

Digital, Responsible Citizenship in a Connected World

IO3 – Digital Literacy and Citizenship Guide for teachers

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Introduction to the Guide for Teachers

This Digital Literacy and Citizenship Guide is targeted at mainstream teachers, teaching assistants and other education providers of primary school students, aged 6-12 years. The Guide aims to support teachers and teaching providers to develop learning activities, games and exercises which can be delivered in the classroom with students, and which will enhance the digital competence of the students, encourage them to be responsible in how they participate and communicate online and to cultivate active (digital) citizenship in students.

The Guide also provides access to a range of innovative teaching activities, approaches, practices and methodologies and aims to act as inspiration for teachers to use some of these activities when integrating the topic of digital literacy into their lesson plans. This Guide provides descriptions of some best practices, which DRC project partners have highlighted through desk-research activities, as being beneficial for teachers. As such, the content of this Guide is aimed at teachers who want to develop and adapt innovative approaches and methods in the classroom to enhance how digital literacy is taught to primary school students and to encourage and motivate young learners to develop their digital competence and to become responsible online citizens. To present this Guide for Teachers, the content is arranged through the following chapters:

- 1. Chapter 1 How to enhance the quality of teaching digital skills through the use of digital technology
- 2. Chapter 2 Approaches and teaching methods to promote the students' interest about technology
- 3. Chapter 3 Approaches and methods that connect digital skills with real life issues
- 4. Chapter 4 Best Practices: Digital resources and tools to enhance how digital literacy and citizenship is taught in schools
- 5. Chapter 5 Summary of research findings from DRC partner countries

The content of Chapters 2-3 has been developed with reference to the Digital Competence Framework for Citizens - DIGCOMP 2.0. This framework was developed by the European Commission to encourage EU citizens to improve their digital competence. As such, the framework aims to encourage citizens to become competent users of digital technology and digital content; and





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to be able to use both in a safe environment. The framework outlines five key areas, where citizens should develop their skills and competence. These competence areas include:

» Information and Data Literacy

This relates to: browsing, searching and filtering data, information and digital content; evaluating data, information and digital content; managing data, information and digital content.

» Communication and Collaboration

This relates to: interacting through digital technologies; sharing through digital technologies; engaging in citizenship through digital technologies; collaborating through digital technologies; netiquette; managing digital identity.

» Digital Content Creation

This relates to: developing digital content; integrating and re-elaborating digital content; copyright and licenses; programming.

» Safety

This relates to: protecting devices; protecting personal data and privacy; protecting health and well-being; protecting the environment.

» Problem-solving

This relates to: solving technical problems; identifying needs and technological responses; creatively using digital technologies; identifying digital competence gaps.

Throughout Chapters 2, 3 and 4, you will see that activities, approaches and methodologies have been grouped under these five themes. So therefore, if you are interested in improving your students' competence in communication and collaboration online, you will find a range of resources in this category under each chapter. For more information on the specific knowledge, skills and attitudes to be developed at each level under each of these five competence areas, please visit: <u>https://ec.europa.eu/jrc/digcomp</u>

Writing the Guide for Teachers: Methodology

To inform the development of this Guide for Teachers, researchers from Cyprus, Greece, Ireland and Italy undertook a research and consultation process to investigate how digital literacy and citizenship are being taught in the primary school curriculum in each country, how teaching these topics is resourced, if there are any specific innovative practices which teachers use in these countries to teach







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these topics and what challenges exist in developing the digital literacies of young learners. A synopsis of the findings from this research process is included in the final chapter of this Guide, as we invite you to read these research summaries to gain an insight into how the research and selection of relevant best practices was undertaken in each partner country.

The innovative tools, resources, methods and approaches that were identified throughout this research process are presented in this Guide in chapters 1 to 3. In compiling a catalogue of best practices under each chapter, researchers from all partner countries undertook independent deskresearch and then contacted local teachers to validate the usefulness of the best practices identified and to gain insight into how these activities and methods would work in reality in the primary school classroom. While some examples included are more specific to some countries, they have all been included in this Guide to serve as a source of inspiration to teachers engaged in the DRC project in all countries. As such, through our research activities, researchers identified similar methods and approaches under each of the different chapter headings. While the methods may be similar, the application of these methods, activities and approaches is different in each of the examples profile in the catalogues of best practice and for this reason, none of the tools and resources identified by partners during the research process have been omitted or edited. To access a shorter version of this Guide which may be more specific to your national context, we recommend that you access the national report developed by the partner organisation in your country. The national reports that were compiled to inform the content of this Guide can be accessed through the DRC website and learning portal, available at: www.digitalcitizenship.oeg.

Link to other DRC Outputs

In developing the Guide for Teachers, as well as undertaking national research, partners also aimed to link the content of the Guide to the findings from the previous project outputs, namely:

- » IO1: The Digital Citizenship profile/identity'
- » IO2: Pedagogical Framework for the development of e-Toolkit on Digital Citizenship

Specifically, through the research activities completed to develop the Pedagogical Framework for the eToolkit, participating partner organisations identified and profiled a range of online tools and methodologies which teachers can use to teach the topics related to the use of ICT, digital literacy,





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responsible online citizenship, online safety, online communication and cyberbullying. As such, tools and resources that were identified in the Pedagogical Framework have been included in Chapter 4 of this Guide. While the Pedagogical Framework is comprised of a list of over 50 tools, a shortened version of this is included in this Guide. Chapter 4, below, presents a summary of the tools and resources that specifically relate to encouraging teachers to use ICT in their teaching practice, developing the digital literacy of young learners and how to encourage them to be responsible digital citizens. As such, these tools have been included in this Guide as they are the most relevant to the topic of this Guide.

User Guide: Guidance Notes for Teachers

The Guide for Teachers presents a theoretical framework for teachers on the topic of digital citizenship, as well as some examples and ideas for how it can be integrated into the primary school curriculum in participating partner countries, and more widely across Europe. In designing this Guide, project partners have aimed to include some practical activities and examples of best practice in integrating digital tools and IT into the primary school curriculum; however, in the main, this Guide is concerned with presenting a catalogue of ideas, methodologies and approaches which teachers can use to gain a better insight into the topic of digital citizenship and to generate some ideas for how specific activities and approaches can be adapted and tailored to the abilities, interests and needs of their class group. The Guide is quite extensive in the range of methodologies and activities it presents; however, now all activities will be relevant or realistic for all primary school teachers to use in their teaching practice. The Guide includes activities for younger learners on how to use storytelling and digital storytelling to build basic skills and vocabulary; to more complex activities which adopt a challenge-based approach to learning. In these activities, researchers from the DRC project aim to show teachers how they can create simple activities - like web quest challenges - to encourage learners to engage in independent research online and to develop their critical thinking, problemsolving and team-work and collaboration skills. For more advanced activities in this Guide, researchers present how educational robotics can be integrated into the primary school curriculum to develop 21st century skills in young learners such as collaboration, critical thinking, creativity and communication. While these activities will not appeal to all teachers, we encourage teachers to take some time to review the activities, methodologies and approaches in the Guide. When you find an activity or method which is particularly interesting and which you think would benefit your students, we recommend that you review the references used by researchers to identify this innovative practice and that you develop a lesson plan to integrate some of the best practices profiled in this Guide into









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your teaching practice. For activities and methodologies included in the Guide, these can be repurposed to address specific curriculum topics or can be implemented as they are described below so as to support primary school students to develop their digital literacy skills.

Chapter 1 - How to enhance the quality of teaching digital skills through the use of digital technology

In this chapter, we present practical guidelines and innovative teaching methods that can be applied in the classroom to enhance the quality of how digital skills is taught to young students (aged 6-12) through the use of digital technology. The aim of these guidelines, methods and activities is to show how teaching digital literacy should not be a mundane task; rather it should harness some of the basic functions of digital technology to provide students with opportunities to develop basic digital literacy skills in an engaging and interactive format. These practices and methodologies should also encourage and inspire teachers to go beyond the basic functions of IT equipment and to apply digital technologies in a creative and engaging activity so that young students will not only develop their digital competence, but will also be encouraged to use their creativity, imagination, sense of curiosity and problem-solving techniques to work through different digital media.

Catalogue of teaching methods and approaches

The activities and methods contained in the catalogue have been identified by researchers in all project countries through desk-research activities and in consultation with primary school teachers. The catalogue presents all activities that were identified and profiled by partners through this process. Specifically, it contains methods and approaches which aim to develop the competence of young learners in relation to Communication and Collaboration and Digital Content Creation as referenced in the DIGCOMP framework.

Methods for Communication and Collaboration

Name:	Google Docs and Collaborative Writing
Description	Google Docs is a free web-based version of Microsoft Word that provides
of example	teachers with some powerful features to help their students develop 21st
	century skills. The use of online technology in the classroom allows multiple
	authors to edit a document in time together. This feature facilitates collaborative









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	 learning among students since they can work together on a story, a script for a play, or any other kind of group writing project. They can use the comments feature to give each other feedback and make decisions together, thus it combines peer editing with cooperative grouping. Google Docs is an especially promising tool for online collaborative writing (Gralla, 2010; Morales & Collins, 2007). According to Limbu and Markauskaite (2015), collaborative writing tools such as Google Docs enable learners to participate in collaborative writing activities. The capacity to share and edit documents between group members makes collaboration much easier (Chiu, Wang, Popescu, Li & Lau, 2014, p.150).
Target age	10-12
Group size	Any
Materials required	Google docs, PCs, projector, internet connection
Instructions for teacher	In the classroom, a Google Document can be used in three ways for a collaborative writing activity:
	 The teachers can create and share a document with all students. Set a writing task on a given project e.g. language topic for which students have to write something from pre-given notes. Student collaborative group add information in the doc, and contribute a sentence, a paragraph etc. and share a draft with teacher in order to receive feedback within the document. Teachers encourage editing of previous sentences, both for content and errors. Students can work on the Google Doc in order to write, edit, and collaborate efficiently on the final version of the document. Students communicate with each other and collaborate to present the final project in the class.
Digital skills taught through this example	Digital writing skills; collaborative writing; communication; 21 st century skills
Please explain how this method can improve the quality of teaching	Collaborative writing tasks require students to work together to produce a common shared assignment. In groups, students scaffold tasks collaboratively and achieve a more developed product than the ones from individual work (Chang & Simpson, 1997; Jones, 2007)







References	Woodrich, M., & Fan, Y. (2017). Google Docs as a tool for collaborative writing				
	in the middle scl	nool classroo	om. Journal of Inforr	nation Technology E	Education:
	Research,	16,	391-410.	Retrieved	from
	http://www.inforr	ningscience.	org/Publications/387	70	

Name:	Scavenger hunting with Digital Photography		
Description	The aim of this activity is to set a topic that students need to find examples and		
of example	take a photograph of to show to the class. If smartphones, devices and/or		
	digital cameras are available to students in school, then this activity can be		
	completed in the classroom; however, as most schools have a policy of not		
	allowing smart phones and devices in the school, this may work best as a		
	homework assignment.		
Target age	8-12 years		
Group size	This is an individual homework assignment that students can present to the		
	class.		
Materials	Digital camera or smartphone for all students - this can be ensured by		
required	encouraging students to use their own devices at home and then either bringing		
	the device to school (BYOD) or emailing the photographs directly to the teacher		
	for a 'Show and Tell' presentation in school.		
Instructions	Teachers follow the below steps:		
for teacher	• The teacher sets an assignment for students whereby they have to		
	search and find items that they can take a photograph of and show to		
	their classmates. One example could be to improve the students'		
	understanding of mathematical angles and shapes; by asking them to		
	complete a scavenger hunt to find as many examples of acute, obtuse		
	and right angles as they can - either at home or in the classroom		
	depending on the availability of digital cameras and devices.		
	• The teacher can discuss with learners about the topic and identify		
	possible objects that they could photographs.		
	• The teacher can then talk the learners through some basic functions of		
	taking a photograph on their smart phone.		









	• The teacher asks all learners to email their photographs to a school		
	email address.		
	 The teacher then compiles all photographs into a short slideshow. 		
	• At the next class session, the teacher invites the learners to the front of		
	the classroom to show their photographs to the whole class through a		
	'Show and Tell' activity.		
	• The teacher then gives feedback to the learners on their photographs.		
Digital skills	Depending on the type of device used - smartphone, tablet or digital camera -		
taught	students will improve their dexterity in using their chosen device. They will also		
through this	understand the basics of framing, editing and adding effects to digital		
example	photographs. When sharing the photographs with their peers and teacher		
	before their presentation, they will also enhance their skills in using file-sharing		
	or email programmes.		
Please	This is an example of active learning, where the students are encouraged to		
explain how	use digital devices to explore curriculum-related topics and concepts. It is also		
this method	a unique activity that helps to connect the students to the world around them. It		
can improve	used embedded and enquiry-based techniques to motivate students to		
the quality of	increase their understanding of angles and shapes; but can also be applied to		
teaching	other curriculum subjects. As such, it affectively employs the integration of		
	digital devices to improve the quality of the learning for the students.		
References:	Balsley, Jessica (2010) 'Digital Photo Scavenger Hunt', available at:		
	https://theartofeducation.edu/2010/08/27/digital-photo-scavenger-hunt/		
	 ArtTV 'Digital Photography Scavenger Hunt - HOW TO' (VIDEO): <u>https://youtu.be/lyId5_MMRZM</u> 		

Name:	Game-based Learning
Description	The use of digital games in didactical activities are widely regarded as a
of example	powerful learning tool with the potential to foster the development of transversal
	skills, such as digital competence, reasoning and creativity.
	Gaming environments containing specific authoring features, that will be
	employed to allow all learners (including those with learning difficulties), not only









	to play, but also to create their own games through the collaboration among the
	groups.
	GBL tries to motivate, activate and involve students to act as if they were in a
	real context, through the use of dynamics, mechanics and gaming strategies.
	The gamification focuses on the motivation and involvement of the students,
	which function as the "engine" of the learning process, and it foresees a high
	degree of personalization, stimulating enjoyment and fun in working.
Target age	GBL can be applied to any school grade, adjusting the level of difficulty
	according to the students' age. Its use is particularly recommended for primary
	school students, and it is suitable for younger learners of pre-primary school as
	well.
Group size	Cooperative learning and team work are the most suitable didactic methods for
	this example of application of digital skills to teaching/learning activities.
	According to the different typologies and rules of the games, it will be necessary
	to divide the pupils of the class in relatively small groups, as to have different
	teams and stimulate the interaction among each participant, sometimes even
	in the form of a face to face session.
Materials	Digital gaming requires the use of didactical ICT tools and software, the
required	occasional use of dedicated devices as game/play-stations, or the access to
	web platforms/hubs. Nowadays, didactical game activities necessarily require
	an intensive and skilled use of mobile devices in real BYOD teaching/learning
	environments.
Instructions	Even if the adopted tools through GBL are many, simple to use, flexible and
for teacher	motivating, their effectiveness and added educational value largely depend on
	the use made of them: student activities need to be carefully designed and
	orchestrated and embedded in carefully thought-out pedagogical scenarios.
	These chores are upon the teachers.
	At the following link, teachers can explore the website of the MAGICAL project,
	which developed several applications of GBL:
	https://docs.google.com/document/d/1g7yrdsEALmvKHpW4KtKoDp-
	W0o6H3uMsPHdoFS6exb8/pub









Digital skills	The GBL requires the use of technological tools in an informal context. Younger		
taught	students can use apps on iPad and mobile devices, and through these they can		
through this	learn the letters of the alphabet, the time tables, songs, etc. Older students,		
example	instead, learn different things watching YouTube videos, or surfing the Internet.		
	The advantage of computer-based and digital devices learning, is that the		
	contents are easy to be learnt, and can be enjoyed at any moment during the		
	day.		
Please	Game Based Learning (GBL) is widely recognized as a potentially powerful		
explain how	approach to learning, and many studies and projects have highlighted the		
this method	opportunities that digital games offer to support immersive, situated and		
can improve	learner-centred educational experiences, showing a considerable capability to		
the quality of	enhance students' engagement and motivation.		
teaching			
	This new didactical form favours an increase in the interactivity, pushing		
	students to reach faster a well-defined objective; moreover, it raises in the		
	students the level of awareness of their actions, challenging them to act and		
	react to a more pragmatic scenario, which is not normally proposed during the		
	traditional didactic activities.		
References	 MAGICAL project (Game Based Learning) <u>https://docs.google.com/document/d/1g7yrdsEALmvKHpW4KtKoDp-W0o6H3uMsPHdoFS6exb8/pub</u> Istituto Nazionale Documentazione Innovazione Ricerca Educativa / <i>National Institute for Documentation Innovation Educational Research</i> (INDIRE) <u>http://www.indire.it/</u> 		

Methods for Digital Content Creation

Name:	Create a story using digital storytelling
Description	Digital storytelling empowers students to be confident communicators and
of example	creators of digital tools as they gain essential 21st-century literacy skills and gain
	deeper understanding in all areas of the curriculum. Students watch videos of
	other students' creations and devote classroom time to working individually or in
	small groups to create their digital stories on the subject of a course e.g. history.
	Teachers write the narrative of a story with their students based on a history
	course topic and they then work individually or in groups to design their
	storyboard. Then they develop their digital story with the aid of the digital







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	storytelling creation tool and once this is completed, they present their story to
Target age	Anv
Group size	Any
Materials required	Digital storytelling creation tools e.g. StoryJumper, Storybird, Pixton, ToonDoo, tablets, PCs, internet connection, projector
Instructions	Teachers follow the below steps:
for teacher	 Decide on a topic and they announce the subject of the topic to the students.
	Create an account in one of the digital storytelling creation tools
	 Present the creation tool e.g. StoryJumper to the students
	Show examples of other students' creations
	 Provide instructions to students on how to use the tool
	 Ask students to write the narratives of their stories
	Ask students to design their storyboards
	Create their digital storytelling
	Present their story to the class
Digital skills taught through this example Please explain how this method can improve the quality of teaching	 Digital storytelling activities develop students' basic oral, written and digital skills, or content understanding. Embracing digital storytelling skills to student it improves their digital literacy and communication skills and enhance their creative thinking. More precisely, by implementing digital storytelling in the classroom students practice the following skills: Research Skills (Documenting the story, finding and analysing pertinent information) Writing Skills (Formulating a point of view and developing a script) Organisation Skills (Managing the scope of the project, the materials used and the time it takes to complete the task; Technology Skills (learning to use a variety of tools, such as digital cameras, microphones) Presentation Skills (Deciding how to best present the story to an audience) Interview Skills (Working within a group and determining individual roles for group members) Problem-Solving Skills (Learning to make decisions and overcome obstacles at all stages of the project, from inception to completion; and Assessment Skills (Gaining expertise critiquing their own and others' work).









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Robin, B. (2006, March). The educational uses of digital storytelling. In Society
for Information Technology & Teacher Education International
Conference (pp. 709-716). Association for the Advancement of Computing
in Education (AACE).
Robin, B. R. (2008). Digital storytelling: A powerful technology tool for the 21st
century classroom. Theory into practice, 47(3), 220-228.

Name:	Introducing multimedia
Description	creating a class webpage, blog or wiki
of example	This example is an introduction to basic webpage design activity. Students will create a classroom website, blog or wiki.
	Web design is fun to learn about and will allow students to express their own web ideas, using links, images, text and other resources.
Target age	10-12
Group size	Team of 2
Materials required	Weebly, PCs, pictures, Instructions guide, projector
Instructions	Show examples to students
for teacher	• Explain to students how to create a web page or website, using Weebly
	platform.
	 Create a series of simple steps, so students can follow.
Digital skills	Basic web development skills; learn to become active participants in the online
taught	community.
through this	
example	
Please	This activity personalize the learning experience of the students are more adept
explain how	with technology, so by integrating it into the classroom, it helps them learn better
can improve	and laster. It empowers students to be active learners and monitors teachers teachers
the quality	
of teaching	

Name:	I create my own wiki and my first website
Description	This learning scenario aims at familiarizing pupils with Wiki-spaces platform
of example	and helping them develop skills of website creation. More specifically, pupils











	explore wiki-spaces platform, create their own websites and learn how to
	import text, picture, video and navigation menu.
Target age	9-12
Group size	Groups of 2-3 pupils
Materials	1 PC for each group, internet access, video projector
required	
Instructions	Initially the teacher can refer some things about the World Wide Web (M/M/M)
for teacher	the father of which is Tim Borners I an (CEBN Where the Web Was "W/W/W/"
	born)
	The teaching approach involves in four phases:
	Phase 1: I create a wiki and my first website
	Children familiarize with wikispaces platform, they create a wiki and a
	website. They also discuss the role of a website administrator.
	Phase 2: I insert pictures and format the text
	Children learn how to format text and insert pictures in their websites.
	Phase 3: I create a navigation menu and I insert videos
	Children understand the importance of a website navigation menu. Then they
	create a preset navigation menu. They delete the contents of the preset menu
	and create they own menu contents using hyperlinks using colours and
	various letter styles.
	Phase 4: Group presentation of digital creations
	Children present their wiki's to the whole class. A discussion follows regarding
	their work and alternative ideas
Digital skills	Using Wikispaces platform and creating and managing a website
taught	Using Wikispaces platorin and creating and managing a website
through this	
example	
Please	The development and creation of a website locally on the computer has
explain how	difficulties and limitations. Nevertheless, developing a Wiki is a simple task,
this method can improve	without the need to master any programming skills. Also, the website editing









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the quality of	tools that are available through the Wikispaces platform are easy to use. The
teaching	result is immediate, and pupils can make any website changes easily and
	quickly. The central idea of the scenario is to familiarize pupils with
	Wikispaces platform, and effectively help them develop skills of creating and
	managing a website, feeling little authors and creators in a digital and
	connected world. They learn how to use a wiki, how to write a new article on
	wiki, how to start an Online Discussion Community. This method nurtures
	cooperative learning as well as group collaboration (Hokanson & Hooper,
	2000; Hazzan, 2004; Smith & Thron, 2007) .See also:
	http://c2.com/cgi/wiki?TopTenWikiEngines
	https://www.mediawiki.org/wiki/Manual:Installing_MediaWiki
	https://www.mediawiki.org/wiki/Manual:Config_script
	"Δευτεράκια, ξεφτεράκια". (The smarty second class pupils). mkoutri.blogspot.com/

Name:	The looping command using Scratch programming language
Description	One of the most important concepts in ICT education is the use of looping
of example	structure. Primary school children need to master looping command in a
	programming language, in a simple way avoiding the complexity of classical
	programming languages. For this reason, the Scratch programming language
	is recommended. It is an environment attractive to students, with a modern
	and entertaining interface, while learners can directly see the results of each
	action. Through this teaching approach, students understand how looping
	structure operates and develop skills in using looping command.
Target age	9-12
Group size	Groups of 2-3 pupils
Materials	A PC for each pupil group, video projector, internet connection, Scratch
required	programming language platform









Instructions	The teaching approach evolves in four phases (The looping command using
for teacher	Scratch programming language", Advanced Electronic Scenarios Operating
	Platform, http://aesop.iep.edu.gr/node/12196):
	Phase 1: Exploration.
	Pupils recall their previous knowledge and try to solve more complex tasks
	using the Scratch programming language
	Phase 2: Presentation
	Teacher presents a Scratch example which uses looping command and
	discusses details with pupils
	Phase 3: Implementation
	Pupils use teacher instructions to create a Scratch video using looping
	commands
	Phase 4: Evaluation / Reflection
	Teacher evaluates pupil knowledge through asking them to use their
	knowledge in a new Scratch scenario.
Digital skills	Programming with Scratch language
taught	
example	
Please	This method to mastering coding is based on fading scaffolding teaching
explain how	approach. During fading scaffolding, pupils are supported and directed to
this method	handle a learning task or to master a concept, which initially they cannot
the quality of	manage without help. Teacher provides assistance only to those learning
teaching	activities that are beyond the capabilities of the student and up to the point
	that pupils can continue to work without any further help. The general idea is
	that teacher involves pupils in challenging learning tasks are just over their
	current abilities. He/she expects that pupils will make mistakes, but he/she
	provides feedback and prompting in order pupils achieve the task or goal. It
	is important to accept mistakes and use them for attaining learning objectives.
	When pupils master the learning task, the teacher begins to decrease
	guidance, to remove "scaffolds", to allow the pupil work autonomously and
	independently. In this way, pupils become autonomous and self – confident
	in using technology and tools.









Name:	Programming with Scratch language (if-then and if-then-else commands)
Description of	This activity is for pupils of primary school with basic knowledge of Scratch
example	2.0 programming language. The goal of the activity is pupils to understand
	the meaning and the use of the If-Then and If-Then-Else commands through
	simple examples, following teacher's instructions. At the end, pupils should
	create by themselves an interaction game at Scratch 2.0
Target age	9-12
Group size	Groups of 2-3 pupils
Materials	A PC for each pupil group, Scratch 2.0 programming language platform
required	
Instructions for	Phase 1: Presentation of Scratch 2.0 interface
teacher	At the beginning of the activity, it is necessary to present to pupils the main
	programming interface of Scratch 2.0 and the use of the main commands that
	are going to be used.
	Phase 2: Presentation of If-Then command
	The teacher should present a simple example of using the If-Then command
	from real life e.g. "if we push the power button of a computer, then the
	computer will start". Then, the teacher should present the If-Then command
	at Scratch 2.0 and how it can be used with an example. At the end, pupils
	should answer a short understanding test.
	Phase 3: Presentation of If-Then-Else command
	The teacher should present a simple example of using the If-Then-Else
	command from real life e.g. "If I have 1.5€ then I can buy a sandwich that
	costs 1.5€ else I can buy a cheese pie that costs 1€". Then, the teacher
	should present the If-Then-Else command at Scratch 2.0 and how it can be
	used with an example. At the end, pupils should answer a short
	understanding test.
	Phase 4: Creation of an interactive game with Scratch 2.0
	Pupils should use all the previous knowledge that they get in order to create
	an interactive football game at Scratch 2.0. The football player should move
	10steps every time we click on him. At the center of the stadium, there is a
	ball. Every time the football player touches the ball, the ball should move 10









	steps. If the ball passes the line of the goal then the football player should
	say "Goal" and both the player and the ball should initialize their positions.
	Phase 5: Exercises
	At the end of this activity, pupils should answer an understanding
	questionnaire about the If-Then and If-Then-Else commands.
Please explain	This method to mastering coding is based on fading scaffolding teaching
how this	approach. During fading scaffolding, pupils are supported and directed to
method can	handle a learning task or to master a concept, which initially they cannot
improve the	manage without help. Teacher provides assistance only to those learning
quality of	activities that are beyond the capabilities of the student and up to the point
teaching	that pupils can continue to work without any further help. The general idea is
	that teacher involves pupils in challenging learning tasks are just over their
	current abilities. He/she expects that pupils will make mistakes, but he/she
	provides feedback and prompting in order pupils achieve the task or goal. It
	is important to accept mistakes and use them for attaining learning objectives.
	When pupils master the learning task, the teacher begins to decrease
	guidance, to remove "scaffolds", to allow the pupil work autonomously and
	independently. In this way, pupils become autonomous and self - confident
	in using technology and tools (see "The control commands If-Then and If-
	Then-Else at Scratch2.0, through the creation of an interaction game",
	Advanced Electronic Scenarios Operating Platform,
	http://aesop.iep.edu.gr/node/14122)

Name:	LMS Platforms (Moodle – e-Class – Edmodo – NEO LMS etc)
Description of example	Schools in Greece use the e-Class Electronic Classroom platform which addresses both teachers and students, with the goal of enriching the classical teaching that takes place daily at school, with modern tools that strengthen the learning process. The teacher creates online courses and has full two- way communication with his/her students. E-Class can also be used for training, collaborations, brainstorming etc, among teachers. The e-Class is based on the Greek open Open e-Class software
	(http://www.openeclass.org).









Target age	Any
Group size	Individual / group
Materials required	PC with internet connection
Instructions for teacher	 A teacher that uses an LMS platforms like e-Class can easily: Create and manage a number of lessons incorporating text, images, videos or SCORM modules Make use of automated quiz creation Create learning lines and organize learning material in modules Get feedback and statistics concerning LMS use and content access by his/her pupils Store and organize in files learning material Assign and grade homework Create group of pupils for face to face or distant cooperative learning tasks Store and organize multimedia Upload and manage e-books in HTML format Achieve synchronous or asynchronous communication (chat, forum, messages, e-conferences)
Digital skills	Children develop multiple skills of accessing and managing information and
taught through this example	learn how to cooperate with teachers and fellow-pupils on-line.
Please explain how this method can improve the quality of teaching	The e-Class platform gives new possibilities in education, offering a means of interaction and continuous communication between teachers and pupils. At the same time, it supports electronic organisation, storage and presentation of educational material, regardless of the limiting factors of space and time. Thus, it creates conditions for a dynamic educational environment. Open eClass platform is designed to implement new educational activities. Pivotal roles are those of the pupil and the teacher. In











particular, teachers can easily and quickly create easy-to-use and functional online lessons using his own teaching material (notes, presentations, texts, images, etc.). At the same time, pupils acquire an alternative channel access to knowledge offered. Open e-Class platform supports asynchronous teleeducation services without limitations and commitments. Pupils need no specialized technical knowledge, since access learning material takes place through the use of a simple Web browser.

Name:	Using Story Remix to create Digital Stories
Description	Story Remix allows teachers to use photographs to create short video files
of example	which are creative and engaging for young learners, and which can be
	shared through social media platforms or the school's website. Story Remix
	can also be used, where there has been a field-trip or study visit and where
	teachers can encourage young learners to create their own digital story of
	the trip by creative a short video with photographs.
Target age	10-12 years
Group size	There is no limit to the group size - but learners could develop this activity
	on their own.
Materials	Laptops, PCs or access to smart devices for all learners; Access to a photo
required	library to create digital stories; Access to Story Remix software.
Instructions	Story Remix creates automatically generated videos from photographs that
for teacher	are stored in a Photo Library on a laptop or PC. As such, it can be a great
	way for teachers to present learning to students in a new and engaging way;
	or for teachers to encourage students to present their homework in a new
	format.
	Teachers follow the below steps:
	• As Story Remix automatically selects the best photographs from a
	Photo Library, and brings them together in one video clip, where
	music, filters and effects can be added by students – all teachers









	needs to do to get started is to upload their photographs to their
	Photo Library and download the app.
	Using Story Remix, they can then select the photographs that they
	want to arrange in a video, and use a video editor in the app.
	• The video can then be further personalized by teachers, and/or
	students depending on their access to IT equipment, by adding
	different photographs, headings, titles, text, music clips and other
	design effects and elements.
	• For a step-by-step guide to using Story Remix, teachers can follow
	the steps at this link: <u>https://www.windowscentral.com/how-start-</u>
	using-photos-story-remix-experience-windows-10
Digital skills	Story Remix is designed to enable students and teachers to quickly create
taught	digital stories and short movies in the classroom. It is a very engaging
through this	programme for teachers to use with their students in creating a digital story.
example	For an example of how this can be used, teachers can assign a task to
	students to create a Story Remix project on an issue affecting their local
	community. With the help of their parents, students can take photographs
	of their local area on the provided topic, and then when they are in class,
	they can upload their photographs from their camera or smartphone to the
	PC in school and create their Story Remix project. Students can then
	present their Story Remix projects to the class. As such, students and
	teachers will develop their digital skills in using the Microsoft suite, in photo-
	editing, creative collaboration, sound editing, etc.
Please	By using Story Remix to create digital stories, this activity will at once
explain how	develop the digital skills of young people in a fun and engaging way; while
this method	also teaching them the theory of digital story-telling. As such, the quality of
can improve	teaching can be improved. This method can be applied to a range of
the quality of	different topics and projects - requiring young learners to collate photographs
teaching	on a specific topic or subject and create their own educational video through
	the use of Story Remix software.











References	 How to get started with Story Remix in Photos: <u>https://www.windowscentral.com/how-start-using-photos-story-remix-experience-windows-10</u>
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Name:	Coder Dojo - Beginner App Inventor Sushi Cards
Description	CoderDojo is a global movement of free, open, volunteer-led coding clubs
of example	(Dojos) where young people aged 7–17 (Ninjas) can explore digital
	technology with the support of their fellow Ninjas and volunteer
	mentors. They can also be applied to teaching methods as all exercises and
	activities are freely available online through the Coder Dojo website.
Target age	7-12
Group size	10-15
Materials	PC or laptop for all students; Internet access; instructions and templates from
required	Coder Dojo.
Instructions	Teachers can choose from different activities from the Coder Dojo website,
for teacher	to develop a range of digital skills and competences in their learners. In this
	example, we suggest that teaches begin by introducing learners to using the
	Coder Dojo App Inventor - the type of app, quiz or game that they develop
	using this inventor can be made specific to the topic being taught.
	The teacher should follow these steps:
	 The teacher should set up an account on the App Inventor website, by visiting: <u>dojo.soy/appinv-start</u> and then clicking on the Create apps! button in the top right-hand corner of the screen.
	 As this app will be built on an Android platform, the teacher will have to create their app inventor account using a Google/Gmail account. If the teacher does not have a Gmail account, it is a good idea to set one up for the class so that they can use this account just for technology projects in the classroom.
	 Once you have signed in with a Google account, App Inventor will show you options to set-up an Android device (a phone or tablet)
	 Now that everthing is set up, the teacher can begin to create apps in the classroom with their students. For this, they can go back to







the App Inver 'Start a New I	itor in their browser and clic Project'	ck on the but	ton called
Start new project Delete Project Publish to Gallery My Projects			
Call your project MyC Project name: You'll see a screen li	QuizApp and click OK. MyQuizApp ke this one, which means y	you're ready t	o get coding!
MyQuizApp Screen 1 - Add Scre	en Remove Screen		Designer Blocks
Palette Viewer		Components	Properties
User Interface ■ Button ① ✓ CheckBox ⑦ ☑ DateFicker ⑦ ☑ Image ⑦ ☑ Image ⑦ ☑ ListPicker ⑦ ☑ ListPicker ⑦ ☑ Spinner ⑦ ☑ Silder ⑨ ☑ Silder ⑨ ☑ TimePicker ⑦ ☑ TimePicker ⑦ ☑ WebViewer ⑦ ☑ WebViewer ⑦ Layout Hadia	Check to see Preview on Tablet size:	Rename Delete Media	Screen1 AboutScreen AlignHorizontal Left: 1 • AlignHorizontal Top: 1 • AppName Mr/outApp BackgroundColor BackgroundColor BackgroundColor ConsScreenAnimation Default • ConsScreenAnimation Default • ScreenOrientation Unspecified • ScreenDate
 From this scrule inventor Desired inventor D	eenshot, you can see that t gner view is broken into fou e, from which the teachers e to build the app r, where they can see the a earrange and select compor- onents, where they can see pp and their relationships t rties, where they can see a mponent they have selected er buttons but these four se eir app. on on the next steps to take uld access the full guide, at s.raspberrypi.org/en/project	he App ur key section picks the cor app they are v nents e a list of the o each other and change the d at the mon ections that u e in developin this link: ts/cd-sebent	ns: nponents they working on, components in ne properties of nent isers will use g their app, <u>o-appinv-1/3</u>







Digital skills	Using this activity, young learners will be able to use the App Inventor tool to
taught	create a simple quiz; they will also learn some basic coding skills which can
through this	be used and applied to other projects.
example	
Please	Using Coder Dojo in the classroom is an active teaching method, because it
explain how	involves learners in developing a digital project - depending on the subject
this method	being taught, the project developed can be adapted and related to the
can improve	curriculum subject. As such, this is an engaging activity that will motivate
the quality of	young learners to develop their digital skills.
teaching	
References:	∘ CoderDojo – Beginner App Inventor Sushi Cards:
	https://projects.raspberrypi.org/en/projects/cd-sebento-appinv-1/3

Chapter 2 - Approaches and teaching methods to promote the students' interest in technology

This Chapter presents teachers and educators with a variety of different approaches and teaching methods which they can use to promote and develop a students' interest in using technology for educational purposes. The examples and activities presented in the following tables aim to encourage and motivate students to not only develop their digital skills, but to promote an appreciation among these learners so that they can apply their digital skills to a learning context.

Catalogue of teaching methods and approaches

The activities and methods contained in the catalogue have been identified by researchers in all project countries through desk-research activities and in consultation with primary school teachers. Specifically, this catalogue contains methods and approaches which aim to develop the competence of young learners in relation to Information and Data Literacy, Communication and Collaboration, Digital Content Creation and Problem-solving as referenced in the DIGCOMP framework.





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Methods for Information and Data Literacy

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Expected	According to the SOLE toolkit (p.9) pupils benefit from the SOLEs in the
outcome of	following ways:
the method	Get empowered to take ownership of their learning experience
	Improve reading comprehension, behaviour, language, creativity and
	problem-solving abilities
	Enhance computer literacy
	Develop the habits of a lifelong learner
	Develop stronger memory recall
	Strengthen interpersonal and presentation skills
	Get better at integrating what they already know into discussions both inside
	and out of the classroom
	Develop a more trusting relationship with educators and adults generally
	Become more motivated to learn about different subjects and ideas

Activity	Digital concept mapping
Name:	
Description	Concept mapping is a teaching method that involves supporting students to
of innovative	make links between different and/or complex concepts and ideas through
teaching idea/method	creating a visual or graphical representation of how the concepts are linked.
	It is an effective means of assessing the students' grasp and understanding
	of a complex concept. With the development o digital concept mapping
	software, this activity can now be practiced in a digital environment which will
	help to develop the digital skills and motivation for students to use software
	programmes in the classroom.
Target age	8-12 years
Group size	Students should work in groups of 2/3
Materials	Access to PC, laptop or smart device for all groups; Access to concept
required	mapping software such as Coggle (fully online) or MindMup (must be
	downloaded to device but is free to use and creates unlimited concept maps).
Instructions	With the development of specific programmes and software which allows
for teacher	teachers and students to create concept maps, it is easy for teachers to
	introduce technology into their teaching practice to support students to further
	develop their understanding of key concepts and events. Depending on the











	curriculum topic being taught, the teacher can set the groups or pairs working
	together by asking them to create concept maps to identify the similarities
	and differences between concepts; or to link sub-components of a concept,
	for example. This could be applied to two historical events - such as the First
	and Second World Wars - and ask students to work together to create a map
	of how the two Wars were linked, what factors contributed to both and what
	the outcomes of both were, for example. Similarly, it could be applied to
	science or mathematics, where students are asked to outline the steps in a
	theorem using a concept map. Alternatively, it can be used for a creative
	project, where students are asked to brainstorm an idea for something
	completely novel and new. The teacher can apply this technique as they see
	fit.
	The teacher should follow these steps:
	$_{\circ}$ The teacher can introduce a topic to the class group.
	$_{\odot}$ The teacher then divides the group into smaller groups of 3-4
	students, depending on the class size.
	 The teacher then distributes laptops/tablets or smart devices to each
	group.
	• The teacher introduces students to some concept mapping platforms,
	like MindMup.
	 The teacher should create a free user account on MindMup and share
	the details with all groups so that they can log in to create their maps.
	 Once logged in, learners should click 'Get Started' and then 'Create
	a New Map'.
	 The learner groups can then work collaboratively to unpack the topic
	of the activity and to create their own concept maps using the
	platform.
	 After 20-30 minutes, the teacher can bring the whole group back
	together and invite different groups to share their concept maps with
	the whol class.
Expected	The benefits of using concept mapping tools is that they appeal to students
the method	with different learning styles; they encourage students to engage in higher
	order thinking and analysis; they encourage meaning-making and allow











	students to elaborate and form understanding of concepts and events; and
	they also present students with a non-linear and visual means of representing
	their learning. As such, using digital concept mapping creates an active,
	meaningful and engaging learning activity for students.
References	$_{\odot}$ Educational Technology and Mobile Learning (2018) '9 Great
	Concept Mapping Tools for Teachers and Students' available at:
	https://www.educatorstechnology.com/2018/01/9-great-concept-
	mapping-tools-for.html
	o Tergen, Sigmar-Olaf (2005) 'Digital Concept Maps for Managing
	Knowledge and Information', available at:
	https://www.researchgate.net/publication/221520304 Digital_Conce
	pt Maps for Managing Knowledge and Information

Activity	Teaching/Learning of Computational Thinking
Name:	
Description	In the computer language, coding is intended as the layout of a program, that
of innovative	is a sequence of instructions performed by a calculator. It is tightly connected
teaching	to that of computational thinking, a basic approach to the problems and their
idea/method	solutions.
	For this reason, the computational thinking is entering more and more in the
	Italian scholastic classrooms, demonstrating that didactics have included the
	importance of this tool.
	The Ministry of Instruction, University and Research is encouraging its
	diffusion in the whole national territory, and the National Plan for Digital School
	(PNSD) gave a particular importance to computational thinking, through the
	establishment of the figure of the digital animator, and by accelerating the
	diffusion of coding in the schools and making the teachers more skilled in this
	new useful language.
Target age	The diffusion of computational thinking is recommended by MIUR for the
	updating of the scholastic curricula, starting from the first year of primary









	school. For this reason, a specific action of the National Plan is dedicated to
	the diffusion of computational thinking among primary school students.
Group size	Activities regarding Computational Thinking could be suitable to class-sizes
	of primary and first grade of secondary school.
Materials	The activities don't require specific devices or tools, but some simple
required	programming software for ordinary ICT tools setting in school, such as,
	Scratcht! and Schratch Jr., developed by the MIT.
Instructions	Teaching coding in school is possible by using simple tools, such as Scratch
for teacher	or Scratch Jr. for the younger children, or exercises of the website code.org
	for older students.
	At the following link, teachers can find the section dedicated to educators of
	the Scratch website, that guides them through the use of the platform:
	https://scratch.mit.edu/educators/
	At the following links, teachers can find the homepage of the code.org website
	(first link), and a page of the website dedicated to educators, that contains a
	table displaying all the activities, organised in courses, that they can
	implement with students from different grades (see Figure 1), as well as
	different tools and one-lesson options (second link):
	https://code.org/
	https://studio.code.org/courses?view=teacher







	Recommended Code.org courses View my recent courses >
	Courses from Code.org for students in grades K-12 and professional learning for teachers.
	Elementary school Middle school High school
	K 1 2 3 4 5 6 7 8 9 10 11 12
	CS Principles
	CS Discoveries
	CS Fundamentals
	Pre-reader Express CS Fundamentals: Express
	Professional Learning for all grade levels
	Figure 1 - source: https://studio.code.org/courses
	The activity is proposed in the form of a game, where problem-solving is
	stimulated by requesting the children to play and try to win every challenge.
	The pupils have to engage, in order to understand what the possible solutions
	to their challenge can be, and, when reaching the objective, they improve their
	computational and problem-solving competencies. Meanwhile, they
	unconsciously write lines of computer code, even if on the concrete level they
	only moved some rectangular blocks, to each of which corresponds a function
	and a code (programming through blocks or visual programming).
Expected	The expected results for the pupils is the acquisition and application of the
outcome of	computational thinking: regardless of their knowledge on how to use a
the method	computer, they will be able to produce small programs like video games, or
	brief sequences, reflecting a model already in use in many European schools.
References	Istituto Nazionale Documentazione Innovazione Ricerca Educativa /
	National Institute for Documentation Innovation Educational
	Research (INDIRE) <u>http://www.indire.it/</u>
	Istituto Tecnologie Didattiche del Consiglio Nazionale delle Ricerche /
	Didactical Technologies Institute of National Research Council (ITD – CNR)
	https://www.itd.cnr.it/







Methods for Communication and Collaboration

Activity	Learning and acquiring new words through my body
Name:	
Description of	Combining body movements and physical interaction with learning material,
innovative	specifically target abstract vocabulary
teaching	
idea/method	
Target age	9-11
Group size	Individual/ team work
Materials	Motion-based games
required	
Instructions	Create a list with target new vocabulary (adjustment on specific
for teacher	curriculum)
	 Engage students in the learning process
	 Class-wide activities with motion-based games
Expected	• Development of cognitive abilities (i.e. memory ability, solving problem)
outcome of	Learning gains
the method	• Affective outcomes (i.e. emotional engagement into the process,
	motivation to participate, increased self-confidence etc.)

Activity	Gamification through Kahoot response system
Name:	
Description of	Kahoot! is a game-based learning platform which combines the dynamics of
innovative	the game with the ability to monitor learning which establishes the cultivation
teaching	of a constructive learning approach (Correia & Santos, 2017; Wang &
idea/method	Lieberoth, 2016; Vuong, 2017). As for Kahoot's most popular feature,
	teachers choose between millions of free public games and simulate them if
	necessary for their own needs or re-create a quiz (Plump & LaRosa, 2017).
	Kahoot transforms the learning process into more efficient and productive
	(Chaiyo & Nokham, 2017).
Target age	Apy
Target age	Any
Group size	Any
Group size Materials	Any Kahoot game-based platform, response system, range of devices (PCs,
Group size Materials required	Any Kahoot game-based platform, response system, range of devices (PCs, tablets or smartphones, laptops, tablets), internet connection, projector
Group size Materials required	Any Kahoot game-based platform, response system, range of devices (PCs, tablets or smartphones, laptops, tablets), internet connection, projector
Group size Materials required Instructions	Any Kahoot game-based platform, response system, range of devices (PCs, tablets or smartphones, laptops, tablets), internet connection, projector • Teachers need to create kahoot account (<u>https://getkahoot.com/</u>)
Group size Materials required Instructions for teacher	 Any Any Kahoot game-based platform, response system, range of devices (PCs, tablets or smartphones, laptops, tablets), internet connection, projector Teachers need to create kahoot account (<u>https://getkahoot.com/</u>) Create a new Quiz. Follow the <u>manual/ instructions guide</u> on how to
Group size Materials required Instructions for teacher	 Any Kahoot game-based platform, response system, range of devices (PCs, tablets or smartphones, laptops, tablets), internet connection, projector Teachers need to create kahoot account (<u>https://getkahoot.com/</u>) Create a new Quiz. Follow the <u>manual/ instructions guide</u> on how to create a new quiz
Group size Materials required Instructions for teacher	 Any Kahoot game-based platform, response system, range of devices (PCs, tablets or smartphones, laptops, tablets), internet connection, projector Teachers need to create kahoot account (<u>https://getkahoot.com/</u>) Create a new Quiz. Follow the <u>manual/ instructions guide</u> on how to create a new quiz Make a Question for the Quiz









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Expected	Students engagement snd performance, creative skills, technological skills
outcome of	
the method	
References	Chaiyo, Y., & Nokham, R. (2017, March). The effect of Kahoot, Quizizz and Google Forms on the student's perception in the classrooms response system. In Digital Arts, Media and Technology (ICDAMT), International Conference on (pp. 178-182). IEEE.
	Correia, M., & Santos, R. (2017, November). Game-based learning: The use of Kahoot in teacher education. In Computers in Education (SIIE), 2017 International Symposium on (pp. 1-4). IEEE.
	Iwamoto, D. H., Hargis, J., Taitano, E. J., & Vuong, K. (2017). Analysing the Efficacy of the Testing Effect Using Kahoot™ on Student Performance. Turkish Online Journal of Distance Education, 18(2), 80-93.
	Kahoot (2017). The Kahoot! guide to creating & playing learning games (3rd edition). Retrieved from https://kahoot.com/files/2017/07/Kahoot_guide_to_creating_and_playing_le arning_games.pdf
	Plump, C. M., & LaRosa, J. (2017). Using Kahoot! in the classroom to create engagement and active learning: a game-based technology solution for e-learning novices. Management Teaching Review, 2(2), 151-158.
	Wang, A. I., & Lieberoth, A. (2016, January). The effect of points and audio on concentration, engagement, enjoyment, learning, motivation, and classroom dynamics using Kahoot. In European Conference on Games Based Learning (p. 738). Academic Conferences International Limited.

Activity	Peer teaching partnerships
Name:	
Description	Peer teaching is not a new concept, but it is being applied to primary school
of innovative	teaching practices in recent times because it can encourage learning of both
teaching	where the share and mean large subary there is unived shifty in the slave
idea/method	peer-teachers and peer-learners where there is mixed ability in the class
	group; and it is also a cost-effective means of providing more personalised
	and targeted learning to students, where resources in schools are limited. As
	there are benefits to both the peer-teacher and peer-learner, outlined below,











	this can be a very effective teaching method to increase both students'
	motivation to engage in digital learning. The reason being that in peer-
	teaching and learning, students tend to speak each other's; discourse, so it
	can be a very motivational exercise for both parties involved and is a good
	example of active learning.
Target age	10-12 years
Group size	Students work in pairs
Materials required	Laptop or smart devices for each pair
Instructions	The teacher follows these steps:
for teacher	$_{\circ}$ The teacher divides the students into pairs.
	$_{\circ}$ The teacher then distributes a smart device or tablet to all pairs – if
	there is a lack of technology available in the classroom, they first step
	can be completed using a pen and paper.
	$_{\odot}$ The teacher then leads a short exercise with the students so that they
	can identify digital skills that one student has that the other can learn
	- this could be related to playing a game, or something more technical
	like completing a Coder Dojo project, for example.
	$_{\circ}$ Once the skills have been identified, the teacher allows all pairs to
	spend 10-20 minutes teaching one another how to use this new skill/complete this task.
	 An offline version of this activity can be replicated for any curriculum
	subject if there is not enough available devices for all pairs in the
	classroom.
Expected	Research shows that through peer-teaching and learning, the students can
outcome of	expect to experience the following benefits:
the method	 Peer-teachers reinforce their own learning by teaching others.
	Peer-learners receive more individualized support to develop their
	understanding of new skills and concepts.
	• The interaction between students through these partnerships promotes
	active learning.









References	$_{\odot}$ Thurston, Allen & Van de Keere, K & J. Topping, Keith & Kosack, W
	& Gatt, Suzanne & Marchal, J & Mestdagh, N & Schmeinck, D &
	Sidor, W & Donnert, K. (2007). Peer learning in primary school
	science:Theoretical perspectives and implications for classroom
	practice. Electronic Journal of Research in Educational Psychology.
	5.

Activity	Social Network Classroom Environment
Name:	
Description	The innovative idea behind this teaching method is the creation of a virtual
of innovative	social network for a class or a school, using the scholastic computer network,
teaching	and aimed to implement a laboratorial activity, which highlights the importance
idea/method	of respecting the privacy in the Web and transmits the main rules of netiquette.
	It can offer a participative and interactive approach in order to face the
	problem of the education to digital citizenship and, particularly, to use the
	social networks in the respect of the privacy and safety of communication.
Target age	The activity requires the participation of the whole primary school class group,
	that will interact on line, even if they are in the. If well planned and managed
	by the teachers, it can be possible to widen the group, up to the involvement
	of the entire school. This type of activity is more appropriate for children
	starting from 10-11 years of age, because this is the age where they begin to
	access the social networks and to use online communication, starting to face
	the problems of interaction in the World Wide Web.
Group size	The activity should involve the use by the single students of their own personal
	devices. They would be interacting only on line with the rest of their
	classmates or other students of the school. So, for this possibility of wide
	connections with other remote users, it's difficult to identify a size for the group
	that it's possible to involve in such activity.
Materials	The social network simulator requires a specific technological environment: it
required	could be applied in a computer room, equipped with PC desktops, laptops or
	tablets. It is necessary to be supported by the development of a web











application operating in a specific web space, like in the Italian best practice
Social4School project.
Teachers can find the link of the Social4School project and social network
simulator at the following link: <u>https://www.social4school.eu/</u>
In order to use the platform, the teachers (or the school) will need to register
on the platform, obtaining a code that can be used by the pupils to access the
platform, create their avatar and play.
This simulation of a social network in the class/school can offer to teachers a
practical tool for:
- creating a personal profile for each student which reflects their own
identity (with a name and a personalized avatar);
- interacting through writing and reading, participating in a real social
session where the students post sentences in a gaming situation;
 controlling and monitoring personal attitudes or social issues in each
student;
 studying and analysing the quality of the relationship of the , .
group/class;
- teaching digital responsible citizenship skills and competencies.
The teacher has then a complete teal that can be used in different ways, in
classes that as from a minimum of six students to an indefinite maximum and
that can be a stimulus for deeper discussions on the meaning of privacy in the
web
The main expected outcome of the application of this idea is the improvement
of perception and rising awareness among students of primary schools of the
proper personal and other people's privacy in the web, particularly in the social
networks online.
Another important result would be the experimentation of a participative and
interactive approach to face in an effective way the problem of the education
to the digital citizenship and, particularly, to the use of the social networks in
the respect of the privacy.









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References	Istituto Nazionale Documentazione Innovazione Ricerca Educativa /
	National Institute for Documentation Innovation Educational Research
	(INDIRE) <u>http://www.indire.it/</u>
	 Social4School project <u>http://www.social4school.eu</u>

Activity	Immersive didactic/Massive Multiplayer Online World
Name:	
Description	"Immersive didactic" is a method of teaching that uses technology and,
of innovative	especially, the virtual reality.
teaching	Massively multiplayer online world (MMOW) is a simulated environment,
idea/method	populated by many other users which can create a personal avatar and
	simultaneously explore the virtual world, participating in its activities and
	communicating with others. These avatars can be bi or tri-dimensional textual
	or graphic representations.
	The user can manipulate the elements of this world and experiment a certain
	degree of presence. These environments and their rules can be inspired by
	worlds of imagination or the reality. Examples of the rules are: the gravity, the
	topography, actions in real time and communication. The communication
	among users can be textual, vocal, gestural and tactile.
Target age	In Italy, virtual reality was experimented in some primary school as a tool for
	teaching particular STEM disciplines (i.e. Primary School "Cantore" of
	Genova) as first best practice of this didactical experience, obtaining good
	results among younger students.
Group size	The activity aims to guide single students to personally experience the virtual
	world using their own senses, but, as the virtual world is itself a shared
	dimension, it requests a moment of interaction with the other classmates, in
	order to decide how to modify together some social or natural aspects of the
	common environment. It could request a phase of small group discussion of
	different aspects in order to decide how to act in the social space.
Materials	The implementation of this activity in the class context requests a high and
required	updated level of technological equipment in the school (i.e. visors, possibility











	of use of personal devices, etc.), very fast and stable internet and intranet
	connections, and the access to a cloud web space or back-end web based
	platforms, or open source multi-platform as i.e. OpenSimulator, multi-user 3D
	application server, that can be used to create a virtual environment (or world)
	which can be accessed through a variety of clients, on multiple protocols.
Instructions	The immersive didactics and methods offer to the teachers an opportunity to
for teacher	innovate the process of learning in a creative way. In fact, inside an immersive
	world it is possible to integrate pedagogic practices that can answer to a clear
	evaluation, to improve the levels of attention, to encourage inclusion, to favour
	positive states of mind, to offer opportunities for learning and generate the
	ability to translate competences in elements of knowledge.
	In Italy, immersive didactic has been promoted by the platforms Edmondo
	(INDIRE) and MinecraftEdu.
	Regarding Edmondo, teachers can find the homepage of the platform at the
	following link: <u>http://edmondo.indire.it/</u>
	Here, teachers and students can register and play. Teachers can also find
	training possibility on the use of the platform, and on the educational outcomes
	that can be achieved through immersive didactic.
	At the following link, teachers can find the homepage of the MinecraftEdu
	platform, containing all the direction for use and application in school:
	https://education.minecraft.net
Expected	The immersive reality can allow the students to put in practice and to document
outcome of	the learning activities, dealing with a technological reality, which is more
the method	familiar to them. The challenges and the opportunities offered by the
	immersion in a virtual or augmented reality can stimulate their dedication,
	spurring them to operate problem solving to find meaningful solutions and to
	increase their competences.









	The immersive didactics allow to build the meaning of the experiences,
	favouring interconnections, creative abilities, interaction and inclusiveness.
References	Istituto Nazionale Documentazione Innovazione Ricerca Educativa /
	National Institute for Documentation Innovation Educational Research
	(INDIRE) <u>http://www.indire.it/</u>
	Edmondo INDIRE http://edmondo.indire.it/
	MinecraftEdu https://education.minecraft.net/
	Open Simulator platform <u>http://opensimulator.org/wiki/Main_Page</u>

Methods for Digital Content Creation

Activity	Creative literacy through Scratch
Name:	
Description	Scratch enables students to develop digital literacy based on ISTE's
of innovative	achievement indicators (2016). Students will create a story of their choice,
teaching	write the narration of it and then animate it. They will need to animate their
idea/method	whole story and include different voices or alter their own voice for the
	characters. When all stories are completed, the teacher can decide on a
	movie day where students can watch their movies.
Target age	7-11
Group size	Group of 2-3 students
Materials	Scratch programming platform, PCs, video projector, handouts, internet
required	connection.
Instructions	When students build their stories in Scratch, their work aligns ISTE's definition
for teacher	of computational thinking. With Scratch, students:
	 Formulate a problem as they determine how to use the elements in Scratch to construct their story.
	 Organise and analyse data by creating blocks of code to create characters and design settings.
	 Represent the data (story content) through the movement of the characters in Scratch (sprites). The source of sprites can be from Scratch's extensive library or an online drawing program within Scratch).
	 Use algorithmic thinking as they create code to make sprites move and communicate.
	 Identify, analyse, and implement solutions in the ordered steps they created to make the program work as they envision.









	 Transfer this problem-solving process to other situations as they tackle more complex animation challenges within Scratch and elsewhere in their lives.
Expected	Based on ISTE's Achievement Indicators for Digital Literacy the seven profiles
outcome of	are: Empowered Learner, Digital Citizen, Knowledge Constructor, Innovative
the method	Designer, Computational Thinker, Creative Communicator, and Global
	Collaborator.
Reference	Afari, E., and Khine, M.S., (2017). Robotics as an Educational Tool: Impact of
	Lego Mindstorms. International Journal of Information and Education
	Technology, 7(6), 437-442. Retrieved from
	http://dx.doi.org/10.18178/ijiet.2017.7.6.908
	International Society for Technology in Education. (2016). ISTE standards for
	students 2016. Arlington, VA: International Society for Technology in
	Education.

Activity	Coding, tinkering and making in the era of IoT (Internet of Things)
Name:	
Description of	STEM is a curriculum based interdisciplinary applied approach which stands
innovative	for Science, Technology, Engineering, and Mathematics. STEM-based
teaching	curriculum encompasses real-life situations to educate students in the four
idea/method	specific disciplines. STEM integration refers to "students participating in
	engineering design as a means to develop relevant technologies that require
	meaningful learning through integration and application of mathematics
	and/or science (Moore & Smith, 2014)." STEAM which encompasses A from
	Arts, is an educational approach to learning that uses Science, Technology,
	Engineering, the Arts and Mathematics as access points for guiding student
	inquiry, dialogue, and critical thinking. According to Merrill (2009), STEM
	teaching and learning focuses on authentic content and problems, using
	hands-on, technological tools, equipment, and procedures in innovative
	ways". STEM helps students to undertake authentic investigations in formal
	and non-formal learning settings. The project builds on established theories
	of learning, namely Papert's constructionism. Resting on this foundation,
	coding, tinkering and making have emerged as engaging entry points and
	activities for STEM education.
Target age	10-12
Group size	Any
Materials	Raspberry Pi, Arduino boards, sensors and actuators, robot construction
required	toolkits, PCs.









Instructions	Teachers create a number of scenarios
for teacher	Each scenario will address at least one type of new generation of
	inexpensive technologies in the era of IoT, e.g., Raspberry Pi, Arduino
	boards, sensors and actuators etc.
	 At least 2 scenarios will address formal STEM learning.
	· Preference will be given to scenarios which address collaborative
	learning linked to the social and cultural practices and contexts in which
	people participate through shared activity (e.g. Lave & Wenger,
	1991; Gutierrez & Rogoff, 2003).
	Davis and Krajcik (2005) nine heuristics for the design of educative materials
	support teachers in:
	1. engaging students with topic-specific scientific phenomena
	2. using instructional representations that support student understanding
	3. anticipating, understanding, and dealing with students' ideas about
	science
	engaging students in questions
	engaging students with collecting and analysing data
	engaging students in designing investigations
	engaging students in making explanations based on evidence
	8. promoting scientific communication
	9. promoting the development of teachers' subject matter knowledge
Expected	Coding, tinkering, making (Honey & Kanter, 2013; Hatch,2014)
outcome of	
the method	
References	Moore, T. J., & Smith, K. A. (2014). Advancing the State of the Art of STEM
	Integration. Journal of STEM Education: Innovations and Research, 15(1), 5.

Activity	Digital Storytelling
Name:	
Description	Storytelling is a very important tool in all levels of education, as it seems to
of innovative	increase children's oral and writing skills, while at the same time it strengthens
teaching idea/method	critical thinking skills, analysis and synthesis of information. More specifically,
	narration (including creating and listening and comprehending a story) leads
	pupils to practice advanced communication skills and information processing.
	Narration also supports effectively the transmission of ideas, knowledge,
	values and attitudes and helps people make decisions about life based on the
	examples of the heroes.
Target age	any











Group size	any
Materials	PC, digital story creation tools such as Storybird, Lego Comic Builder,
required	<u>Camtasia Studio.</u>
Instructions	The steps to be followed for the creation of digital narratives are the following:
for teacher	 Writing: Includes the story creation and its' continuous improvement.
	The writing should follow basic rules of storytelling.
	$_{\odot}$ Screenplay: After story writing, writers must isolate the different
	snapshots of the story in order to choose how they will enrich their
	story using multimedia.
	$_{\odot}$ Illustrated script/"storyboard": this stage involves decision-making
	about how to visualize the story (heroes, objects and sceneries).
	$_{\odot}$ Multimedia: this stage involves identifying and adding multimedia to
	the story.
	$_{\odot}$ Digital storytelling creation: in this stage, the writer uses a suitable tool
	to compose the digital narration.
	$_{\circ}$ Publication: this stage involves the presentation of story and its
	dissemination in the education community or on the Internet.
Expected	"A number of studies have revealed that adopting digital storytelling not only
outcome of	helps bridge the high-tech world outside the classroom and traditionally low-
the method	tech setting, but also motivates students to learn through the creation of
	personal stories []. Digital storytelling provides an opportunity for students
	to solve problems and gain competence with technology through practice and
	experimentation [] Digital storytelling enables students to develop digital
	literacy through the use of technological tools in the video production
	process." (Chan, et. al., 2017)
References	 PDST – 'Using digital storytelling in the classroom (Primary)', available
	at: <u>https://www.pdsttechnologyineducation.ie/en/Training/ICT-in-</u>
	Classroom-PDFs/ICT-in-the-Classroom-PDFs/Using-digital-
	storytelling-in-the-classroom-Primary-13-04.pdf







Methods for Problem-solving

Activity	Using Educational Robotics to enhance students creative thinking
Name:	
Description of	Educational Robotics is a growing field with numerous researchers to have
teaching	endorsed Robotics as educational tools (Frangou et al, 2008; Glaveanu, 2010). Educational robotics are increasingly integrated in education as
idea/method	knowledge modelling tools. Learning with robots help students to obtain
	knowledge and acquire 21st century skills such as collaboration, critical
	thinking, creativity and communication (Eguichi, 2014; Breuch & Fislake,
	2018). Previous studies integrated robotics as an effective teaching method
	associated with the processes of building and programming (Zawieska &
	Duffy, 2015). One of the greater values of educational robotics relies on its
	potential to inspire curiosity and creativity in students (Breuch & Fislake,
	2018). Creativity in educational robotics has been related with the
	constructionist learning approach and the processes of building, programming and manipulating robotic platforms (Zawieska & Duffy 2015;
	Breuch & Fislake, 2018).
Target age	Any
Group size	Any
Materials	Lego Mindstorms NXT, Lego Mindstorms EV3, Lego WeDo 1.0, Lego WeDo
required	2.0, PCs, Internet connection, Lego Mindstorms
for teacher	• Engage students in hands-on, technology-based as well as unplugged
	activities related to robotics, based on the grounds of gamification, project,
	problem and inquiry-based learning.
	 Include presentations, educational games, documentary, rich audiovisual
	material, hands-on activities, technology-based (educational software &
	simulations as well as unplugged activities, interactive activities (building &
	developing robots).
	• Divide lessons into several small tasks, giving students a sense of
	progress, and essentially gamifying the learning experience.
	• Familiarise students with the robots and introduce them to basic
	programming concepts.
	 Encourage students to use their creativity and communicate ideas with
	other student to find possible solutions.
	Introduce gradually different concepts from mathematics and science are
	introduced and incorporated in lessons





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	During the programming interventions students master high level
	programming concepts.
Expected	Creativity process with productive outcomes such as students will build a
Expected outcome of	Creativity process with productive outcomes such as: students will build a
the method	robot that creates different drawings or play modes. Learners will engage in
	a collaborative and creative approach, integrating complex- activities which
	require high cognitive skills such as problem-solving skills, creative thinking
	skills and computational thinking for students of all ages.
References	• Frangou, S., Papanikolaou, K., Aravecchia, L., Montel, L., Ionita, S.,
	Arlegui, J., & Monfalcon, S. (2008, November). Representative
	examples of implementing educational robotics in school based on
	the constructivist approach. In Workshop Proceedings of
	<i>SIMPAR</i> (pp. 54-65).
	$_{\odot}$ Glăveanu, V. P. (2010). Paradigms in the study of creativity:
	Introducing the perspective of cultural psychology. New ideas in
	psychology, 28(1), 79-93.
	o Breuch, B., & Fislake, M. (2018, April). Bringing Educational Robotics
	into the Classroom. In International Conference on Robotics and
	Education RiE 2017 (pp. 101-112). Springer, Cham.
	• Eguchi, A. (2010, March). What is educational robotics? Theories
	behind it and practical implementation. In Society for information
	technology & teacher education international conference (pp. 4006-
	4014). Association for the Advancement of Computing in Education
	(AACE).
	o Zawieska, K. & Duffy, B., R (2015). The Social Construction of
	Creativity in Educational Robotics. In Szewczyk, R., Zieliński, C., &
	Kaliczyńska M. (Eds.), Progress in Automation, Robotics and
	Measuring Techniques 2015, Springer: 329-338.







Activity	Augmented Reality
Name:	
Description of	Augmented reality is the integration of digital information with the user's
innovative	environment in real time. Augmented Reality uses the existing environment
idea/method	and integrates new digital information onto it. The content can be accessed
	with a device such as a mobile phone that scans an image and reveals the
	digital material. This material can be a video, a different image, a 3D
	animation, games and much more.
Target age	10-12
Group size	Any
Materials	AURASMA software (<u>https://www.aurasma.com/</u>),QR-Code reader,
required	smartphones / tablets, PCs, pictures
Instructions	Many innovative teaching ideas can be implemented using augmented reality
for teacher	software. For example, teacher can hide a clue for a puzzle in a picture or in
	a QR code. Pupils trying to solve the puzzle, scan the picture or the QR code
	with their tablets or their mobile phones and a video created by the teacher
	appears which offers them the clue. Also, in school entrance visitors can scan
	pictures and reveal some digital content. Moreover, pupils can create
	augmented reality content, which might include personal videos or devise
	some kind of exploration game.
Expected	The incorporation of augmented reality in educational process can help
outcome of	teachers to actively involve students in the learning process and to motivate
the method	them. Participation in the process of creating augmented reality objects
	constitutes the educational process more attractive, increases students'
	attention and helps pupils understand concepts. In addition, it is a different
	way of understanding the world and can be exploited with success in different
	pedagogical approaches.

Activity Name:	Online Educational Escape Room
Description	Escape rooms have become increasingly popular in recent years as an
of innovative	innovative teaching practice. They encourage teachers to plan out challenge-
idea/method	based learning scenarios, which encourage learners to develop skills in critical

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	thinking, collaboration, communication, team work and deductive reasoning.				
	These typically take place in the classroom; however, with open source				
	software like Kahout! and other programmes available to learners, it is				
	possible for teachers to create online games and puzzles and encourage				
	learners to work in teams to find the answers to these puzzles - thus creating				
	a type of online educational escape room.				
Target age	10 to 12 years				
Group size	4-6 per group				
Materials	Laptop/Tablet for each group; Access to Kahoot! or other open source				
required	software for creating games and puzzles for learners.				
Instructions	Depending on the subject being taught, the teacher can come up with				
for teacher	between 3 and 5 problems, challenges or puzzles, that can be solved by				
	learners working in teams to complete research online. The teacher should				
	follow these steps:				
	 Complete a short reseach activity online to find examples of online 				
	educational escape rooms.				
	$_{\circ}$ Use software programmes like Kahoot! to develop games and				
	puzzles, which require students to deliver the correct answers.				
	$_{\circ}$ The teacher then shares these games and puzzles with learners and				
	encourages them to work in teams to find the correct answers.				
	$_{\circ}$ The teacher then gives each team access to a laptop, PC or smart				
	device, and allows them a defined amount of time (5-10 minutes), to				
	solve each puzzle - the first team to solve all puzzles, win the				
	challenge.				
Expected	Young learners are encouraged to take part in autonomous learning -				
outcome of	completing research online to find answers to clues, and aiming to solve the				
the method	clue, input the correct answers and break-out of the escape room. There can				
	also be an element of competition between different groups, with the first team				
	to 'escape' being the winners.				
References	 Lock Paper Scissors – 'Escape Games – The boredom-crushing 				
	classroom tech your students need', available at:				
	https://lockpaperscissors.co/school-escape-games				







0	Teach Ev	ery Day (2	.018) -	– ' How	to Make and W	ork Sheet into	o an
	Escape	Room	in	the	Classroom',	available	at:
	https://tea	cheveryda	y.com/	/escape	-room-in-the-clas	sroom/	
0	Kahoot! –	How to Pla	ay: <u>http</u>	os://kaho	oot.com/what-is-l	<u>kahoot/</u>	

Activity	Web-Quest Challenges
Name:	
Description	Web-Quests are enquiry-based learning activities where all of the materials,
of innovative	sources and content which learners need to complete their challenge can be
idea/method	found online. In Web-Quest challenges, the teacher creates a scenario or task
	for the students to research online. In this activity, students develop their
	ability in collaborative and also autonomous learning, and the teachers takes
	on the role as a facilitator of learning.
Target age	10-12 years
Group size	Students should work in groups of 3-4
Materials	Access to smart devices, PCs or laptops for all groups; a web quest scenario
required	with instructions for groups to complete the challenge - this can be written on
	paper or presented on a PowerPoint slide for the students - web quests do
	not have to be presented online for the purpose of this activity.
Instructions	The teacher should follow these steps:
for teacher	• To develop a web quest, the teacher should brainstorm a topic that
	they would like their students to complete autonomous research on to
	support and enhance their learning.
	• Depending on the curriculum subject being taught, this could be a
	social issue, event in history, environmental challenge, scientific
	concept, famous author or poet, etc.
	The teacher should then develop a handout or PPT slide which
	present the challenge to learners in the following stages:
	1. Introduction - here the teacher provides the context for why this
	topic will be explored - if the teacher has decided to pick a
	social issue or environmental challenge for this activity, in this
	section the teacher introduces what it is, why it's important,
	what impact it is having on us now, and what potential impact
	it will have in the future, for example.

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	2.	Task - next the teacher describes the task that the student will
		work in teams to complete. For example, if using the example
		of an environmental challenge, this might include that there is
		a surplus of plastic in the Mediterranean, and you and your
		team are tasked with finding an innovative solution that will
		help to reduce the amount of plastic and improve the
		ecosystem for fish and marine plant life.
	3.	Process - here the teacher gives some general instructions for
		how the students will go about completing this challenge and
		generating a solution to this problem. Here the teacher can
		include advice on how the students should research plastic
		pollution in the oceans around the world what other
		governments and NGOs are doing to tackle the issue, what
		supports and grants are available, how to develop a campaign,
		etc. This is essentially the step where the students collaborate
		together to generate new ideas and to complete their online
		research.
	4.	Presentation - the final step is for each group to present their
		idea or solution to the whole class group; and for groups to vote
		on which idea is best.
Expected	This is an e	xample of active learning where students will deepen their
outcome of	understanding	g of a topic, while also practicing collaboration, negotiation and
the method	communicatio	n skills, and developing digital and online research skills, critical
	thinking, creat	tivity and evaluation skills.
References	 Educa Think' 	tion World – 'Creating a WebQuest - It's Easier Than You , available at:
	<u>https://</u>	/www.educationworld.com/a tech/tech/tech011.shtml





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Chapter 3 - Approaches and methods that connect digital skills with real life issues

In Chapter 3, we aim to present teachers with different approaches and methods which they can use to help connect the digital skills which young students have, and those that they will develop, with real-life issues, such as cultivating and understanding online identity, communication in online environments, personal profiling, etc.; but also soft skills which young people will need to develop so as to be competent learners in the 21st century. These soft skills include critical thinking, analyzing and synthesizing information, creativity, collaboration, problem-solving and negotiation. The following approaches can be adapted to suit a range of educational environments and can be practiced across different curriculum areas so as to enhance how digital education is taught in primary schools.

Catalogue of teaching methods and approaches

The activities and methods contained in the catalogue have been identified by researchers in all project countries through desk-research activities and in consultation with primary school teachers. The methods profiled in this chapter specifically refer to the DIGCOMP competence areas of Information and Data Literacy, Communication and Collaboration and Problem-solving.

Methods for Information and Data Literacy

Name:	Computational thinking
Description	
of approach/	Computational Thinking (CT) is a thought process (or a human thinking
teaching	skill) that uses analytic and algorithmic approaches to formulate,
method	analyse and solve problems (EC, 2016).
	 CT has been characterised as a fundamental skill of the 21st century for everybody, not only for computer scientists (Wing, 2010).
	 CT brings problem solving, design and understanding together in a way meaningful to computing (Djurdjevic-Pahl, Pahl, Fronza & El Ioini, 2017).
	 CT has been declared as fundamental skills for solving complex problems we encounter every day (Wing, 2006).
	 CT involves solving problems, designing systems, and understanding human behaviour, by drawing on concepts fundamental to Computer Science.







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	 CT and related concepts (e.g. coding, programming, algorithmic thinking) have been promoted by educational stakeholders as skills that are as fundamental for all as numeracy and literacy (Bocconi, 2016). Computational thinking is a collection of mental tools that enables the individual to solve problems more effectively by thinking like a computer scientist (Wing, 2006).
	Selby and Woollard (2014) describe CT through 7 aspects: 1. A thought process 2. Abstraction 3. Decomposition 4. Algorithmic design 5. Evaluation
Targot ago	0. Generalization 7. Automation.
Group size	Group setting, to aid negotiation
Matorials	Tools equivalent to students age group
required	Suggestions:
	 From one-dimensional to three-dimensional (1D, 2D, 3D) shapes. A range of 'unplugged' approaches and 'plugged' activities as described in the report developed by Ireland's National Council for Curriculum and Assessment (NCCA, 2016). LOGO, LEGO, Turtle, Scratch; tools outlined in a recent study by Hsu, Chang and Hung (2018).
Instructions for teacher	Hu (2011) describes the computational thinking elements to consider when integrating computational thinking into the school curriculum. These include: Formulating solutions, algorithm, logic, pattern, simulation, decomposition and abstractions.
	 The core CT capabilities that are targeted by the suggested primary schools CT curriculum are as follows. abstraction (through arithmetic and spatial coordination), logical reasoning (through cryptography, and applied arts, language and nature-based problems) patterns (through geometry/symmetry and art) decomposition (through spatial coordination) algorithms (through cryptography, arithmetic and geometric puzzles) coding digital Games programming robots Computer programming and coding are part of the computer science curriculum in Cyprus, which is compulsory for students aged 13-16. There is no distinct computer science subject in the primary school curriculum, but computers support other learning.









How will this approach connect digital skills with real-life issues	 Gretter and Yadav (2016) present two approaches to 21st century skills that merge CT with UNESCO's concept of Media & Information Literacy (MIL) in support of students' 21st century skills and citizenship. The European reference framework for the digital competence of citizens, DigComp (Ferrari, 2013), includes programming. The recent update, DigComp 2.0 (Vuorikari et al., 2016), encompasses the main components of Information Literacy and parts of UNESCO's Media & Information Literacy. Computational thinking improves student's analytical skills and supports inquiry-based learning at every level. Specifically, CI develops students' digital skills such as coding, decomposition, algorithmic thinking, and information systems (NCCA, 2016). Some more skills are listed below: Spatial Thinking: Breaking a complex problem into smaller, more comprehensible steps Creative problem-solving Debugging Logical thinking Conditionals (if this, then that) Recognizing patterns
References	 Selby, C. C., & Woollard, J. (2014). Refining an Understanding of Computational Thinking. Retrieved from http://eprints.soton.ac.uk/id/eprint/372410 Wing, J. M. (2006). Computational Thinking. Communications of the ACM, 49(3), 33–35. Retrieved from https://doi.org/10.1145/1118178.1118215 Bocconi, S., Chioccariello, A., Dettori, G., Ferrari, A., & Engelhardt, K., (2016). Developing computational thinking in compulsory education - Implications for policy and practice. JRC Science for Policy Report, edited by P. Kampylis, P. and Y. Punie. EUR 28295 EN; doi:10.2791/792158. Retrieved from https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical- research-reports/developing-computational-thinking-compulsory- education-implications-policy-and-practice NCCA (2016). Review of Literature on Computational Thinking. Retrieved from https://www.ncca.ie/media/3547/primary- coding_review-of-literature-on-computational-thinking.pdf







 Vuorikari, R., Punie, Y., Carretero Gomez S., Van den Brande, G. (2016). DigComp 2.0: The Digital Competence Framework for Citizens. Update Phase 1: The Conceptual Reference Model. Luxembourg Publication Office of the European Union. EUR 27948 EN. doi:10.2791/11517

Methods for Communication and Collaboration

Name:	Game-based learning (GBL)
Description	Game-based Learning (GBL) is a method of using games while teaching
of approach/	a subject to achieve a defined set of learning outcomes.
teaching	 Digital game-based learning is essentially any situation in which digital
method	games are leveraged to support learning (Joung & Byun, 2014).
	GBL is similar to Problem Based Learning (PBL), wherein specific
	problem scenarios are placed within a play framework.
	GBL brings intrinsic motivation on by challenges, curiosity, control and
	fantasy" (Lepper & Cordova, 1992; UNESCO, 2016, pg.15).
	 Games include many characteristics of problem solving, e.g. an
	unknown outcome, multiple paths to a goal, construction of a
	problem context, collaboration in the case of multiple players, and
	they add the elements of competition and chance (Hsu, Chang &
	Hung, 2018).
	Game-based teaching and learning features include but are not limited to:
	 Competitive exercises which can allow students to challenge themselves to learn better
	 Earlier belief. Earlier belief.
	story line
	 Motivates students to learn and immerses them in the lesson so they
	can learn more effectively
	 Encourages student to learn from their mistakes.
	5
Target age	All grades of primary school (6-12)
Group size	Depending on the game requirements.
	Preferably students will work cooperatively in small groups. Divide class into
	4-5 teams according to the class size.
Materials	Variety of game-based platforms, tools.
required	











Instructions	Prensky (2001) describes various structural elements of games: (i) games
for teacher	have rules (ii) goals (iii) outcomes and feedback (iv) competition or challenge
	(v) interaction (vi) representation
	Teachers need to consider these when using games in the teaching/learning
	environment.
	chvironment.
	Competitive -Goal to achieve better than other persons
	Difficulty Presentations of tasks that require effort
	Exploration A context consitive virtual environment
	 Exploration -A context-sensitive virtual environment. Eantagy A make believe story or onvironment.
	Fallasy -A make believe slory of environment. Cools Evaluate and objectives with a clear purpose
	Goals -Explicit aims and objectives, with a clear purpose.
	Interaction - Feedback from actions and changing state of play.
	Outcomes -ivieasured results from game play, i.e. scoring.
	 People -Other individuals playing the game at the same time. Bulas - Deum device of a loss line iteration on constraints.
	Rules -Boundaries of play, limitation or constraints.
	 Safety -Lacks consequences of the game in the real world.
	In order for Game based Teaching and Learning to be effective is important
	to integrate games into teaching with a clear pedagogic process. The following
	to integrate games into teaching with a clear pedagogic process. The following
	 Place learning activities and content within the same maintaining the
	• Flace learning activities and content within the game, maintaining the
	balance between run and learning.
	• Make the teaching content integral to the game. Content specific tasks
	Work better when embedded in the content and rules of the game.
	Carefully design and plan the rules that both teacher and learner will
	apply to the game.
	Adjust deliver content that adjusts itself to player knowledge and learning
	Slyle.
	 reachers should serve as facilitators, tostering teathers experience, providing guidenes when peeded, ensuring that rules are followed.
	providing guidance when needed, ensuring that rules are followed
	Tenecting a respection attitude.
How will this	Research suggests that game-based learning encourages participation and
approach	learning in STEM subjects (Jackson, 2014). Learning in science, technology.
connect	engineering and mathematics (STEM) disciplines
digital skills	can be addressed real-world context scenarios. thus, enhance students
with real-life	programming and coding skills, problem-solving, critical and computational
issues	thinking as well as other 21st century skills.
Reference(s	<u> </u>
)	Jackson, D (2014). STEM growth: Getting students interested in the
	sciences. (Australia: ACER Research Developments).
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	12 mathematics education. School Science and Mathematics
	Association.









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<u>%20Final%202017.pdf</u>
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teach computational thinking: Suggestions based on a review of the
literature, Computers & Education, 126, 296-310

Name:	The e-Reflect approach (Chelmis & Latzaki, 2016)
Description	Incorporation of digital tools in the traditional Reflect approach. The e-Reflect
of	approach suggests the use of digital tools for collaboration and content
approach/	creation aiming at social change through empowering and enabling children
method	to participate actively in problem identification, analysis and development of
	practical solutions to problems.
Target age	6-12
Group size	12 - 25
Materials	Collaborative and content creation digital tools of teachers' and pupils' choice.
required	These can include Google collaborative tools such as Google Documents and
	Google Draw, digital story-telling platforms such as Storybird and
	collaborative canvasses such as Lino.it.
Instructions	Pupils can make use of the digital tools while they work through the following
for teacher	learning steps:
	Step 1: Pupils explore attitudes and values towards global citizenship
	Step 2: Pupils investigate important issues that affect their lives and choose
	one that will work
	Step 3: Pupils collect more information on their subject and studying it in
	depth.
	Step 4: Pupils work out ways of dealing with the problem Step 5: Pupils take
	action while recording their actions and the results of their efforts
	Step 6: Pupils reflect upon their learning experiences and discuss what they
	can do differently the next time.







How wi	Social and participatory media, online environments and networks provide
this	collaborative, distributed and shared construction of knowledge, opportunities
approach connect	for individual empowerment and active engagement in social and political life.
digital skills	The e-Reflect approach contributes to active citizenship education helping
with real-life	children develop an understanding of
issues	» the significance of individual and collective action
	» their own values and the relationship of these to behaviour and action
	» democratic systems and the individual's role within these
	» contemporary events and controversial issues
	» the causes of social and environmental problems
	» recent historical events and their relationship to the
	present/future(Holden & Clough, 1998:14).

Name:	The Project Method
Description of approach/ teaching method	The project method falls into the constructive, discovery and emancipating learning approaches. Howard Gardner (1983), through studying brain functions and structure popularised the diversity of human intelligence and the multiple ways learning corresponds to intelligence multiplicity. The project method, using various software applications and ICT tools, enables a multimodal approach to a given topic, with the simultaneous exploitation of multiple brain functions. Students through interaction with their peers, with their teacher but also with the wider environment manage complex learning projects. In this way, they develop critical thinking and cooperation skills.
Target age	6-12
Group size	Any group size
Materials required	A wide variety of digital tools
Instructions	The project method includes the following teaching stages:
for teacher	1st Stage: Exploring existing experience and knowledge of students –
	framing the subjectStudents reflect in many ways their interest in a topic.
	The teacher assesses what is known and what the children are really











	interested in. He/She sets open-ended questions, asks for clarifications and
	explores experiences, knowledge and interests of children.
	2nd Stage: Search and gathering content from sources – assigning
	roles and distributing activities.
	Children form research groups. Each team member takes over a role.
	Children discuss their experiences, exchange and manage information,
	sharing answers. Children search and collect material: children explore all
	relevant sources from the Internet or their own sources (libraries, research
	centres, interviews with experts).
	3rd Stage: implementation of scheduled activities, feedback- topic
	presentation by the groups This stage can include free expression
	activities, constructions, games, communication with specialists, Children
	paint, write, count, manufacture, store elements, dramatize, experiment and
	make use of the computer tools.
	4th Stage: intra-group and inter-group presentation and evaluation of
	project and processes (Matsagouras, 2000)Intra-group / Inter-group
	presentation: Each group presents their plan to the other groups. Evaluation
	- Submission of the final plan: Both the plan and the procedures are being
	assessed and groups submitted their final products.
How will this	Project based method deals with authentic issues in children's life and each
approach	teaching stage offers the opportunity of using multiple digital tools, which, in
digital skills	the long run, develop pupil's digital skills.
with real-life	
issues	

Name:	Story Telling
Description	Applied in pedagogy, Storytelling is an instrument used to widen and deepen
of approach/	the traditional activities of writing and speaking, as well as learning in general.
teaching	
method	It is a methodology that uses the narration as a mind-created tool to frame
	the events of reality, and to explain them according to a logic. The action of
	narration can be represented in various forms (both individually or











	collectively), that connect thought and culture, especially to the person's
	emotions. The narrative action organizes the subjective and interpersonal
	experience; while the narrative discourse makes the critical content
	elaboration possible. It deals with an "interactive trial", because the narrative
	discourse makes it possible to give manifold interpretations to each subject
	coming into contact with a certain history.
Target age	Primary school or first grade of secondary school (aged 6-12)
Group size	Classrooms of 15-25 members
Materials	Technological equipment in the classroom (LIM, Laptop/PC,)
required	Personal devices (smartphone or tablet)
	School website
Instructions	This method foresees the following phases:
for teacher	1 st phase : design of a cognitive scheme, in which the focus is on the
	predispositions and passions of the pupils. These seem distant from the
	didactic sphere, but they become essential in order to explore the inclinations
	and the preferences of the students involved in the various tasks of the
	process of content creation.
	2nd phase : choose the theme, that will develop through the story, and that is
	necessarily connected to the disciplinary context in which this methodology is
	applied.
	3rd phase : the teacher divides the class group, that will be managed as a
	working-team in which a reference person or leader should be appointed.
	4 th phase: this phase is dedicated to interviews and/or research of sources
	on the web, followed by the collation of the contents managed and shared by
	the groups.
	5 th phase: elaboration and publication of the content found during the
	previous phase, which can be done through a blog managed by the class, or
	through external contents on the website of the school. The methodology may
	require the realization of textual contents, video and photos and graphics.
How will this	The principal objective of story-telling is the autobiographical narration (telling
approach	about oneself), as a mean of amplification of the voice of a community.
connect	
digital skills	With the diffusion of technologies and technological tools, Storytelling is today
	an instrument through which teachers can transmit or explain more effectively











with real-life	contents or concepts with the use of narrations, metaphors or by connecting
issues	to real-life facts and situations, exploiting in a synergic way a web-based
	technology, combining images (fixed or in movement), a narration (recorded
	or written), the voice and a soundtrack (simple sounds or music) with
	elements of the narrative project and composition, with the final aim to
	elaborate a public presentation.
References	Digital Story Telling – Digital didactics Pearson https://it.pearson.com/aree-
	disciplinari/italiano/didattica-digitale.html

Name:	Collaborative Learning
Description	Collaborative learning is a form of active learning, which involves a minimum
of approach/	of two students working together to develop their learning. It teaches the
teaching	students key skills of negotiation, critical thinking, problem-solving and
method	flexibility; while also encouraging them to develop their competence as
	autonomous learners.
Target age	10-12 years
Group size	Group size should be kept to between 2-4 students, especially when
	collaborative learning is being practiced for the first time - it is best to keep
	the groups smaller.
Materials	Access to tablets or smart devices for all groups.
required	
Instructions	The teacher should follow these steps:
for teacher	• Before beginning a collaborative learning approach, the teacher
	should prepare the learners by setting ground rules for the group
	collaboration - such as showing respect to others, listening when
	others are speaking, etc.
	• The teacher should form smaller groups (of between 2 and 4
	students).
	• The teacher then assigns a task to each group. It could be to
	complete research and find out information about a historical event,
	or to develop something completely new like a new product idea that











	could be marketed to students in the school - regardless of the topic,
	the teacher assigns a task.
	The teacher then encourages students to work together to complete
	the assignment.
	After 20 minutes, each group should present their findings from their
	collaborative work to the whole class.
How will this	The world is moving towards a more collaborative style of work and
approach	education, even in early years, needs to catch-up to this new trend in order
connect	to prepare learners with the soft skills that they will need for the future.
digital skills	Collaborative learning works best when technology is integrated, through
with real-life	group work tasks, project work and online research into curriculum topics.
issues	As such, students can work collaboratively to apply these digital skills, while
	at the same time building the soft skills they need for the future, such as
	decision-making, flexibility, critical thinking and problem-solving.
References	 ResourcEd – 'Collaborative learning in primary schools', available at: https://resourced.prometheanworld.com/collaborative-learning- primary-schools/

Name:	Play-centred Learning
Description	Younger children are naturally motivated to play. As such, many programmes
of approach/	for junior cycle primary students are being adapted to encourage students to
teaching	exploit this motivation, and to learn through play. The idea behind play-
method	centred learning is to encourage children to learn by discovering, exploring,
	creating and imagining the world around them. This can also be applied to
	activities where children can apply digital skills through their exploration of the
	world.
Target age	6-8 years
Group size	10 to 15 students
Materials	Access to tablets or smart devices for all children so that they can play on
required	their own or in pairs, and engage in exploration of concepts and topic.







Instructions	A play-centred approach to learning sees the teacher having a new role in the
for teacher	classroom. Play-based learning is driven by the students, with support from
	the teacher. In this method the teacher should follow these steps:
	• The teacher sets up a situation where the children are playing - in this
	context it could be a digital game.
	• The teacher then encourages students to stretch their thinking to
	explore new ideas and concepts by posing questions and encouraging
	students' curiosity and imagination. For example, while students are
	playing a digital game or solving a puzzle, the teacher can pose
	questions about problem-solving, risk-taking, probability and/or
	prediction. I
	 n this way the children engage with these higher thinking concepts,
	through the medium of a game they are playing.
How will this	Play-centred learning stimulates young learners' curiosity, imagination and
approach	ability to explore higher thinking concepts. This method also develops young
connect	learners' ability to focus and concentrate on a task. Furthermore, this method
digital skills	has been shown to develop key skills in young learners which are deemed to
with real-life	be essential for 21st century learners and workers - these include:
issues	collaboration, problem-solving, critical thinking, analysing and synthesising
	information and creativity.
References	The Conversation – 'Play-based learning can set your child up for
	success at school and beyond', available at:
	up-for-success-at-school-and-beyond-91393

Methods for Problem-solving

Name:	Web quest
Description	WebQuest is an inquiry-oriented lesson format in which searching for
of	information and resources through the web plays a key role for accomplishing
approach/ teaching method	a given task or solving a problem.





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Target age	9-12
Group size	12 - 25
Materials	PC, Tablets, smartphones, internet, factsheets, clues, list of web resources
required	which help children accomplish the task
Instruction	The WebQuest teaching scenario includes the following structural elements:
s for teacher	Introduction: Introduces the concept of a scenario/challenge in an original
	way. A basic question is stated around which the entire WebQuest
	scenario evolves.
	• Task or Mission or purpose: Describes the role of pupils in the
	scenario/challenge and defines the tasks. Pupils are notified about the
	final product of the WebQuest.
	Process: Presents step-by-step all processes and activities pupils need to
	undertake in order to complete their investigation.
	• <i>Evaluation</i> : Clearly describes students' evaluation on the basis of specific
	criteria.
	Conclusion: This section includes summary of learning experience, allows
	for reflection on the process, and sets open questions for new
	Investigations.
	Instructor's page. This addresses teachers and contains instructions for hendling the learning process. Includes themes, tips and instructions
	for the implementation of the economic correlation with the Curriculum
	and tips for objectives evaluation
	Actually pupils ongoas in an internet research trying to solve a "real, world"
this	dilemma or task. According to Thayer of al. (2003) WebOuget "involves the
approach	dynamic construction and mooning making of roal world problems, fremad
connect	within the context of interdisciplinary and collaborative learning communities."
digital skills with	within the context of interdisciplinary and collaborative learning communities."
real-life	
issues	







Name:	Tinkering
Description	Tinkering is an innovative approach, deemed by the National Plan for Digital
of	School PNSD as an important tool for the development of the competences
approach/	of the 21st century in the teaching of the STEM subjects.
teaching	Tinkering is recognised as a form of informal learning by doing, where the
method	students are encouraged to experiment, and their attitude towards problem-
	solving is stimulated.
	All the activities will be presented as a game or a challenge, and will be
	realized in working groups.
	The principal activities presented are those of: building or breaking up objects;
	constructing a moving machine; exploring material or mechanical elements;
	creating artificial original objects or chain reactions.
	Tinkering is a creative training activity for aspirant makers, that teaches to
	"think with the hands", an educational method to interest children in the study
	of the STEM subjects (Sciences, Technology, Engineering, Mathematics), in
	a practical and playful way.
Target age	With tinkering, young children or teen-agers will approach disciplines such as
	art, science and technology without the stress of memorizing theoretical
	concepts. This method is suitable and successful especially with children in
	primary school, and in Italy it has been successfully implemented in maternal
	schools as well.
Group size	Class groups of students in primary school, or in the first grade of secondary
	school
Materials	The purpose of tinkering is to realize objects of various kind, using recyclable
required	materials easy to find at home, such as boxes, glasses, sheets of paper, wood
	pieces, metallic threads, plastic wraps, which are some of the "ingredients"
	that serve for the work. Some of the things that can be built are: small robots,
	mechanical toys, chain reaction mechanisms, sculptures.
Instructions	Tinkering is a resource for teachers that develops an environment that
for teacher	valorises learning by doing. With the appropriate activity, infrastructures and
	tools to support the experience, tinkering provides the pupils with a system of
	acquisition through practice of a variety of skills and mind-sets, that not only
	engage with them, but also prepare them for life and work in the real world.











	Tinkering can also create a differentiated environment, that nurtures diverse learning styles. Working in teams reinforces, on one hand, the value of group work, and, on the other, allows the teacher to assign individual tasks, that agree with individual students' abilities.
	Those students with basic knowledge of tinkering can be tasked to use some objects or materials to achieve a desired result, while other students with less experience may be better suited to develop other aspects of the project, such as design or written documentation. This type of learning environment provides multiple pathways for participation and for success.
	With tinkering, students receive an open-ended opportunity to conduct research, develop empathy, create questions, wonder, and use their own motivation to engage in the learning experience. These help to ensure that students are better engaged in the project.
	Since the student's interest is the key driver for maintaining an active engagement in the teaching/learning process, tinkering fosters an ongoing working partnership between the teacher and the student in an array of settings. For example, they both can have a role in identifying topics of interest, doing research, developing concepts and testing new ideas.
	At the following link, teachers can find an online guide to tinkering, that explains in detail how to apply this method to teaching STEM subjects and guides them through the creation of lesson plans:
	https://ec.europa.eu/epale/it/node/40449
How will	Learning environments that include tinkering and crafting require students to
this	develop those dispositions of the designer and the innovator, and build their
approach	personality to be confident and competent in choosing the right tools for the
connect	real problems.











digital skills	
with real-life	In order for the students to search and find solutions to unknown problems,
issues	they need to be prepared to encounter and use unusual tools, including new
	technologies, and to approach as a stimulating challenge something they
	meet for the first time. Tinkering and crafting can be the opportunity to
	experiment failure, and internalize it as a moment of self-assessment, instead
	of seeing it as the end of their activity. Learning how to use new crafting tools
	develops grit and perseverance; students should be flexible and resourceful
	when there are no instructions available, or these do not match with precision
	the problem addressed.
References	 Istituto Nazionale Documentazione Innovazione Ricerca Educativa / National Institute for Documentation Innovation Educational Research (INDIRE) <u>http://www.indire.it/</u> Harris E., Winterbottom M., "Tinkering. A practitioner guide for developing and implementing tinkering activities" <u>http://www.museoscienza.org/tinkering-eu/download/Tinkering-A- practitioner-guide.pdf</u>

Chapter 4 - Best Practices: Digital resources and tools to enhance how digital literacy and citizenship is taught in schools

In Chapter 4, we present you with a sample of some of the digital resources, tools, programmes and practices that were identified during the research conducted by partners to develop a Pedagogical Framework for the development of e-Toolkit on Digital Citizenship. (IO2). In developing this previous project output, partners undertook research to identify suitable examples of best practice in developing digital literacies of primary school students. Some of these tools and resources link directly to the innovative methodologies that were mentioned in previous chapter, like exploring computational thinking techniques in the classroom, for example. These specific examples were chosen because they relate directly to the topics of digital literacy and citizenship. In the following tables, teachers are coached and advised how best to adapt these resources and apply them in the classroom.









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Catalogue of best practices for digital literacy and citizenship

The content for this Catalogue is taken directly from the Pedagogical Framework for the development of e-Toolkit on Digital Citizenship (IO2). This catalogue provides a summary of some of the tools featured in the Framework. They were selected for inclusion in this Guide, because they relate directly to the competence areas of: as referenced in the DIGCOMP Framework.

Tools related to Information and Data Literacy

TOPIC	USE OF ICT
TITLE OF RESEARCH/ TOOL	PENSIERO COMPUTAZIONALE: una guida per insegnanti / <i>Computational thinking: a guide for teachers</i>
AUTHOR(S)	Computing at School association (CAS) Institute for Didactical Technologies of National Research Council (ITD – CNR)
DATE	2015
SOURCE	Computational Thinking a Guide for Teachers (CAS) https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved= 2ahUKEwiSsPjomMfdAhViMOwKHYVnD0kQFjABegQICRAC&url=https%3A %2F%2Fcommunity.computingatschool.org.uk%2Ffiles%2F6695%2Foriginal. pdf&usg=AOvVaw3Fomhq-Sift8Rp6hrFA4rB Italian version (ITD –CNR) http://pensierocomputazionale.itd.cnr.it/pluginfile.php/957/mod_page/content/ 7/Guida%20al%20Pensiero%20Computazionale.pdf Italian web_on_Computational_Thinking_resources_(<i>Programmare_per apprendere</i> project) http://pensierocomputazionale.itd.cnr.it/ http://pensierocomputazionale.itd.cnr.it/ http://pensierocomputazionale.itd.cnr.it/
DESCRIPTION	The National Plan for Digital School intend promote an appropriate education to the "computational thinking", that goes beyond the initial digital literacy acquired formation. It is in fact essential so that the new generations are able to face not the society of the future from passive and unaware consumers of technologies and





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	services, but from subjects aware of all the aspects in game and as actors you
	actively participate of their development.
	The association Computing At School (CAS), composed by teachers and
	English researchers, has produced an useful guide for teachers on
	computational thinking that was translated in Italian version adapting it to the
	national context. The translation in Italian of the Guide is part of a general
	activity of Institute for Didactical Technologies of National Research Council
	(ITD – CNR) with a related research project "Programmare per apprendere"
	with the sim to create a real supergy between educational research and
	activities of teaching / learning in the elegeroom to define and to experiment
	activities of teaching / learning in the classroom to define and to experiment
	vertical educational paths in order to promote the "computational thinking"
	starting from primary school.
MAIN	The proposed methodological approach foresees the followings three
AFFORDANCES	qualifying points:
	- to make to work the pupils on plans meaningful (for contents, concepts and
	complexity);
	- to encourage them to experiment and to learn from the errors;
	- to promote the collaborative working and the sharing of experiences.
EXAMPLES	Material, resources and examples of activity for teachers are contained in a
	section of the site "Programmare e imparare con Scratch / Program and Learn
	with Scratch (http://pensierocomputazionale.itd.cnr.it / course / view.php?id=6)
	The section "Computational Thinking"
	http://pensierocomputazionale.itd.cnr.it / mod / page / view.php?id =85
	of the website site of the ITD CNR contains all the available resources for the
	teachers for the formation and the use of the computational thinking in class.
	· · · · · · · · · · · · · · · · · · ·

TOPIC	Use of ICT
TITLE OF	Essediquadro
RESEARCH/	
TOOL	
AUTHOR(S)	Institute for Didactical Technologies of National Research Council (ITD – CNR)
DATE	2003-on going
SOURCE	http://www.sd2.itd.cnr.it/
DESCRIPTION	Essediquadro is the telematic service of documentation on the available Didactic software and managed by the Institute for Didactical Technologies of National Research Council (ITD – CNR) in partnership with the MIUR (Office of the education, of the Ministry of University and Research). Born on the base of the experience conducted beginning from 1985 with the Library for the Didactic Software, Essediquadro offers a large documentation on the digital resources for the education today available on the national and international market. Available informations are organised so that to furnish a







	complete answer to whom sets the problem of what produced to use and of as
	Starting from 2003, Essediquadro has begun a job of recognition, technical evaluation, analysis of the didactic characteristics and software usable Open Source to educational purpose. The products that overcome the tests of technical functionality and didactic usability are equipped of ample documentation and I directly made subsequently through the site available Essediquadro. The software Open Source is integral part of a Database of didactic Software
	continuously increasing and represents an enjoyable free service, mainly directed to the needs of the teachers in service and in formation. Essediquadro allows to enter to a complete documentation on the didactic characteristics and techniques of over 4000 products usable as didactical software, but it is also a tool through which the teachers can inquire and to be informed on as the software can effectively be used in the school. The system offers in fact also a series of analysis related to the available software in various disciplinary sectors, proposed of "didactical paths" that contemplate the software use, a documentation of the more meaningful
	didactic experiences and a distance consulting service.
MAIN AFFORDANCES	 Main affordances for teachers offered by ESSEDIQUADRO: Promotion among teachers and orientation to the didactic software use Possibility to explore and use functional products fro didactical activities
	 Knowing experiences of use behaviours in real scholastic contexts Updating teachers on the theme didactic software Essediquadro also offers distance consultation (sd2@itd.cnr.it) and it makes a forum available to discuss on thematic connected with the software didactic use (http://sd2.itd.ge.cnr.itlphpBB / index.php). Realisation of training events finalised to the updating of the teachers on her characteristics, the possibilities and the formalities of use of the digital resources.
EXAMPLES	Didactical software Database of open source software https://sd2.itd.cnr.it/?r=site/ricerca
	In-depth documents https://sd2.itd.cnr.it/?r=site/approfondimenti A series of in depth documents on the use of the digital (didactic resources, sectors' analysis, experiences and elements for reflection or debates) resources
	Training https://sd2.itd.cnr.it/?r=site/formazione A harvest of proposals training courses for the updating of the teachers on the themes Technologies and inclusion.







During 2006, within the action 'Accessibility of the didactic software' of the project MIUR "New technologies and disabilities", a methodology of evaluation of the software has been studied that has contributed to enrich and to integrate the already present data of around 250 examples. Such information are available in the bank you date, selecting "Focus disability" among the search keys.

Tools Related to Communication and Collaboration

TOPIC	Use of ICT
TITLE OF	Digital poster creation cooperation tool
RESEARCH/	
TOOL	
AUTHOR(S)	Agiomavritis, M.
DATE	November 2015
SOURCE	http://edu.glogster.com/
	http://padlet.com/
	http://www.photovisi.com/
	http://www.postermywall.com/
	http://www.picmonkey.com/
DESCRIPTION	Poster creation activity can bring about a number of important educational
	benefits for students of all grades. One of the major benefits is the development
	of cooperation skills. However, there are not many platforms that support
	technologies which gradually cease to be supported by browsers. In this
	context a digital poster creation tool has been created for primary and
	secondary school children, which fully supports collaboration, incorporating the
	latest Web application development technologies. This system was evaluated
	by the method of empirical assessment by elementary students with very
	encouraging results.
MAIN	Key advantages of creating posters within the educational process (O ' Neil &
AFFORDANCES	Jenkings, 2012):
/	The posters help students who learn easier watching the information (Visual
	types) (Summers, 2005).
	Students show great enthusiasm and active participation (Walker, 2005).
	Students are provided the opportunity to discuss constructively for their
	learning (Briggs, 2009).
	Can be an authentic assessment tool (Summers, 2005).





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EXAMPLES	Students of the fourth grade must be assessed for knowledge gained about Alexander the Great and his life, in the history course. Spyros, a student chose to make a poster, that will include highlights of the life of Alexander the Great and present the information that is learned. Spyros has noticed that does better when the work contains images, audio and video in addition to text. In this way, it seems easier to understand and assimilate information, and can do more work in less time. Also, since he makes several spelling mistakes, he has more confidence when the size of the text he writes is relatively small and has a succinct format. Spyros uses the following platforms to create posters: http://edu.glogster.com/ http://padlet.com/ http://www.photovisi.com/ http://www.postermywall.com/
NOTES	The creation of digital posters is an activity which has many educational benefits for students. These benefits are not limited merely to the fact that posters help students to acquire skills for effective verbal and non-verbal communication, but also on the cultivation of students' aesthetic, in acquiring skills of cooperation, etc. Also, the posters are used effectively in various stages of education as tools for evaluating the degree of knowledge achievement. Although the pedagogical value of poster creation activities is undeniable, the digital tools available do not always combine those features that impart pedagogical value in the process (i.e. cooperation, usability, simplicity, etc).

Tools related to Safety

TOPIC	Digital citizenship and online safety
TITLE OF	Be Internet Awesome
RESEARCH/	
TOOL	
AUTHOR(S)	Google in partnership with iKeepSafe
DATE	2017
SOURCE	https://beinternetawesome.withgoogle.com/en/
DESCRIPTION	Be Internet Awesome teaches kids the fundamentals of digital citizenship and safety so they can explore the online world with confidence. Interland is an adventure-packed online game that makes learning about digital safety and citizenship interactive and fun—just like the Internet itself. Here, kids will help their fellow Internauts combat badly behaved hackers, phishers, oversharers,







	and bullies by practicing the skills they need to be good digital citizens. The Be
	Internet Awesome curriculum gives educators the tools and methods they need
	to teach digital safety fundamentals.
MAIN	
AFFORDANCES	To help kids be safe, confident explorers of the online world.
EXAMPLES	https://beinternetawesome.withgoogle.com/en/resources
	https://beinternetawesome.withgoogle.com/en/slides
	https://www.blog.google/technology/families/be-internet-awesome-helping-
	kids-make-smart-decisions-online/
	https://www.youtube.com/watch?v=1_uHacsxAp4
	https://www.youtube.com/watch?v=i307esUZTSc
TOPIC	Use of ICT
TITLE OF	Education and new media / Educazione e nuovi media
RESEARCH/	
тоо	a) Diritti e responsabilità verso una cittadinanza digitale. Guida per insegnanti
TOOL	/ Rights and responsibilities towards a digital responsibility. Guide for teachers
	b) Guida per genitori / <i>Guide for parents</i>
AUTHOR(S)	Guide for teachers
	Published by Save the Children – Mondadori Education
	Main author: Elisabetta Papuzza
	Co-Authors: Cristiana De Paoli, Mauro Cristoforetti, Maria Elisa Marzotti
	Editor: Walter Nanni (Editor)
	Cuido for Poronto
	Guide for Farents Published by Save the Children AdiConsum (association of consumers)
	Coordinamento Genitori Democratici
	Co-Authors: Elisabetta Papuzza, Adele Rita Medici, Maria Elisa Marzotti, Mario
	Russo
	Editor: Walter Nanni (Editor)
	``´
DATE	a) 2008 b) 2009
SOURCE	https://www.sicurinrete.it/wp-content/uploads/2018/08/GUIDA-
	INSEGNANTI.pdf
	https://s3.savethechildren.it/public/files/uploads/pubblicazioni/educazione-e-
	nuovi-media 0.pdf
DESCRIPTION	Guide for teachers
	The guide offer to Italian teachers didactic guidelines and practical examples
	in order to undertake with their own pupils, children and teen-agers, a course







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	toward the awareness of the own right online in the use of the actual digital
	technologies, in application of the Convention U.N. on the rights of the infancy
	and the adolescence (1989).
	The intervention is thought for the pupils of the primary (8-10 years) and
	secondary school of first (11-13 years) and according to degree (two years, 14-
	15 years).
	The manual is divided in three parts:
	1. A lecture of the relationship that today's young people have with the New
	Media and it develop the theme of the responsibility and the safety on line;
	2. A proposal for the school an optic of New Media Education: the
	methodological approach of Save the Children founded on the rights and
	the used tools;
	3. The last part is a real operational-didactic manual, container a series of
	examples of activities to be brought ahead with the group class.
	1 5 5 1
	Guide for parents
	This guide is targeted to parents with the aim of furnish them correct
	informations and practical guidelines for education of their children to a correct
	use of the new technologies.
	The finality is to valorise and promote the potentialities of these new tools in
	the life of children underlining and evidencing the risks of it. It's an educational
	proposal from which parents can draw with clarity the value and specific
	elements characterising their own role.
	The Guides try to analyse needs and motivations that are behind the use of
	multimedia instruments with the objective to know better because they use
	them, as they use them and from thing they are able to prevent possible risky
	behaviours.
	Finally it's proposed an educational model, so that in the use of the new media
	from children that can develop specific competences (critical sense,
	autonomous thinking, sense of responsibility, etc.) and act in name of
	determined values (the respect of itself and of the other persons, of the legality,
	of the community, etc.).
	At the same time the Manual offer some suggestions to help parents to regulate
	times and ways of use.
	The structure of the guide foresees four section principal in base to the same
	technological tools: cellulars, Internet, TV and video games.
MAIN	For teachers:
AFFORDANCES	promote a responsible behavior in the use of the New Media by young
	generations;
	to be able to regulate affective dynamics and report them (emotions,
	motivations, sociability, needs,); .
	to acquire and develop dynamic cognitive capacities (knowledges and
	technical competences of the tool);
	to acquire and develop dynamic values and moral and ethical principles that
	drive the person, as also the ability to assume social responsibility, tied up to











	 the general maturity of the subject and the development of the sense of citizenship. For parents: In an educational poly-centric conception the responsibility of education calls
	in field different educational agencies (family, school, institutions, associations,
	These agencies are called to collaborate to a common project, within shared
	educational functions.
EXAMPLES	For teachers
	In the third section of the manual are proposed various activities:
	This section they are proposed some activities on the theme of the New Media
	that you/they can concretely be conducted in class by the teachers, having as
	general reference the illustrated theoretical-technical model. Such activity was
	been divided in 3 second typologies that mainly works on:
	the recognition of the emotions (affective level) to make to reflect on the
	needs, on the motivations, on the representations, on the meaning of
	certain behaviours, also in base to the context of reference (school, family, etc.);
	 the technical knowledge (cognitive level) to furnish notions on the
	functionality of the tools, on the characteristics of the net, of the media, etc.;
	 the values and the matter linked to the rights (civic level) to reflect and to
	debate on the rights and on the responsibilities in partnership to the needs,
	to the roles in the society, to the moral principles that the individual and
	social behaviour directs and on the characteristics of the Digital Citizenship
	 A guarter and last group of activities (evaluation level) is intended as
	support for the evaluation of the run from the same students.

TOPIC	USE OF ICT
TITLE OF	Guide for Digital Responsible Citizenship / Guida alla cittadinanza digitale
RESEARCH/	consapevole
TOOL	
AUTHOR(S)	Common Sense education in collaboration with Ministry for Instruction
	University and Research (MIUR)
DATE	2018
SOURCE	Website
	https://programmailfuturo.it/come/cittadinanza-digitale
	PDF document
	https://programmailfuturo.it/media/docs/cittadinanza-
	digitale/cittadinanza digitale consapevole.pdf






	Schemes for parents https://programmailfuturo.it/cittadinanza-digitale/genitori.pdf
DESCRIPTION	In a dedicated section of the website of <i>Programma il Futuro</i> is provided to teachers are contained section there are lessons proposed inside the courses for the primary and secondary school, that illustrate whether to navigate in Internet in aware and sure way. These lessons premise to realise some complete interventions in the classroom on these matters and the page of every lesson permit to download the relative didactic material.
	The lessons and the relative video original they are realised by Common Sense Education, with which we have undersigned an accord of collaboration for the adaptation in Italian language of their educational material.
MAIN AFFORDANCES	 The main important affordances of this tool of this are: teachers can permit to their students to practice their own citizenship using in critical and aware way the Net and the Media students can express and valorise if same use of the technological tools autonomously;
	 inform students how to protect them from the dangers present in the Web and the Media (plagiarism, frauds, enticement etc.), educate students to respect specific norms (i.e. respect of the privacy, respect and guardianship of the authors' rights)
EXAMPLES	Examples of learning are contained in specific sections <i>My digital urban district</i> : where the pupils learn how they can visit online fantastic places and how to do it in safety, following some fundamental rules. <u>https://www.programmailfuturo.it/come/cittadinanza-digitale/il-mio-quartiere-</u> <u>digitale</u>
	Stop and think online: in this video a song underlines the importance to think "from head to fit" to navigate in responsible way in the digital world. https://www.programmailfuturo.it/come/cittadinanza-digitale/fermati-e-pensa-online/
	<i>The power of the words</i> : in this lesson the pupils are invited to reflect on the fact that, while they are having a good time on their sites preferred web, they risk to be exposed to messages of other children that can be offensive, violent or vulgar and they learn whether to manage the actions of cyberbullying. <u>https://www.programmailfuturo.it/come/cittadinanza-digitale/il-potere-delle-parole/</u>
	<i>Super digital citizen</i> : in this lesson the objective is to teach what it means to act in respectful and responsible way towards our own community, both in the material world and online. In the video combined to the lesson, a superhero







helps the protagonist to make the correct choices to stir in Internet in responsible and in safety.

Tools related to Problem-solving

TOPIC	Use of ICT
TITLE OF	Digital story telling as a problem-solving tool in school context
RESEARCH/	
TOOL	
AUTHOR(S)	Fokides, E., Makarouna, F., Saltidou, E.
DATE	2017
SOURCE	http://opensimserver.aegean.gr/publications/2016 conf GR Fokides Makaro
DESCRIPTION	The difficulties of integrating immigrant pupils in the school environment and bullying situations are two problems frequently encountered by pupils and teachers and have important psychological and social implications. Digital storytelling is an instrument often used in educational practice, with interesting results. The article presents the results of two educational interventions in primary schools of Rhodes, which employed digital storytelling to address the above problems. The key characteristic of the interventions was the active involvement of students in the process, while the researcher held a consultative-auxiliary role. Data were collected with a variety of research tools, to ensure research validity. Data showed that interventions had positive results and helped children deal both with immigrant integration and bullying situations. Educational interventions or special equipment. They can be either part of wider educational programmes either self contained actions.
MAIN AFFORDANCES	Findings support the idea that digital storytelling can help: (a) immigrant students, giving them the opportunity to express their thoughts and feelings and, thus, adapt more easily and (b) their school-mates to understand the problems of foreigner peers and, thus, change their attitude towards them. Furthermore, the findings of this study support the idea that the intervention helped pupils organise their thoughts about bullying, reflect about the issue and understand its implications. However, it is unclear whether the teaching
	interventions helped in shaping children attitudes and behaviour. Since digital stories were hypothetical situations, it is unknown how children would react in real-life situations.





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TOPIC	Use of ICT
TITLE OF	Elementary students' difficulties with the SCRATCH programming language
RESEARCH/	
TOOL	
AUTHOR(S)	Nikolos, D., Komis, V.
DATE	2017
SOURCE	http://www.etpe.gr/custom/pdf/etpe2505.pdf
DESCRIPTION	The paper describes the difficulties 5 th graders face when they get involved in an educational scenario for learning programming with the programming language SCRATCH. Some of these difficulties existed in earlier programming languages too, while others appear in recent educational oriented languages. Those difficulties can be categorised into (a) beginner difficulties, (b) difficulties in basic structure "forever if" and (c) difficulties having to do with the new language features of Scratch 2.0. Finally, the paper proposes some solutions for overcoming these difficulties in the context of the educational scenario.
MAIN	The paper suggests the following educational scenario for teaching the
AFFORDANCES	SCRATCH language:
	Lesson 1 – Introduction: Introduction to SCRATCH programming language
	 Lesson 2 – Views: Commands, which manage objects' appearances. Lesson 3 – Interaction: Interaction takes place with the command "if then" Lesson 4 – Messages: Send and receive messages for object synchronisation Lesson 5 – Variables: Setting game score monitoring. Initialising variables Lesson 6 – Repetition: Repetition of main concepts Lesson 7 – Creation of new commands: Create processes from existing commands using Turtle geometry. Lesson 8 – Clones: Developing a game using clones Lesson 9 – 10 – Game creation: Pupils create their own game
EXAMPLES	A list of educational scenarios on teaching with SCRATCH programming
	language uploaded on Greek Institute of Educational Policy AESOP (Advanced Educational Scenarios Operating Platform) gateway:
	http://aesop.iep.edu.gr/senaria?search api views fulltext=scratch&sort b y=field ekp vathm&sort order=ASC









TOPIC	Use of ICT
	3D Simulation Games
TITLE OF	Exploitation of Electronic Games in Education
RESEARCH/	
TOOL	
AUTHOR(S)	Mourniakis, E
	University of Pireaus
	Department of Digital Systems
	Teaching of technology and digital systems
DATE	2012
SOURCE	http://dione.lib.unipi.gr/xmlui/bitstream/handle/unipi/8540/Mournianakis_E mmanouil.pdf?isAllowed=y&sequence=1
DESCRIPTION	This is an educational application in 3D virtual environment of Sim Safety: Development of critical thinking of primary education pupils with the teaching technique of SBL Simulation. The purpose of this study is to take full advantage of the 3D virtual environment of Simsafety for educational scenarios orchestrated utilising the educational method SBL simulation (Simulation Based Learning) in order to develop the skills of critical thinking and the safer Internet in primary education. It aims to familiarise students with potential dangers. Players are encouraged to cultivate critical thinking, to reflect, to acquire knowledge and develop skills in general safe use of the internet.
MAIN	Games promote important skills such as safe Internet navigation skills,
AFFORDANCES	inquiry and reflection skills.
	Virtual worlds is an educational tool for the development of critical thinking
	Simulations help simplify complex learning situations Virtual / 3D worlds enhance learner motivation
EXAMPLES	http://www.simsafety.eu

TOPIC	Digital competences, ICT
TITLE OF	Ikanos Test (Self-diagnosis test)
RESEARCH/	
TOOL	
AUTHOR(S)	Basque Government
DATE	2017
SOURCE	http://www.ikanos.eus/en/







DESCRIPTION	Ikanos is a project developed by the Basque Government to contribute to the development of a society that is: Competent, Highly participative and co- responsible, User of advanced and high-impact digital services.
	More specifically, the IKANOS Test is an online tool that helps members of the public to make an approximate self-diagnosis of their digital profile, based on the assessment of the following parameters:
	 Their potential for developing digital competences, measured through the availability of equipment and an Internet connection, as well as habits with regard to the use they make of the Internet, Their training experience in the field of ICTs, with regard to their technological knowledge and certifications held and, Their level of digital competence, as a result of measuring the sum of knowledge, skills and attitudes concerning different key components of digital competence.
	The questionnaire is based on the European framework of digital competences DIGCOMP and fill out it will only take you twenty-five minutes. This tool provides a personalised appraisal of your digital profile as a citizen based on your responses to the questionnaire you are going to complete now. The questionnaire is structured in 3 theme blocks in which you must self-assess your current personal status with regard to a series of aspects relating to the Information and Communications Technologies (ICTs).
MAIN AFFORDANCES	 Promote the digital empowerment of members of the public and, as a result, the advancement of the digital society in the Basque
	 Make the people in the Basque Country aware of the importance of developing digital competences, by giving them an approximate idea of their digital profile. Contribute to fostering the dissemination and adoption of the European framework of digital competences.
	 Provide a basic element for the future development of a certification tool of digital competences.
	 Channel the information gathered in order to determine in an approximate manner the aggregate digital profile of the inhabitants of the Basque Country.
	 Publicise the offer of public services (resources, programmes, etc.) to promote the digital competences of the inhabitants of the Basque Country (KZ gunea – network of telecentres, Enpresa Digitala, IT txartela, Barnetegi Teknologiko, etc.).







TOPIC	Use of ICT
TITLE OF	NetLogo Modelling Environment
RESEARCH/	
TOOL	
AUTHOR(S)	Aristotelis Gkiolmas, Anthimos Chalkidis, Maria Papaconstantinou, Zafar Iqbal & Constantine Skordoulis
DATE	2014
SOURCE	https://bit.ly/2NdR2Mv
DESCRIPTION	The Multi-Agent-Based programming, modelling and simulation environment of NetLogo (Wilensky, 1999) has been used extensively during the last fifteen years for educational – among other – purposes. The learning subject, upon interacting with the User's Interface of NetLogo, can easily study properties of the simulated natural systems, as well as observe the latter's response, when altering their parameters. In this research, NetLogo was used under the perspective that the learning subject (student or prospective teacher) interacts with the model in a deeper way, obtaining the "role" of an "agent". This is not achieved by obliging the learner to program (write NetLogo code) but by interviewing them, together with "applying" the choices that he/she makes on the model. The scheme was carried out, as part of a broader research, with interviews, and web-page-like interface menu selections, in a sample of 17 University students in Athens (prospective Primary School teachers) and the results were judged as encouraging. At a further stage, the computers were set as a network, where all the agents performed together. In this way the learners could watch onscreen the overall outcome of their choices and actions on the modelled ecosystem. This seems to open a new – small – area of research in NetLogo educational applications.
MAIN AFFORDANCES	Make the students conceptualise natural and environmental systems' models (especially Multi-Agent-based models) from "the inside", by leading them to understand the behaviour of agents, without introducing them to computer programming.
	Make the learners capable of building models of natural systems and ecosystems, not "from the scratch", but by deciding the behaviour of agents, a skill that is crucial for understanding how the modelled systems will behave under different rules. Students might possibly, through the use of simple NetLogo models and their variations, as well as through their navigation in specifically created interfaces, learn how to act and "think" like members of a natural system or ecosystem and thus understand its functions and behaviour.





	In a further stage of application, similar to Wilensky's "HubNet" (Wilensky & Stroup, 1999), it is aimed that each student can move one agent, for example through the use of a joystick, and they altogether watch the results of their combined actions on a NetLogo screen, provided that their computers are networked.
EXAMPLES	NetLogo. <u>http://ccl.northwestern.edu/netlogo/</u> NetLogo Fire model. <u>http://ccl.northwestern.edu/netlogo/models/Fire</u> NetLogo Ants model. <u>http://ccl.northwestern.edu/netlogo/models/Ants</u>

For the full suite of best practice examples that were identified by DRC project partners as part of our research activities for IO2, please visit the DRC website (available at: <u>https://digital-citizenship.org/</u>) and access the Pedagogical Framework for the development of e-Toolkit on Digital Citizenship.

Chapter 5 - Summary of research findings from DRC partner countries

Research Findings from Cyprus

Evidence from the Digital Economy and Society Index for Cyprus (DESI, 2018) declares that the enhancement of use of digital technologies is among the 16 initiatives of Digital Strategy (DESI, Country Report, 2018). Cyprus ranks 21st out of the 28 EU Member States in terms of digitisation (DESI, 2018). Henceforth, digital education and digital navigation skills initiatives should be present in Cyprus' educational context. ICT is currently integrated into the Cypriot primary school curriculum not as a stand-alone separate subject but as an interdisciplinary educational tool embedded in the teaching and learning process of other subjects. The report reviews the background of the current research-desk conducted in relation to the ICT integration in the Cypriot primary schools and tackles the most important findings. The practical part of the report outlines the results of a focus group with 10 teachers on social media as a result of intellectual output 3. The lack of professional development/ training, the volume of curriculum we have to cover per subject and teachers' resistance to change are the main barriers for technology integration in the classroom.

The focus group analysis pointed out the necessity for teachers' professional development on digital education that will guide digital citizenship programme integration in the school class. The





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results underscore teachers need to receive practical hands-on workshops with colleagues, students and parents. These interventions need to continue on a regular basis so as to have a positive effect in a long-term period. In addition, the upcoming digital citizenship guide needs to be accessible and up-to date to its audience in order to become valuable and effective tool. The report shapes teachers' recommendations and sheds a light for the development of the upcoming outputs of the DRC project.

Research Findings from Greece

ICT education is a separate teaching subject in Greek primary schools (grades 1 through 6) taught 1 hour weekly in all classes. It aims at equipping children with introductory but coherent and comprehensive understanding of basic computer functions. Moreover, the ICT curriculum for the elementary school opts for enhancing learning, developing pupils' competencies and preparing them for participating in knowledge-based society. The National Curriculum groups learning goals under three pillars: Knowledge and methodology, Cooperation and communication and Science and Technology in everyday life.

According to the Ministry of Education Bulletin (28/12/2016) ICT is a key tool for the transformation of the school, for supporting and enhancing learning and for upgrading educational outcomes. The emerging ICT environments are changing radically the way people access, gather, analyse, illustrate and present information, communicate and cooperate with each other. They shape and define new types of competencies, which students have to develop within their basic studies, in order to be able to use ICT with effective, creative and ethically sound manner. The school must effectively prepare tomorrow's citizens of the knowledge society, in order to be able to face the challenges and to harness the opportunities of the new era. Taking into account that ICT will continue to grow and penetrate into the social sphere at a growing speed, the teaching of ICT and computer literacy in the elementary school, has to prepare children to harness the computational, the analytical and the interdisciplinary critical thinking competencies necessary for continuing their studies in the secondary school and for further life.

Even though Greek official education documents appear keeping up with emerging ICT environments, teachers and ICT educators in our study object towards the recent lessening of school hours devoted to ICTs teaching and learning. They believe that cultivating appropriate and responsible use of technology is of pivotal importance in contemporary context but they recognise that shortage in digital education infrastructure deter teachers from implementing projects aiming at digital skills development. Also, both research literature and our research subjects report that non-availability of technological tools, excessive curriculum volume and lack of administrative support are







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the three prominent barriers when implementing technology programmes in the classroom. Contrary to teachers' belief, literature research reveals that there is a wealth of digital tools for classroom use which teachers can effectively and efficiently incorporate into their teaching. What teachers ask for is a professional, simple and comprehensive guidebook/toolbox which will aggregate practical ways on how to foster responsible digital citizenship qualities in their pupils and well-designed in-service education programmes and professional development seminars on exploiting ICTs in teaching practice and cultivating ICT skills.

Research Findings from Ireland

The Primary School curriculum is Ireland is currently delivered through an eight-year school cycle, which is structured as follows: junior infants, senior infants, and first to sixth classes. Children typically begin this cycle at age 4-5 and exist the primary school cycle aged 12-13. The curriculum is designed to focus on the following seven curriculum areas: arts education, new languages (where Irish is taught) from junior infants to sixth class, language (English), mathematics, religious education, physical education, social, personal and health education and the social environment and scientific education. Under each of these curriculum areas, themes are further subdivided based on specific subjects. Following this structure, a total of 11 subjects are taught throughout the primary school cycle.

Until recently, the topic of digital responsibility and citizenship was not addressed in any curriculum area of the primary school curriculum; however, in 2014 the Irish Department of Education and Skills introduced changes to the primary curriculum so that teachers are now encouraged to teach digital responsibility and citizenship through the SPHE curriculum. While this change to the curriculum does not address all facets of digital responsibility, it has led to the introduction of curriculum models on Internet Safety, which is now taught to children aged 8-12 years (senior cycle of the primary curriculum). To support teachers to teach these digital skills, the SPHE curriculum is now delivered through three distinct strands, namely: 'Myself', 'Myself and Others' and 'Myself and the Wider World'. Under the subject area of 'Myself and the Wider World', senior primary students are taught to appreciate global issues, but also digital citizenship. As such, the following two units have been included in this section of the SPHE curriculum: 'Developing Citizenship' and 'Media Education'. Within these units, there is targeted emphasis on keeping students safe, but also on supporting them to act and think responsibly.

With the introduction of this new curriculum area, there are a range of available digital tools that will help teachers to support students to become more responsible digital citizens. In terms of





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how technology is used in practice in the classroom, there is limited literature available online which tells how technology is used every day in the primary school classroom. However, a document from 2014 that was published by the Department of Education and Skills called 'The Digital Strategy for Schools 2015-2020 - Enhancing Teaching, Learning and Assessment' provides support, guidance and advice to teachers that should help them to foster the use of technology in their teaching practice. This framework document also provides examples of best practice in using technology in the classroom from other EU nations and aims to coach teachers in how best to integrate technology into the curriculum. Despite these advances in recent years, the issue still remains that many schools in Ireland are under-resourced to deliver high quality digital education.

From our desk-research activities it is apparent that the key challenges which teachers face in implementing technology programmes in primary schools relate to a lack of IT infrastructure. While our desk-research activities have uncovered a range of available digital resources that can be used to support the teaching of curriculum subjects, the physical barriers of not having sufficient IT tools or access to the Internet for students and teachers to use to engage with these materials, prevents teachers from engaging with these resources and adapting them for use in their teaching practice. Additional in-service teacher-training programmes are also required to support teachers to have the confidence and competence to use these resources in the classroom. While there are a range of inservice teacher-training programmes available in Ireland, which offer primary teachers the opportunity to enhance their teaching skills for specific curriculum areas and subjects; however, we have not been able to find programmes which support teachers to develop their digital skills for teaching. Instead programmes on offer focus on the new language curriculum which will support teachers to teach young learners who's first language is not English, addressing inclusive and special needs education and introducing play-based learning, as previously mentioned. This represents a significant barrier for teachers and for the integration of technology in the classroom in primary schools in Ireland.

Despite these challenges, through our field-research activities, we were able to identify additional digital resources and available teacher-training programmes that are available to teachers during the summer months and are accredited CPD programmes. The field-research activities also gave researchers the opportunity to gain an insight into the specific actions which schools are using to develop responsible citizens from a young age, including adding a 'buddy bus stop' and 'buddy bench' school yards so that young learners experiencing loneliness or being bullied can find support from their peers; and how teachers use these initiatives to educate children about being safe, respectful and responsible outside of school and online as well. Furthermore, while the literature review process uncovered interesting approaches and methods for working with children of all ages in new and innovative practices - such as play-centred learning, challenge-based learning,









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collaborative learning - and novel activities - such as introducing web-quests, escape room challenges and concept-mapping techniques - the field research activities helped researchers to learn more about the innovative digital tools which teachers in Ireland are using to bring a different dimension to their teaching practice and how they make learning more appealing for primary school students. These digital resources range from online platforms with animated videos and short lectures on events throughout the year and historical artefacts from Ireland's past; to online games that help young learners to improve their vocabulary in Irish or their understanding of mathematical equations and concepts. As such, through these combined research activities, researchers from FIPL were able to develop a holistic understanding of the challenges and successes of how digital literacy and citizenship are being taught in the primary school curriculum in Ireland.

Research Findings from Italy

The current picture of the educational situation in Italy, that emerged from the research and Focus Group session, shows the necessity to develop the foundations in the approach to informatics and digital technologies in the scholastic curriculum for primary school and first year of secondary school students. This document presents two sections: one regarding the results of the desk research, and the other to the analysis of the information and data collected in the Focus Group (Intellectual Output n. 3 of the DRC project).

The methods and experiences that are considered innovative the most in Italy, are those promoting Computational Thinking and Problem Solving. As a matter of fact, the Italian Ministry of Education itself explicitly invited teachers to apply them to the ordinary teaching curriculum for the forthcoming scholastic activities, as part of the National Strategy for the digitalisation of the school system (PNSD). Nevertheless, the analysis conducted highlights the necessity to promote another type of action, which consists of an investment in the preparation of both teachers and students in the acquisition the pertinent skills. What emerged are the following issues: inadequate infrastructures; insufficient availability of tools and resources; inadequate technological equipment (such as the possibility of using personal devices furnished by the school e.g. tablets, smartphones, etc.); unprepared human resources; inadequate classroom spaces.

Indeed, the choice of using particular and innovative methods of teaching/learning is strictly and directly linked to the schools' effective disposal of adequate open spaces and laboratories or, in the best cases, of fab-labs (fundamental for innovative activities as robotics or tinkering in general). We must therefore consider the experiences here described, and the examples collected, as "desiderata", simple good practices that the teachers called: "something we would like to do, but...".





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The opportunities of using the pedagogical resources and tools developed in the DRC project, would offer to Italy a concrete way to put into practice some fascinating new pedagogical ideas, which, in Europe, are already an operative reality and an active element of change towards the new Knowledge Society, Global Village and towards a more Connected World.

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Web Resources

- Associazione Italiana per il Calcolo Automatico / Italian Association for Automatic Calculation (AICA): <u>https://www.aicanet.it/</u>
- Bebras Games: <u>http://bebras.it/</u>





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- Consorzio Interuniversitario Nazionale per l'Informatica / National Interuniversitary Consortium for Informatics (CINI): <u>https://www.consorzio-cini.it/index.php/it/</u>
- DOL Master of Polytechnic University of Milan
- HOC-LAB of Polytechnic University of Milan: <u>http://www.dol.polimi.it/hoc-lab/</u>
- Digital Story Telling Digital didactics Pearson: https://it.pearson.com/aree-disciplinari/italiano/didattica-digitale.html
- Edmondo INDIRE: <u>http://edmondo.indire.it/</u>
- Emma platform: <u>https://platform.europeanmoocs.eu/login</u>
- Fondazione Cassa di Risparmio di Perugia: <u>http://www.fondazionecrpg.com/la-fondazione-cassa-</u> <u>di-risparmio-di-perugia-a-fianco-della-scuola-e-dei-ricercatori-per-una-nuova-cultura-dello-</u> <u>sviluppo/</u>
- Impara Digitale: <u>http://www.imparadigitale.it/</u>
- Istituto Nazionale Documentazione Innovazione Ricerca Educativa / National Institute for Documentation Innovation Educational Research (INDIRE): <u>http://www.indire.it/</u>
- Istituto Tecnologie Didattiche del Consiglio Nazionale delle Ricerche / Didactical Technologies Institute of National Research Council (ITD – CNR): <u>https://www.itd.cnr.it/</u>
- MAGICAL project (Game Based Learning): <u>https://docs.google.com/document/d/1g7yrdsEALmvKHpW4KtKoDp-W0o6H3uMsPHdoFS6exb8/pub</u>
- Makers@school project 3D INDIRE: <u>http://www.indire.it/progetto/maker-a-scuola/;</u> <u>http://3d.indire.it/</u>
- MinecraftEdu: <u>https://education.minecraft.net/</u>
- Olimpiadi del problem solving: https://www.olimpiadiproblemsolving.it/web/index.php
- Open Simulator platform: <u>http://opensimulator.org/wiki/Main_Page</u>
- Programma il futuro <u>code.org</u>: <u>https://www.programmailfuturo.it/</u>
- Scratch for educators: <u>https://scratch.mit.edu/educators/</u>
- Social4School project: <u>http://www.social4school.eu</u>
- Tuscia University Master: <u>http://www.masterunitus.com/</u>





