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OTA

ONLINE TEACHING ADVANCEMENT

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OTA - ONLINE TEACHING ADVANCEMENT – SCIENCE THROUGH ART

OTA LEARNING TOOLKIT

+ ANNEX (SUMMARY OF PILOT EVALUATIONS AND FOCUS GROUPS MEETINGS)

COMPILED BY

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OTA

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1 INTRODUCTION

OTA - *Online Teaching Advancement – Science through Art* is an Erasmus+ project which **is using art to overcome barriers to online learning of science subjects**, obtain better learning outcomes and engage in positive learning experiences.

Different art forms can be used to introduce pupils to new types of online learning, achieve learning outcomes stated in the curriculum and help reduce the feeling of social isolation.

PROJECT'S MAIN OBJECTIVES

- To equip primary / secondary science teachers in formal settings with skills and knowledge that will allow them to work in diverse online classes, in order to create a safe learning environment for pupils by using different art forms to teach science.
- To ease the transition to new learning settings, build confidence and promote children's personal growth after a life-changing event such as studying in online learning environments without the support of friends and peers.
- To allow relevant stakeholders in education to get involved in the project and to use the platform to prepare their learning sessions and exchange best practices.
- To influence policy makers in all partner countries in order to provide guidance and educational support for an effective online science education.

1.1 TOOLKIT

OTA Learning Toolkit is closely connected to the OTA *Learning Methodology and Needs Analysis* done in OTA project.

With the Needs analysis partnership of OTA project firstly excluded topics from the curricula of three primary/secondary school subjects – Mathematics, Physics, and Chemistry, learned by pupils aged 12 to 14 years. After we gathered all joint subjects, we made a wide research among stakeholders in form of an on-line survey and focus groups. Needs analysis showed important information about which topics and subtopics were the hardest to teach or learn on-line during the worldwide lock down due to the pandemic of Covid-19.

This was the starting point but prior to preparing the content for the activities other steps were to be taken and are presented in *OTA Learning Methodology*. Development of methodology was based on a desk research of efficient approaches and methods when learning science and natural subjects and good practices, which was also researched and provided by organisations in OTA consortium.

For the basis of OTA Learning Methodology we chose **STEAM** approach and **Three Stage Model**.

1.1.1 STEAM

STEAM is promoting interdisciplinary teaching, specifically for science subjects in combination with art. STEAM approach has been a discussion point in the education field in recent years. There are different views on what exactly STEAM stands for. We can come across the view, which sees A in STEAM as school subject ART, another view takes A for all forms of art and craft and the broadest of them all takes A as arts, meaning humanities in general (Piila et al., 2021).

By implementing STEAM approach in lesson plans several components are grouped together. From the OTA point of view, we use the STEAM approach to add art components in a company of Mathematics, Physics and Chemistry in a formal education environment. To achieve a high level of variety in that manner, elements from informal environments, such as galleries and science centres, are taken in consideration. Art is an entry point to science since it increases the value of science and makes it more effective.

How certain art forms are used for specific subject topics depends on a lesson plan, topic itself, issue presented and the objectives of an individual lesson.

1.1.2 THREE STAGE MODEL

1. Motivational Stage

In this stage is expected an establishment of link of the topic from curriculum to a society issue that is seen relevant from pupils' perspective, issue linked to a phenomenon in nature or phenomenon from pupils' everyday life.

2. Investigational Stage

This stage is a natural follow-up of the first stage, where pupils take matters in their own hands, with aroused motivation to find the solution. To fulfil the task and find solution(s), pupils will strive for different teaching method(s).

Focus on subject topic, presentation of the art expression(s) used, setting objectives of the learning unit, leading the process through appropriate teaching method(s), which are not necessarily exclusive: creative-problem solving, resource-based learning, inquiry-based learning, setting small groups, teamwork, experiential learning.

3. Consolidation Stage

Reflecting the issues with chosen methods, such as discussion, argumentative debate, role-playing and deriving relevant decisions considering the above issue.

1.1.3 LEARNING OBJECTIVES

In the Methodology we defined cross-curriculum learning objectives, such as reflective thinking, learning to learn, metacognition–understanding connections, patience, autonomy.

In activities' content, specific learning connections are defined, coming from individual subject's curriculum and using Bloom's Taxonomy as a basis.

1.1.4 ART EXPRESSIONS

We underlined what type of art and art expressions can be used and what kind of role they can take when including them in the activities. Read more on this topic in chapter 2.2 of this document.

1.1.5 METHODS AND APPROACHES

We selected some of the teaching methods and approaches for a wider consideration and outlined the benefits of using them while learning.

CREATIVE-PROBLEM SOLVING

Is a process, method, or system for approaching a problem in an imaginative way and resulting in effective action (Mitchell & Kowalik, 1999).

Creativity is often associated with art. Any form of art to be precise. The OTA project does just that. Art as a tool to teach science can improve pupils' creativity, especially when their task is to provide their own art form, connected to the scientific problem they have to solve. Keeping pupils active in a creative way is important in all school processes. Pupils should be encouraged to think creatively at their earliest ages, thus providing strong roots for latest schooling and life-long learning.

Creative problem solving is solving problems out of an ordinary and conventional way, allowing yourself to see outside the box and find solutions elsewhere in a unique way.

INQUIRY-BASED LEARNING

Inquiry-based learning strongly defends pupils' active participation in their educational process and places part of responsibility also on pupils' to discover new knowledge themselves (Pedaste et al., 2015). It is closely connected to a problem solving process, as it requires problem-solving skills.

EXPERIENTIAL LEARNING

The examples of experiential learning activities include field research, classroom activities, off-site school trips, project-based learning, field activities, experiments, simulations, field trips. Teacher's role is to guide pupils toward the possibility to draw from previous experience and set a clear field for them to make a connection with the subject of teaching. Out of this connection, pupils form a new meaning by combining previous experience with new knowledge, which has a greater potential for pupils' overall understanding of a matter as well as enabling skills for life-long learning.

Note: For more information on the methodological approach and the learning principles adopted, including practical examples, please visit project's website with the OTA Learning Methodology document: https://ota-project.eu/outputs/

2 FORMATION OF THE ACTIVITIES

All the activities are following OTA learning Methodology.

Division of three stages is very clear in terms of content itself as well as visually.

Each activity is following the basic idea to learn science through art, thus approaching STEAM in an unique way.

Activities are equipped with a **short description**, to give educators a basic idea of the activity; **connection to the subject's curriculum**; **specific objectives** of the activity; **equipment required**; **relevant sources; connection of the activity with art**.

One of the principles coming out of the three stage model is to show pupils science is not separated from everyday life. Therefore, OTA activities are well connected to phenomena close to pupils, to something they can relate to and eases the way for them to connect school subjects with things they are observing outside school. We achieved that with different approaches. For example, there are some scenario-based activities (e.g. 62, 78 and 86), where pupils are thrown in a fiction situation, which predicts a problem and their solving while learning selected science subject along. Another way was to outline a specific societal phenomenon or issue and through experiential exercises lead pupils toward the solving (for example activities 9, 29, 47 and 94). Link to the society or familiar situation or phenomenon is sometimes expressed in the third stage of the activity, where an assignment is given closely connected to pupils' everyday life, sometimes including their families as well (such as baking bread in activity 1 or separating home waste in activity 5).

2.2 ART AND ART EXPRESSIONS IN OTA ACTIVITIES

There is a wide range of artworks included in activities. From ancient history – Egyptian art and artworks from Greek or Roman Antiquity (in activities 12, 33, 58, 77, 95, 97 for example). Works from medieval ages (activities 40, 42, 92, 98 for example) to renaissance art (activities 34, 44, 59 and 78), where a special attention is given to a person representing both fields science and art – Leonardo da Vinci.

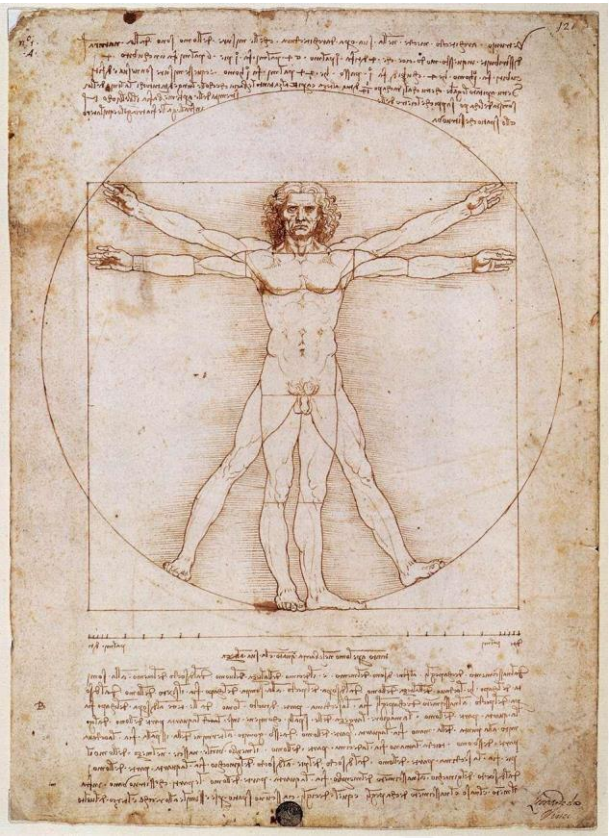

Figure 1: Leonardo da Vinci, Vitruvian man, 1492, Gallerie dell'Accademia, Public domain, via Wikimedia Commons

Artworks from baroque era are included for example in activity 79, while romanticism is interesting for activities 22 and 94 e.g. with era's special attention to depiction of weather phenomena. Also art from 20th century is presented, for example in activities 46, 73. And in case you are missing your favourite era, don't worry, with at least two activities (19, 93) you are guaranteed a walkthrough the field of art history from its very beginning all the way to contemporary arts.

Benefit of knowledge from the field of art history is undeniable going through OTA activities. Not only it familiarises pupils to the special field of history it also profoundly helps to understand and visualise otherwise more abstract terms from the science topics.

Including art, beside history, there are also other aspects taken into account. Techniques, for example, are considered and are closely connected to science or are a lot of time science themselves, such as colour preparation (activity 13, 17), using golden ratio (activities 34 and 56), geometrical shapes (e.g. activities 42 and 67).

Going through OTA activities, there are also other forms of art included, such as dance (activity 24), music (activity 57), theatre (activity 33 and 79), documentary movies (e.g. activities 37 and 70).

Including art in learning lessons also opens a wide field for pupils' creativity enhancement. Thus, there are many activities, which are leading to problem solving through creativity. Activities include different art forms for pupils' self-expression, such as storytelling (e.g. activity 9), painting and drawing (e.g. activities 10, 41 and 55), taking and editing photographies (e.g. activities 3, 14 and 71), role-playing (activity 15 and 1), cutting, collage and mosaic making (e.g. activities 33, 35, 38, 40, 67 and 82).

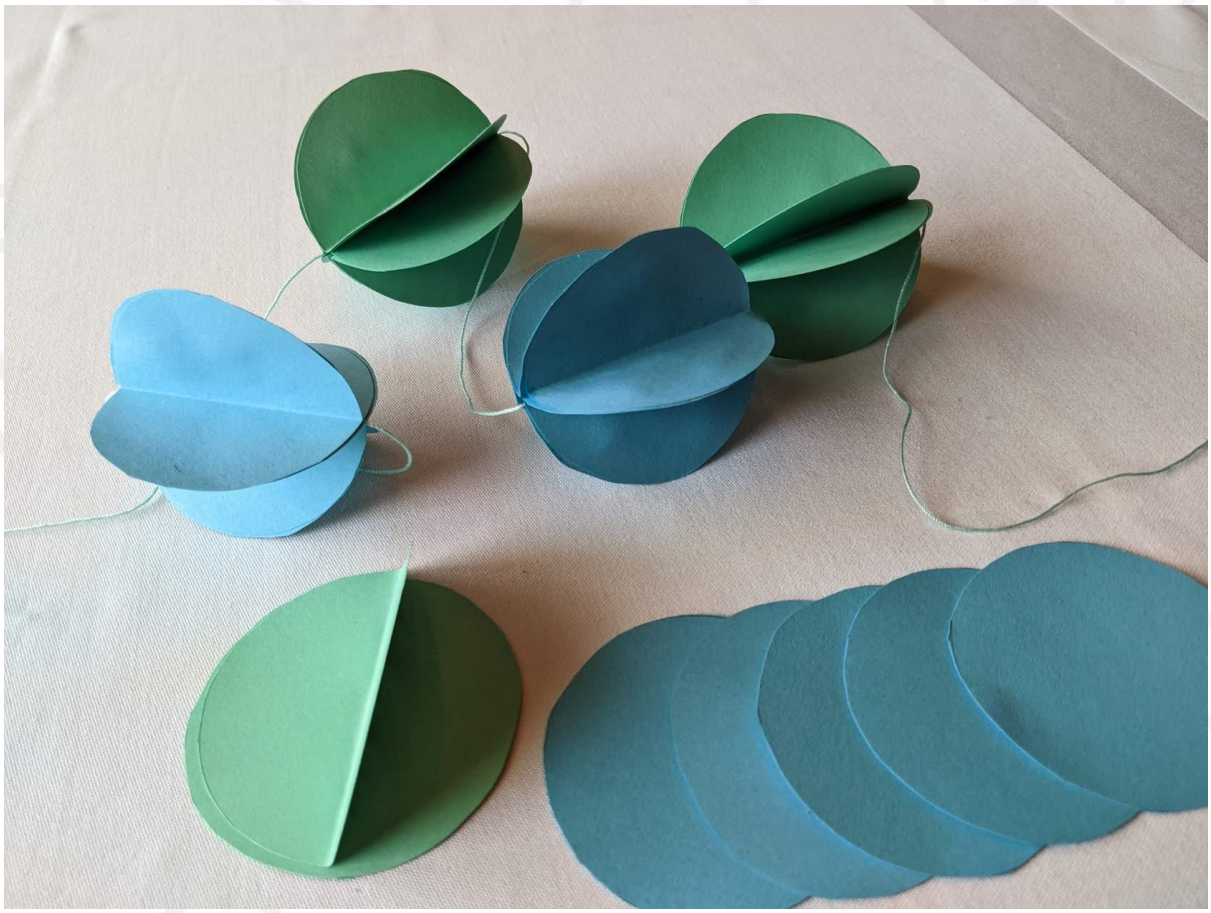

Figure 2: Photo of making decoration task from activity <u>One circle to rule them all</u>

Another important principle for OTA Activities was to give lesson plans an engaging title, which will draw attention prior even knowing the content of the activity. Titles such as: *Laughing atoms, Colour the world, Spice up Your life, Cocktail Party, The need for speed, May the force be with you, Art's VIP, Money laundering, Tiles on sale, Let's go to the seaside, Designing a movement, Math of Music, Lab disasters* and many more without a doubt attract our attention and make us want to learn more.

OTA activities follow provisions such as:

- promoting hands-on activities,
- last no longer than one learning unit,
- driven by an experiential learning principle,
- close connection to learning curriculum,
- can be implemented either on-line or in a classroom,
- all the materials needed are easily reachable and low cost.

2.3 DIGITIZATION AND INTERACTION OF THE ACTIVITIES

For additional engaging elements, all of the OTA activities are enriched with digitization and interaction.

Creating an engaging learning environment also the interaction of activities were considered.

All activities are available in digital form in a special platform, developed exclusively for OTA Project.

There the activities are interactive with moving objects and other engaging animations. The platform leads teachers through activity step-by-step, starting with short introduction, including description of the activity, connection to curriculum, learning objectives, connection of the activity with art, material needed and relevant sources.

Interaction and digitization of the activities are provided also with engaging material for pupils' exercises, such as:

- specially designed on-line quizzes on different platforms for educational quizzes (activities 5 and 7),
- specially designed exercises for OTA activity in external learning environment, such as GeoGebra (for example activity 36),
- introducing e-learning environment, such as MolView (activity 18),
- specially designed interactive worksheets (e.g. activities 11, 42, 64 and 66),
- gamification (e.g. activities 4, 8, 27 and 52),
- cooking exercises (e.g. activities 1 and 14).

3 ACTIVITIES

This repository provides 101 activity/lesson plans on 61 topics in Mathematics, Physics and Chemistry. The consortium worked on the topics identified as the most challenging in teaching and learning, for both teachers and pupils. Science teachers of primary or secondary education can choose material according to their needs, adjust it and use it online or in the classroom, with a large or small group of pupils.

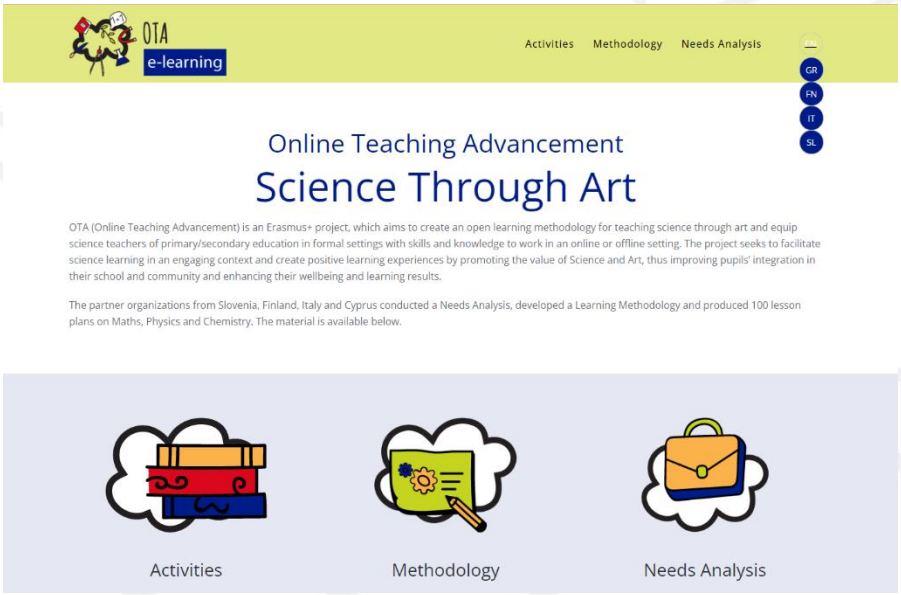

Figure 3: Home page of OTA e-learning Platform

- Activities on the platform are downloadable in *pdf.* format.
- The whole collection is available at OTA e-learning PLATFORM: click, or through the project's website: https://ota-project.eu/.
- Activities are available in 5 different languages (English, Slovenian, Greek, Italian, and Finnish).

3.1 INDEX OF ACTIVITIES

The list below provides activities divided by subjects and topics and hyperlinks under the Activity title, which leads directly to an individual activity.

Topic / Subtopic	Activity title with hyperlink to activity	No.
CHEMISTRY		
General & Safety / Role of chemistry in everyday life	There is no bread for breakfast. What should we do?	1
	State of water	2
	Flat or Fluffy Cake	3
General & Safety / Laboratory equipment safety	Find the Mistakes	4
	Hazardous waste is everywhere, even in our houses	5
General & Safety / Laboratory equipment	Similar and different equipment	6
	Our kitchen is a mess!	7
General & Safety / Safety in Laboratory	Lab Disasters	8
	Why is my strawberry ice cream less vivid than yours?	9

Mixture and pure substances / Methods for separating pure substances from mixtures	Water - Colours: painting with chromatography	10
Mixture and pure substances / Distinguish between pure substances and mixtures	Money laundering	11
Mixture and pure substances / Chemical elements composed of one type of atoms	Atomic pyramid	12
Solution / Concept of solubility of substances and saturation of solutions	Sour Art	13
	Colour to the World, Spice Up Your Life!	14
Solution / Solutions as examples of mixtures and distinguish between solvent and solute	The scientist interviews	15
	Coctail Party	16
Solution / Factors that affect the rate of dissolution of substances	Mixing oil paint	17
Chemistry general / Molecules	Molecular modeling with MolView	18
	What is art made of?	19
Chemistry general / Atoms	Atoms through exercise and IT skills	20
	Laughing atoms	21
Atoms / Electronic chains	A sea of ions	22

Atoms / Structure of the atom	Getting to know the structure of an atom through simulation	23
	Dancing atoms	24
Atoms / Atom model	Building an atomic model functionally and through art	25
	Dotted atoms	26
Elements in the periodic table / Chemical elements are classified in the periodic system and marked with symbols	Elements, chemical symbols and atomic numbers through playful learning	27
	Periodic table of… pigments!	28
MATHEMATHICS		
Percentage / Graphical display p%	The epidemic and attendance at world-famous museums	29
Percentage / Calculation with p%	Proportion is Key	30
	Why do we like certain pictures more than others?	31
Percentage / Solve real life problems	Become an architect and colour transform and create a new exterior image of the house	32

Percentage / Use of pocket calculator	Tiles on sale	33
	What does Leonardo Da Vinci have to do with a calculator?	34
Geometric concepts / Triangle	How do you spell Sankakkei?	35
Geometric concepts / Other polygons	Polygons with Geogebra	36
Geometric concepts / Circle	Which part of the face	37
	Möbius Strip	38
	Citrus rays	39
	One circle to rule them all	40
	Soul Circle	41
	Window to the Past	42
Geometric concepts / Rectangle & square	Why does a painter have to deal with the area and perimeter of rectangles?	43
	One day as Leonardo Da Vinci	44

Geometric concepts / Pythagorean theorem	Mr. Pitagora	45
	What do the ancient Egyptians have in common with setting up a wardrobe?	46
Functions / Definition of the linear function y=kx + n and draw it	Determine the mass of structures made of recycled materials without a scale	47
Functions / Compose table and draw a graph variables	Math behind Abstract Art	48
Functions / Read graph	Draw a graph on Dice Tossing Results	49
	The importance of graphs in works of art	50
Functions / Coordinate system, coordinate axes (abscise, ordinate) grid and coordinates of given point	How does math help us make cartoons?	51
Accounting operations and their properties / Skilfully calculating	Roll the dice	52
Accounting operations and their properties / Calculating with fractions, decimals, integers	Converting fractions to decimals using functional mathematics	53
	The perfect fit	54
Accounting operations and their properties / Solving real life problems	Round Earth on Flat Paper	55
	Everyday gold	56

Accounting operations and their properties / Calculation with rational numbers	Math of Music	57
Equation and inequalities / Solve equations	The master mosaicists	58
	Symmetry in equations? Yeah, right!	59
Equation and inequalities / Solve the inequality (Real numbers); computationally solve the equation and do the test	Art's VIPs	60
	Solving everyday problems using mathematics	61
Equation and inequalities / Express the unknown from the formula	Beaten up by a dolphin? There's an equation for that	62
	What is the approximate mass of the pyramid?	63
Transformation / Transformations (mirroring displacement, rotation) and their properties	Flags, Flags, Flags	64
	Let's go to the seaside!	65
Transformation / Mirror a point, line, angle, character over a selected line over a point	Designing a Royal Garden	66
	What connects a self-portrait and a rectangle?	67

Transformation / Concept of line bisectors and angle bisectors and solve the construction problems	Colourful stars	68
	Visual Palindromes	69
PHYSICS		
Forces / Assembling forces	The Lever Brings the Power	70
Forces / Drawing forces	Draw Forces	71
	Everyday life	72
	May the force be with you	73
Forces / Measurement of forces	The Apple's Fall	74
Forces / Description of forces	Flying Marshmallows	75
	Sticky Rice	76
Forces / Interaction act	The world's oldest sport	77
Forces / Friction and resistance	I can't move the cupboard	78
Forces / Spring balance	Inner world of our retractable pens	79
Forces / Balance of forces	Balance the Kinetic sculpture!	80

Forces / Centre of gravity	Centre of Gravity	81
	What do navel and Centre of Gravity have in common?	82
	Finding Mass Center	83
	Finding Mass Center II	84
Density, pressure and buoyancy / Buoyancy	Floating Metal	85
	Watch out! There is plastic swimming on the sea surface	86
Density, pressure and buoyancy / Density and specific gravity	Density and specific gravity	87
	Archimedes Experiment	88
Density, pressure and buoyancy /Mass and volume measurement	How much space do chess pieces take up?	89
Density, pressure and buoyancy / Area measurement	From rice to mosaic	90

Density, pressure and buoyancy / Atmospheric phenomena and weather	The Core of the Rain	91
	Funny creatures on mediaeval churches	92
	Under Weather	93
Density, pressure and buoyancy / Fluid pressure	STOP the car, there's a deer on a road!	94
Density, pressure and buoyancy / Pressure due to the weight of the stationary fluid	Ancient Roman architecture and our toilets have something in common	95
Accelerated motion and Newton's second law / Path at steadily accelerated motion	Full Throttle- a "Physics" rush	96
Accelerated motion and Newton's second law /Relationship between mass, force and acceleration	You run until you stop	97
Accelerated motion and Newton's second law / Free fall	Pisa's experiment	98
Accelerated motion and Newton's second law / Description of movement and straight steady movement and repetition	Not so fast, please	99
	The need for speed	100
Accelerated motion and Newton's second law / Steady accelerated movement	Designing the movement	101

4 REFERENCES AND SOURCES

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SOURCES:

Figure 1: Leonardo da Vinci, Vitruvian man, 1492, Gallerie dell'Accademia, Public domain, via Wikimedia Commons

Figure 2: Photo of making decoration task from activity *One circle to rule them all*, Photo provided by National Gallery of Slovenia

Figure 3: Home page of OTA e-learning Platform, own

Note: References and sources, used for providing contents of the activities are listed as a part of individual activity.

5 ANNEX

1 SUMMARY OF PILOTING EVALUATIONS AND FOCUS GROUPS MEETINGS

All participating countries tested activities by implementing piloting event in their own or external organizations. They selectively piloted a number of learning activities with different groups of pupils in 4 countries of the project: Slovenia, Italy, Cyprus and Finland.

The objective of the piloting was to ensure that OTA activities and online learning platform can be applied in classroom during the formal educational process as well as in non-formal settings, and provide the expected education and motivational results. Through systematic evaluation consortium also wanted to assess the relevance and effectiveness of the OTA activities and online learning platform for the target groups. To achieve this, several piloting activities were organised by the project partners, involving in total 233 pupils of primary/secondary school, aged 11-14 and 60 high schoolers, aged 16, across European countries. All partners reported and evaluated pilot courses they organised. Prior pilot took place, partners had a training event in Cyprus, where they had an extensive look of an overall project's process, walk-through the methodology, presentation and testing of some of the developed activities as well as creating new ones, based on the OTA Methodology. Trained teachers/trainers returned to their home countries and organized the OTA piloting, in both formal and non-formal settings.

1.1 Slovenia

In Slovenia, piloting was carried out in Primary School of Litija and in National Gallery of Slovenia.

In Primary School of Litija 2 teachers piloted 4 different activities in 4 groups of pupils. Together 117 pupils were involved in piloting, aged between 12 and 13.

Piloted activities:

Physics:

How much space do chess pieces take up?

Maths:

Flags, flags, flags

How does math help us make cartoons?

The epidemic and attendance at world-famous museums

Both teachers reported that the structure of activities is clear and easy to use and that all of the activities encourage pupils to work independently. Majority of piloted activities contain a good connection between science and art and a good link to interesting topic from everyday life or topic closely connected to pupils general interests. Half of the activities are successful with achieving the

learning objectives set and are helping pupils to better understand science topic or raise their motivation. Others are rated as *somewhat* in these categories, while none is rated with *not at all*. While one of the teacher is very satisfied with overall OTA platform appearance (visual appearance, usefulness, clarity, amount of information) the other rated it somewhere in the middle. Both will recommend others to use activities in their classes and both are planning to use other OTA activities in future.

Figure 2: Who doesn't love cartoons?

In National Gallery of Slovenia facilitator of pilot event was gallery's own pedagogue. She piloted one activity in two groups of pupils, aged 16. Together there were 60 pupils present on the piloting event.

Piloted activity:

Chemistry:

Mixing oil paint

Trainer stated that the structure of activities is clear and easy to use. Activity contains a good connection between science and art and a good link to interesting topic from everyday life or topic closely connected to pupils general interests. It helps pupils to better understand science topic and is successful in achieving learning objectives set. It somewhat raise their motivation and encourages pupils to work independently. Trainer is very satisfied with overall OTA platform appearance – visual appearance, usefulness, amount of information, and a little less with its clarity. She will recommend others to use this activity in their classes but does not know at the moment if she will use other OTA activities in future.

1.2 Cyprus

1 teacher piloted activity in a class of 50 pupils aged 14.

Piloted activity:

Physics:

Finding mass centre II

The teacher found the piloted activity useful to be applied in class. It has a clear structure, proposing an interesting connection between science and art (more specifically pupils explore the centre of gravity through the creation of beautiful balanced crafts). Students had the chance to practically explore the topic first through investigation, experimentation and observance. Their work and conclusions smoothly led to the theoretical part of the topic. This approach definitely helped them understand the topic better and be more engaged in the classroom. The teacher reported that he will definitely navigate the OTA platform, use more activities in his class and recommend them to his colleagues.

Regarding the platform, the teacher finds it user- friendly, visually appealing with a well – organized content.

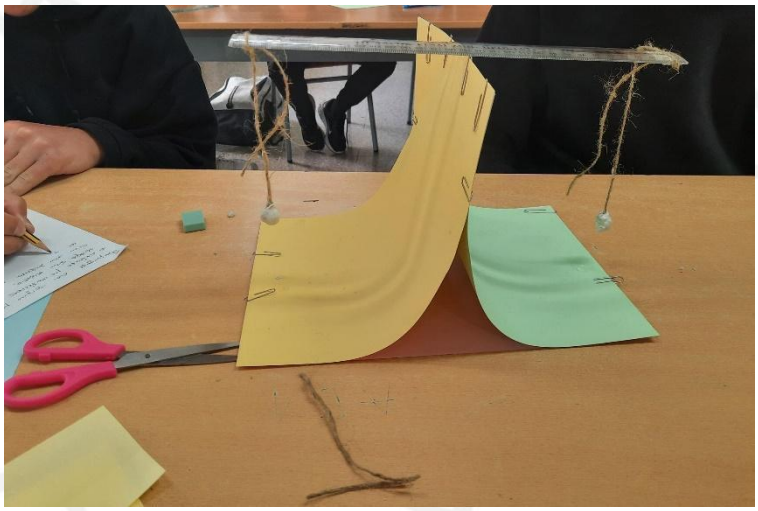

Figure 2: Is it balanced?

1.3 Finland

3 teachers piloted 4 activities. They each tested all 4 of the activities. Together 46 pupils aged between 12-13 and 9 pupils aged 11 participated.

Piloted activity:

Physics:

Archimedes experiment

Chemistry:

Money Laundering

Lab Disaster

Find the mistakes

All teachers reported that the structure of activities is clear and easy to use. With an exception of one teacher, who felt that activities somewhat contains good connection with art and somewhat encourages pupils to work independently, all categories were rated with the highest rate, regarding activities or overall appearance of OTA Platform. All teachers are planning to use OTA activities in future and will recommend them to others.

Figure 3: Let's have some money washed

1.4 Italy

The activities were implemented by a teacher assisted by the project manager who designed the proposed activities.

20 children aged 12 and 13 were trained**.**

Piloted activity:

Maths:

One day as Leonardo Da Vinci

The perfect fit

The class in which the activities were implemented corresponds to the second year of secondary school. The pupils had already studied the proposed topics. Before the start of the activities, the project manager who followed OTA did an ice-breaking activity, asking them which was their favourite subject and which they did not like.

The majority of the class answered that the most difficult and sometimes boring subject was mathematics and especially geometry, and based on these answers, the two activities that were chosen were precisely geometry and arithmetic.

The pupils were very interested in this new methodology created for learning difficult topics more easily.
In the activity on Leonardo Da Vinci, they reproduced the Vitruvian man and had fun speculating on how Leonardo da Vinci had thought of making that drawing.
Thanks to a discussion with the teacher, they went over the properties of polygons.
The other proposed activity triggered a competition between the different groups, who had fun despite the fact that the activity involved doing operations.
The teacher found the tested activity useful to apply in the classroom and found the link between science and art relevant. She was very satisfied with the platform and will talk to colleagues about using it.

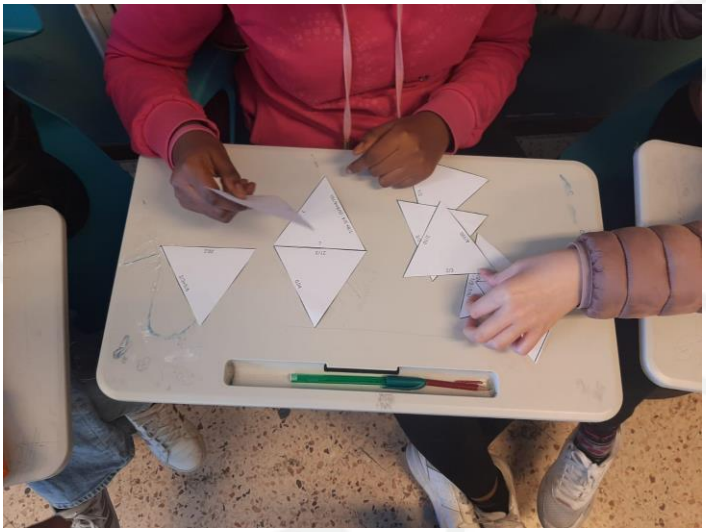

Figure 4: Does it fit?

2 CONCLUSION

Piloting events took place in Slovenia, Finland, Italy and Cyprus. Most of them were implemented in primary/secondary schools environments and facilitated by the teachers of natural/science subjects. All of the teachers who piloted selected activities stated, they **will recommend using the material to others** and the vast majority **are planning to use them in their future work**. Some piloting events also took place outside formal education environment – in the gallery and with a group of older pupils, who are already in high school. Objective of setting pilot events in different environments and with different aged pupils was to show that activities are appropriate for pupils beyond target ages of the project and they can be implemented also in non-formal educational environments.

From the beginning of the project, the situation regarding Covid-19 pandemic changed and pupils returned to their classrooms. Thus, all piloting events were implemented in face-to-face settings. For the activities, which have exercises tight to online programmes, such as GeoGebra, teachers are recommending to organise them in computer classes, so pupils have individual access to computer and internet, when implementing them face-to-face rather than from home.

Positive feedbacks from teachers confirmed the effectiveness and appropriateness of the learning activities. Overall facilitators reported that the structure of the activities is **clear and easy to use, contain relevant connections of science and art and are helpful for pupils' better understanding** of presented science topic. They are also good for raising pupils' motivation and encouraging their individual work. Teachers found the connection between science and art aesthetically pleasing and a good addition to the aesthetic education.

Regarding the platform, facilitators reported, they are satisfied with its overall appearance and usefulness.

Aside from piloting events, also focus groups meetings were held in each partners' countries, to gather feedback of overall project results, with special focus on the platform and its content. Focus groups were formed with several different profiles: primary/secondary school teachers of natural and science subjects, art teachers, ICT teachers, museum pedagogues, curators, restaurateur-conservators, human resource planner, teacher students, audience development coordinator, pedagogical coordinator, theme leader. The majority of feedback from focus groups members was positive; they found the platform visually appealing, both from a **visual and practical point of view**. They agree that implementing art to science teaching has been a good way to inspire pupils.

Members also pointed out the usefulness of the categorization of activities into subtopics according to the curricula and liked the clear instructions of the lesson plans, which are divided into "step-by-step" sections.

They also gave some suggestions for the improvement, which were considered and helpful for the revision and finalisation of the platform.

3 EVALUATION QUESTIONNAIRE

1. **Please, write the title of the activity you were piloting:**

2. **What is your opinion about the structure of the activity?**

   - **The structure is clear and easy to use.**
   - **The structure is somewhat clear.**
   - **The structure is not clear and wasn't easy to use at all.**

3. **In your opinion, did the content of the activity (please mark):**

	Yes, to a great extent	Somewhat	Not at all
Contain a good connection of science and art?			
Help pupils to better understand the science topic?			
Raise pupils motivation?			
Contain a good link to interesting topic from everyday life or topic closely connected to pupils general interests?			
Encourage pupils to work independently?			
Achieve the learning objectives set?			

4. **Would you recommend others to use this activity?**

   - **Yes**
   - **No**

5. **Do you plan to use OTA activities in the future?**

   - **Yes**
   - **No**
   - **I don't know**

6. **What is your overall impression of the OTA Learning Platform? Please rate.**

	1 not satisfied at all	2	3	4	5 very satisfied
Visual appearance					
Usefulness					
Clarity					
Amount of information					

7. **Did you face any obstacles when piloting the activity? If YES, please describe:**

8. **Do you have any suggestions for improvement or any other comment? Please write:**