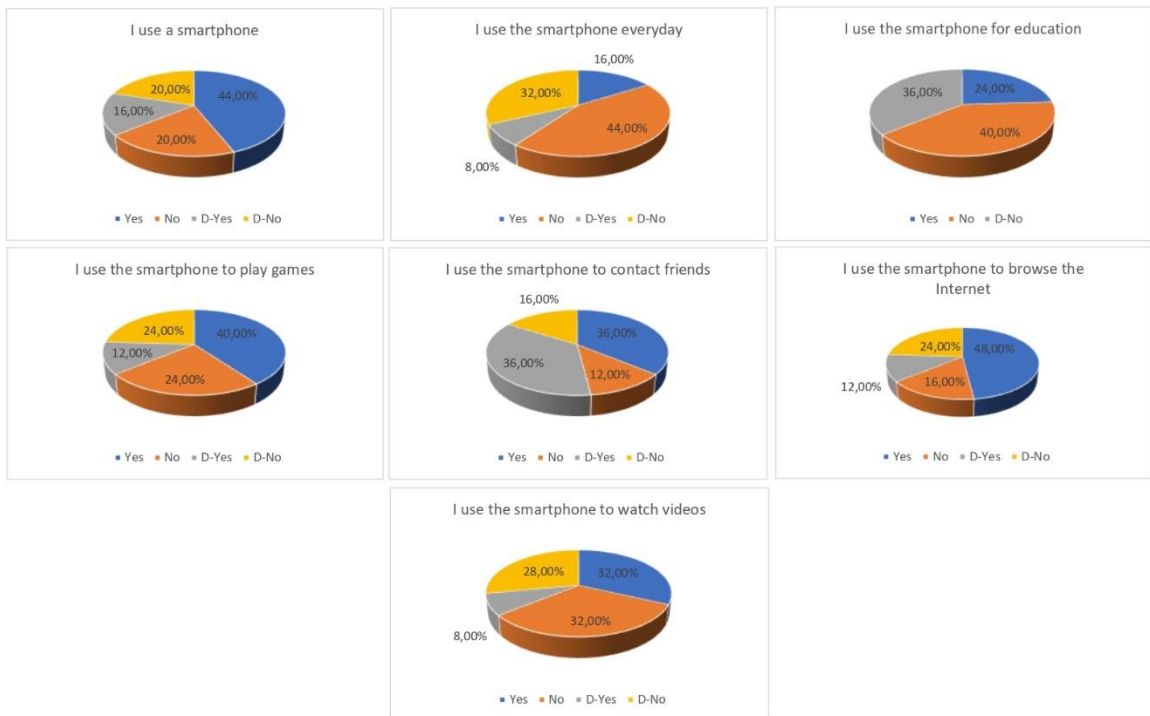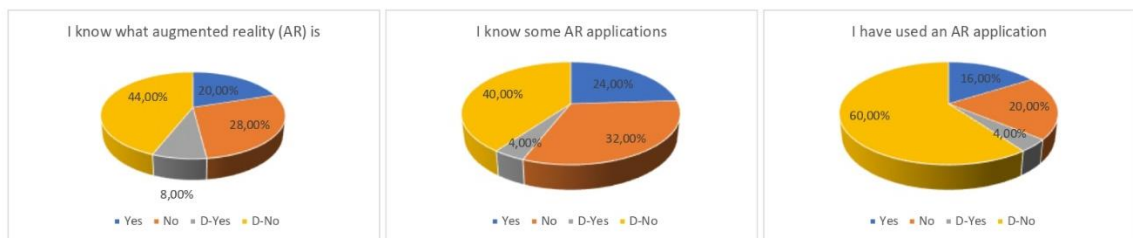**Appendix 7:** *Results of the pre-test on technology (Students)*

Percentage of answers related to Block 1: Computer

Percentage of answers related to Block 2: Tablets

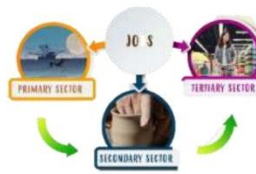**Percentage of answers related to Block 3: Smartphones**

I use a smartphone

- 44,00%
- 20,00%
- 16,00%
- 20,00%

Yes ▪ No ▪ D-Yes ▪ D-No

I use the smartphone everyday

- 16,00%
- 44,00%
- 8,00%
- 32,00%

Yes ▪ No ▪ D-Yes ▪ D-No

I use the smartphone for education

- 24,00%
- 40,00%
- 36,00%

Yes ▪ No ▪ D-No

I use the smartphone to play games

- 40,00%
- 24,00%
- 12,00%
- 24,00%

Yes ▪ No ▪ D-Yes ▪ D-No

I use the smartphone to contact friends

- 36,00%
- 12,00%
- 36,00%
- 16,00%

Yes ▪ No ▪ D-Yes ▪ D-No

I use the smartphone to browse the Internet

- 48,00%
- 16,00%
- 12,00%
- 24,00%

Yes ▪ No ▪ D-Yes ▪ D-No

I use the smartphone to watch videos

- 32,00%
- 32,00%
- 8,00%
- 28,00%

Yes ▪ No ▪ D-Yes ▪ D-No

Percentage of answers related to Block 4: Augmented reality

I know what augmented reality (AR) is

- 20,00%
- 28,00%
- 8,00%
- 44,00%

Yes ▪ No ▪ D-Yes ▪ D-No

I know some AR applications

- 24,00%
- 32,00%
- 4,00%
- 40,00%

Yes ▪ No ▪ D-Yes ▪ D-No

I have used an AR application

- 16,00%
- 20,00%
- 4,00%
- 60,00%

Yes ▪ No ▪ D-Yes ▪ D-No

Appendix 8: *Pre- and post-test on content (Students)*

ECONOMIC SECTORS

Name:

1. Which economic activities are included in the **primary** sector? Please select the correct options.

| agriculture | mining | industry |
| fishing | construction | cattle industry |

2. What **characteristic** do **primary** sector activities share? Mark the correct option.
   a. They transform raw materials into consumer or capital goods.
   b. They provide services to people.
   c. They obtain products from nature.

3. Write the name of the **activity** that corresponds to each of these **definitions**.
   a. It works the land to obtain vegetable products: _____.

   b. It consists of raising animals for our food: _____.

   c. It is the catching of fish from the sea or rivers to feed ourselves: _____.

   d. Extracting minerals and rocks from the earth's surface or subsoil: _____.

   e. It is the care of forests and their exploitation for resources: _____.

4. Oh no, what a mess! Can you help us choose the **raw materials**? Circle them.
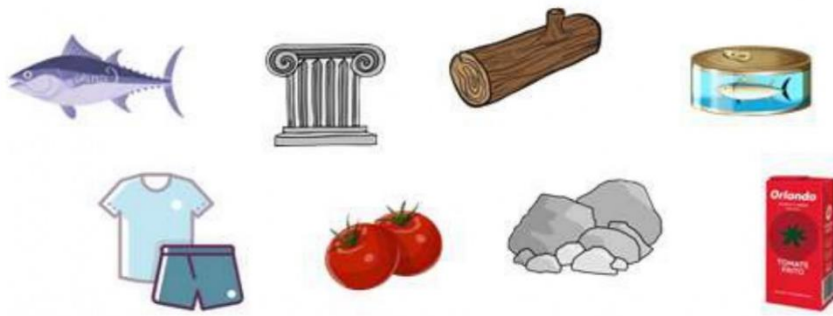
5. Place each product in the correct box taking into account its **origin**.

iron – wheat – tuna – wool – tuna steak – T-shirt – tool – bread

	Agriculture	Cattle industry	Fishing	Mining
Raw material				
Manufactured material				

6. Mark the activities that belong to the <u>secondary</u> **sector**.

cattle industry

crafting

agriculture

industry

fishing

construction

7. Match each **definition** with the type of **activity** that corresponds to it.

Construction	Crafting	Industry

The products are produced by workers in <u>factories</u> using highly complex machines and tools.	It is responsible for the construction of buildings and engineering works such as bridges, tunnels and roads.	The products are made by <u>artisans</u> in small workshops using their hands and very simple tools.

8. What has each **raw material** been processed into after it has gone through the factory? **Draw a line**.

9. Select jobs that provide a **service**.

10. Put the milk **production process** in <u>order</u> and fill in the <u>names</u> of the sectors.
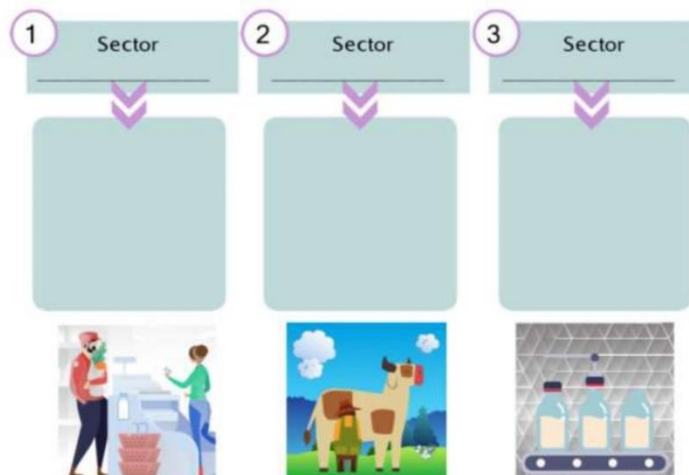
11. **Number** each image according to whether they are working in nature (1), in the factory (2) or providing services (3):

Appendix 9: *Excel with scoring of pre- and post-tests on content*

Pre-test Content

Student	Activity 1 (4)	Activity 2 (1)	Activity 3 (5)	Activity 4 (4)	Activity 5 (8)	Activity 6 (3)	Activity 7 (3)	Activity 8 (4)	Activity 9 (4)	Activity 10 (6)	Activity 11 (4)
1	1	0	4	2	2	1	3	4	3	3	3
2	1	0	4	4	8	1	3	0	0	3	4
3	3	1	4	4	3	3	3	4	3	6	4
4	0	0	4	4	8	0	3	4	4	3	4
5	4	1	4	4	8	3	3	4	3	6	4
6	2	0	4	3	1	2	3	4	3	3	3
7	2	0	4	4	2	1	3	4	3	0	4
8	3	1	0	0	4	2	1	4	3	3	4
9	3	1	4	3	0	3	3	4	4	3	4
10	3	0	4	4	8	3	3	4	3	3	4
11	3	1	4	4	3	3	3	4	3	3	4
12	2	1	0	3	3	1	1	4	2	3	3
13	4	1	4	4	6	3	3	4	3	6	4
14	4	1	0	4	7	3	3	4	4	0	4
15	4	1	4	3	6	3	3	4	3	1	4
16	3	1	4	3	4	3	3	4	3	0	4
17	1	1	4	2	4	1	3	0	3	3	2
18	4	0	4	2	8	3	3	4	3	3	4
19	3	1	4	4	8	3	3	4	3	3	4
20	1	0	4	2	2	2	3	4	2	3	4
21	1	1	4	2	2	2	3	4	3	6	4
22	3	1	4	4	8	2	3	4	3	6	4
23	2	0	0	4	3	2	3	4	3	3	4
24	3	1	4	2	2	3	3	4	3	0	4

Post-test Content

Student	PActivity 1 (4)	PActivity 2 (1)	PActivity 3 (5)	PActivity 4 (4)	PActivity 5 (8)	PActivity 6 (3)	PActivity 7 (3)	PActivity 8 (4)	PActivity 9 (4)	PActivity 10 (6)	PActivity 11 (4)
1	3	1	0	4	4	3	3	4	4	6	1
2	4	1	5	4	8	3	3	4	4	6	4
3	4	0	4	3	4	3	3	4	3	6	1
4	2	1	5	3	5	2	3	4	4	6	4
5	2	1	5	2	2	1	3	4	2	6	1
6	4	1	4	4	8	3	3	4	4	6	4
7	3	1	4	3	6	3	3	4	3	6	4
8	4	1	4	4	6	3	1	4	2	6	3
9	4	1	5	4	8	3	3	4	4	6	4
10	3	1	4	4	8	2	3	4	4	6	4
11	4	1	5	3	3	3	3	4	3	3	4
12	3	1	5	4	2	2	3	4	4	6	4
13	4	1	5	4	8	3	3	4	3	6	4
14	4	1	4	4	8	3	3	4	4	6	4
15	3	1	4	4	4	3	3	4	3	3	4
16	4	1	5	4	8	3	3	4	4	6	4
17	4	1	5	4	8	3	3	4	3	6	4
18	3	1	4	4	8	3	3	4	3	6	4
19	4	1	5	4	8	3	3	4	4	6	3
20	3	1	4	4	1	3	3	4	4	6	4
21	4	1	5	3	8	3	3	1	0	6	3
22	3	1	4	4	8	3	3	4	3	6	4
23	4	1	4	4	8	3	3	4	4	6	4
24	4	1	5	4	6	3	3	4	4	3	4

Appendix 10: *Table 2-Descriptive statistics for the pre- and post-tests on content*

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std. Deviation		N	Minimum	Maximum	Mean	Std. Deviation
Activity 1 (4)	24	0	4	2.42	1.139	PostActivity 1 (4)	24	2	4	3.50	.659
Activity 2 (1)	24	0	1	.58	.504	PostActivity 2 (1)	24	0	1	.96	.204
Activity 3 (5)	24	0	4	3.33	1.523	PostActivity 3 (5)	24	0	5	4.33	1.049
Activity 4 (4)	24	0	4	2.96	1.233	PostActivity 4 (4)	24	2	4	3.71	.550
Activity 5 (8)	24	0	8	4.25	2.770	PostActivity 5 (8)	24	1	8	6.13	2.383
Activity 6 (3)	24	0	3	2.13	.947	PostActivity 6 (3)	24	1	3	2.79	.509
Activity 7 (3)	24	1	3	2.83	.565	PostActivity 7 (3)	24	1	3	2.92	.408
Activity 8 (4)	24	0	4	3.67	1.129	PostActivity 8 (4)	24	1	4	3.88	.612
Activity 9 (4)	24	0	4	2.88	.797	PostActivity 9 (4)	24	0	4	3.33	.963
Activity 10 (6)	24	0	6	2.79	1.911	PostActivity 10 (6)	24	3	6	5.63	1.013
Activity 11 (4)	24	0	4	3.63	.924	PostActivity 11 (4)	24	1	4	3.50	1.022
						Valid N (listwise)	24				

Appendix 11: *Table 3-Paired Samples Statistics for the pre- and post-tests on content*

		Mean	N	Std. Deviation	Std. Error Mean			Mean	N	Std. Deviation	Std. Error Mean
		Paired Samples Statistics									
Pair 1	PostActivity 1 (4)	3.50	24	.659	.135	Pair 7	PostActivity 7 (3)	2.92	24	.408	.083
	Activity 1 (4)	2.42	24	1.139	.232		Activity 7 (3)	2.83	24	.565	.115
Pair 2	PostActivity 2 (1)	.96	24	.204	.042	Pair 8	PostActivity 8 (4)	3.88	24	.612	.125
	Activity 2 (1)	.58	24	.504	.103		Activity 8 (4)	3.67	24	1.129	.231
Pair 3	PostActivity 3 (5)	4.33	24	1.049	.214	Pair 9	PostActivity 9 (4)	3.33	24	.963	.197
	Activity 3 (5)	3.33	24	1.523	.311		Activity 9 (4)	2.88	24	.797	.163
Pair 4	PostActivity 4 (4)	3.71	24	.550	.112	Pair 10	PostActivity 10 (6)	5.63	24	1.013	.207
	Activity 4 (4)	2.96	24	1.233	.252		Activity 10 (6)	2.79	24	1.911	.390
Pair 5	PostActivity 5 (8)	6.13	24	2.383	.486	Pair 11	PostActivity 11 (4)	3.50	24	1.022	.209
	Activity 5 (8)	4.25	24	2.770	.565		Activity 11 (4)	3.63	24	.924	.189
Pair 6	PostActivity 6 (3)	2.79	24	.509	.104						
	Activity 6 (3)	2.13	24	.947	.193						

Appendix 12: *Table 4-Paired Samples Tests for the pre- and post-tests on content*

		Paired Differences					t	df	p-value
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PostActivity 1 (4) - Activity 1 (4)	1.083	1.139	.232	.602	1.564	4.660	23	<0.0001
Pair 2	PostActivity 2 (1) - Activity 2 (1)	.375	.576	.118	.132	.618	3.191	23	0.002
Pair 3	PostActivity 3 (5) - Activity 3 (5)	1.000	1.818	.371	.232	1.768	2.695	23	0.006
Pair 4	PostActivity 4 (4) - Activity 4 (4)	.750	1.260	.257	.218	1.282	2.917	23	0.004
Pair 5	PostActivity 5 (8) - Activity 5 (8)	1.875	2.849	.581	.672	3.078	3.225	23	0.002
Pair 6	PostActivity 6 (3) - Activity 6 (3)	.667	.868	.177	.300	1.033	3.762	23	0.001
Pair 7	PostActivity 7 (3) - Activity 7 (3)	.083	.408	.083	-.089	.256	1.000	23	0.164
Pair 8	PostActivity 8 (4) - Activity 8 (4)	.208	1.318	.269	-.348	.765	.774	23	0.223
Pair 9	PostActivity 9 (4) - Activity 9 (4)	.458	1.250	.255	-.070	.986	1.796	23	0.043
Pair 10	PostActivity 10 (6) - Activity 10 (6)	2.833	1.880	.384	2.039	3.627	7.381	23	<0.0001
Pair 11	PostActivity 11 (4) - Activity 11 (4)	-.125	.992	.202	-.544	.294	-.617	23	0.728

Paired Samples Test

Appendix 13: *Post-test on technology (Students)* (adapted from Harfield, 2014)

QUESTIONNAIRE ON THE USE OF AUGMENTED REALITY (AR)

Choose one face depending on how much you agree with the following statements.

Definitely NO!	No	Yes	Definitely YES!

For example, if you like pasta very much, you should choose the following face.

But, if you don't like pasta at all, you should use this face.

REMEMBER! There aren't right or wrong answers, I am just interested in your opinion.

Block 1. *Engagement, attention, interest*

	Definitely NO!	No	Yes	Definitely YES!
1. The AR application we employed captured my attention.				
2. The topic of the activity made me want to find out more about it.				
3. I liked the design and the appearance of the AR application.				
4. I wanted to spend the time to complete the activity successfully.				
5. The time I spent for the activity was more than I expected.				
6. I think that participating in this activity was a waste of my time.				

Block 2. *Usability*

	Definitely NO!	No	Yes	Definitely YES!
7. It was easy for me to use the AR application.				
8. I felt confident since I knew how to use the AR application.				
9. I felt that I could use the AR application to find the information I wanted.				
10. I did not have difficulties in controlling the AR application.				

Block 3. *Emotional attachment*

	Definitely NO!	No	Yes	Definitely YES!
11. I was impatient about completing the activity successfully.				
12. I was often excited since I felt as being part of the activity.				
13. I often felt suspense by the activity.				
14. I often felt that I was really in charge of the activity.				

Block 4. *Focus of attention*

	Definitely NO!	No	Yes	Definitely YES!
15. If interrupted, I looked forward to returning to the activity.				
16. I was more focused on the activity rather on any external distraction.				
17. Time went by quickly during the activity.				

Block 5. *Presence*

	Definitely NO!	No	Yes	Definitely YES!
18. During the activity, I felt that I was the protagonist.				
19. The activity felt so authentic that it made me think that the virtual characters/objects existed for real.				
20. The activity felt more as something that I was experiencing, rather than something I was just doing.				
21. I so was involved, that I felt that my actions could affect the activity.				

Appendix 14: *Excel with answers of post-test on technology (Students)*

Gender	Age	Block 1-1	Block 1-2	Block 1-3	Block 1-4	Block 1-5	Block 1-6	Block 2-7	Block 2-8	Block 2-9	Block 2-10	Block 3-11	Block 3-12	Block 3-13	Block 3-14	Block 4-15	Block 4-16	Block 4-17	Block 5-18	Block 5-19	Block 5-20	Block 5-21
F	11	Yes	Yes	No	Yes	Yes	No	D Yes	D Yes	Yes	D Yes	Yes	Yes	No	D Yes	Yes	No	No	No	No	Yes	No
M	11	No	Yes	No	No	No	No	Yes	No	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	No	No	Yes	Yes
F	11	D Yes	D Yes	D Yes	D Yes	Yes	D No	D Yes	D Yes	D Yes	D Yes	D Yes	D Yes	D Yes	Yes	D No	D Yes	D Yes	D Yes	Yes	D Yes	D No
M	11	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
M	11	D Yes	Yes	D Yes	D Yes	Yes	D No	D Yes	Yes	D Yes	D Yes	Yes	No	Yes	Yes	Yes	D Yes	Yes	Yes	Yes	D Yes	Yes
F	11	Yes	D Yes	Yes	D Yes	No	No	Yes	Yes	D Yes	Yes	D Yes	Yes	Yes	No	Yes	Yes	D Yes	Yes	Yes	Yes	Yes
M	11	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	No	Yes	No	No	Yes	No
F	11	Yes	Yes	D Yes	D Yes	No	D No	D Yes	Yes	No	Yes	Yes	Yes	No	D Yes	Yes	D Yes	Yes	Yes	No	Yes	Yes
M	11	Yes	Yes	Yes	D Yes	No	D No	Yes	D Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	D No	D No	No	Yes
F	11	Yes	No	D Yes	D Yes	D Yes	Yes	Yes	D Yes	D Yes	Yes	No	Yes	No	Yes	No	D No	D Yes	D No	Yes	Yes	No
F	11	D Yes	Yes	Yes	No	D Yes	D No	D Yes	No	No	Yes	D Yes	Yes	D No	D No	No	Yes	D Yes	Yes	Yes	D Yes	No
F	11	D Yes	Yes	D Yes	D Yes	No	D No	D Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	No
F	11	Yes	D Yes	Yes	Yes	Yes	Yes	Yes	Yes	D Yes	Yes	Yes	Yes	Yes	Yes	Yes	D Yes	Yes	D Yes	Yes	Yes	Yes
M	11	Yes	No	Yes	Yes	No	No	No	No	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
F	12	D Yes	Yes	No	D Not	Yes	Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	D No	No	No	No
F	12	Yes	Yes	Yes	Yes	Yes	D No	Yes	Yes	D Yes	D Yes	Yes	D No	D No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
F	11	Yes	Yes	Yes	Yes	No	D No	Yes	No	No	D Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
M	11	Yes	Yes	D Yes	Yes	No	D No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	D Yes	No	Yes	Yes	Yes
F	11	D Yes	Yes	D Yes	Yes	Yes	D No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	No	No
M	11	No	D Yes	No	No	Yes	D No	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	No	Yes	No	No
M	11	Yes	D Yes	D Yes	Yes	No	D No	D Yes	D Yes	No	D Yes	Yes	D Yes	No	D Yes	Yes	Yes	Yes	No	Yes	Yes	No
M	11	Yes	Yes	D Yes	Yes	No	D No	D Yes	Yes	Yes	Yes	Yes	No	D No	No	Yes	No	D Yes	No	D No	No	No
F	11	Yes	Yes	D Yes	Yes	No	D No	D Yes	No	Yes	D Yes	No	Yes	Yes	D Yes	Yes	D No	D Yes	No	Yes	Yes	No
F	11	D Yes	Yes	D Yes	D Yes	Yes	D No	Yes	D Yes	Yes	D Yes	D Yes	D Yes	No	Yes	D Yes	Yes	D Yes	D Yes	Yes	D Yes	Yes

Appendix 15: *Results of the post-test on technology (Students)*

Percentage of answers related to Block 1: Engagement, attention, interest

The AR application we employed captured my attention.
29% | 8% | 63%
Yes · No · D-Yes

The topic of the activity made me want to find out more about it.
20,80% | 12,50% | 66,70%
Yes · No · D-Yes

I liked the design and the appearance of the AR application.
45,80% | 37,50% | 16,70%
Yes · No · D-Yes

I wanted to spend the time to complete the activity successfully.
33% | 4% | 50% | 13%
Yes · No · D-Yes · D-No

The time I spent for the activity was more than I expected.
8,30% | 41,70% | 50,00%
Yes · No · D-Yes

I think that participating in this activity was a waste of my time.
12,50% | 25,00% | 62,50%
Yes · No · D-No

Percentage of answers related to Block 2: Usability

It was easy for me to use the AR application.
37,50% | 4,20% | 58,30%
Yes · No · D-Yes

I felt confident since I knew how to use the AR application.
25,00% | 25,00% | 50,00%
Yes · No · D-Yes

I felt that I could use the AR application to find the information I wanted.
25,00% | 20,80% | 54,20%
Yes · No · D-Yes

I did not have difficulties in controlling the AR application.
33,30% | 4,20% | 62,50%
Yes · No · D-Yes

Percentage of answers related to Block 3: Emotional attachment

I was impatient about completing the activity successfully.

16,70%
29,20%
54,20%

Yes No D-Yes

I was often excited since I felt as being part of the activity.

12,50% 4,20%
16,70%
66,70%

Yes No D-Yes D-No

I often felt suspense by the activity.

12,50% 29,20%
4,20%
54,20%

Yes No D-Yes D-No

I often felt that I was really in charge of the activity.

4,20%
16,70%
33,30%
45,80%

Yes No D-Yes D-No

Percentage of answers related to Block 4: Focus of attention

If interrupted, I looked forward to returning to the activity.

4,20% 4,20%
20,80%
70,80%

Yes No D-Yes D-No

I was more focused on the activity rather on any external distraction.

12,50% 8,30%
33,30%
45,80%

Yes No D-Yes D-No

Time went by quickly during the activity.

33,30% 50,00%
16,70%

Yes No D-Yes
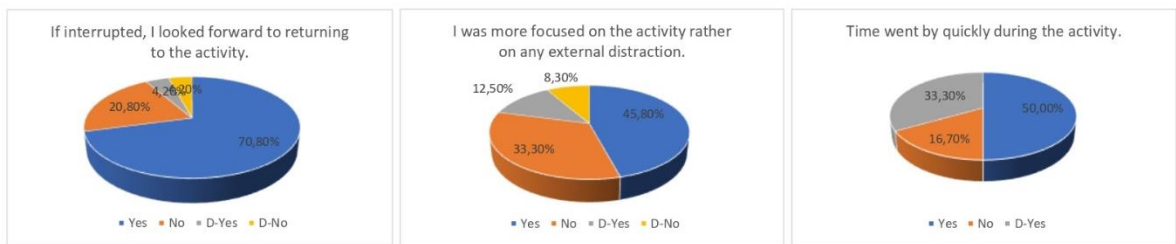
Percentage of answers related to Block 5: Presence

During the activity, I felt that I was the protagonist.

12,50% 8,30%
50,00%
29,20%

Yes No D-Yes D-No

The activity felt so authentic that it made me think that the virtual characters/objects existed for real.

12,50%
4,20%
20,80%
62,50%

Yes No D-Yes D-No

The activity felt more as something that I was experiencing, rather than something I was just doing.

16,70%
20,80%
62,50%

Yes No D-Yes

I so was involved, that I felt that my actions could affect the activity.

4,20%
41,70%
54,20%

Yes No D-No

Appendix 16: *Table 5-Sequencing of activities*

Session 1		
AIM OF THE ACTIVITY	**STEP/LEVEL**	**RESOURCES**
Introduce the topic	4 markers	Four images that correspond to an audio of each of the paragraphs of the text on economic sectors. Students will have to find out the order of the different paragraphs to create the complete text. Once they put together, they will be able to listen to the audio and read it (since they will have it on paper once it has been resolved).
Create a definition of economic sectors	3 or 4 markers	A total of 4 definitions will be created: economic sectors, primary sector, secondary sector and tertiary sector. There will be a total of 15 markers. However, each sentence will be integrated by 3 markers (in the case of the definition of economic sector) and 4 markers (in the definitions of each of the sectors). | Economic sectors	are	the division of the economic activity of a state or territory.	

		The primary sector	includes all activities	involving the extraction and obtaining of raw materials from the natural environment.	Ex. Agriculture, livestock, mining, forestry and fishing
		The secondary sector	includes all activities	involving the transformation of raw materials into processed products.	Ex. Industry and construction
		The tertiary sector	includes all activities	involving the supply of intangible goods to individuals, communities or companies.	Ex. Tourism, business, health, education.
Link definitions with their respective concepts	2 markers	On the one hand, pictures of different economic activities together with an audio with the name of the activity and, on the other hand, definitions of each activity together with an audio reading the written text. They should link each image with its definition.			

Session 2		
AIM OF THE ACTIVITY	**STEP/LEVEL**	**RESOURCES**
Linking different activities with their respective sector	2 markers	Image with written name and audio, and the names of the 3 sectors on the other side. They should link each image with its respective sector.
To link the concepts "raw material" and "manufactured material" with their respective characteristics	3 or 4 markers	On the one hand, the markers with the words "raw material" and "manufactured material" and, on the other hand, the different characteristics. They will have to link the concepts with all their characteristics.
Recognise raw materials	Zoom	5 images of materials, 1 of them will be "manufactured" and the other 4 will be "raw". When the students zoom in, they will be able to see which material it is and hear whether it is raw or manufactured.
Recognize manufactured materials	Zoom	5 images of materials, 1 of them will be "raw" and the other 4 will be "manufactured". When the students zoom in, they will be able to see which material it is and hear whether it is raw or manufactured.
Recognise the steps in the industrial process of different products	3 markers	Students will see the 3 steps of different industrial processes. They will have to identify which ones are from the same process, and in which order they should be placed. Once ordered, they will listen to the industrial process of that product.
Review concepts through understanding a summary video	2 markers	On the one hand, a marker that will take students to a video. Once finished, they will have both the markers with the questions and the possible answers to each one of them. A *Voki* will be in

AIM OF THE ACTIVITY	STEP/LEVEL	RESOURCES
		charge of formulating the questions when scanning the marker and the students will have to match the marker with the indicated answer.
Session 3		
To get to know the different sectors present in the Basque Country	Zoom	A map of the Basque Country with different markers on it. Each marker will take students to an audio, which will tell them which sector is predominant in that place and some basic information about it.
Remember and identifying raw materials in the first sector	Zoom	1 marker with a picture of a company or service from the secondary or tertiary sector, and 4 markers with a picture of a raw material from the first sector. They will have to eliminate the odd one, and when they zoom in, they will be able to see if that really was the odd one or if it was another one.
Remembering and identifying companies in the second sector	Zoom	1 marker with a picture of a product, activity or service from the primary or tertiary sector, and 4 markers with a picture of a company from the secondary sector. They will have to eliminate the odd one, and when they zoom in, they will be able to see if that really was the odd one or if it was another one.
Remembering and identifying services in the tertiary sector	Zoom	1 marker with a picture of a product, activity or company from the primary or secondary sector, and 4 markers with a picture of a service from the tertiary sector. They will have to eliminate the odd one, and when they zoom in, they will be able to see if that really was the odd one.

Session 4		
AIM OF THE ACTIVITY	**STEP/LEVEL**	**RESOURCES**
Apply what has been learned (Creation)	3 markers	Each student will have to choose an industrial process and explain it through AR. To do this, the selected industrial process must be divided into 3 steps (corresponding to each sector) and students will record an audio for each step explaining what is done in it.
Apply what has been learned (Presentation)	3 markers	Once they have finished their industrial process, they should leave it on their desk and walk around the classroom to view their peers' industrial processes.
Transfer what has been learned to another situation	4 markers	This last activity will be carried out in groups. Each group should choose a city or country. They should first create a marker corresponding to that place. They should then investigate what is predominant in each of the sectors of that place. Once they have done that, they will create a marker for each sector and audio record a brief summary of what they have found.

Appendix 17: *Materials*

Economic sectors	are
`1`	`1`
the division of the economic activity of a state or territory.	The primary sector
`1`	`2`
includes all activities	involving the extraction and obtaining of raw materials from the natural environment.
`2`	`2`

Ex. Agriculture, livestock, mining, forestry and fishing.	The secondary sector
`2`	`3`
involving the transformation of raw materials into processed products.	Ex. Industry and construction.
`3`	`3`
The tertiary sector	involving the supply of intangible goods to individuals, communities or companies.
`4`	`4`

Ex. Tourism, business, health, education. 4	includes all activities 3
includes all activities 4	

Activity engaged in travelling to other places for leisure or relaxation.	Activity engaged in the buying and selling of goods for profit.	Activity of the primary sector that is engaged in animal husbandry.	This sector is responsible for the transformation of natural resources into processed products.
They generate energy to enable industries to transform products	This sector is responsible for extracting resources from nature.	Activity of the primary sector that catches fish.	This sector provides services to people.
Secondary sector activity that is responsible for transforming the products.	Activity of the primary sector that is engaged in the felling of trees: _____ logging.	Primary sector activity that cultivates the land.	Activity engaged in the transport of people or goods.

PRIMARY SECTOR	SECONDARY SECTOR
TERTIARY SECTOR	
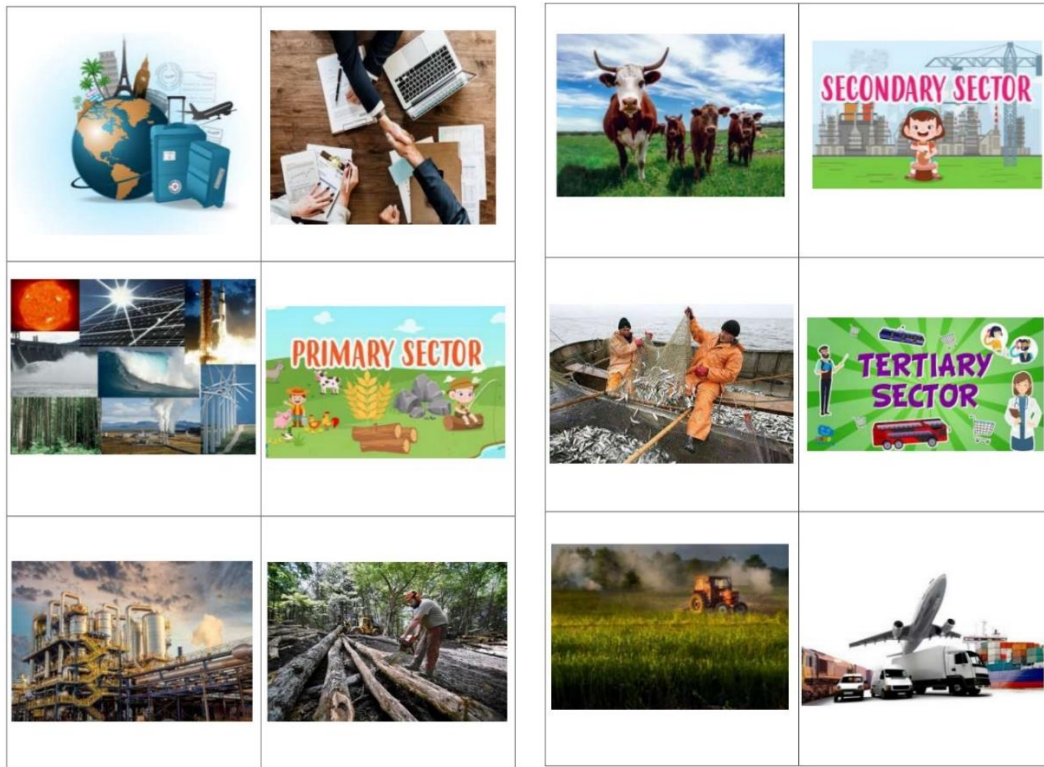
RAW MATERIAL ①	MANUFACTURED MATERIAL ①
Materials in their natural state. ②	They are used to make product. ③
Products that have been made from a raw material. ②	They are made by hand or by machine. ③
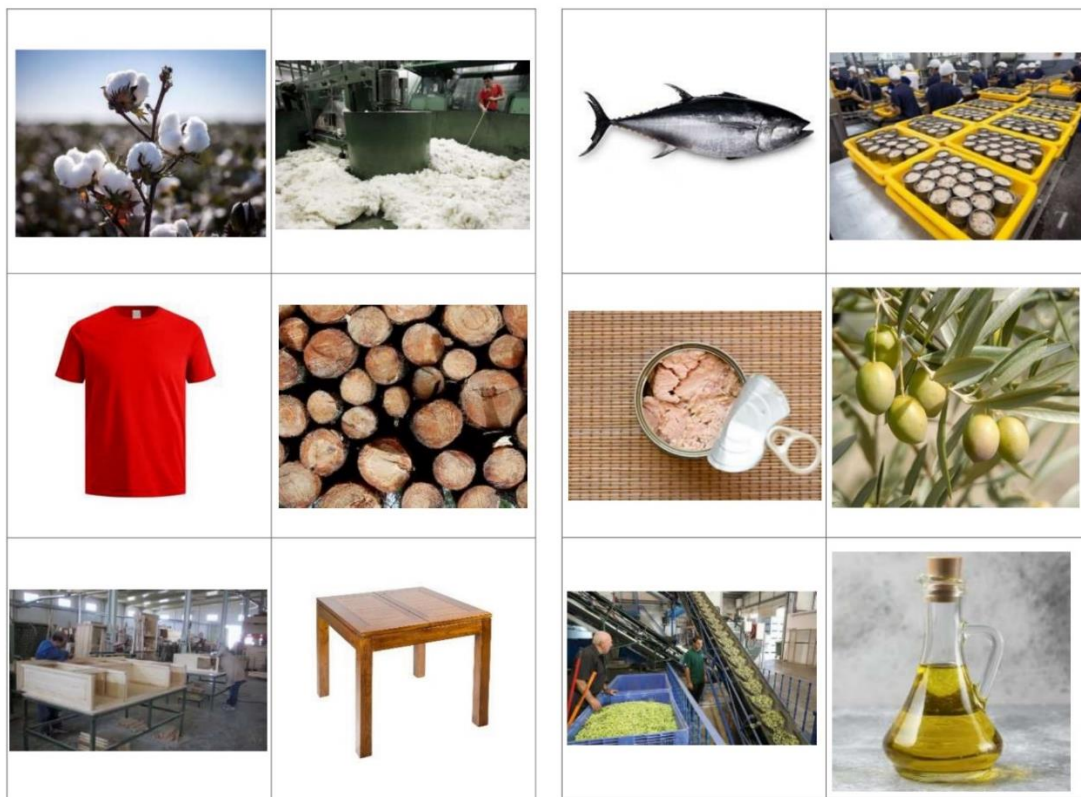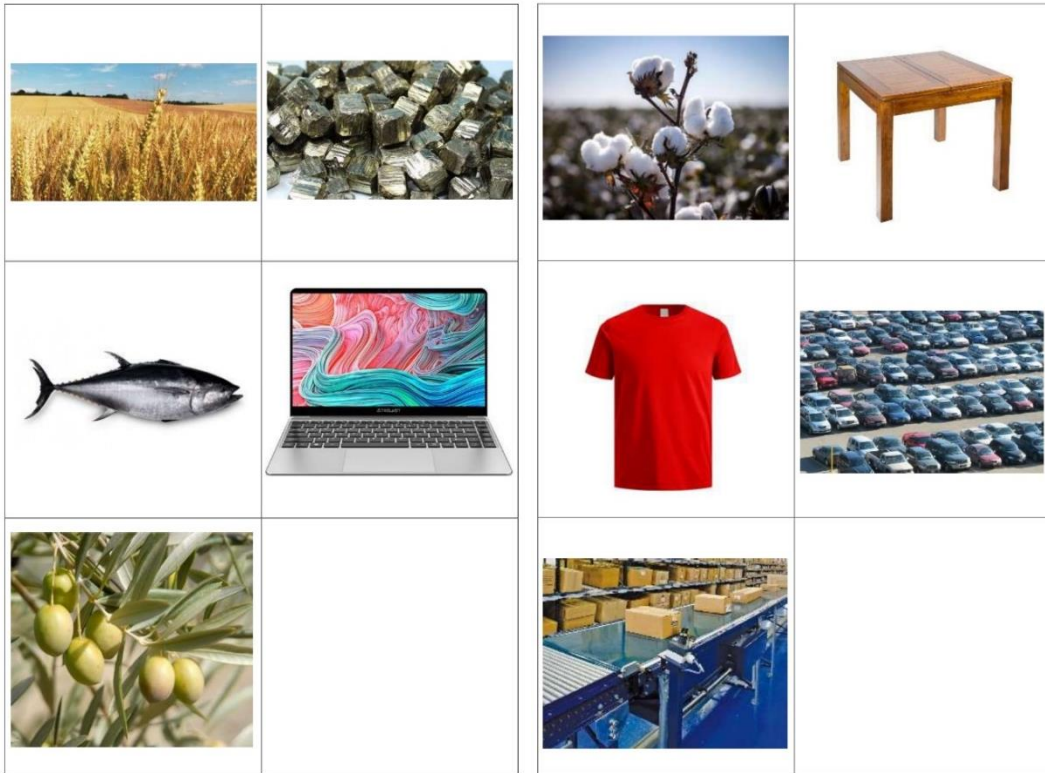
	are artificially made materials.
	are obtained from nature.	are obtained from manufacturing plants.

	Cheese
A spoon	Wool
	Transform the raw materials into elaborated final products.

Obtain raw materials directly from nature.	Provide important services to society.
	Primary sector
Secondary sector	Tertiary sector

	Raising of animals for food or materials	Secondary sector	Tertiary sector
Obtaining minerals from a mine	Cutting trees		Primary sector
	Primary sector	Secondary sector	Tertiary sector

	Primary sector
Secondary sector	Tertiary sector
	True, they all belong to the primary sector.

False, they belong to the primary and tertiary sector.	False, they belong to the primary and secondary sector.

IBERDROLA	Petronor	BBVA	
sidenor	TUBACEX	Osakidetza	ERTZAINTZA
Bizkaia bizkaibus			
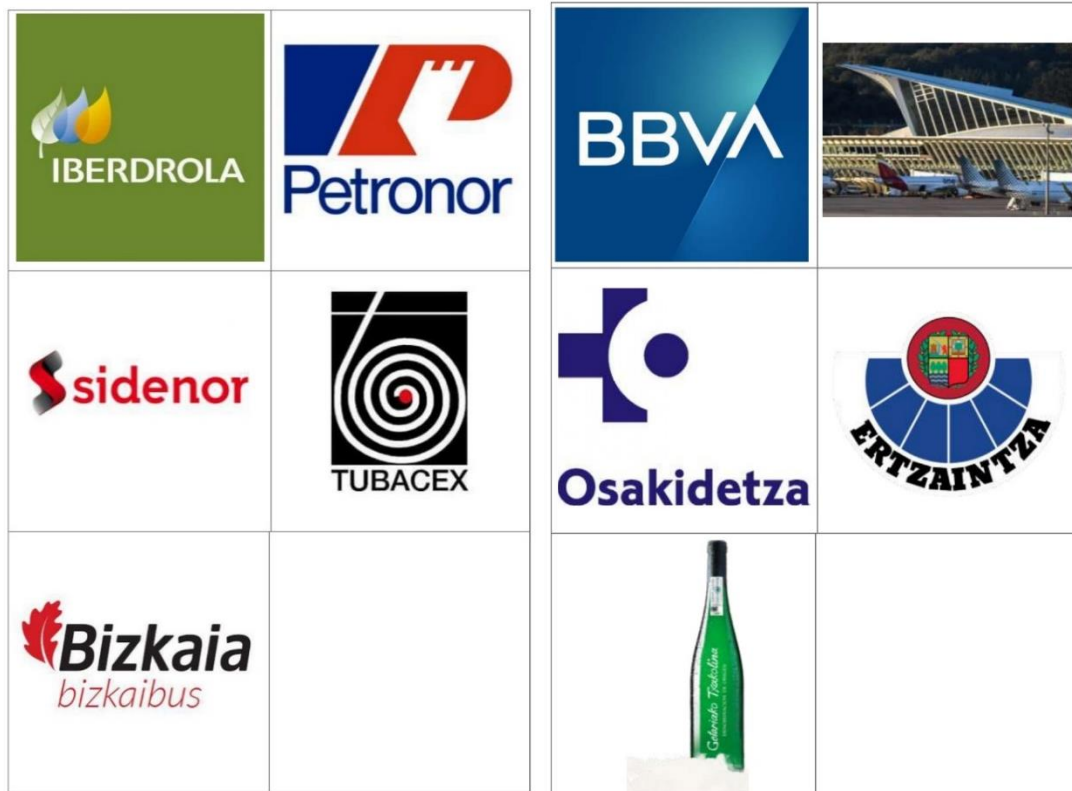
LET'S GET TO KNOW THE ECONOMIC ACTIVITIES IN THE BASQUE COUNTRY
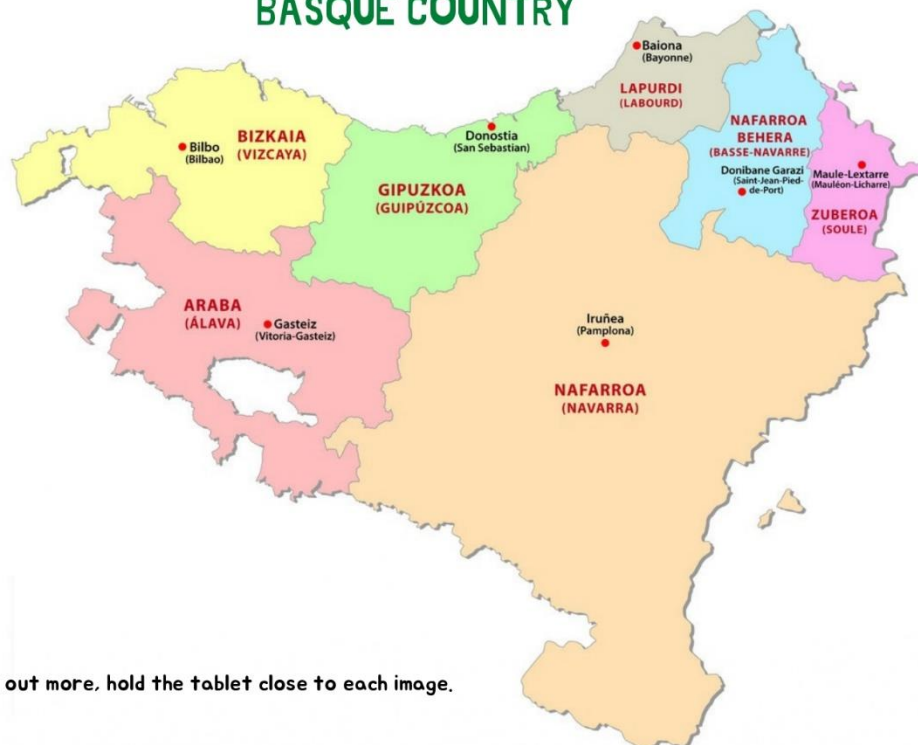
To find out more, hold the tablet close to each image.

Economic sectors

Economic sectors are the division of the economic activity of a state or territory, according to the type of productive process that takes place.

The three-sector hypothesis

Economic activities are divided into three sectors called primary, secondary and tertiary. This economic theory was developed by Colin Clark and Jean Fourastié.

Primary sector

The primary sector groups together activities involving the extraction and obtaining of raw materials from the natural environment. Agriculture, livestock, mining, forestry and fishing, for example. It is specific to rural areas.

Secondary sector

The secondary sector includes activities that involve the transformation of raw materials into processed products, that is, industry and construction. For example, iron and steel, agri-food sector, etc.; the production of consumer goods in general. This sector is mainly located in urban areas.

Tertiary sector

The tertiary sector, finally, includes all activities and service provision that do not belong to the other two sectors and that could be considered as activities of supplying intangible goods to individuals, communities or companies. This sector groups together several services such as: commerce, tourism and leisure, health, education, or any culture and services provided by public administrations.

Appendix 18: *Augmented Class presentation*
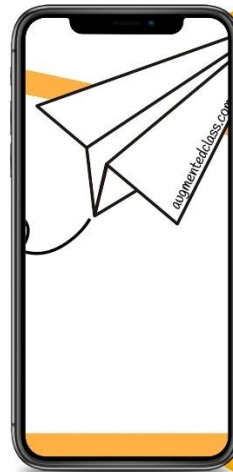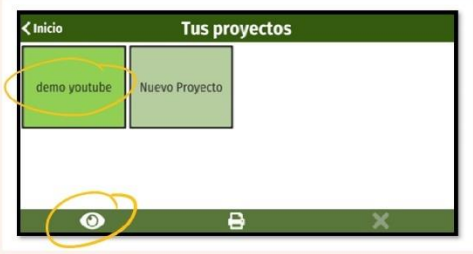
Step by step

3. Choose the **project** in question and click on the **eye** at the bottom.

Step by step

4. Within the project, you will find different activities.

Each of them will have its own **MARKERS**.

Markers?

Step by step

Markers are **cards containing information**, in the form of text, image, audio or video.

Page 3

Step by step

5. Following the instructions for each activity, you will have to **join 2, 3 or even 4 markers**. In this way, you will solve the activities correctly.

Page 3

Step by step

Let's see an example!

	Cheese	Cake
Marker 1	Marker 2	Marker 3

Page 3

Step by step

Let's see an example!

	Cake
Marker 1	Marker 3

Step by step

2. Click on "**New project**".
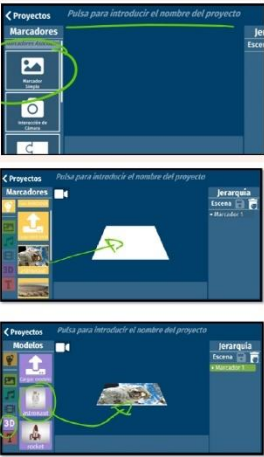
Step by step

3. Enter the **name** of the project and choose an image as a **marker**.

> You can take it with your smartphone, upload it from your gallery or use a predefined image.

Once chosen, drag it to the centre of the screen.

Step by step

4. Add a **3D model** by uploading it from your device or using one from the repository, dragging it to the centre of the screen. You can also add **images, audio, video or text.**

Appendix 19: *Final project markers and script*

First, a person takes the honey from the three.

Then, in one industry they clean the honey.

Finally, in one supermarket you can buy it.

First, some persons cut the trees

Then