



NEXT STEP O2

NEXT STEP SCENARIO

Master School Educational Scenario



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Short Description:			



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1. Introduction

Main aim

The NEXT STEP project is proposing a whole school approach to science learning. Building on previous successful European open schooling and STE(Arts)M initiatives, the project will bring about the NEXT STEP in education by providing a roadmap for the transformation of school classrooms into open and creative learning spaces. NEXT STEP methodological approach exceeds the state of the art regarding existing creative approaches and STEAM initiatives. In this framework the NEXT STEP project will design and set in operation the STEAM IDEAS' Square, an innovative learning environment which will be the nucleus of the school's activities. NEXT STEP will demonstrate how these environments a) can offer opportunities for deeper learning of STEAM, b) can improve the innovation and creative capacities of learners, c) can support the new role of teacher as a coach of the learning process, d) can facilitate effective cooperation with external stakeholders and e) can inspire policy-makers, school heads and school staff to imagine the schools of tomorrow.

Vision of the Project

The NEXT STEP vision for a creative and innovative school is the development of the creative and innovative classroom of tomorrow, the STEAM IDEAS' Square, in which education relies on an interdisciplinary, arts-based methodology within an entrepreneurship and design thinking framework.

STEAM IDEAS' Square - (SIS) which will be the main core of the school's creative and innovative activities will have two substances: digital and physical. In its premises and via its digital tools in-school interaction between STEM and other disciplines schoolteachers and among all the relative stakeholders (students, educators, parents, artists, scientists, local community authorities, industrial stakeholders, and policy makers) will be established with purpose to run complex and exciting real-life educational world projects. Teams of students (from the same or different classes) can also work and cooperate under SIS umbrella.

By connecting curious minds and specialists and lead them to think "out of the box" will help to speed up the flow of ideas to **transform the school and its classrooms** to a unique creative space for educational innovation and STEAM education.

Through collaboration and the appropriate pedagogies will be established prototyping, pedagogical innovation, creativity (along with distance learning opportunities) and well-being at school.

In addition, the capacity to work with external organizations so as to explore how such partnerships and networks can be built through a long-term strategy-based on trust and common objectives they contribute to key competence development.

A way to implement and use the ideas of NEXT STEP project is through developing a series of scenarios of use that are in line with the proposed approach and involve schools in a series of creative and innovative activities for the improvement of the local cities, settlements, and communities' physical and built-up environments, while engaging key stakeholders (experts, researchers, local communities, businesses etc.) in the process. Different scenarios about different school typologies will be created and these with the help of the right Strategies will help schools to evolve

One of these scenarios that is suitable for a STARTER school (according to our typology) is the one presented later in this document.





2. Essential Features of the STEAM IDEAS' Square

The development of key competences is further facilitated by the provision of context from other disciplines and can:

- a. offer opportunities for deeper learning of STEAM,
- b. improve the innovation and creative capacities of learners,
- c. support the new role of as a coach of the learning process,
- d. facilitate the effective cooperation with external stakeholders and
- e. inspire policy makers, school heads and school staff to imagine the schools of tomorrow.

All the above in total in the context of a functional NEXT STEP STEAM IDEAS' square will drive to overcome the organizational and technical barriers and to integration of creative and innovative culture in every day school practices and to aggregate and create projects and activities customized to the specific needs of schools.

Deeper Learning Competences, as defined in the Recommendation of the European Parliament and of the Council of 18 December 2006 on Key Competences for Lifelong Learning (2006/962/EC) as described by the Hewlett Foundation model (Pellegrino & Hilton, 2013) can be adopted in order to define the exact indicators needed to measure the efficiency of the project's objectives. A selection of certain deeper learning competences that correspond to a range of ages wider than the high school students (which is the main target group of the deeper-learning competences model) can be classified in the following three groups (Frans & Andreotti, 2018):

Group A: Cognitive competencies

- (1) Mastering rigorous academic content - A1
- (2) Thinking critically - A2

Group B: Interpersonal competencies

- (3) Working collaboratively - B3
- (4) Communicating effectively - B4

Group C: Intrapersonal competencies

- (5) Learning to learn (C5)
- (6) Developing academic mindsets - C6

As defined in the Recommendation of the European Parliament and of the Council of 18 December 2006 on Key Competences for Lifelong Learning (2006/962/EC):

- F1) Literacy competence (GA1)
- F2) Multilingual competence
- F3) F3M.Mathematical competence and F3S. competence in science, F3T. technology and F3E.engineering, F3MS, F3ST, (STEM=F3)
- F4) Digital competence - F4
- F5) F5P.Personal, F5S.social and F5L.learning to learn competence (C5)
- F6) Civic competence
- F7) Entrepreneurship competence
- F8) F8C. Cultural awareness and F8E.expression competence

We use the Competences as features taxonomy from the European Parliament and the Council's recommendation in our scenario. (...)





3. NEXT STEP Scenario Identification for the proposed scenario with the title: *The kite then and now*

3.1. Educational Scenario in a Master School - General description.

A kite is an unpowered, heavier-than-air flying device held to the earth by a line. The kite flies because wind resistance causes the air pressure under the kite to be greater than the air pressure above the kite, making the kite rise. The word kite is derived from the name of a type of bird belonging to the hawk family which is known for its graceful, soaring flight.

The Kite Scenario is a project-oriented scenario consists of 10 activities. The activities are transdisciplinary in nature, aiming to create the necessary cooperation and synergies between teachers, school management and other educational authorities as long as various stakeholders. The activities and the preparatory actions are proposed to take place inside classrooms, ICT labs or other labs and STEAM IDEAS' square place (newly created or started to implement).

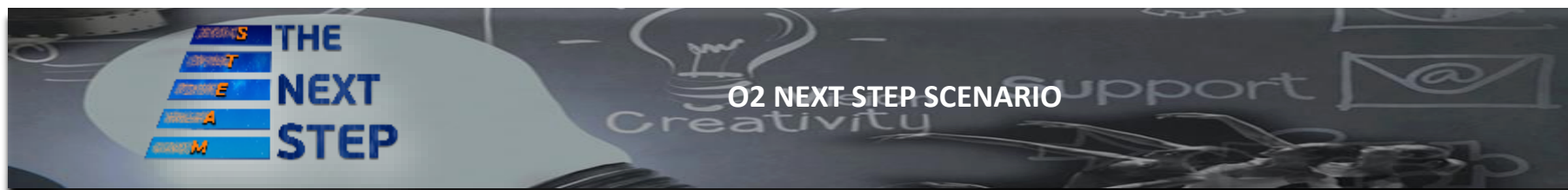
Various teachers' fields will be needed according to their activities and different synergies explained in the scenario.

We can note about Teachers' fields and concepts they will deal with as follows:

- **Science Teacher:** *Physics (forces, balance, flying, altitude, temperature, pressure, and weather phenomena, history of Science.*
- **Technology Teacher:** *Engineering, construction of the kite*
- **ICT/Informatics Teacher:** *Apps for stop motion videos, ...*
- **Art Teacher** *painting kites, and add-on paper for kites*
- **Mathematics Teacher** *Geometry, mathematical equations)*

Teacher Synergies they will implement include, for example:

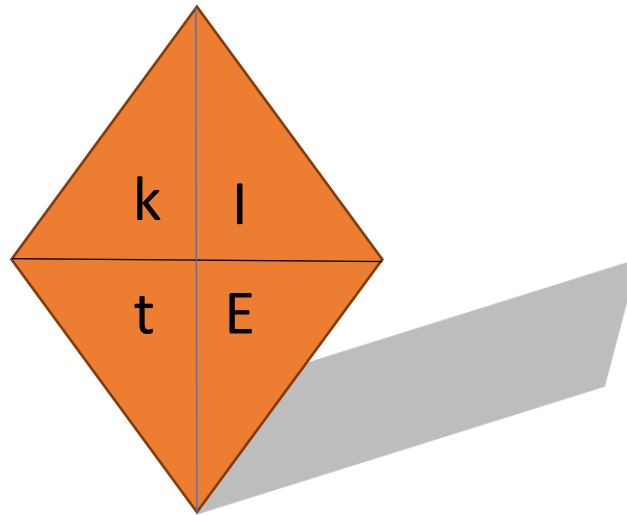
- Art Teacher will collaborate with Technology Teacher in the creation of the paper which will be used to the kites.
- Science Teacher will collaborate with math Teacher in order to prepare (in sketch) the frame of the kite in different sizes.
- Math and Technology Teachers will collaborate in order to create/construct the frame of the kite used as a model to teaching.
- These collaborations could take place in STEAM Ideas' Square physical premisses or at any other electronic place.

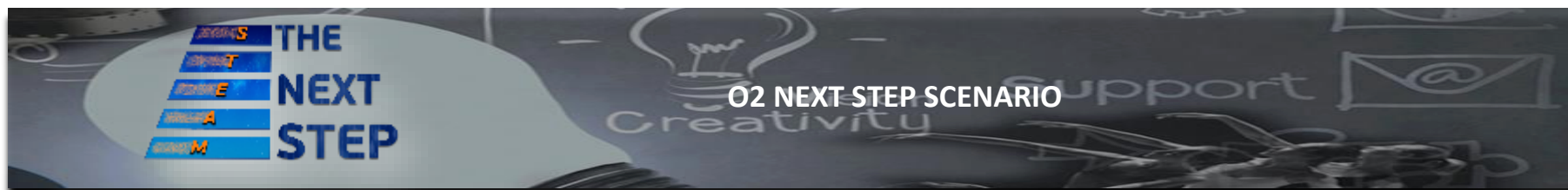


3.2 Scenario Identification Card



Category	Description
Title	<i>The kite then and now</i>
Teaching theme/problem	Through several activities of kite's creation various phenomena and concepts of science, technology, engineering, art, and history are studied and explored in a pleasant and full of vivid experiences, educational process.
Keywords	STEAM, kite, Forces, B. Franklin, Geometrical Shapes, AR, Painting movements and Art styles
Language	English
Thematic classification	STEAM oriented Education
Learning/Teaching main objectives:	Principles of Flight, Principles, and applications of Weather Measurements (S), Construction of a Kite (T) engineering (E) Painting Styles (A), Kite's shapes and geometrical properties, (M)
Suggested age group	12-15
Estimated level of difficulty	Master
Material and technical infrastructure needed	STEAM IDEAS' Square physical and/or digital (new created) , ICT school infrastructure, 1-1 laptops/tablets/iPads
School - Stakeholders Synergies	Field trip, "Koulouma" event on Kathari Deytera, local competition with prizes
Typical interaction time	1/2 month
Teaching level	(Gymnasium and Lyceum) Junior High School and High School
Level of interactivity	High
Type of interactivity	Physical, digital, educational field trips, events
Authors, Publisher name	Dimitrios J. Sotiropoulos, Menelaos Sotiriou
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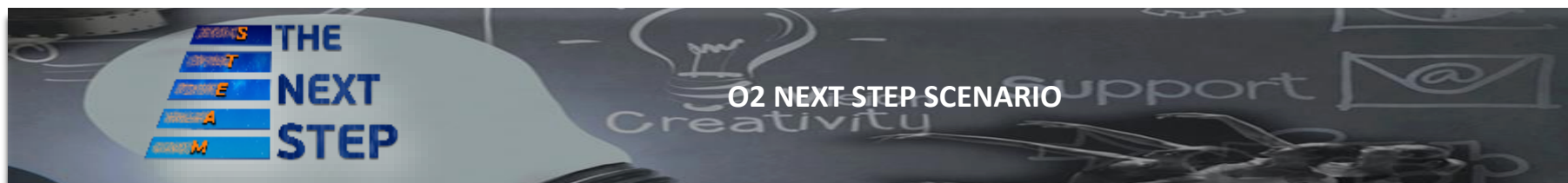
3.3 Scenario Identification Picture


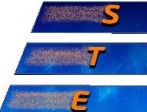




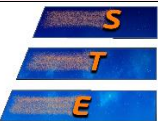

4. Main Project - MP: Kite construction

				
Act #	Description of activities, strategies, methods, means, resources and synergies		Learning goals - Learning outcomes Features/Competences	STEAM Fields
A1	Science Teacher	Shows videos (MP_FA1_WS1) and pictures of different kites. (websites) Make questions to the students to trigger them to think. Referring to Benjamin Franklin's kite story Tools: IWBS, P., https://www.kiteplans.org/ , https://www.history.com/this-day-in-history/franklin-flies-kite-during-thunderstorm	Educational Method <i>Introduction to the theme and Socratic dialogue</i>	
	Students	Discuss in pairs, take (digital) notes, using tools working Using: MP_FA1_WS1 Tools: tablets or notebooks	This activity introduces students to the concept of "a kite", and they will learn about its history and the various types of kites around the world <ul style="list-style-type: none"> • Can describe what a kite is • Can describe different kite types • To know Benjamin Franklin's kite story and weather concepts <p style="text-align: center;">F1, F2, F8C, F3S, F4, F5P, F5S</p>	
STEAM Ideas' Square (SIS) Operation - School Community Synergies	During A1 and after A1, the schoolteachers (musicians, artists, historians, scientists) collaborate on creating worksheets, online platforms, timeslots for using creative spaces (working in and preparing the STEAM Ideas' Square) and agree on the whole procedure and time needed from daily school activities. It could also the competition theme and criteria could be established.			Time: 1-2 hs
School-Stakeholders Synergies	A teacher (maybe from STEAM Ideas' Square that the school is gradually starts to create, or the principal) will collaborate with the local community stakeholders to organize the event of "kite's competition" during "Kathari Deytera" or any other day (could be used for). Competition could be organized with gifts and prizes. The kite could have been judged by its height reached on that day, its appearance, its art inspired theme, etc.			Time: 2 hs



Act #	Description of activities, strategies, methods, means, resources and synergies		Learning goals - Learning outcomes Features/Competences	STEAM Fields
A2	Science Teacher	Show video and making questions about the possible materials in kite's implementations. Tools: IWBS,P, https://www.kiteplans.org/	Educ Method Inquiry <ul style="list-style-type: none"> To learn about materials used in creating a kite. Can describe the materials that can be used in kites and can refer to the possible uses of kites <p style="text-align: center;">F3, F4, F5</p>	 In classroom duration 45m
	Students	Using MP I A2 WS2 will try to answer to questions and imagine how kites had been constructed. Students with this activity will make questions (to themselves and pairs) Tools: tablets, notebooks		
A3	Technology or History Teacher	Show videos, and referring to paper invention (as paper is one of the main materials for kites) and paper making history in Europe and Greece Tools: IWBS,P, https://www.youtube.com/watch?v=Mx9949aT06U	Educ Method Inquiry <ul style="list-style-type: none"> To learn about the history of paper invention To connect the past with the today paper creation Can explain the paper creation process with various methods. To get sensitized about paper recycling <p style="text-align: center;">F1, F3, F4, F5, F8E</p>	 In classroom duration 45m
	Students	Using MP I A3 WS3 will try to answer to questions about paper manufacturing Tools: tablets, notebooks		
(SIS) - School Community Synergies		Teachers gather necessary tools and materials for next activities of creation of a kite. One kite must be constructed in advance (from teacher's synergy) for using it in the classroom in order Teachers to use it as model. Maybe a (draft or not so draft) video from the procedure also could be in hand in order to be used next (or to have it as procedure in a flipped-classroom alike procedure)		Time: 3h
School-Stakeholders Synergies		Physical Visit (or iconic visit to a museum through https://museotek.net/venue/mouseio-benaki/) about ancient or older "making paper" procedures. Or at a factory of recycling paper ()		Time 1h / Field trip

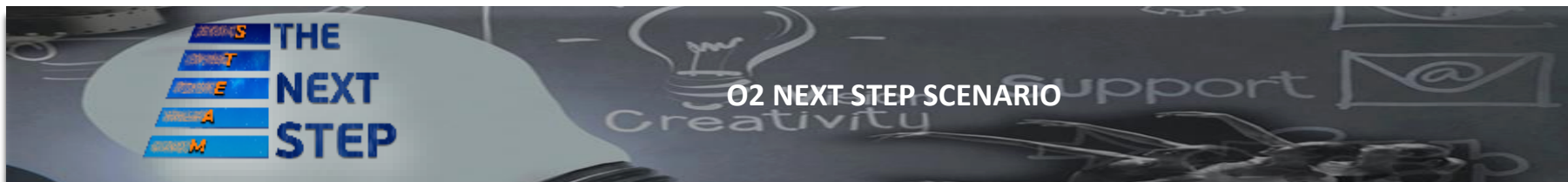



Act #	Description of activities, strategies, methods, means, resources and synergies		Learning goals - Learning outcomes Features/Competences	STEAM Fields
A4	Science Teacher Using a kite (as a model) for demonstrating the forces applied at it and in parallel will use pictures and text to create a relative presentation (to show and explain the forces applied at a kite and the condition of flying- as it is here: website) Tools: a kite, IWBS, P. Simulations, representations of forces	Educational Method <i>Guided Discovery</i>	<ul style="list-style-type: none"> to know the major forces in a kite (weight, lift, tension, and drag) Be able to describe the main forces that take place in a flight of a kite Be able to recognize the conditions of a kite in order to fly up, going down and flying in a constant height Be able to recognize the force derived from the air (force in general not taking into account in physics problems) Be aware of temperature and pressure interaction at the atmosphere <p style="text-align: center;">F1, F2, F3 (F3S,F3T,F3E),</p>	 In classroom duration 45m
	Students Students will work in teams (3-4 students) Using : MP C A4 WS4 Tools: tablets (or notebooks), camera (tablet's)			
A5	Science or Math Teacher Explain math functions and trigonometry needed to construct the frame of the kite / (do something like this in classroom: video) . Making the appropriate calculations for kite of various sizes Tools: IWBS, P.S. Simulation	Educational Method <i>Guided Discovery</i>	<ul style="list-style-type: none"> To know the math of a kites' frame construction Be able to calculate the lengths of the sides of different shapes of various kites <p style="text-align: center;">F2, F3, F4, F5S, F5L, F8C, F8E</p>	 In classroom duration 45m
	Students Actions: Students will work in teams (3-4 persons) and will make the mathematical calculations to draw a kite's frame Tools: tablets or notepads, Wolfram Alpha			

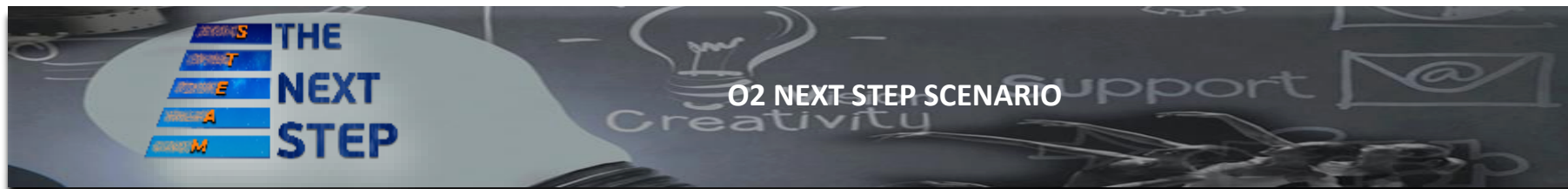
A6	Technology Teacher	Demonstrate the frame construction of a kite, talking about the different shapes and sizes and starting construct a diamond shaped kite	Educational Method <i>Inquiry</i>	<ul style="list-style-type: none"> To see and get to know how a kite can be constructed Be able to construct a kite's frame based on their calculations Explain and apply the steps to create a kite 	
		Tools, Resources: appropriate rope, stripes from light plastic or wood of different length			
	Students	Create their own kite (per team) working in pairs. First the frame and then with Art Teacher the main paper		<p>F2,F3,F4, F7,F8L,F8E</p>	<p>In classroom</p> <p>90m / 2 teaching hours</p>
		Resources: light rope, stripes from light plastic or wood of different length for every team			
A7	Art Teacher	Talk about different colors and/or shapes	Educational Method <i>Guided Discovery</i>	<ul style="list-style-type: none"> Get to know different art and paint movements Apply such techniques to their kites Step by step painting of their kites' main paper or paint light paper (to be glued after to the kite) Using cubism as an inspiration (through painting or collage art techniques). 	
		Talk and show different painting styles and movements, Cubism especially, remembering students collage art techniques.			
	Tools: IWBS, P.S. paper, scissors, rope, glue, paints, https://www.rileystreet.com/blogs/art/paper-collage				
	Students	Actions: Complete their own kite working in pairs adding the main paper on the frame. Working in pairs. The paper itself is the canvas of their painting or the base where they glue their light hand painted paper. Paint, make their kite an Art item, taking pictures of the results, in order to create (later) stop-motion videos from the procedure.		<p>F1, F2, F3, F4, F5, F8</p>	<p>In classroom</p> <p>45m</p>
		Tools: paper, paints, camera (tablet's)			

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A8	Science Teacher	<p>Show videos about flying a kite</p> <p>Show videos of kite with tail, without tail, without “ears”. Explain the importance of tail in kite’s flying,</p>	<p>Educational Method</p> <p><i>Socratic dialogue</i></p>	<ul style="list-style-type: none"> • Students with this activity will be oriented in the concept: “how to flight a kite” • Identifying the forces and the possible factors for not quite balance in a flight • Calculating the weight, a kite could lift 	
	Students	<p>Discuss/working in pairs, take digital notes,</p> <p>Using a game simulation of kite flying https://m.apkpure.com/kite-flying-layang-layang/br.pipacombate.maiworm/download?from=details , or https://apps.apple.com/us/app/real-kite-flying-simulator/id1448464346</p> <p style="text-align: center;">Tools: tablets or notepads</p>	<p>Tools: IWBS, P. (using: http://dide.ker.sch.gr/ekfe/epiloges/6_artra/77_aetos.pdf)</p>		
A9	Science Teacher	<p style="text-align: center;">Science Teacher actions</p> <p>Flying the kite outside in the school yard with his students</p>	<p style="text-align: center;">Educational Method</p> <p><i>Introduction to the theme and Socratic dialogue</i></p>	<ul style="list-style-type: none"> • They will flight their kites • Experientially get to know the factors influencing a “good kite fly” • Adding more tail in situ (outdoor) • Using laboratory little masses (weights) sets 	
	Students	<p>In pairs, flying their kite. At least and depending on the available free space, in order to check the flight balance of the construction. They are also taking pictures of first flying attempts</p> <p>Resources: scissors, paper, light rope, glue, “weights” for experimenting kite lifting capabilities</p>	<p>Tools: IWBS, P.S. cameras (tablet or smartphones)</p>		
<p>SIS Operation</p> <p>School Community Synergies</p>	<p>Before A9 person form SIS check the weather conditions for outdoor activities (sunny and windy day). Preparing the field trip on the day of "Kathari Deytera", or another appropriate day (if the time period cannot be arranged).</p>				<p>Time: 1-2 hs</p>
<p>School-Stakeholders Synergies</p>	<p>One special tradition is <u>koulouma</u>. On the day of “Kathari Deytera”, families gather eat all together and fly kites. It would be possible to arrange an event for students -with the local community- to fly the kites they created during this educational scenario at that day (or at another day).</p>				<p>Time: 2h</p>



Act #	Description of activities, strategies, methods, means, resources and synergies		Learning goals - Learning outcomes Features/Competences	STEAM Fields
A10	ICT Teacher	Show the process of creating a video, the materials which are needed to create one video of that type Start to create the video with the pictures had taken from Teachers' kite construction.	<ul style="list-style-type: none"> To create a stop-motion video To share it within school and with local community <p>F3,F4,F5L,F7</p>	 In classroom 45m
	Tools: IWBS, P.S.			
	Students	With this activity will create stop motion videos of the procedure of creating their kite. Discuss in pairs, using app for stop motion videos		
		Tools: Pcs at Pc Lab, an app like: qStopMotion		
SIS Operation - School Community Synergies		Structuring of the online platform in order to properly place the photos and the story of the kite's creation. Uploading the phots and videos / creations of the students to school's platform		Time: 1 h
School-Stakeholders Synergies		The (responsible for) sharing person (of STEAM Ideas' Square) will collaborate with the appropriate stakeholder to publish one or more videos of creating a kite (talking into account the personal data e.t.c.). To make the activities known to the public in order to prepare the event that will take place at Kathari Deytera. Where students will fly their kites at a local community event.		Time: 1 h



5. References

(...)

<https://www.eursc.eu/BasicTexts/2018-09-D-69-en-1.pdf>

6. ANNEXS

6.1 ANNEX 1 – Worksheets

6.1.1. Main Project - Feel - Activity 1_Worksheet 1 - MP_F_A1_WS1

Science teacher discusses with students through Socratic dialogues and showing them some videos (below) to the IWBS.

Socratic dialogues

- Do you know what a Kite is? (Yes, No)
- Have you ever tried to “fly” a kite? (Yes, No)
- Have you ever tried to construct/build /create such a kite? (Yes, No)
- Have you ever tried to construct/build / create something like a Kite? (Yes, No)
- What was that? (This can be just heard not written if there is not a device)
- Have you ever seen this kind of kites? (Yes - the majority of them, None, Some of theme)

V1. <https://www.youtube.com/watch?v=fViEyvR-ADc> (3:38)

V2. <https://www.youtube.com/watch?v=87NIC35Psw8> (3:14)

V3. https://www.youtube.com/watch?v=xz_yeWgIFqI (2:33)

V4. <https://www.youtube.com/watch?v=DGpm50njvDA> (13:29) (showing some scenes only)

V5. <https://www.youtube.com/watch?v=aqcTZsyLLGE> (0:58) (in Greece)

V6. https://www.youtube.com/watch?v=DttZhzfa_qQ (3:25) - Kite surfing



B.F story site. <https://www.history.com/this-day-in-history/franklin-files-kite-during-thunderstorm>

Students in pairs they are discussing and answering one by one to their owns devices or notebooks.

- They answer the above questions and note them into their tablet/laptop/iPad or notebooks.
- The answers are collected and presented in IWBS by the .
- The dialogue continues with the and students continue to work in pairs.
- The statistics of the students' answers are recorded (*educational data analytics*).
- The data could be very useful in various evaluation procedures (student's skills, knowledge, e.t.c.).
- Try to imagine the dangerous circumstances when you fly a kite (inspire from B.F. story)

Students can see more at home about it: <https://www.youtube.com/watch?v=f0oc4gUCOQI>, <https://www.youtube.com/watch?v=g5mzFb2hhHY>

Essential Tip 1	If digital devices are not present for students to use, could use: https://get.plickers.com/
	See it here in progress: https://www.youtube.com/watch?v=bejiz2HzUz8
	Data can be extracted to: CSV format for Educational Data Analytics



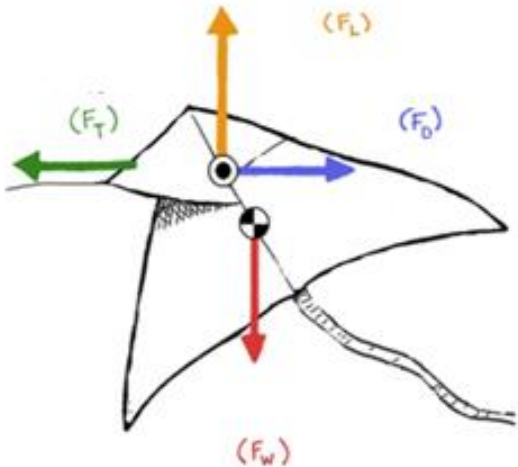


6.1.2. Main Project-Imagine-Activity 2_ Worksheet 2 - MP_I_A2_WS2

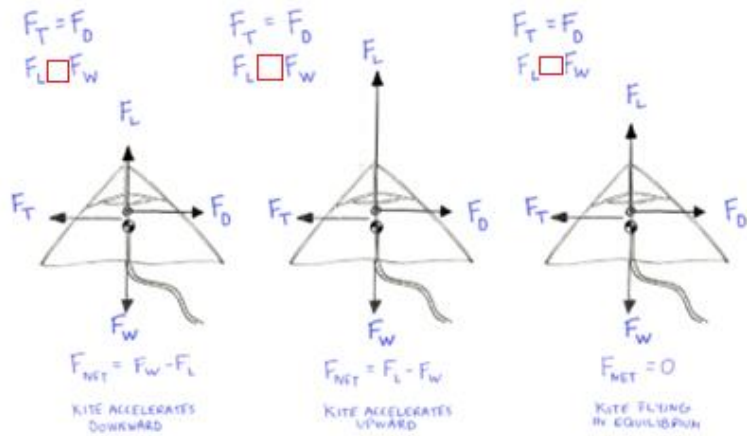
<i>Questions to Students -Answers</i>
<i>Propose ideas about materials of kites and its history, debate</i>
<i>Materials?</i>
<i>Uses?</i>
<i>Paper Invented earlier?</i>
Teacher creates a Presentation with content especially about History of kites http://www.madehow.com/Volume-4/Kite.html
Students will note to their tablet/notebook their answers.

6.1.3. Main Project-Imagine-Activity 3_ Worksheet 3 - MP_I_A3_WS3

Show some videos about paper invention and paper in Europe and Greece
https://www.museodellacarta.com/en/interesting_video
Discuss about the paper creation
https://xeiropoiito-xarti.gr/prehistory.html
What is the procedure of creating paper?
What materials are used?
Is the same procedure as at the ancient times?
What is changed?

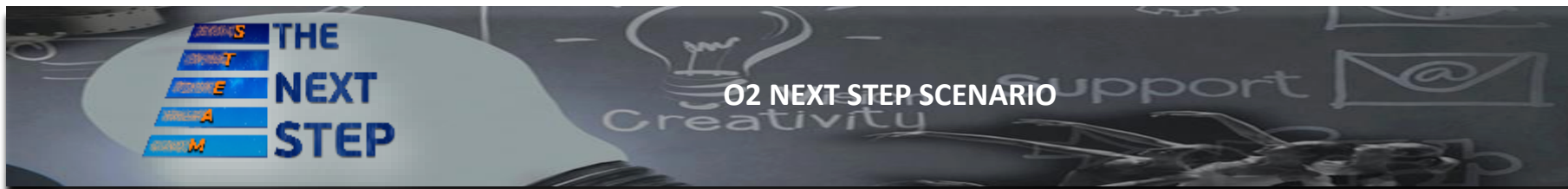
6.1.4. Main Project-Creation-Activity 4_ Worksheet 4 - MP_C_A4_WS4

<p>Photo from https://www.sciencefriday.com/educational-resources/kite-engineering/</p> 	<p>Exploring the forces applied to a kite that flying</p>
	<p>Green force is</p>
	<p>Yellow force is</p>
	<p>Blue Force is</p>
	<p>Red force is</p>
	<p> is ...</p>
	<p> is ...</p>



Put the right symbol in the red boxes

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6.2 ANNEX 2. Information Library for Educational Material about Kites

- <https://www.sciencefriday.com/educational-resources/kite-engineering>
- <https://www.youtube.com/watch?v=Mx9949aT06U>
- <https://www.kiteplans.org/> ,
- <https://www.history.com/this-day-in-history/franklin-flies-kite-during-thunderstorm>
- https://www.museodellacarta.com/en/interesting_video
- <http://www.madehow.com/Volume-4/Kite.html>
- <https://koon.ru/el/vozdushnye-zmei-v-proshlom-i-nastoyashchem-issledovatel'skaya-rabota-na/>
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7. Abbreviations, short terms apps used in Educational Scenario

- SIS: STEAM IDEAS' Square
- Stakeholders: Parents, special scientists, external Educators, authorities, entrepreneurs,
- IWBS: Interactive White Board System, Video Projector and interactive whiteboard.
- P. Presentation (like a pptx created with Powerpoint).
- Tablets. Electronic devices for personal use, like Android tablets or iPads.
- Laptops. Either in a lab or in classroom
- PCs. Computers in a lab.
- Plickers. <https://www.plickers.com/>
- qStopMotion: <http://qstopmotion.org/>
- <https://m.apkpure.com/kite-flying-layang-layang/br.pipacombate.maiworm/download?from=details>
- <https://apps.apple.com/us/app/real-kite-flying-simulator/id1448464346>

- F1. Literacy competence
- F2. Multilingual competence
- F3. F3M.Mathematical competence and F3S. competence in science, F3T. technology and F3E.engineering //or/ F3MS, F3ST , (STEM=F3)
- F4. Digital competence
- F5. F5P.Personal, F5S.social and F5L.learning to learn competence
- F6. Civic competence
- F7. Entrepreneurship competence
- F8. F8C. Cultural awareness and F8E.expression competence



NEXT STEP Partnership



Western Norway
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