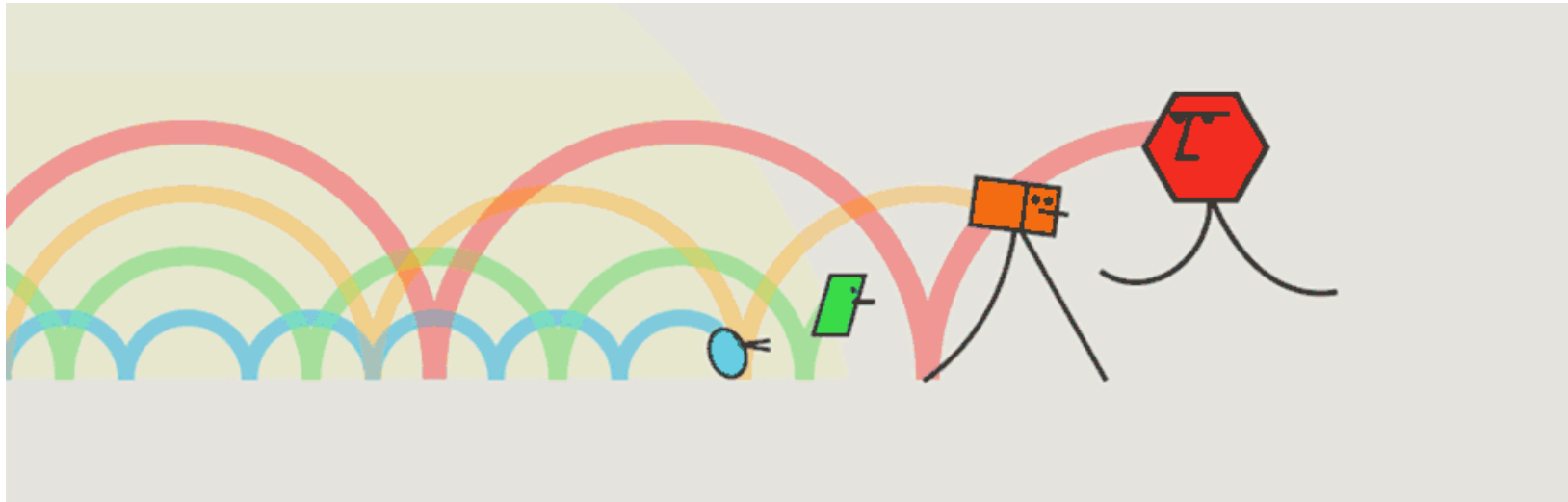


What's the



INS Alexandre Deulofeu

Sandra Olaya

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Generació Plurilingüe (GEP)

Year 2

2019-2020

Identification of the GEP project

Els materials creats en el marc de la formació del programa GEP pertanyen a l'autor/a amb una [licència creative commons CC BY-NC-SA](#):



Reconeixement - No Comercial - Compartir Igual

Title	What's the colour of light?
Authorship	Sandra Olaya / Alex Salgado
School	INS Alexandre Deulofeu
Students' CEFR Level (A1, A2...)	A2
Grade	3rd ESO
Content area(s)	Visual i Plàstica / Tecnologia
Number of sessions (4, 6 or 9)	6
Teacher(s) involved	Sandra Olaya / Alex Salgado
Keywords	Colour, perception, light, eye, engines, DC circuits

Template adapted from CLIL-SI 2015.

More information at: <http://grupsderecerca.uab.cat/cliisi/>



1. OUR PROJECT

Introduction: Our project is about colour perception and light mixing. Students will work on colour theories, eye perception and will build a spin art table.

Driving question: What's the colour of light?

Final product: Students will design and create a table holding several electric engines spinning patterned discs. The movement of these discs will create an added colour.

2. GOALS

1. Introduce students to the key concepts underlying the perception of colours and vision

3. HOW DO YOU KNOW STUDENTS ARE MAKING PROGRESS? (assessment criteria)

Students can :

1.1. Research and summarize information gathered in several webs provided by the teachers

1.2. Create a mindmap with some of colour theories they have investigate

2. Demonstrate how eye works, which affects our interpretation of artworks	2.1 Create a video showing their learning (common craft, topic presentation, colourblind role playing)
3. Stimulate further interest in the relationship between colour and art	
...	

3. CURRICULUM CONNECTIONS SPECIFIC COMPETENCES AND KEY CONTENTS

Subject-matter curriculum		Foreign language curriculum	
Specific Competences	Key Contents	Specific Competences	Key Contents
<p>Competència 1. Utilitzar estratègicament els elements dels llenguat-ges visual, musical i corporal per analitzar les produccions artístiques.</p> <p>Competència 7. Desenvolupar projectes artístics disciplinaris o trans-disciplinaris tant personals com col·lectius.</p>	<p>Colour perception</p> <p>Primary and secondary colours</p>	<p>Competència 4. Aplicar estratègies de comprensió per obtenir informació i interpretar el contingut de textos escrits d'estructura clara de la vida quotidiana, dels mitjans de comunicació i de l'àmbit acadèmic</p> <p>Competència 1. Obtenir informació i interpretar textos orals de la vida quotidiana, dels mitjans de comunicació i de l'àmbit acadèmic</p>	<p>Structures to discuss and reach an agreement.</p> <p>Specific vocabulary</p>

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4. 21st CENTURY COMPETENCES

Collaboration	x	Information, media and technology	x
Communication		Leadership & Responsibility	
Critical Thinking and Problem Solving	x	Initiative & Self-direction	
Creativity & Innovation	x	Social & Cross-cultural	
Others:			

5. KEY COMPETENCES

Communicative, linguistic and audiovisual competence		Digital competence	x
Mathematical competence		Social and civic competence	

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Interaction with the physical world competence	x	Learning to learn competence	
Cultural & artistic competence	x	Personal initiative and entrepreneurship competence	

6. CONTENT (Knowledge and Skills)

CONTENT-RELATED KNOWLEDGE	CONTENT-RELATED SKILLS
<ul style="list-style-type: none"> • Identify color terms using the academic vocabulary of the discipline • Evaluate the use of color in op art • Create a coloured pattern • Design and build an exposition table to make the discs spin. • Conduct independent research on color theorists. (Newton, Chevreul, Goethe) 	<ul style="list-style-type: none"> • Using of technical drawing to create shapes and patterns. • Sharing information within groups. • Working with technical devices like engines, batteries and welders.

7. REFERENCES

Template adapted from CLIL-SI 2015.

More information at: <http://grupsderecerca.uab.cat/cliisi/>



Color, vision and art

<http://www.webexhibits.org/colorart/teaching1.html#.Xe9h8gUzcls.gmail>

8. COMMENTS (optional)

9. ACKNOWLEDGEMENTS (optional)






Skills: R: reading , S:speaking, L: listening, W: writing, I: Interaction

Interaction: T-S: teacher-student, S-S: student-student, SG: small groups, WG: whole group, S-Expert, S-World

Assessment: PA: Peer assessment, SA: Self-assessment, TA: Teacher assessment, AT: Assessment tools

Template adapted from CLIL-SI 2015.

More information at: <http://grupsderecerca.uab.cat/cliis>

10. UNIT OVERVIEW						
Session	Activities	Timing 	Skills 	Interaction 	ICT 	Assessment 
1	Lights off. Students get into the class. A LED is turned on. Then teachers provide the DQ : "What's the colour of light?" Lights on	5'	L	T-S		Teacher grades student involvement
	Th,P,Sh to answer the DQ	30'	R,W,I	S-S T-S		Teacher assesses student involvement, and their production written in the class windows using glass chalk.
	Two posters are presented : 1. K,W,L	15'	S,L,I			

Template adapted from CLIL-SI 2015.

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	2. Vocabulary bank					
2	Colour theory					
	Colour theory documents. Students form groups of 4 to work with their own colour theory. They must summarize and explain it using window chalk.	30'	R,,I,W	S-S		Teacher overviews student works, specially their involvement and production.
3	Perception	15'	L	T-S		
	Work with RGB leds	15'	L,I	T-S		Teacher grades student production and comprehension.
	Listen up activity (Warhol)	20'	L,I,W	S-S	Youtube	Teacher grades the activity
4	Workshop					
	Students go to the workshop class.					

Template adapted from CLIL-SI 2015.

More information at: <http://grupsderecerca.uab.cat/cliisi/>



	Sketching and planning. Wood cutting. Discs painting	50'	L,I,S	T-S		
5	Workshop					
	Spinning device assembly.	50'	L,I	T-S		
6	Final exhibition.					
	Students share their projects	50'				

Template adapted from CLIL-SI 2015.

More information at: <http://grupsderecerca.uab.cat/cliisi/>



11. SESSION PLANNING

SESSION 1: INTRODUCTION. WHAT'S THE COLOUR OF LIGHT?

Objectives of the session:

- Present the activity.
- Introduce the topic, as well as the expected development of further sessions

Content-obligatory language for the session:

Vocabulary and structures for giving their opinion:

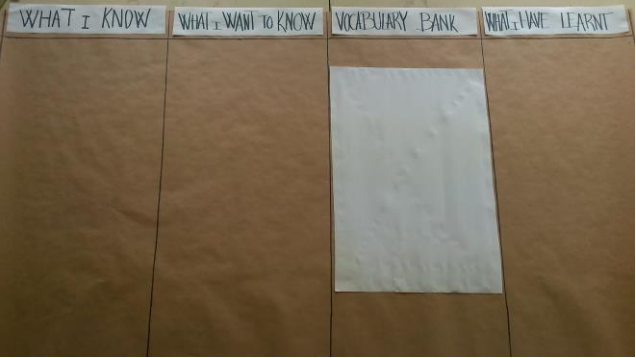
- I think, I guess, In my opinion...
- Light, spectrum, waves, ...

Activities

include : Name and description; Assessment tool (if any); Material (including language support)



1.1 Lights off. Students get into the class. A LED is turned on. Then teachers provide the DQ : "What's the colour of light?"
Lights on






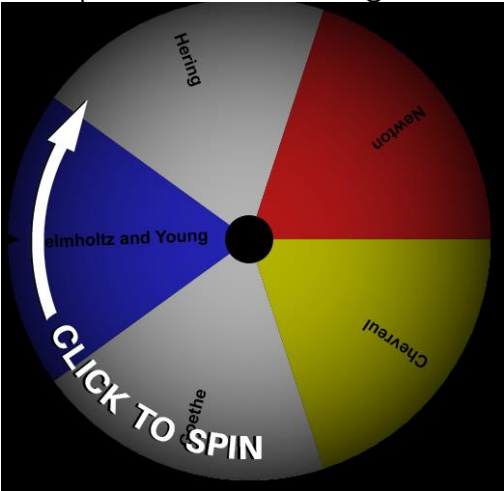
1.2	Th,P,Sh to answer the DQ using small whiteboards. The group (15) is split in groups of three/four.					
1.3	<p>Two posters are presented :</p> <ol style="list-style-type: none"> 3. K,W,L 4. Vocabulary bank. It is hanging on the wall, and it will be filled by one spokesperson. 					

SESSION 2: COLOUR THEORIES

Objectives of the session:

- Study and summarize different historical approaches of colour theories (Newton, Goethe, Mayer...)
- Present orally and written part of the topic given



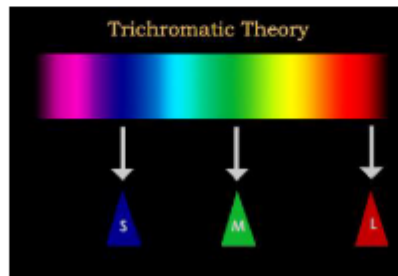
	<p>Content-obligatory language for the session:</p> <ul style="list-style-type: none"> - Specific vocabulary : Primary and secondary colours, hue, light, wave, wavelength. - 					
	<p>Activities</p> <p><i>include : Name and description; Assessment tool (if any); Material (including language support)</i></p>					
<p>1.1</p>	<p>Students are split in 5 groups of 3.</p> <p>Groups are formed using the next decision wheel.</p>  <p>Each group must read, understand and summarize one piece of information given. Initially they work writing drafts on paper, and when they all agree, they should take a window chalk and draw a chart to highlight their piece of information.</p>					

Those [information sheets](#) are given below.



Trichromatic Theory

Evidence for the trichromatic theory comes from colour matching and colour mixing studies. **Young and Helmholtz** carried out experiments in which individuals adjusted the relative intensity of 1,2, or 3 light sources of different wavelengths so that the resulting mixture field matched an adjacent test field composed of a single wavelength. Individuals with normal colour vision needed three different wavelengths (i.e., primaries) to match any other wavelength in the visible spectrum. This finding led to the hypothesis that normal colour vision is based on the activity of three types of receptors, each with a different peak sensitivity. Consistent with the trichromatic theory, we now know that the overall balance of activity in S (short wavelength), M (medium wavelength), and L (long wavelength) cones determines our perception of colour as shown in the figure below.



Template adapted from CLIL-SI 2015.

More information at: <http://grupsderecerca.uab.cat/cliisi/>

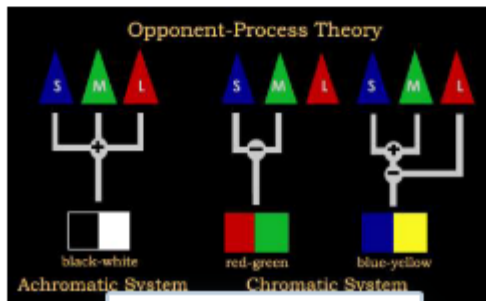




Opponent-Process Theory

Developed by **Ewald Hering**(1920/1964), the opponent-process theory states that the cone photoreceptors are linked together to form three opposing colour pairs: blue/yellow, red/green, and black/white. Activation of one member of the pair inhibits activity in the other. Consistent with this theory, no two members of a pair can be seen at the same location, which explains why we don't experience such colours as "bluish yellow" or "reddish green". This theory also helps to explain some types of colour vision deficiency. For example, people with dichromatic deficiencies are able to match a test field using only two primaries. Depending on the deficiency they will confuse either red and green or blue and yellow.

The opponent-process theory explains how we see yellow though there is no yellow cone. It results from the excitatory and inhibitory connections between the three cone types. Specifically, the simultaneous stimulation of red (L cones) and green (M cones) is summed and in turn inhibits B+Y-, which results in the perception of yellow. However, when blue light is present, the S cone is activated, the B+Y- cell receives excitatory input and blue is perceived.



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Sir Isaac Newton's Discovery and the Color Wheel

While it appears as though the color wheel is the visible spectrum of colors placed on a wheel, the real basis for the color wheel is rooted in Sir **Isaac Newton's** experiments with prisms. His experiments led to the theory that red, yellow and blue were the primary colors from which all other colors are derived. While that's not entirely true, it's still influential in the color wheels developed in the early 1800s as well as the color wheel currently used today. Add to that the secondary colors of violet, orange and green—those which result from mixing the primary colors—and the color wheel begins to take shape. The tertiary colors yellow-orange, red-orange, red-purple, blue-purple, blue-green and yellow-green complete the color wheel. If these colors sound familiar, that's because they're similar to Munsell's hue circle. The value of the color wheel is its ability to help designers create appealing palettes by applying the underlying theory of the color wheel with the way we see color. For example, a palette based on color wheel complementary colors would include colors that are opposite each other on the color wheel, such as red and green.



Temp
More



<h2>SESSION 3: Visual perception</h2> <p>Objectives of the session:</p> <ul style="list-style-type: none"> - Understand how the eye and brain perceives colour. - 								
<p>Content-obligatory language for the session:</p>								
<p>Activities <i>include : Name and description; Assessment tool (if any); Material (including language support)</i></p>								
1.1	<p>Perception</p> <p>Teacher explains how the eye works, and why we perceive colours.</p>			10'				
1.2	<p>Work with RGB leds</p> <p>Teacher provides RGB leds, batteries and clip wires. Students follow her instructions. They drill a</p>			20'				

Template adapted from CLIL-SI 2015.

More information at: <http://grupsderecerca.uab.cat/cliisi/>



	<p>hole in a table tennis ball, and insert the RGB in it. It creates a dome effect where students will see how white colours dissociates in the 3 primary colours.</p>					
<p>1.3</p>	<p>Finally students must complete the text that recaps the main concepts appeared on this unit. Each group has the vocabulary (see below) and the missing gap text. Students complete the text while hearing their teacher who is reading aloud the text. At the end, they have 5 minutes to agree on the final version of the text.</p>					
<p>...</p>	<p><u>Task fill the gap</u></p> <ol style="list-style-type: none"> 1. color wheel 2. hue 3. primary 4. red, yellow, blue (no order necessary) 5. secondary 6. green, orange, violet (no order necessary) 7. tertiary 8. primary 9. analogous 10. complementary 11. Brighter 12. tinte 13. shade 					



	<p style="text-align: center;"><u>The language of colours</u></p> <p>The chart that shows the relationship of different colors to each other is called the (1) _____. Instead of the word "color," one could also use the three-letter word (2) _____.</p> <p>The three colors from which all other colors are made are called (3) _____ colors, and they are (4) _____, _____, and _____. Colors that are created by mixing equal parts of the colors above are called (5) _____ colors, and they are (6) _____, _____, and _____. Colors that are created from equal parts of each of the two kinds of colors above are called intermediate or (7) _____ colors. When describing these colors, place the (8) _____ color first.</p> <p>Colors that are next to each other on the color wheel are called (9) _____. Colors that are opposite to each other on the color wheel are called (10) _____. When these colors are placed next to each other, they make each other seem (11) _____. When mixed equally, they create Muddy tones like black, gray, and brown.</p> <p>Si va add white to a color, that is called a (12) _____. Si va add black to a color, that is called (13) _____.</p> <p>If something only uses one color, it is called (14) _____.</p> <p>If something uses more than one color, it is called (15) _____.</p> <p>If something is completely lacking in color, it is called (16) _____.</p> <p>The colors on the green / blue / violet side of the color wheel are called (17) _____. The colors on the red / orange / yellow side of the color wheel are called (18) _____.</p>					
	<p>One extra activity can be done. Students can view Warhol's interview short clip. It can be done in class or as homework.</p>					



Warhol use of colour

Time to listen up!






Warhol generally used bright, bold **colors**, like the red, black, yellow, white, blue, purple, and green hues in *Shadows*.

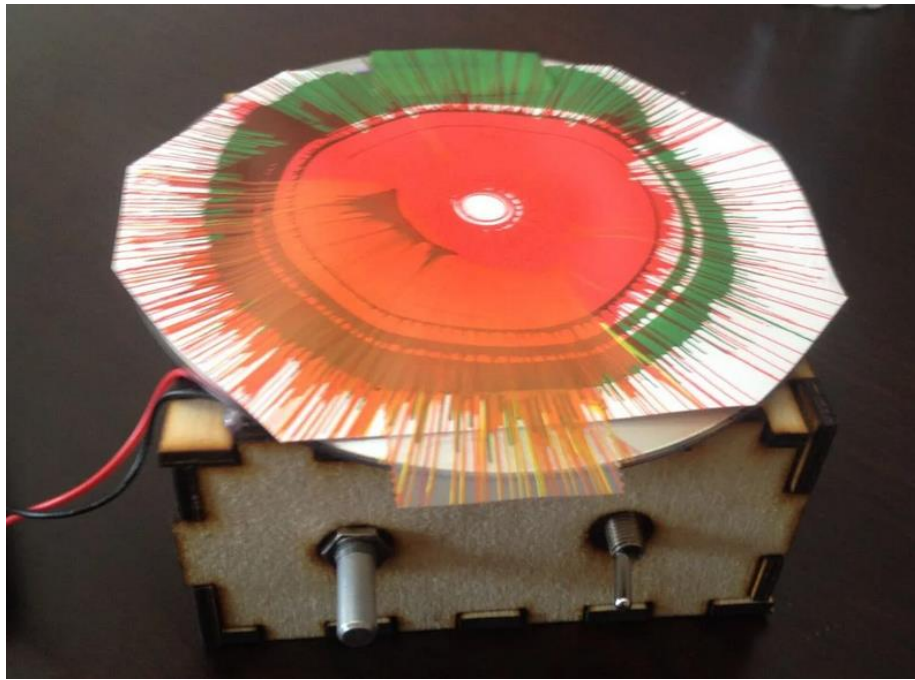
On the occasion of Marilyn Monroe's suicide in August 1962, Warhol used this image for his screenprinting. It was a publicity shot by Gene Korman for the film *Niagara*, made in 1953.



Warhol discusses his choice of color in this 1981 recording. Press the play button to listen to his comments.

<http://www.webexhibits.org/colorart/marilyns.html>

	<p>SESSION 4: Workshop. Objectives of the session: - Create an electric device</p>					
	<p>Content-obligatory language for the session: - Specific workshop vocabulary : Tin, to weld, pliers, hold, fasten, strip a wire, To attach, To drill, bit</p>					
	<p>Activities <i>include : Name and description; Assessment tool (if any); Material (including language support)</i></p>					
<p>1.1</p>	<p>Students follow teacher instructions to build their electric device. Simultaneously students must create their CD patterns mixing 2 primary colours.</p>	<p>1h</p>				



1.2						
1.3						
...						

Template adapted from CLIL-SI 2015.

More information at: <http://grupsderecerca.uab.cat/cliisi/>



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Resources or Annexes

Folder

<https://drive.google.com/drive/folders/1IYnHjzhwUx4zXQpQgCR5C24lcWEr7KaU?usp=sharing>

Colour theory

<https://drive.google.com/open?id=1NsKD4ABS9vGKp-3riOe0LdrN-Mtdxm9J>

Listen up activity

https://drive.google.com/open?id=1itvi1GQhJ-ICruk_3SIYtZ_Pni_XJggJ

Fill the gaps

https://drive.google.com/open?id=14wF4YcG03Zuzd0tsH0MiUZWiOlkzr_Yk

Bank of images

<https://drive.google.com/open?id=1raTIWWb82YDSVEF21i5n0fMzAwA1Kwrl>

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