

HOLOMAKERS PROJECT

**Motivating secondary school students towards STEM careers through
hologram making and innovative virtual image processing practices
with direct links to current research and laboratory practices**

Erasmus+ KA2 2017-1-PL01-KA201-038420

Activity 7

Capturing light: The Identity Project



Project description for teachers

Overview

This activity is one of the interdisciplinary projects in STEAM for physical holograms that will be developed within the 2nd pilot phase of the Holomakers project.

In this project, we expect from the students to become familiar with the basic principles of optics through the use of physical holography and specifically through the use of the portable HoloKit, which represents a basic holographic set up. This activity revolves around the concept of identity and anything depictable that denotes this concept. The students will be encouraged to find out or create objects that can reflect parts of their identity and then they will be invited to use the HoloKit in order to successfully record them.

Est. Duration	4-6 hours (dependant on the implementation of the extended activity scenarios and discussion topics)
Equipment/materials needed	The portable HoloKit, batteries, holographic film, plasticine of different colours, materials that can be used to create shapes and figures
Links to external files	Useful material can be found in Dropbox O3>Projects>Identity Additional OERs that might be useful for introductory purposes: https://holomakers.eu/oers/ External resources: https://holomakers.eu/wp-content/uploads/2019/03/ExternalResources-identity.pdf
Learning objectives	We expect students to: <ul style="list-style-type: none">• get familiar with the procedures of making a physical hologram using the HoloKit• understand how basic setups for hologram recording function• problematize upon the materiality and the colour of the object/figure to be recorded• practice their collaborative skills towards producing a more complex and meaningful – from an artistic perspective – hologram• review and deepen their understanding of identity• reflect upon the concept of identity and create figures/emblems/objects that convey relevant thoughts• explore different historical, political, cultural role figures
Preparation needed	The teachers need to become familiar with the process by testing different angles and positions of the object to be holographed as well as different colours of plasticine or other material. <i>The experience gained during C2 training activity should be recalled.</i>

Preparatory phase

In Dropbox (see folder O1, O2 and O3) there are several resources for physical holography that you may need in order to familiarize your students with the concept of holography. You can also trigger students' curiosity by asking them to do a short/small research on specific topics related to holography and holographic process.

Some good tips before you start:

- 1) Carefully select the material for making the object. Plasticine-like clay (modelling clay) is likely to give you better results. Use black colour markers to decorate your object; this will allow you to more easily identify the recorded hologram on the holographic film.
- 2) Spend some time to experiment with different materials and materials of different colours.
- 3) Trial and error: Try to use a shiny object (before placing the one that you have designed) in order to find the position that gives the better reflection.

Phase 1: Introduction into the scenario of the activity

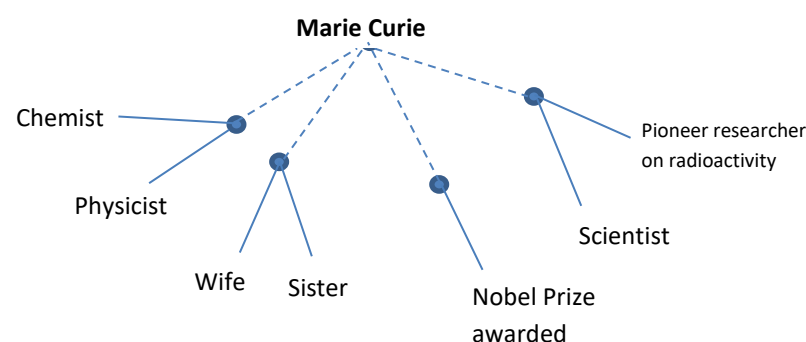
Unlike previous activities, which were mainly oriented on finding and testing different objects from certain categories, the present activity is primarily driven from a **conceptual framework**. At the beginning the students will be encouraged to reflect upon the concept of identity in order to perceive the complexity of this rather ambiguous and multifaced concept as well as to figure out the different uses of this concept in various disciplines (philosophy, psychology, sociology, history).

The project starts with a brainstorming question: What words come to your mind when you hear the term 'identity'? The students are encouraged to work in teams and list the words that they closely associate with the term 'identity'. Optionally, the [Answergarden](#) tool can be used to collect students' responses. The teacher brings all the answers together, summarizes the responses provided and in an interactive way identifies links between the responses, raises key questions regarding different perspectives and highlights the complexity of the concept.

Making identity maps

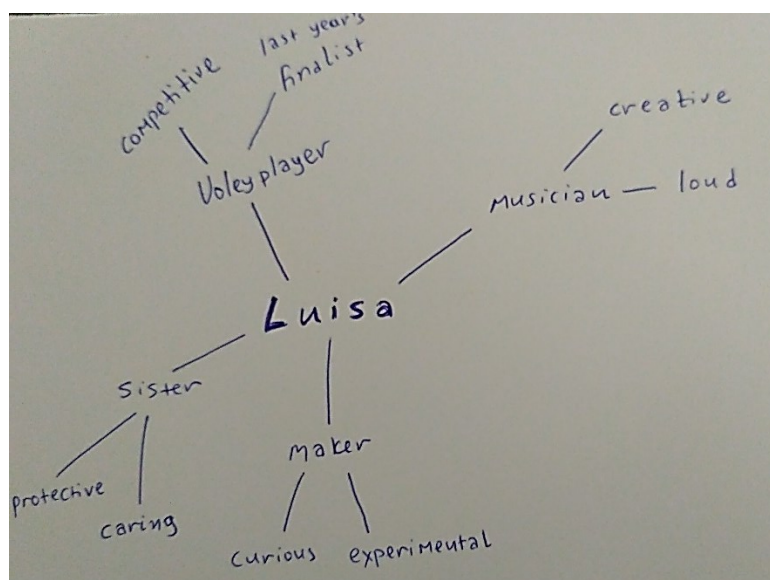
At a next step, the teacher provides the class with several historical, scientific, artistic, fictional figures' names (i.e. Benjamin Franklin, Marie Curie, Van Gogh, Charlie Chaplin, Mary Poppins). All together prepare a map to show different nouns that are used to describe that person's roles (after reviewing information online).

Marie Curie' identity map may look like this (off course the identity map can be further enriched):



Building on this experience, the students will be encouraged to map their own identity maps. Although they may not be (yet) well known for their different roles, they will use this mapping

opportunity to introduce themselves to their peers through their identity maps. For doing this, a sheet of large drawing paper and a marker to each student will be needed. The student should place his/her name in the centre of the drawing paper with large bold letters. An example might look like this:



The students should be encouraged to post the identity maps on the classroom's walls and circulate around the room reading the maps. After sharing their identity maps, students could discuss their observations:

- *What did they learn about their peers through this mapping exercise?*
- *What roles do many students share?*
- *What adjectives were the most descriptive or unique?*

It is worth noting that this activity can be extended by, for example, revealing what a student "is not" or by adding a line of another colour to denote that a student "is a member of" a club or team affiliation. This activity can be also repeated by having students making the identity maps of their classmates. The activity can be also extended by bringing case studies in the class that stress different aspects of the term 'identity' (i.e. social media and identity, appearance and identity, domestic or urban space and identity, society and identity etc.) helping students to understand that the concept of identity is a complex one, shaped by individual characteristics, family dynamics, historical factors, and social and political contexts.

At a next stage, the students can be encouraged to prepare a hologram that symbolises aspects related to their identity or the concept of identity in general. **Can the identity map or the discussion that took place in the class stimulate students in coming up with illustrative objects, emblems, figures that can be (later on) holographed?** They are free to use materials and technics that have already been applied to previous activities or even introduce new ones (use of plasticine, use of white clay, use of 3d pens etc.). The scenario below

describes how Laura (a teacher in Spain) implemented the activity in her class introducing the context as a vehicle for sense and hologram making.

Scenario: Laura is a Spanish teacher that implements the “identity” project with her students. She thinks that it is important to immerse the students into the scenario of the activity. She forms students in teams and moves them to reflect upon identity and the different definitions of the concept in various disciplines by using brainstorming questions: What words come to your mind when you hear the term ‘identity’? She then composes all the responses and opens up the discussion in the class by stressing the many different kinds of identity. Laura then introduces the identity maps in the class and together with her students make the identity map of Marie Curie, Benjamin Franklin, Charlie Chaplin and more. This proves to be a fun activity that immerses students into information review.

Then Laura moves the students to build their one identity maps and share their maps in the plenary. She then encourages the students to identify aspects of their identity that can be represented as holograms. This task appears to be challenging and Laura provides some examples. She demonstrates the identity map of Luisa (see above) and then Luisa’s decision to make the hologram of a music note, given that music was defined as central to her identity. Some students have already some ideas; some of the ideas are rather concrete some other more abstractive (for example a student inspired about the discussion on identity and social media decided to holograph the emblem of Facebook while another one his artistic signature/nickname)– but this is more than welcome.

Laura explains that each hologram should come along with a small note (4-6 lines) that gives the ideas underpinning the hologram and/or answers the question “why the selected object/emblem is an important part of defining who you are”. She encourages the students to work in teams and to prepare the holograms that better represent each team member’s thoughts on identity. The students are free to use any material they like (i.e. materials from previous activities, plasticine, white clay, filament (3D pen) and more) but they were advised to keep in mind practical issues regarding the behavior of the material during the holographic process.

As the teams are working, Laura realizes that the students have come up with many different and interesting ideas on the topic of identity. This practice was highly supported by Laura as it offers students many opportunities to express their personality, their creativity and use their imagination, while going deeper into more conceptual processes.

Tips and ideas: Experimenting with different materials

For better recording results, the students are informed that they should use rather shiny and glossy materials. If they use plasticine, they should avoid using those of green and black colour. However, they should be encouraged to test different colours so that to realize the importance of this parameter in physical holography. A good idea is to create an object composed of different materials and colours so that to see the difference. They can also use (if it is applicable) black pen to decorate their figure (e.g. draw details on a figure from plasticine). They also should keep in mind that their object **should not exceed the height of 2-4cm** in order to fit the size of the holographic film.

Outcome: At this point, the students should be problematized on the significance of the parameter of materiality and colour in the process of physical holography.

The teacher can raise the following questions to activate the dialogue in the class:

- Do parameters such as material and colour play a role in the holographic recording?
- Why does shiny materials are better recorded?
- Why does the white colour work better?

White objects can reflect every colour that belongs to the visible light spectrum

- What other colours or materials would work well in our setup?

Every color that can reflect the red light. White, red as well as yellow and orange

Plastic can also reflect well the light.

Phase 2: Preparing the set up

In this phase, the students are invited to use the portable HoloKit (Figure 1) and prepare the set up in order to record the selected object. You can find the instructions here (Output 2: <https://holomakers.eu/intellectual-outputs/>), in case the HoloKit is not already assembled from previous activities.

Students are encouraged to test different angles and positions among the laser beam, the holographic/plexiglass plates as well as the base of the object in order to better understand the mechanisms of holography. They are also encouraged to place the object in various heights and positions by using the provided plasticine. When the students agree that the reflection on the holographic/plexiglass plates of the plasticine figure is the finest (that can be done), then the set-up will be ready for the recording phase.

Some general rules/tips that usually give good results:

- Place the kit on a stable table
- Turn on the laser diode at least 5 minutes before making holograms
- Place the object as close to the holographic film as possible
- Place the object at a height that is illuminated by the laser beam
- Check that the reflection of the object is visible on the holographic/plexiglass plate (Figure 2)
- Avoid changing the height of the laser diode

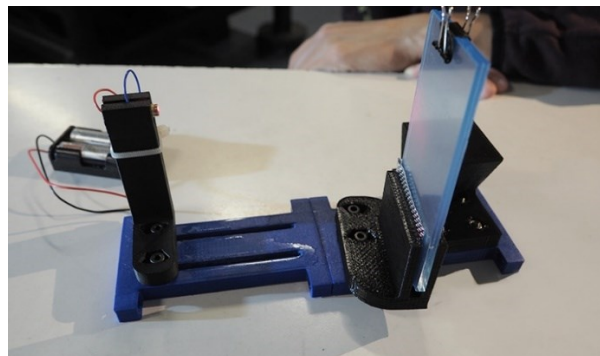


Figure 1 The portable HoloKit

Outcome: At this point, the student should have become familiar with the HoloKit and the underpinning physical holography procedures. The focus is on realizing the importance of choosing the best angle and positions among the basic parts of the set-up.

Capturing the artefact

Once the set-up is ready, the students should mark on the holographic/plexiglass plates the area where the holographic film will be placed (Figure 3, left). They should also place the shutter between the laser beam and the holographic/plexiglass plates (Figure 3, right). Then – with the help of their teachers – and in a semi-dark room, they will place the holographic film between the two holographic/plexiglass plates (before placing the holographic film it is important to check whether the holographic/plexiglass plates are clean). After that, they will wait for approximately 3-5 minutes.

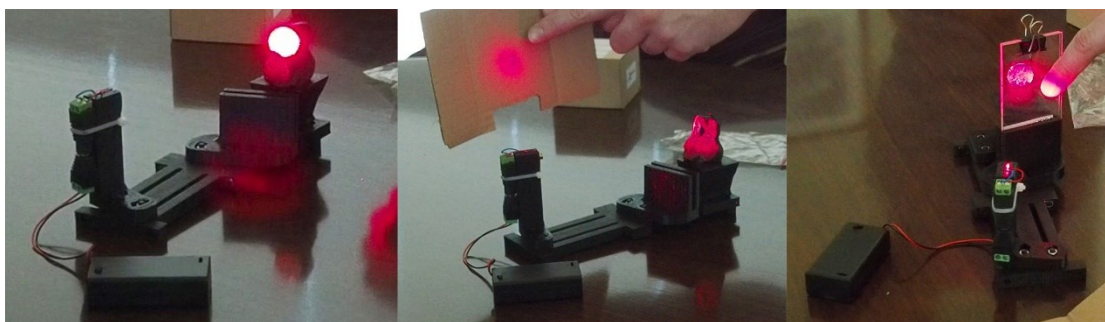


Figure 2 Checking object's reflection on a neutral surface to get familiar with the process and then on holographic/plexiglass plate.

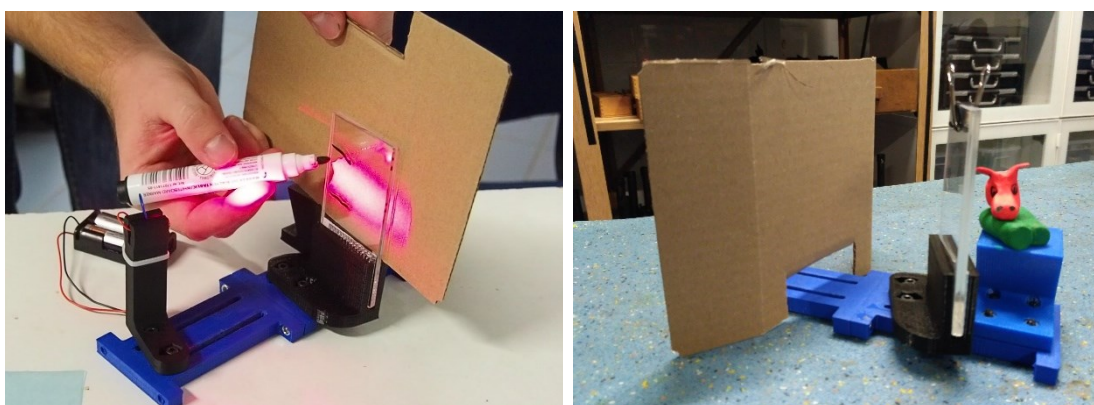


Figure 3 Marking the holographic/plexiglass plate (left), Placing the shutter (right)

Placing the holographic film: Before placing the holographic film, it is important to check the colour of the film and specifically if it is blue or red. Blue colour indicates that the film hasn't been previously exposed to light, while red indicates previous exposure. The holographic film is covered by two thin transparent foils, a colourless one and a green one. The student in charge should firstly remove the colourless foil, and carefully stick the film on the marked area (Figure 4, Left). It is crucial to firmly and slowly stick the film on the surface in order to avoid getting/having bubbles. In case of mistake, do not try to unstick the film, but put some pressure on film's surface in order to pop the trapped air out. After sticking the film, it is time for the green foil to be removed and for the second holographic/plexiglass plate to be placed. Then, the two holographic/plexiglass plates with the embedded film should be placed on the kit (Figure 5, right). You can find more instructions here: <https://www.youtube.com/watch?v=4lwSLHOQpWM>

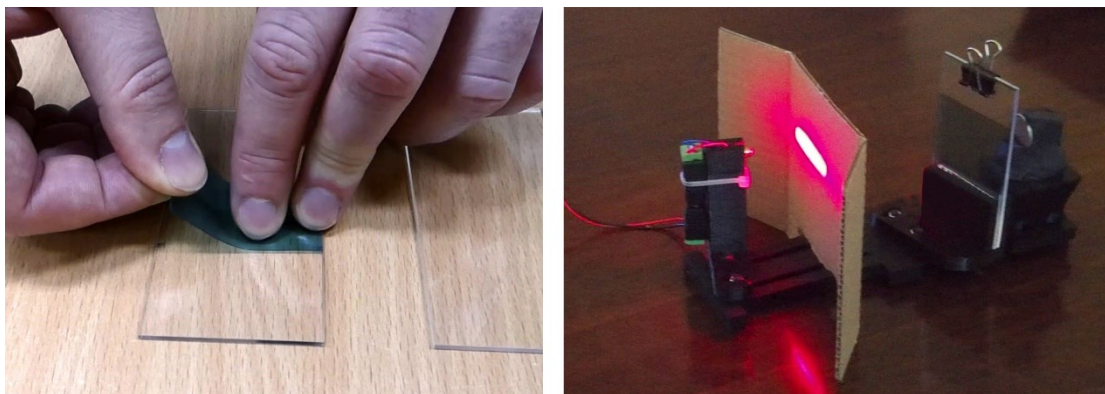


Figure 4 Sticking the film on the holographic/plexiglass plate (Left), Placing the holographic/plexiglass plates with the embedded film on the kit (Right)

Important notes: During recording the parameters of stability and silence are of crucial importance. Thus, apart from placing the HoloKit on a stable surface (e.g. the floor) it is recommended to have in charge one student for each HoloKit who, after removing the shutter, will stand still and silent for the entire recording time. The shutter should not be abruptly removed, but rather slowly in order to avoid any disturbance or/and failure that can be created by the air flow.

Checking the produced holograms

After 3-5 minutes the students can check if the object was holographed. Therefore, with the laser beam still connected to the feed supply, they should look at the holographic film (which will still be between the holographic/plexiglass plates) from different angles in order to find out if their object (the entire object or part of it) was successfully recorded on the film. If the object has been holographed, then the set-up was correct. If the object is not holographed, then the set up should be modified. In general, it is recommended to test at least 2 or 3 different setups in order to engage the students to the entire procedure.

Important notes: To avoid any disappointment or even frustration, the students should be informed that the process of holography is not always straightforward, and it takes a lot of tests and practice in order to have the best possible results. You should also have in mind to check the level of the provided power to the laser beam because low power levels can lead to failure during the recording process.

Phase 3: Presenting the hologram(s)

Each team creates a collection hologram (one representative of each team member) that come along with a short note (4-6 lines). The short note explains what the hologram denotes and/or answers the question “why the selected object/emblem is central to your identity or an important part of defining who you are”.

Phase 4: Raising discussion- stimulate students' reflection upon the concept of identity

As previously mentioned, students can be triggered to do further research on the topic of identity in order to draw inspiration from different disciplines or fields. The field of Arts is rich of examples since many artists, from various art movements (modernism, pop art, street art etc.) have, over time, tried to explore, reconstruct and even deconstruct through their artworks different aspects of the concept of identity.

Find those who reconstruct the identity of the urban space

Street artists for example are making an attempt to reconstruct the identity of urban space, and also to be identified through these urban interventions. Students can be inspired by such kind of artworks and try to create their own manifestation. For example, they can draw inspiration from Banksy's works or from graffiti's that have been created by local artists, all over the world (e.g Brazil's favelas).



Figure 5 “Swinger”, Banksy’s work in New Orleans. Banksy is an anonymous but famous street artist who is identified for his deeply political and activist graffiti's. Retrieved from: <http://www.banksy.co.uk/>



Figure 6: Gigantic mosaic created by Favela Painting Team in a favela in Rio de Janeiro. Retrieved from: <https://favelapainting.com/SANTA-HELENA-FP>

Social media and identity

The social media platforms have a growing importance in our lives since they are the places where we “showcase” our living experiences. Watch the following short film https://youtu.be/GXdVPLj_plk with your students and open up the discussion in the class. What it means to be real in a virtual world? How virtual identity is constructed? Can you create an identity map for your virtual self? Is it any different from the one you made earlier?

Do you have a 3D scanner and 3D printer?

If the answer is yes, then you can encourage your students to make one's another 3D portraits using 3D scanners. After the appropriate scaling down and 3D printing, you can encourage students to make the holograms of their 3D printed portraits using the HoloKit.

Discussing students' experiences in class

After accomplishing the project, the students should be encouraged to discuss and share their experience with their teachers as well as with their classmates. It is important to provide the link between this experience and the previous activities and thus make a comparison between physical and computer-generated holograms, reflective capacity of different materials and more.

Here are some questions that can be addressed to the students:

- Can you describe the process in your own words?
- What was the most challenging part in this process?
- What advice would you give to a friend that just starts the project

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Declaration

This report has been prepared in the context of the HOLOMAKERS project. Where other published and unpublished source materials have been used, these have been acknowledged.

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