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European
Commission



Digital Skills Playbook for Educators

European Digital Education Hub
Digital Skills Squad

**EUROPEAN
DIGITAL
EDUCATION
HUB**

*Education and
Training*

EUROPEAN DIGITAL EDUCATION HUB



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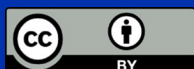


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SECTION A

Introduction & Context



1. Introduction

Welcome to the Digital Skills playbook for educators. In this playbook, we are digging into the challenge of improving the digital skills of students – no matter what age or stage of learning they might be at. Whether young children, vocational students, or older learners, we are looking at how we can best support them. In this context, we focus principally on basic digital skills, rather than advanced digital ICT professional skills.

In this playbook, we look at several key areas. First, we review the context of digital skills in the European Union (EU), what they are for, and what some of the challenges are. We then move on to understanding digital skills in more depth, leaning on the European DigComp Framework as a guide, as well as looking at important issues like ethics and sustainability. We then go on to describe practices for improving digital skills for various ages and skill levels. The final section of this playbook looks at the supporting environment for digital skills, including professional development and the role of leaders.

This playbook has been produced by a team of deeply experienced education experts at multiple levels of education from across the EU, who make up the Digital Skills squad in the context of the [European Digital Education Hub](#). All contributors are volunteers, and we are deeply grateful for their efforts and contributions.





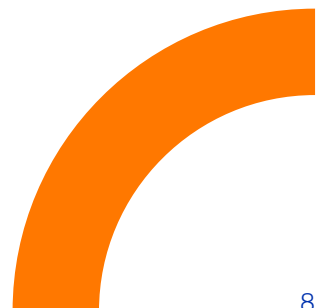
2. Context

The European Union aims for 80% of its population to have basic digital skills by 2030, as compared to only 54% of the population having such skills in 2021 as reported by Digital Economy and Society Index. The EU recognises that insufficient digital skills act as a barrier to participation in digital society and the [digital economy](#). People who do not have basic digital skills are less likely to be able to critically use digital tools such as social media and the internet and will also struggle to find a job compared to those with better skills. At a macro level, this also has a negative impact on society, as companies are not able to grow and compete European Digital Education Hub as they are unable to find workers with the skills they need to effectively use digital tools in the workplace.

Ensuring that we collectively address this issue is thus critical, and educators working in education and training organisations are the practical solution to this issue. However, there are several challenges to face in order to do this, namely, how to include marginalised groups (the elderly, socially disadvantaged, rural, refugees, etc.), ensuring sufficient infrastructure is available in education and training institutions, the appropriate level of educator skills and having the right digital skills curriculum available.

For marginalised groups, it can be challenging to even reach them as they are diverse and often not reachable at scale as they are unlikely to already be online. Many education and training institutions also still struggle with infrastructure across the EU, for instance with insufficient bandwidth, old and inappropriate devices. Educator skills are also a barrier, as most educators in the EU still report a need for further digital skills training themselves, and thus struggle to support their students effectively. And finally, although many efforts have been made, there is not a consistent, well-documented approach to curriculum for digital skills for all ages and stages of education.

This playbook thus aims to contribute particularly to supporting educators in thinking about curriculum approaches to digital skills. In the next section, we review the European Digital Competence Framework which defines what digital skills really mean, and how ethical and sustainability issues need also to be taken into account in the context of digital skills.





SECTION B

Understanding Digital Skills



3. Understanding Digital Skills

In this section we look at the definition of digital skills, in particular the European DigComp Framework, ethical issues in digital skills and sustainability.

3.1. European DigComp Framework

The [European DigComp Framework](#), also known as the Digital Competence Framework for Citizens, is a tool developed by the Joint Research Centre (JRC) of the European Commission to provide a common understanding of what digital competence represents, across the EU and beyond. The framework has provided a solid basis for framing digital skills policy, curricula development and assessment of digital skills, both in education and in the labor market.

The framework is regularly updated to keep pace with the rapidly changing digital landscape. The latest update, [DigComp 2.2](#), provides more than 250 new examples of knowledge and skills to help European citizens with self-evaluation, identifying training offers and job search. The update aims to engage citizens confidently and safely with digital technologies, taking account of emerging technologies, such as Artificial Intelligence (AI), the Internet of Things (IoT), datafication or new phenomena derived from the pandemic crisis, which have led to the need for new and increased requirements in digital competence for citizens and workers.

Competences in general are seen as a combination of knowledge, skills and attitudes; they are therefore composed of concepts and facts (i.e., knowledge), descriptions of skills (e.g., the ability to carry out processes) and attitudes (e.g., a disposition, a mindset to act) (see figure below). Key competences are developed throughout life.¹

¹ DigComp 2.2, p. 3.



BOX 1. Dimension 4 of the DigComp framework outlines examples of knowledge, skills and attitudes in a non-exhaustive manner

KNOWLEDGE

It means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study.



→ In DigComp 2.2, **knowledge examples** follow the wording of: *Aware of...*, *Knows about...*, *Understands that...*, etc.

SKILLS

They are the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).



→ In DigComp 2.2, **skills examples** follow the wording of: *Knows how to do...*, *Able to do...*, *Searches...*, etc.

ATTITUDES

They are conceived as the motivators of performance, the basis for continued competent performance. They include values, aspirations and priorities.



→ In DigComp 2.2, **attitude examples** follow the wording of: *Open to...*, *Curious about...*, *Weighs the benefits and risks ...*, etc.

Figure 1; Image source: DigComp 2.2, p. 3

The work on operationalising digital competence following the [2006 Council Recommendation](#), started in 2010. In 2013, the first DigComp reference framework came out defining digital competence as a combination of 21 competences grouped in five main areas. Since 2016, the five areas are Information and data literacy; Communication and collaboration; Digital content creation; Safety; and Problem solving (see figure below).²

² DigComp 2.2, p. 4.



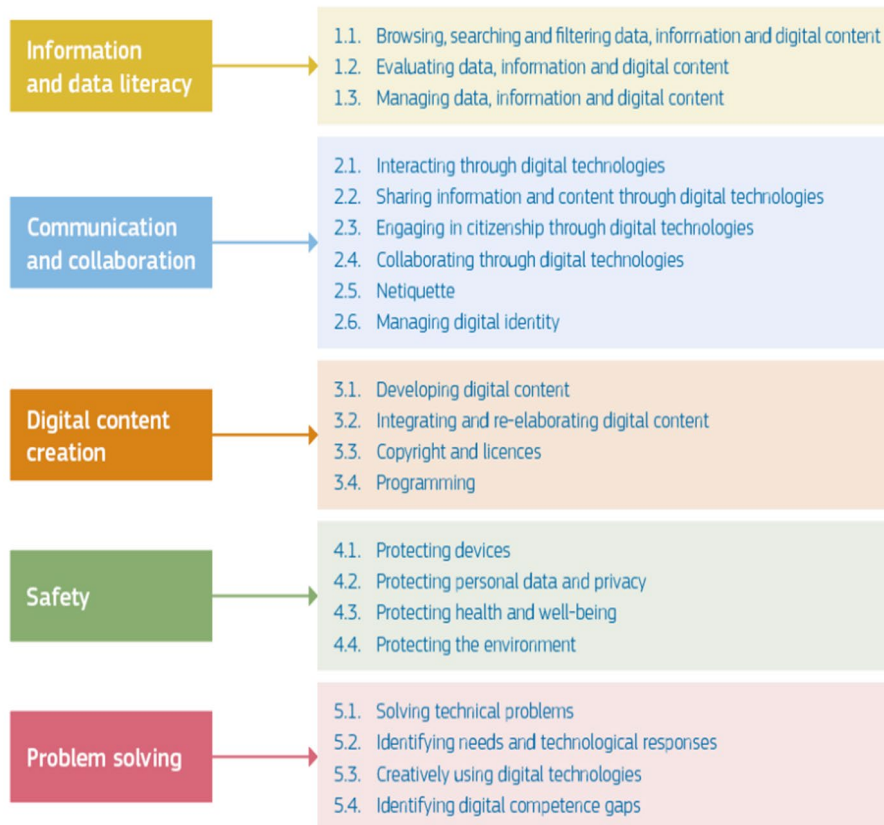


Figure 2; The DigComp conceptual reference model; Image source: DigComp 2.2, p. 4.

DigComp 2.2 is a valuable tool for educators as it helps assess students' digital competences and design a curriculum that addresses the needs of learners in a rapidly changing digital landscape. The framework can also be used to identify training needs for educators themselves, to ensure that they are equipped with the necessary digital skills to support their students' learning.





3.2. Ethical Issues in Digital Skills – a European Perspective

In this section, we discuss the key areas of ethics to consider in digital skills, some of the specific issues arising from misuse of digital skills, and examples of how ethical issues connect into the competence framework.

There are three key areas of ethics to consider in the field of digital skills:

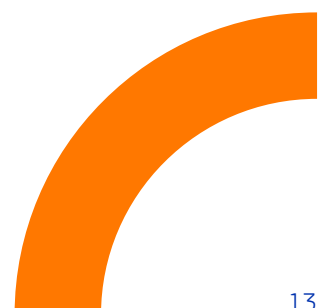
- **Conceptualising Digital Ethics:** Digital ethics, within the European framework, is about ensuring that technology serves humanity while respecting fundamental rights and values.
- **Ethical Challenges in Digital Literacy:** Digital literacy goes beyond technical proficiency. It encompasses understanding the ethical implications of our digital actions, such as respecting privacy, ensuring data protection, and combating the spread of fake news.
- **Navigating Ethical Dilemmas in Digital Communication and Content Creation:** The digital realm offers unprecedented opportunities for communication and content creation. However, it also presents challenges like cyberbullying, misinformation, and intellectual property violations.

Next, we define ethical issues arising from the misuse of digital skills in an educational context.

Plagiarism and Academic Dishonesty: One of the most prevalent ethical issues in digital education is plagiarism. With an abundance of information available online, students may be tempted to copy and paste text from internet sources directly into their work without proper citation. This constitutes academic dishonesty and a violation of intellectual property rights. Tools like Turnitin are being used to check for plagiarism in student papers, but the responsibility ultimately lies with the individual to use their digital skills ethically.

Cyberbullying: Digital communication tools have unfortunately opened up new avenues for bullying. Cyberbullying can take place via social media, chat rooms, or email, and it can be relentless because it doesn't stop at the school gate. This form of bullying can have severe psychological impacts, and it's a clear misuse of digital skills. Schools need to have clear policies in place to deal with such incidents and provide support to victims.

Privacy Violations: There's a vast amount of personal data that students may share online, either knowingly or unknowingly. Misuse of digital skills can lead to privacy violations, such as unauthorized access to personal emails, data theft, or sharing private information without consent. For example, students might share a screenshot of a private conversation without the other party's consent, violating their privacy.





Cheating in Online Assessments: The rise of online education has brought new challenges in maintaining academic integrity during assessments. Some students misuse their digital skills to cheat on tests or exams. This can be done by browsing the internet for answers, using digital tools to collaborate with others during an individual test, or even hiring someone else to complete the assessment.

Spreading Misinformation: Digital skills include the ability to create and share content online, but this can become problematic when students use these skills to spread misinformation or false news. This could be as simple as sharing a news article without checking its credibility or as significant as creating false information to cause harm or for personal gain.

These examples underline the importance of integrating digital ethics education alongside the teaching of digital skills, emphasising not just how to use these skills, but also when and why certain uses are inappropriate or unethical.

Examples Based on the Competence Framework

Information and Data Literacy

Overview: Information and Data Literacy refers to the ability to identify, locate, retrieve, store, organise, and analyse digital information, judging its relevance and purpose.

Ethical Challenges:

- Data Privacy: Ensuring that personal and sensitive data are handled with respect and not misused or accessed without proper authorisation.
- Misinformation: The responsibility of discerning credible sources from unreliable ones, and the ethical implications of sharing or acting upon misinformation.
- Intellectual Property: Recognising and respecting copyrights, patents, and trademarks in the digital realm.

Communication and Collaboration

Overview: This competence involves sharing information digitally, using a range of digital tools, understanding the norms and conventions of online interactions, and being aware of the impact of digital technologies on societal structures.





Ethical Challenges:

- Cyberbullying: The misuse of digital platforms to harass, threaten, or harm others.
- Digital Footprint: Being aware of the lasting nature of online communications and the challenges of erasing one's digital history.
- Online Etiquette: Understanding and adhering to the unspoken rules of online interactions and respecting diverse viewpoints.

Digital Content Creation

Overview: Digital Content Creation encompasses creating and editing digital content, programming, and understanding how digital technology functions.

Ethical Challenges:

- Plagiarism: The unauthorised use or close imitation of the language and thoughts of another author without authorisation and the representation of that author's work as one's own.
- Authenticity: Ensuring that digital content, especially images and videos, are not manipulated to deceive or mislead audiences.
- Accessibility: Ensuring that digital content is accessible to all, including those with disabilities.

Safety

Overview: Digital safety revolves around protecting devices, content, personal data, and one's digital identity, understanding the risks and threats of the digital environment, and taking steps to mitigate them.

Ethical Challenges:

- Data Protection: Ensuring that personal data is protected from breaches and unauthorised access.
- Digital Well-being: Recognising and mitigating the potential harms of prolonged digital exposure, such as mental health challenges or digital addiction.
- Consent: Ensuring that digital tools and platforms do not exploit users' data without clear and informed consent.





Problem Solving

Overview: Digital problem-solving involves identifying digital needs and challenges, solving technical issues, and innovatively using digital tools to address broader life challenges.

Ethical Challenges:

- **Algorithmic Bias:** Recognising and addressing biases in digital solutions, ensuring fairness and equity.
- **Sustainability:** Considering the environmental impact of digital solutions, such as e-waste or energy consumption.
- **Inclusivity:** Ensuring that digital solutions are designed for all, without inadvertently excluding certain groups.

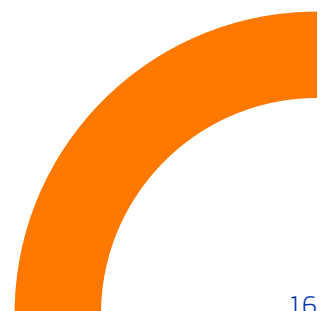
3.3. Sustainability and Digital Skills

Sustainability encompasses the responsible use of resources, the reduction of waste and pollution, and the adoption of practices that support long-term ecological and societal stability. It extends beyond environmental concerns to include economic viability and social equity, aiming to create a harmonious, prosperous and long-lasting coexistence between people and planet.

The birth of the concept is related to the [Brundtland Report](#) released in 1987 by the World Commission on Environment and Development and chaired by Norwegian Prime Minister Gro Harlem Brundtland. Although not enough attention was given to it over the years, the rising global temperatures and sea levels, the increasing frequency and severity of extreme weather events, the mountains of waste and the depletion of natural resources have placed, nowadays, sustainability at the forefront of the global agendas. Governments, businesses, and communities around the world are becoming aware of the critical need for sustainability and are beginning to take consistent action.

This widespread concern over climate change is reflected in the DigComp 2.2 framework as well, listing “protecting the environment” and “protecting health and well-being” as dimensions that are part of the “safety” competence area. This approach aims to help us become aware of the impact that digital technologies have on resource consumption, waste generation and human well-being.

To put this into context, try to estimate the percentage of global greenhouse gases (GHG) that you think are linked to the digital space in 2023. How does this number compare to the emissions attributed to aviation?





While flying is often criticised for its emissions, accounting for approximately 2% of GHGs or 2.5% of CO2 emissions, it is crucial to recognise that emissions from our digital devices, internet usage, and its underlying infrastructure contribute to approximately 4% of global GHGs. What is even more concerning is the projection that these emissions are set to double by 2025. Many technology companies are however taking steps to mitigate this, for example Microsoft invests heavily in (controversial) carbon offsetting and green energy for data centres, and Apple devices are increasingly built from recycled materials. Nonetheless, emerging technologies such as large-language models like ChatGPT are heavy users of data centre capacity and thus energy usage.

Hence, we can recognise the pivotal role we, as educators, play: we should engage in meaningful conversations regarding the environmental and social ramifications that digital technologies bring about. Our responsibility should encompass nurturing critical thinking in relation to themes such as: time online - addiction and overuse, proliferation of misinformation, life cycle of electronics, e-waste disposal, energy consumption of data centres, of devices and online activities (such as streaming, video conferencing, cloud storage, social media and emails, etc.). Indeed, educators can also influence school decision making in choosing the most responsible and sustainable options.

It is time to inspire generations to think sustainably, act responsibly, and lead us towards a brighter, regenerative future. Check the practices area for ideas on where to start.





4. Digital Skills in Lifelong Learning

In this section, we provide case studies around digital skills at the following levels:

- Primary school
- Secondary school
- Technical and vocational education (TVET)
- Adult education

In each sub-section we review some of the important competence areas for the level of education and provide practice descriptions of tried and tested approaches.

4.1. Primary School

At primary level, increasing numbers of children already have exposure to some digital technologies at home. Schools thus have the responsibility to develop students' initial skills in terms of data literacy and online safety. This is also an important time to introduce the fundamental areas of digital skills for children too, including digital content creation, data literacy, online safety and even programming and coding.

Title	Digital Storytelling with Multimedia
Level(s) of education	Primary School (4th Grade) ³
Learning objective(s)	<ol style="list-style-type: none">1. Students will learn to create digital stories using multimedia elements like images and text.2. Students will develop their digital literacy skills by using a simple online storytelling tool.3. Students will enhance their ability to communicate ideas and stories through digital media.
Which areas of DigComp it contributes to	<ul style="list-style-type: none">• Information and Data Literacy• Communication and Collaboration• Digital Content Creation
Is it knowledge, skills or attitude?	Skills and attitude
What proficiency level of DigComp this aligns to	Foundation
Description	In this learning scenario students will learn the art of digital storytelling. They will use a user-friendly online tool StoryJumper or Book Creator to create their own digital stories. Focus of activity is on teaching students how to select and add images, create text, and organise their ideas into a coherent narrative. It also encourages an attitude of creativity and self-expression through digital media.

³ As grades differ between school systems of the Member States, the grades used in this table and throughout this playbook refer to systems where primary school starts around the age of six.





Why is this selected?	This practice is selected because it combines several digital skills: selecting and using digital tools, creating digital content, and effectively communicating through digital media. It aligns with the primary school curriculum's goal of fostering creativity, improving digital literacy, and enhancing students' ability to express themselves in a digital world.
Scenario for how it could be reused	This practice can be reused in different primary school classes and grade levels. Teachers can adapt it for all subjects and topics, encouraging students to create digital stories related to their learning objectives. For example, it could be used to create fictional stories, recreation of historical events, writing about science experiments, etc.
Tools	StoryJumper (https://www.storyjumper.com/) Book Creator (https://bookcreator.com/)

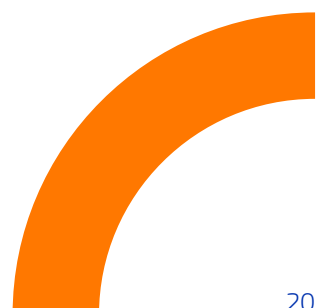
Title	Online Collaborative Problem-Solving with Padlet
Level(s) of education	Primary School (5th Grade)
Learning objective(s)	<ol style="list-style-type: none"> 1. Students will learn to collaborate effectively with peers on digital platforms. 2. Students will develop problem-solving skills through online teamwork. 3. Students will improve their digital communication abilities.
Which areas of DigComp it contributes to	<ul style="list-style-type: none"> • Communication and Collaboration • Problem-Solving
Is it knowledge, skills or attitude?	Skills
What proficiency level of DigComp this aligns to	Foundation
Description	In this case, 5th-grade students will participate in an online collaborative problem-solving activity. They will use a digital collaboration platform Padlet to work together on a school project. Focus of the activity is on clear communication, teamwork and creative problem-solving in a digital context.
Why is this selected?	This example is selected because it helps students develop crucial digital skills such as online collaboration, problem-solving and effective communication. The activity also fosters a positive attitude towards teamwork and creative thinking.
Scenario for how it could be reused	The example can be reused for various subjects and topics across different primary school classes. For instance, it could be used for collaborative research projects in social studies, group problem-solving exercises in mathematics or creative story-writing in language arts. Teachers can also choose other appropriate digital collaboration tool based on their school's technology resources.
Tools	Padlet (https://padlet.com/)





Title	Coding with Scratch
Level(s) of education	Primary School (5th Grade)
Learning objective(s)	<ol style="list-style-type: none"> 1. Students will develop foundational coding and programming skills. 2. Students will gain problem-solving abilities by creating interactive stories or games. 3. 3Students will improve their digital literacy through coding.
Which areas of DigComp it contributes to	<ul style="list-style-type: none"> • Problem Solving • Digital Content Creation
Is it knowledge, skills or attitude?	Skills and attitude
What proficiency level of DigComp this aligns to	Foundation
Description	5th grade students will learn to code by using application Scratch, a beginner-friendly visual programming language. They will learn the basics of coding by creating interactive stories or games. Students will be introduced to different coding concepts like loops, variables, and conditionals while using Scratch's block-based coding interface. This example develops students coding skills and also fosters problem-solving abilities and a positive attitude towards technology.
Why is this selected?	Coding and programming skills are essential in today's digital world. This example introduces coding concepts in a fun and engaging way, with app that is suitable for primary school students. It prepares students for future digital challenges and develops their problem-solving skills.
Scenario for how it could be reused	This example can be reused in different primary school classrooms and grades. It can be adapted to explore various coding concepts and create diverse projects. For example, it can be used to teach mathematical concepts by having students code interactive math quizzes or to explore science topics by creating animated science simulations.
Tools	Scratch (https://scratch.mit.edu/)
Website for more information	Examples how to introduce coding in school - Learn today, build a brighter tomorrow. Code.org

Title	Digital Safety Detectives
Level(s) of education	Primary School (5th Grade)
Learning objective(s)	<ol style="list-style-type: none"> 1. Students will understand the importance of online safety. 2. Students will recognise online risk and threats. 3. Students will develop critical thinking when encountering digital content.
Which areas of DigComp it contributes to	<ul style="list-style-type: none"> • Safety • Information and Data Literacy • Communication and Collaboration
Is it knowledge, skills or attitude?	Skills and attitude





What proficiency level of DigComp this aligns to	Intermediate
Description	In this practice, students will take on the role of "Digital Safety Detectives" to explore the world of online safety. They will engage in a series of interactive activities and discussions that aim to teach them how to identify and respond to online risks, such as cyberbullying, privacy concerns, and the importance of strong passwords. Students will also learn about responsible online behaviour and ethical digital citizenship. The practice will encourage critical thinking and empathy, fostering a positive attitude towards online safety.
Why is this selected?	<i>(Which change in behavior)</i> al age, and it is essential to start teaching these skills at a young age. This practice equips 5th-grade students with the necessary knowledge, skills, and attitudes to navigate the digital world safely. By adopting the role of "Digital Safety Detectives", students become actively engaged in their learning and are more likely to retain and apply these important concepts.
Scenario for how it could be reused	This practice can be reused in different primary school classes and grade levels. Educators can customise the content to suit their students' needs and can also incorporate real-life case studies to enhance the learning experience.
Tools	Interactive Activity – Be Safer Online! (netsmartzkids.org) Digital Citizenship Online Safety Cyberwise California Naslovnica - Varni na internetu (in Slovene language)

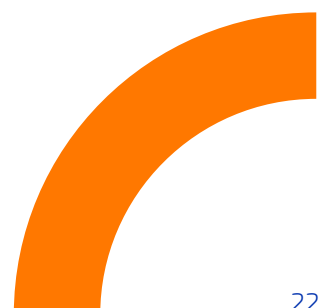
Title	Exploring AI through Digital Art
Level(s) of education	Primary School (5th Grade)
Learning objective(s)	<ol style="list-style-type: none"> 1. Students will understand the basic concepts of Artificial Intelligence (AI). 2. Students will develop digital art skills using AI-powered tools. 3. Students will foster creativity and critical thinking through AI-driven art projects.
Which areas of DigComp it contributes to	<ul style="list-style-type: none"> • Information and Data Literacy • Digital Content Creation • Problem Solving • Digital Citizenship
Is it knowledge, skills or attitude?	Skills and attitude (Promoting curiosity and adaptability)
What proficiency level of DigComp this aligns to	Foundation
Description	In this learning scenario students will be introduced to the Artificial Intelligence through digital art creation. They will learn about the basics of AI, including its applications and implications. Students will then use AI-powered tools to create their own digital artworks. They will explore how AI algorithms can enhance their creative process and gain hands-on experience in using these tools.





Why is this selected?	This scenario is selected to engage students in an interactive and creative way while developing their digital skills. Current trends in technology are leading towards creative use of AI. Students will foster mindset of curiosity and adaptability and learn about AI, a field of increasing significance in our modern world.
Scenario for how it could be reused	The scenario can be reused in other grade levels or adapted for different subject areas by adjusting the complexity of AI concepts and digital art projects. Teachers can incorporate it into computer science, art, or interdisciplinary lessons to enhance students' digital skills and creativity.
Tools	Google's Deep Dream (https://deepdreamgenerator.com/) Dall-e-2 (DALL-E 2 (openai.com))

Title	Everyone Can Code Early Learners
Level(s) of education	Primary School (K-grade 3)
Learning objective(s)	<ol style="list-style-type: none"> 1. Students will learn the basics of coding and app design. 2. Students will understand coding concepts like commands, functions, loops and variables. 3. Students learn to apply design thinking to create basic apps.
Which areas of DigComp it contributes to	<ul style="list-style-type: none"> • Information and Data Literacy • Digital Content Creation • Problem Solving
Is it knowledge, skills or attitude?	Skills and attitude
What proficiency level of DigComp this aligns to	Foundational
Description	This set of five modules for early learners introduces coding concepts to young learners in a cross-curricular approach. According to the Curriculum Guide, "each module includes lessons that help learners explore new coding concepts through science, art, music, and more. Learners share personal experiences and ideas as they explore coding topics".
Why is this selected?	This scenario is useful for any school with access to Apple iPads to introduce simple coding principles to younger students in a playful and structure manner.
Scenario for how it could be reused	This scenario is very specific to younger learners, as the associated resources and app interfaces are built in a tailored way to make it accessible for them. However, the resources are available in multiple languages so could be used in many countries. Other parts of the Everyone Can Code curriculum are targeted at other age groups.
Tools	Swift Playgrounds app - Swift Playgrounds - Apple
Website for more information	Everyone can code curriculum guide Everyone-Can-Code-Curriculum-Guide_011822_Final2 (apple.com) Everyone can code early learner's teacher guide: Early Learners_120222_cl (apple.com)





4.2. Secondary School

Secondary school students are using technology and work with massive amounts of digital information on an everyday basis. Developing students' digital skills has become a necessity to keep pace with this fast-developing technology-determined world. Those digital skills do not just refer to using given technical tools but are more connected with a wide range of cognitive soft skills connected to searching, managing and evaluating information, interacting and collaborating through digital technology, developing digital content, as well as safety and problem-solving competences.

Information and Data Literacy

This competence is referred to articulate information needs, to locate and retrieve data, information and content. To judge the relevance of the source and its content. To store, manage and organise digital data, information and content.

- Students search for information through digital devices and the Internet. In this sense, teachers should guide the learning processes to judge the relevance of the source, providing adequate databases.
- A good practice could be to promote search and access to **Open Educational Resources** (OER) as adequate sources to access information (Larson & Murray, 2008).
- Providing **Online or Virtual Learning Environments** (Alqurashi, 2019) and defining Personal Learning Environments (Junus & Brophy, 2023) can be good practices to manage, to store, and to organise data, information and learning content. Both approaches can complement face-to-face education.
- **Active methodologies** in class include a step of learning by searching information: these types of methodologies are considered in the curriculum of secondary education (Fernández-Rodrigo, 2016).

Communication and Collaboration

Communication is a transversal action in any area of the curriculum and necessary in any kind of teaching and learning process. Digital technologies provide both students and teachers with more tools and possibilities to facilitate communication processes in or out of the face-to-face class. On the other hand, collaboration





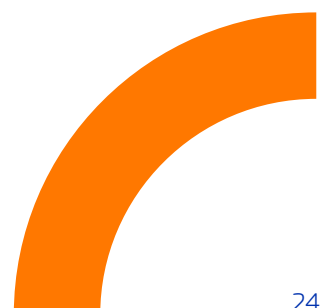
is needed especially in cooperative learning activities in groups, in any kind of curricular area. Achieving communication and collaboration competence is a way to achieve other learning contents in the curriculum.

- **Active methodologies** in class are good practice to improve communication and collaboration competence: students need to cooperate using digital technologies to achieve learning goals. Types of communication and collaboration actions considering the agents involved (Evangelista & Thrower, 2023; García Chitiva & Suárez Guerrero, 2019).
- Among students: **in face-to-face lessons**, using collaborative work tools to share content and work together synchronously; at home, also they can use communication tools to do homework in groups, like video conferences or chats.
- Among students of different courses: students of different schools can collaborate to achieve learning goals. **Video conferences and collaborative work tools** facilitate those students at different secondary schools working together.
- Among teachers and students: implementing a virtual learning environment can be a good practice to share learning content and solve doubts through forums or other tools, in **blended learning environments**. A virtual learning environment can be used in any curricular area.

Digital Content Creation

The creation of digital content can be integrated in different types of learning process and in any area, in order to generate a learning product by achieving new knowledge (Scolari, 2020). The digital content considers all the multimedia supports: text, video, pictures, audio, games, photography, etc. The Digital Content Creation competence can be integrated in the curriculum as a way to generate new knowledge and information in any area.

- **Working through design thinking projects**, as an active methodology, can be a good practice in class to conduct the learning process in order to create a digital product (Androutsos & Brinia, 2019).
- **Creative apps/software** facilitate digital content creation.
- Adolescents know the functionalities of a lot of apps for creating content, in this sense teachers should manage **students' abilities** according to the learning process.





Safety

Students need to know some civic rules to participate in society through digital spaces: how to interact in virtual environments; how to manage one's digital presence, identity and reputation; how to protect personal data and psychological health; and to be aware of digital technologies for social well-being and social inclusion.

- It is important for students **to be informed** about the potentialities of technology but, also, to be aware of the risks for their well-being.
- Best practices show us the importance of **establishing the rules** by the cooperation of teachers and adolescents at the same level (Urrea et al., 2023). The rules can be made for face-to-face lessons using digital technologies and for virtual spaces, when students work from home to do homework.
- On the other hand, the use of technology in the school should be sustainable for the environmental impact, with policies for the re-use and maintenance of the devices. Students should be involved in these management.
- Safety also is a digital competence that can be adopted in secondary school in a transversal way, although it is linked with the **citizenship curricular area**.

Problem Solving

This competence is referred to identify needs and problems and to resolve conceptual problems and problem situations in digital environments.

- Problem solving is also a competence in the secondary curriculum. In this sense, the use of digital technologies can facilitate the problem-solving processes according to new knowledge acquisition, for example, through **Design Thinking projects** (Androutsos & Brinia, 2019).
- The use of **Artificial Intelligence** with an ethical approach can support these processes (Akgun & Greenhow, 2021).
- Other actions to achieve this competence can be **robotics and programming**, promoting computational thinking (Arís & Orcos, 2019).





Also, digital tools should be used to innovate processes and products and to keep up to date with digital evolution. The use of digital tools can be inherent in the learning processes to improve knowledge acquisition.

- Following the **SAMR mode**⁴ can be a good practice to include technology in learning activities, considering when to use technology; substitute another tool; augment the results; modify the teaching practices; and redefine new processes (Puentedura, 2010).
- The **TPACK model**⁵ also can help to design learning processes including technology (Koehler & Mishra, 2009).

Title	Using Games to Learn Cyber Security and Misinformation
Authors	NGO Centre for innovations and digital education Dig-Ed, Skopje, North Macedonia
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none">• Information and data literacy – advanced• Communication and collaboration – advanced• Digital content creation – advanced• Safety – advanced• Problem solving - advanced
Level(s) of education	Secondary education
Why is this selected?	Students develop knowledge and skills on cybersecurity and misinformation through peer learning and game-based approach. Students develop critical thinking skill and digital skills by creating engaging learning environment. Open educational resources are produced as the result of this activity.
Learning objective(s)	<ul style="list-style-type: none">• Deepening students' knowledge on cybersecurity and misinformation• Developing students' communication, collaboration and digital skills• Establishing students' community where students will be open for discussion and sharing opinions• Creating a database with educational resources on project's topics that will be free for re-use

⁴ More information about the SAMR model can be found here: <http://www.hippasus.com/rrpweblog/archives/2014/01/31/SAMRAnAppliedIntroduction.pdf>.

⁵ More information about the TPACK model can be found here: <https://www.digitaltechnologieshub.edu.au/understanding-dt/professional-learning/tpack-model/>.





Description	<p>The activity is implemented as a peer learning activity where students from upper grades develop lectures and games for teaching lower grades students on cybersecurity and countering misinformation.</p> <p>At the beginning upper grade students, working in groups, deepen their knowledge on the topics connected with cybersecurity and misinformation. They search for information online, assess it, make conclusion based on facts and create digital educational materials that can be used during lectures on those topics. In this way, upper grade students create higher understanding for the topics and develop their digital skills.</p> <ul style="list-style-type: none"> • Students from upper grades give lectures to the students from lower grades, starting discussion with them, by explaining their own experiences and initiating some talks, to make younger students more collaborative. Through these classes, the most challenging issues concerning cybersecurity topic for the students from lower grades, that should be discussed and explained in more details, are identified. • Based on this feedback students from upper grades develop interactive games in Scratch with the same aim: to deepen knowledge about concrete topic by offering players concrete examples. Lower grade students play games and learn more deeply on given topic in a fun and engaging way. • Improved games based on students' feedback are shared as open educational resources.
Reuse	This methodological approach can be easily used with different students age concerning different topic .
Tools	Microsoft Power Point, Canva, Genially, Kahoot, Scratch
More information	Using Games to Learn Cyber Security and Misinformation Archives - Center for Innovations and Digital Education (dig-ed.org)

Title	Interdisciplinary Projects with Micro:bit
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none"> • Digital content creation – intermediate • Problem solving – intermediate
Level(s) of education	Secondary education
Why is this selected?	In today's technology-driven world, developing students' basic programming skills is a necessity. Micro:bit is a small, programmable microcontroller designed for educational purposes, aiming to introduce students to coding and electronics in an accessible and engaging way. Through solving real-life problems with Micro:bit students will develop programming skills and create innovative products in a fun and engaging way.
Learning objective(s)	<ul style="list-style-type: none"> • Analysing real life problems and thinking about solution idea • Programming Micro:bit to implement the solution algorithm • Creating final product with Micro:bit





Description	<p>Students are introduced to project ideas for solving real-life problems, e.g., designing local weather station, plant watering system, safety alarms, environmental monitoring, etc. Based on their interest they choose a project that they will be working on, and groups are formed.</p> <p>Students work in groups to think about possible problem solutions, search online for information and provide necessary equipment that should be used for creating a final product. They write an algorithm with the instructional steps for their project idea and test hands-on Micro:bit. If their product does not work correctly, they analyse the code, trying to correct the mistake and they then test again. In that way students learn through trial and error.</p>
Reuse	<p>Micro:bit can be used in different grades in secondary school depending on the project complexity. Lower grade students can use MakeCode visual editor Microsoft MakeCode for micro:bit (microbit.org) and upper grade students can use Python text-based programming editor micro:bit Python Editor (microbit.org)</p>
Tools	<p>Let's code micro:bit (microbit.org)</p>
More information	<p>More project ideas can be found at Projects (microbit.org)</p>

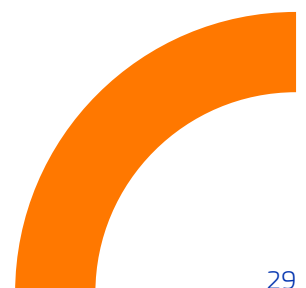
Title	Exploring AI through Digital Art
Authors	Common Sense Media
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none"> Information and data literacy – intermediate Communication and collaboration – intermediate Digital content creation – intermediate
Level(s) of education	Secondary education
Why is this selected?	Students consider the ethical dilemmas of using AI to create content, and identify the appropriate use of these tools in education
Learning objective(s)	<ul style="list-style-type: none"> Defining artificial intelligence (AI) and generative AI, and their potential impacts on education. Discussing about ethical use AI in education.
Description	<p>Students discuss about the development of AI and its implementation in education, especially focusing on generative AI. They watch What to Know About OpenAI's Chatbot episode from the Wall Street Journal's Tech News Briefing podcast and fill the worksheet about what is ChatGPT, how it works, what are its limitations, and point out things that they want to learn more about. Discussion about the possibilities of using ChatGPT in the classroom is started.</p> <p>Students analyse a document the Original Author Student Handout, where they should give their opinion about the student that presents ChatGPT produced document as his own. During the discussion each student gives his opinion on the topic, but also listens to different perspectives. Should AI recommendations not be used without human intervention?</p> <p>Students develop digital resources about ethical use of generative AI tools, such as ChatGPT.</p>
Reuse	The main idea of the activity is to start a discussion about the impact of artificial intelligence on how we learn and create. So it can be reused with different students age, in different subjects, just by changing the topic of the document originality or the dilemma that will be presented to the students.
Tools	ChatGPT
More information	Artificial Intelligence: Is It Plagiarism? Common Sense Education





Title	Internet Rights: Towards Digital Ditzenship
Authors	Istituto Tecnico settore Tecnologico "G. Marconi", Campobasso - Italy
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none"> • Information and data literacy – intermediate • Communication and collaboration – intermediate • Digital content creation – intermediate • Security - intermediate
Level(s) of education	Secondary education
Why is this selected?	This Digital Curriculum aims to acquire (at different levels) the knowledge, skills and attitudes necessary for the exercise of Internet Rights, as enshrined in the Declaration of Internet Rights .
Learning objective(s)	<ul style="list-style-type: none"> • Knowledge: the knowledge that there is an Internet Declaration of Rights, the understanding of the articles in which it declines, the context in which these articles are included. • Ability: the ability to recognise these rights, to know how to decline them and put them in relation to their online conduct and to understand the boundary between their rights and the rights of others. • Attitude: the ability to develop a critical and ethical approach that allows the users to exercise their rights consciously and independently online.
Description	<p>The overall objective of the project is to create and test a Digital Curriculum aimed at developing and strengthening the digital skills of students in the first cycle of education and the first two years of the second cycle of the schools that make up the project network. In particular, knowing how to know, recognise, respect and exercise the Rights of which they are bearers, as sanctioned by the Internet Declaration of Rights and more generally by the UN Convention on the Rights of the Child and Adolescence (CRC).</p> <p>The network of schools involved in the project proposal consists of schools that cover the entire age range to which the Digital Curriculum is proposed, from the five years of primary school to the first two years of secondary school, passing through the three-year period of secondary school of first degree.</p>
Reuse	This activity can be easily used in any subject across different student grades.
More information	The curriculum "Rights in the Internet" (in Italian language)

Title	Create your own Digital Fingerprint
Authors	Liceo Scientifico e Linguistico Statale Ceccano – Italy
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none"> • Information and data literacy – intermediate • Communication and collaboration – intermediate • Digital content creation – intermediate • Security – intermediate • Problem solving – intermediate
Level(s) of education	Secondary education
Why is this selected?	Education on "life on the net" enters the curriculum from kindergarten and accompanies to adulthood and beyond with a basic literacy to which digital skills are added, essential to participate in the information and knowledge society and exercise the rights of digital citizenship.





Learning objective(s)	<ul style="list-style-type: none"> • Developing students' communication, collaboration and digital skills • Developing students' knowledge and skills on digital footprint
Description	<p>More than 30 schools in the Lazio region have been working together since 2016 to develop a curriculum to build their own digital footprint.</p> <p>The project offers all teachers a vertical curriculum hypothesis, from kindergarten to secondary school.</p> <p>Education on "life on the net" enters the curriculum from kindergarten with a basic literacy to which digital skills are added, essential to participate in the information and knowledge society and exercise the rights of digital citizenship.</p> <p>The project includes activities for each school year, diversified on the basis of the age of the students and their relationship with digital environments.</p>
Reuse	This activity can be easily used in any subject across different students' grades.
More information	Create your own digital fingerprint (in Italian language)

Title	Engaging in Fact-checking
Authors	European Commission, Directorate-General for Education, Youth, Sport and Culture
Learning objective(s)	<ul style="list-style-type: none"> • Students can determine if information is trustworthy • Students can judge the accuracy of information • Students can use legitimate sources • Students can think about information in a critical way
Level(s) of education	Secondary I & II (depending on the difficulty of the article)
Which areas of DigComp it contributes to	Information and data literacy: 1.1. Browsing, searching and filtering data, information and digital content 1.2. Evaluating data, information and digital content
Is it knowledge, skills or attitude?	Knowledge & Skills
What proficiency level of DigComp this aligns to	Foundation
Description	<p>Description from the Guidelines: Have students fact check media statements from that day or that week to make it relevant. You will need to guide them to some sources you have identified in advance. When conducting this work, the students can ask themselves – whether done individually or in small groups - the following questions:</p> <p>WHAT sources can I/we trust?</p> <p>WHERE can I/we find these sources?</p> <p>WHAT emotions does the information attempt to evoke, if any?</p> <p>WHY was this article written, what was its purpose?</p> <p>WHAT kind of reader was this article written for (target group)?</p>



Why is this selected?	We do fact-checking when we verify if information is true or false. Students learn strategies on how to critically evaluate and reflect on information from the internet, for example, and can thus also be protected from fake news in a preventive way.
Reuse	<p>Example taken from the guidelines:</p> <p>You are researching global warming and you come across this website: https://friendsofscience.org. Please decide if this website is a trustworthy source of information global warming. You can also open a new tab and do an internet search if that helps.</p> <p>1. Is this website a trustworthy source for learning about global warming?</p> <ul style="list-style-type: none"> • Yes • No <p>2. Explain your answer, citing evidence from the webpages you used. Be sure to provide the URLs to the webpages you cite.</p> <p>[open field for answer]</p>
Tools	Guidelines for teachers and educators on tackling disinformation and promoting digital literacy through education and training
Website for more information	Digital Education Action Plan – Action 7

4.3. Technical and Vocational Education

Technical and vocational education increasingly calls for an integration of digital skills into its curriculum, recognising their critical role in a technologically advanced society. This emphasis goes beyond students' familiarity with technical tools; it encompasses a broader spectrum of competencies. These include among others the ability to efficiently locate, organise, and analyse digital information, the skill to effectively communicate and collaborate through digital mediums, generating and curating digital content, and the critical thinking needed for solving complex problems in a digital context. Additionally, there is a strong focus on digital safety and ethical practices, ensuring that students are prepared not only to thrive in a digital environment but to do so responsibly and securely. This comprehensive approach in technical and vocational education ensures that students are not just keeping pace with technological advancements but are also equipped to drive innovation in their future professional fields.

Title	Digital Learning Ecosystem Based on the STEAM Gamification Concept
Level(s) of education	TVET
Authors	Kummanee, Jiraphorn; Nilsook, Prachyanun; Piriyasurawong, Pallop; Wannapiroon, Panita
Learning objective(s)	<ul style="list-style-type: none"> to develop innovator characteristics of vocational learners, which play an important role in the development of the country, as a guideline for developing learners to have knowledge, skills, good attitude in working in the organisation, or entrepreneurship in the future; to promote the lifelong learning characteristics of learners, from applying and utilising the self-development process with the scientific and artistic thought processes that are possible to create innovations for solving problems and developing society and the nation in the future.
Which areas of DigComp it contributes to	<p>Communication and collaboration: To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital presence, identity and reputation.</p> <p>Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.</p>
Is it knowledge, skills or attitude?	Skills and attitude
What proficiency level of DigComp this aligns to	<p>Communication and collaboration: INTERMEDIATE</p> <p>Problem solving: INTERMEDIATE</p>
Description	The proposed conceptual framework has a number of important components, namely: STEAM Education: Teaching and learning by integrating five branches of learning in the form of S (Science), T (Technology), E (Engineering), A (Arts), and M (Mathematics). The aim is to develop a range of skills in order to apply knowledge to solving real-life problems, to create new processes or products that are artistically beautiful, and which are useful both for work and daily living.
Why is this selected?	According to the evaluation, the experts rated the model as being highly appropriate. As a result, this model is appropriate and can be used to enhance vocational students' creativity and innovation skills.



Reuse	<p>Carrying out classroom learning activities, using educational learning processes which focus on integrating science, and teamwork to develop innovative skills, consists of five steps:</p> <ol style="list-style-type: none">1. Problem definition: by researching and collecting data from various learning sources in order to define real problems. This includes: i) Problem definition, ii) problem solving design, iii) problem solving tool construction, iv) test procedure interpretation and improvement of problem-solving methods, and v) presentation stage/solution methods.2. Designing tools: This involves problem solving process design by using mathematics and technology. It is the application of technology and knowledge in mathematics to design solutions.3. Producing instruments: Test procedure interpretation and improvement of problem-solving methods in order to develop tools according to the form created.4. Testing: interpretation, and improvement procedures. These are the tools or solutions that are designed to solve problems, and suggest effective improvements.5. Presenting: Presentation process / problem solving methods. Students present a solution to problems or present innovations created in order to exchange knowledge between learners.6. In carrying out the learning activities, teachers use the gamification mechanism to stimulate interest and fun in the classroom. <p>There may be a selection of easy, medium, or difficult levels in order to ensure that they suitable for the ability of the game players, or sometimes the level may be determined the players themselves, by using experience points they may have gained. Collecting experience at a certain point will increase the experience level and these will become higher throughout the game.</p>
Tools	Hardware, software, databases, networks, and pedagogical theories.
Website for more information	<p>http://www.ijiet.org/show-142-1654-1.html</p> <p>https://link.springer.com/chapter/10.1007/978-3-031-26190-9_73</p> <p>https://link.springer.com/chapter/10.1007/978-3-030-40271-6_68</p>






Title	Remote Learning and Examination based on Augmented Reality
Level(s) of education	TVET
Authors	Acevedo-Reveron, Aaron M.; Camilleri, Christian; De-Raffalle, Clifford; Deguara, David; Zammit, Edwin; Smallegange, Jan; Butnaru, Adrian; Mora, Carlos E.
Learning objective(s)	<ul style="list-style-type: none"> to define a set of learning outcomes to develop three demo scenarios to test and demonstrate the system of Remote Learning and Examination based on Augmented Reality, which is based on the RealWear HMT-1 assisted reality hands-free computer; to focus on the professional competencies, students will acquire, the expected learning outcomes, the required knowledge, and the transferable skills required by students to perform professionally.
Which areas of DigComp it contributes to	Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.
Is it knowledge, skills or attitude?	Knowledge, skills, attitude
What proficiency level of DigComp this aligns to	Advanced
Description	<p>Each scenario's methodology is based on three components that facilitate the adoption of active learning in Engineering Education: Curriculum, Pedagogy, and Technology.</p> <p>Curriculum: he curricular aspect is built-in base on the descriptors proposed by EQF level 4, Knowledge, Skills, and Responsibility and autonomy. From these descriptors are extracted four aspects: Professional competencies, Learning outcomes, Subject knowledge, and Transferable skills.</p> <p>Pedagogy: Pedagogical framework for Demo Scenario design is based on active learning and remote learning. The instructor's role during the process is to guide and facilitate the learners through their actions and to give feedback when it's needed.</p> <p>Technology: Technological integration describes how and when assisted reality system should be incorporated into the learning process. For this purpose, HMT-1 device is the chosen tool by the consortium, leaving other devices based on AR and VR as feasible options for similar scenarios. Learning Management Systems (LMS) and videoconferences are useful tools to use in the digital active learning progress, to follow and share between learners and instructor in asynchronous or synchronous ways, respectively.</p>
Why is this selected?	Remote Learning and Examination based on Augmented Reality (RELAR) is a European Erasmus+ project (2020-1-NL01-KA226-VET-083043) that aims to create a crisis-proof resilient education environment, enabling remote coaching and digital skills training based on AR.






<p>Reuse</p>	<p>Demo scenario workflow in general words, RELAR demo scenarios are divided into 3 phases (see figure below).</p>  <p><i>Figure 3; RELAR digital active learning process. Acevedo et al. (2022): Remote learning and examination based on augmented reality; Image source: SEFI 50th Annual conference of The European Society for Engineering Education, p. 911, licensed under CC BY NC ND 4.0.</i></p> <p>The first phase focuses on the activation of previous knowledge, where students can be exposed to the topic knowledge that they already should know. Using self-evaluation tests and having an open discussion between classmates and instructor is a proper way to know and understand lack of knowledge or misconceptions from the learners, facilitating flexible variations during the learning experience. The second stage's aim is to create new knowledge and competencies. Learners themselves must work as teams to investigate digital content about the topic and elaborate their own content to take action in training. During this stage, learners can receive instant feedback from the instructor via HMT-1 (expert coaching). At the third stage, the knowledge has to be consolidated, expecting that it can be transferred to new situations in learners' future professional environment. For this stage, learners may build their own workflow to follow in the expected problem. The learner action can be recorded by the HMT-1 device to receive asynchronous feedback from the instructor (digital workflow). This final stage could be used as an assessment of the topic.</p>
<p>Tools</p>	<p>HMT-1, HoloLens, HP Reverb, LMS, videoconferences</p>
<p>Website for more information</p>	<p>https://upcommons.upc.edu/handle/2117/384165 https://www.puterea.ro/marinarii-romani-vor-fi-scoliti-si-cu-ajutorul-realitatii-augmentate-si-aplicatiilor-speciale/ (in Romanian language) https://www.realwear.com https://www.microsoft.com/en-us/hololen</p>





Title	ACOUCOU Platform to Acquire Professional Skills and Knowledge in the Field of Acoustics
Level(s) of education	TVET
Authors	Karolina Jaruszewska; Filip Barański; Magdalena Piotrowska; Manuel Melon; Oliver Dazel; Michael Vorländer; Lukas Aspöck; Marko Horvat; Kristian Jambrošić; Monika Rychtáriková; Leopold Kritly; Andreas Herweg
Learning objective(s)	<ul style="list-style-type: none"> Create space for new, innovative and multidisciplinary approaches for teaching and e-learning acoustics (e.g., based on gamification, VR, or web simulators).
Which areas of DigComp it contributes to?	Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.
Is it knowledge, skills or attitude?	Knowledge and skills
What proficiency level of DigComp this aligns to	Advanced
Description	The ACOUCOU Platform (http://acoucou.org/) is a part of a strategy aimed at expanding and strengthening acoustic knowledge, supporting the development of innovative teaching methods based on attractive and effective delivery of content, services, teaching methodologies and practices at national and international levels. The form of materials and courses published on the Acoustic Courseware Platform are suitable to be used for self-learning as well as in blended learning, where an educator uses materials from the platform to carry out training among employees/students. Technical, professional knowledge is usually presented as text including equations and technical drawings. Presenting it in a visually attractive form is more appealing and increases the motivation of the users. The visualization of phenomena simplifies the understanding of problems and makes it easy to acquire knowledge in similar, practical situations of an engineer's work.
Why is this selected?	ACOUCOU receives positive feedback from universities, business partners, educators and self-educating professionals. In future, ACOUCOU Team is hoping to continuously address upcoming challenges in education and awareness in field of acoustics.
Reuse	Free access to knowledge is one of the main foundations of ACOUCOU. The platform is designed to serve as modern self-development tool for engineers, young professionals, students and other individuals interested in acoustics. ACI consists of materials enriched with case studies as VR videos. Effects can be watched on a computer or using the VR headset. The form of materials and courses published on the ACOUCOU Platform is suitable to be used for self-learning as well as in blended learning, where an educator uses materials from platform to carry out training among employees/students.
Tools	Acoucou, VR
Website for more information	http://publications.rwth-aachen.de/record/769865/files/769865.pdf https://acoucou.org





Title	Active Teaching Strategies Supported by Different Technological Tools
Level(s) of education	TVET
Authors	Campaña-Jiménez, Rafael Luis; Gallego-Arrufat, María Jesús; Muñoz-Leiva, Francisco
Learning objective(s)	<ul style="list-style-type: none"> Acquisition of digital, professional, social and personal competence
Which areas of DigComp it contributes to	<p>Communication and collaboration: To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital presence, identity and reputation.</p> <p>Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.</p>
Is it knowledge, skills or attitude?	Knowledge, skills, attitude
What proficiency level of DigComp this aligns to	Intermediate
Description	The educational center where the study takes place has Google Apps accreditation, which provides a comprehensive package of tools for communication and collaboration. In the acquisition of competences, didactic strategies supported by tools such as email, chat, shared documents, blogger, calendars, Google sites, YouTube, Picasa and Google maps are used. In addition, there is a Learning Management System (LMS) based on Moodle as a repository for documents and two-way communication with the student
Why is this selected?	The active methodology with diversity of technologies provides a new way of learning in pre-professional studies. The application of new and multitude of strategies has provided teaching and learning models that enhance motivation and creativity, but also contribute to improve initiative, learn from mistakes, increase communication channels between teachers and students, facilitate collaborative learning, providing a high degree of interdisciplinarity and improving written and oral expression skills. This training environment where a variety of strategies are used is defined as the medium where the student is the true protagonist of their learning, physically interacting with other classmates by being face-to-face, and where the teacher becomes the facilitator, advisor, adviser of that learning.
Reuse	A series of activities are proposed (see Campaña-Jiménez et al. 2019, pp. 226-229) that are related to professional, personal and social skills. These activities are described in the classroom schedule of the training module: objectives, content, strategies, tools and evaluation. Some activities are carried out individually and others through groups organised by the teaching staff. This is to promote the interpersonal relationships of students.
Tools	Email , chat , shared documents , blogger , calendars , Google sites , Youtube , Picasa and Google maps LMS Moodle
Website for more information	https://educar.uab.cat/article/view/v55-n1-campana-gallego-munoz



Title	Mobile Learning in a Strength of Materials Course
Level(s) of education	TVET
Authors	Luis Celorrio-Barragué
Learning objective(s)	<ul style="list-style-type: none"> • to learn the concepts and procedural contents of the course in a faster and more enjoyable manner "Strength of Materials"; • improving students' academic results; • developing certain competences and improving technological skills; • use of mobile technology. Students must know how to operate and maintain their own phone. For example, to know how to: install and uninstall apps, locate a file in the memory, check phone's status, especially the battery, memory and space available in their phone. • use of cloud storage tools. The exercises completed with the mobile phone must be saved in a safe location and the cloud is the ideal site. There are several free cloud storage tools like Dropbox, Google Drive and others. • use of instant message apps (for example: WhatsApp).
Which areas of DigComp it contributes to	<p>Information and data literacy: To articulate information needs, to locate and retrieve digital data, information and content. To judge the relevance of the source and its content. To store, manage, and organise digital data, information and content.</p> <p>Communication and collaboration: To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital presence, identity and reputation.</p> <p>Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.</p>
Is it knowledge, skills or attitude?	Knowledge, skills, attitude
What proficiency level of DigComp this aligns to	Intermediate
Description	The activities were based on two applications available in app stores or repositories: Mechanics of Materials and Frame Design. Frame Design is a powerful app based on the Finite Element Method for conducting linear static structural analysis of plane structures. Statically indeterminate beams and frames are studied for three weeks during the course. Computer labs are designated for teaching how to use a software specific to the area of Mechanics of Materials called MdSolids.
Why is this selected?	Students appreciated these activities because the learning experience progressed more quickly and proved to be more enjoyable, and they also felt more motivated. Furthermore, students improved their academic results as compared to previous years when these apps were not incorporated. This real experience with mobile learning demonstrated other advantages as well: competences in ICTs improved, along with skills involved with using mobile devices.
Reuse	The pedagogical approach is well described in the research and the apps are available on App stores for reuse in other educational settings.
Tools	Mechanics of Materials (Learn Mechanical Engineering), Frame Design , MdSolids
Website for more information	https://dl.acm.org/doi/10.1145/3012430.3012571

Title	Dialogical Authentic Netlearning Activity (DIANA)
Level(s) of education	Vocational education
Authors	Helena Aarnio, Jouni Enqvist (interpretation Sanna Ruhalahti, Anne-Maria Korhonen, Päivi Rasi)
Learning objective(s)	<ul style="list-style-type: none"> the learning designing for existing digital, open and mobile learning environments to create a general view of authentic and dialogical knowledge construction
Which areas of DigComp it contributes to	<p>Communication and collaboration: To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital presence, identity and reputation.</p> <p>Digital content creation: To create and edit digital content. To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licences are to be applied. To know how to give understandable instructions for a computer system.</p> <p>Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.</p>
Is it knowledge, skills or attitude?	Knowledge, skills, attitude
What proficiency level of DigComp this aligns to	Advanced
Description	<p>The renewed DIANA model</p> <p>The cornerstones of the model are called functional dimensions. It is thought to facilitate the planning and implementation of the learning process. The renewed model takes into account working in the varying learning environments and communities of the digital age.</p> <p>The titles and contents of the cornerstones of the DIANA model follow.</p> <p>A Creating a common basis for learning together (A1, A2, A3)</p> <ul style="list-style-type: none"> A1 The idea of dialogical and authentic learning A2 Preparing for dialogical participation in the learning community A3 Structuring and starting collective work <p>B Enabling authenticity in learning (B1, B2)</p> <ul style="list-style-type: none"> B1 Deriving authentic learning tasks (starting problems) learner-centredly from real-life and work situations, formulating problems using language used by students, the starting point being their everyday conceptions B2 Using authentic sources and materials/data to create content and products C Enhancing learning through dialogic methods of operation (C1, C2, C3) C1 Solving problems and constructing knowledge through dialogical actions C2 Working as equals, participating reciprocally and symmetrically, listening to others, open and constructive inquiry and weaving syntheses C3 The focus is on open, inquiring questions that are used to find solutions and create content <p>D Combining theory and practice in learning (D1, D2)</p> <ul style="list-style-type: none"> D1 Alternating theory and practice, weaving a synthesis, finding gaps in thinking and actions, formulating new problems D2 Continuous reflection and evaluation throughout the learning process – individually and collectively on the basis of those gaps

Why is this selected?	<p>This model creates opportunities for authentic, dialogical and collaborative learning experiences while integrating mobile learning technologies with a structured learning design.</p> <p>The mobile applications brought new and enriching aspects to collaborative knowledge construction. The model provides an example of educational openness for professional teachers who wish to design, teach and integrate new open technologies into education, use open content and transparently construct their knowledge.</p>
Reuse	<p>The study module was designed and implemented using the DIANA model. The main components of the learning environment provided by the facilitators were an open course blog, containing freely accessible educational resources and open blogs for the study circles. The module was designed so that each collaborative learning application could be accessed via mobile devices. Three of the four module implementations included contact teaching, while the remaining course was solely based on online and mobile learning environments. The model is well described and so could be implemented and reused in other contexts.</p>
Tools	Blogger, Facebook, Google Drive, WhatsApp
Website for more information	https://www.tandfonline.com/doi/full/10.1080/00131881.2017.1369858 https://journal.fi/akakk/article/view/84877

Title	Online Video to Explore Vocational Learning on YouTube for Interactive Service Work
Level(s) of education	Vocational education
Authors	Charlotte Arkenback
Learning objective(s)	<ul style="list-style-type: none"> Learning interactive service work that focusing on connected service encounters in which transactions and customer service are intertwined through interaction with digital technologies.
Which areas of DigComp it contributes to	Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.
Is it knowledge, skills or attitude?	Knowledge, skills, attitude
What proficiency level of DigComp this aligns to	Advanced
Description	<p>Increasingly, public video-sharing sites like YouTube are used by firms, educators and learners to teach and learn about work practices, new work roles and skills. However, more knowledge is needed about what instructional videos exist and how they facilitate vocational learning. This practice draws from online video research to explore vocational learning on YouTube for interactive service work. Focusing on connected service encounters in which transactions and customer service are intertwined through interaction with digital technologies, cashier work was used as the empirical case.</p>
Why is this selected?	Online instructional videos have been presented as an efficient instructional method in workplace learning and vocational education and training (VET).
Reuse	Videos are viewed during theoretical and practical classes, as well as during independent work.
Tools	YouTube
Website for more information	https://www.tandfonline.com/doi/full/10.1080/13636820.2023.2180423



4.4. Higher Education

The attainment of digital skills has become critically important for students undertaking university degree education in order to enhance and heighten their employability, and to ensure they have acquired a range of competences to successfully participate in an increasingly digital society.

According to a study by Gaebel, Zhang, Stoeber & Morrisroe (2021), 54% of Higher Education institutions in Europe offer students the opportunity to engage in courses and training that address general digital literacy within all or most study programmes. Whilst initiatives and learning programmes to build general digital literacy are useful and can assist students with gaining confidence in using multiple basic platforms, digital tools and other software, it is essential that students are also given the opportunity to acquire specific and more specialist digital skills that relate to their discipline/field of study. Only 41% of Higher Education institutions in the study have integrated specific digital skills development into all or most of their programmes. 49% of Higher Education Institutions do, however, have a voluntary offer that students can opt in to.

Higher Education institutions are well-placed to support students with developing relevant and applicable digital skills that they can utilise in specific job roles (e.g., consultant, marketer, business analyst, scientist, engineer) as well as within specific industry sectors (e.g., banking, retail, consulting, engineering). The use of digital tools and platforms can be incorporated into assessments, projects, immersions, research reports, scenario weeks and other live and hybrid learning experiences. These can be designed to provide students with practice-based learning, creating the conditions for students to actively put the tools to work to test their capabilities, and combine tools to drive higher level outputs, whilst also understanding the limitations of their use.

When organisations, across industry sectors, hire new recruits, many of these roles will require candidates to demonstrate some level of digital skills and competences. A study by the OECD (2022) found that in EU countries, jobs that require digital skills make up a significant amount of job postings online, ranging from



7% in France to 12% in Spain. Whilst not all of these job roles target recent university graduates, it does emphasise the critical role that Higher Education institutions have in preparing students for a labour market that increasingly values applicants who can demonstrate their ability to use digital tools, software and platforms.

Good practices in Higher Education

In this section we introduce several examples of how digital skills can be acquired through innovative and impact-driven learning experiences that can be incorporated into the curriculum across faculties and degree programmes.

Title	Impact on People and Planet (with AI)
Authors	Dr. Catalina Mueller
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none"> Information and data literacy - intermediate Communication and collaboration - intermediate Digital content creation – intermediate
Level(s) of education	Undergraduate, Graduate
Why is this selected?	<p><i>(Which change in behaviour related to digital skills we want to see after the session)</i></p> <p>Evaluate the credibility and reliability of generative AI tools and other digital sources of information</p>
Learning objective(s)	<ul style="list-style-type: none"> Understand the ESG framework (environmental, social, governance) and its importance Identify key ESG principles associated with product management Use a generative AI tool to answer questions and critically assess the results
Description	The session includes the icebreaker "Would you rather" with a sustainability focus (e.g., "Would you rather have the power to make products last forever or the power to make products biodegrade faster?"), individual activities, small group activities and plenary activities. Participants are divided in 3 groups and assigned one concept (E, S or G) to get familiar with by interacting with a generative AI tool. Then they discuss findings in relation to two areas: the concepts that need to be understood and the experience of using a generative AI tool.
Reuse	<ul style="list-style-type: none"> Replace the concept in focus (ESG) with any other concept that requires more than two independent layers of understanding and assign them to several groups to check and discuss. Use different types of generative AI tools to compare results.
Tools	<p>A generative AI tool (ChatGPT, Bing, Bard)</p> <p>A virtual space for collaboration (Google Sheets / Miro)</p>
More information	https://www.sessionlab.com/templates/esg-framework-workshop/





Title	The Digital Debate: Developing a Rich Web-based Resource
Authors	Dr Rikke Duus
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none"> Information and Data Literacy – intermediate Communication and collaboration - advanced Digital Content Creation - advanced Problem Solving – intermediate to advanced
Level(s) of education	Undergraduate, Postgraduate
Why is this selected?	Students acquire the ability to design and develop a rich web-based resource, whilst also showcasing their ability to develop an evidence-based debate on a highly relevant topic.
Learning objective(s)	<ul style="list-style-type: none"> Analyse information and insight from a multitude of sources to develop a set of arguments Develop an informed stance by comparing and contrasting key issues Explain how organisations are involved in driving social and community-based impact Demonstrate the ability to use 3-4 different digital tools in combination to create an informative and engaging web-based debate platform
Description	<p>This is an assessed, individual submission. Students develop a critical debate on one of three topics: AI in Healthcare, Digital Transformation of Education, or Evolution of Smart Cities. As part of their debate and within the chosen topic, students consider how organisations can deliver on related UN Sustainable Development Goals.</p> <p>Based on extensive academic and secondary research, each student is required to develop a total of 15 minutes of video-based recordings of themselves debating the key issues related to their chosen topic. The 15 minutes are split into four shorter videos that focus on specific areas of the debate (i.e. setting the scene, arguments for, arguments against, a final stance). Students create their own website with Wix.com and make the videos available on this site. The videos are complemented by three data visualisations, an infographic related to the topic and 1,000 words of written content by the student. These different digitised components created by students lead to a rich web-based platform, exploring the students selected topic and enabling students to present an evidence-based debate. This output is also shareable with current and potential employers.</p>
Reuse	<ul style="list-style-type: none"> Other topics can be used other than AI in Healthcare, Digital Transformation of Education, or Evolution of Smart Cities Choose a different suite of digital tools for the creation of the digitised components and the web-based platform
Tools	Wix, iMovie, Loom, Lumen5, Genially, Flourish, Infogram
More information	<p>Duus, R. and Cooray, M. (2022). Dare to evolve: <i>Re-assessing assessments in Business Schools</i>. Chartered Association of Business Schools (CABS).</p> <p>https://charteredabs.org/dare-to-evolve-re-assessing-assessments-in-business-schools/</p>




Title	Digital Agility Enhanced through Peer Learning
Authors	Dr Rikke Duus, Dr Mike Cooray
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none"> • Communication and collaboration - advanced • Digital Content Creation - advanced • Problem Solving – intermediate to advanced
Level(s) of education	Undergraduate, Postgraduate
Why is this selected?	Students acquire the ability to use 5-6 different digital tools to create impactful digital marketing content and campaigns for selected organisations.
Learning objective(s)	<ul style="list-style-type: none"> • Design a digital marketing campaign concept with a clearly defined purpose and set of outcomes for a chosen organisation • Create a recorded campaign presentation including mock-ups and visuals of campaign content • Demonstrate the ability to use 5-6 different digital tools in combination to create the presentation in an impactful and effective manner • Critically review the work of other teams and provide recommendations for improvements
Description	Over 6 weeks, students work in teams to design and develop a digital marketing campaign for a chosen organisation. The output is a 10-minute recording in which the teams present their campaign. In the recording, students introduce the business context and key challenges for the chosen organisation, justify their creative campaign idea, present the campaign mock-up content, specific objectives and an action plan for delivery. As part of this 6-week team assignment, student teams contribute to the Digital Peer Learning Hub. The Digital Peer Learning Hub is an online, interactive platform set up and managed by the module team. In each weekly session, teams use a new digital tool to complete a task related to the campaign. These outputs are uploaded to the Digital Peer Learning Hub for all teams to see, learn from and be inspired by. Teams also engage in structured peer-feedback. This propels forward progress for all teams and create a heightened level of transparency.
Reuse	<ul style="list-style-type: none"> • Replace the 'digital marketing campaign' with any other assessed output/project • Choose a different suite of digital tools
Tools	Lucidchart, Lumen5, Genially, Canva, Figma, Flourish
More information	<p>Duus, R. and Cooray, M. (2022) Empowering Students to Learn from Each Other. Harvard Business Publishing Education. August.</p> <p>https://hbsp.harvard.edu/inspiring-minds/empowering-students-to-learn-from-each-other</p> <p>Duus, R. and Cooray, M. (2022). Enable learners to become confident digital explorers. Times Higher Education.</p> <p>https://www.timeshighereducation.com/campus/enable-learners-become-confident-digital-explorers</p>




Title	AI for Good: Developing Ethical and Socially Responsible AI Solutions
Authors	Dr. Virginia Dignum
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none"> Information and Data Literacy Communication and collaboration Safety Problem Solving
Level(s) of education	Postgraduate
Why is this selected?	Students develop the ability to design and develop ethical and socially responsible AI solutions that address real-world problems and align with human values and principles.
Learning objective(s)	<ul style="list-style-type: none"> Identify and analyse the ethical and social implications of AI applications in various domains Apply ethical frameworks and guidelines to evaluate and improve the design and development of AI solutions Use a variety of AI tools and methods to create and implement AI solutions that are aligned with human values and principles Communicate and collaborate effectively with different stakeholders and users of AI solutions Reflect on the role and responsibility of AI developers and practitioners in society
Description	This is an assessed, group-based project. Students work in interdisciplinary teams to create an AI solution that addresses a real-world problem related to one of the UN Sustainable Development Goals. An AI solution is a system or application that uses AI techniques such as machine learning, natural language processing, computer vision, or robotics to perform tasks or provide services. Students use AI tools such as TensorFlow, IBM Watson, or Microsoft Azure to create their AI solutions. They also use ethical frameworks and guidelines such as the EU Ethics Guidelines for Trustworthy AI or the UNI Global Union Top 10 Principles for Ethical AI to evaluate and improve their AI solutions. Students are required to produce a prototype of their AI solution, a 10-minute video presentation of their project, and a 2,000-word report on their ethical analysis and evaluation.
Reuse	<ul style="list-style-type: none"> Other real-world problems can be used other than those related to the UN Sustainable Development Goals Other AI tools and methods can be used for the creation and implementation of AI solutions Other ethical frameworks and guidelines can be used for the evaluation and improvement of AI solutions Other formats and lengths can be used for the prototype, the video presentation, and the report
Tools	TensorFlow, IBM Watson, Microsoft Azure, EU Ethics Guidelines for Trustworthy AI, UNI Global Union Top 10 Principles for Ethical AI
More information	Dignum, V. (2019). Responsible Artificial Intelligence: How to Develop and Use AI in a Responsible Way. Springer. https://link.springer.com/book/10.1007/978-3-030-30371-6





Title	How to Reduce the Carbon Footprint of a Website
Authors	Dr. Catalina Mueller
DigComp area(s) & proficiency level(s)	<ul style="list-style-type: none"> • Safety - foundation • Problem solving – foundation
Level(s) of education	Undergraduate, Graduate
Why is this selected?	Websites contribute significantly to carbon footprints due to data centers and energy consumption, so learning to minimize this impact is a responsible and ethical choice. Moreover, many companies and organisations are prioritising sustainability and environmental initiatives, and having the skills to reduce a website's carbon footprint can be a valuable asset when entering the job market.
Learning objective(s)	<ul style="list-style-type: none"> • Understanding the environmental impact of websites • Utilising tools for website carbon emissions assessment • Implementing sustainable web practices
Description	Start by asking participants how familiar they feel they are with the topic of sustainability. Introduce statistics connected to the carbon footprint of digital activities and their context (for example, in 2023 it was estimated that each search generated 2 g of CO ₂ and a simple email, 4 g; context: daily there were 3,5 billion searches and 306 billion emails). Present one tool that estimates the carbon emissions of websites and ask participants to test a page of their choosing and write the results in a G Sheet. Then ask the participants to test 2 pages of the same organisation (one normal - https://organicbasics.com , and one low impact - https://lowimpact.organicbasics.com/eu). Discuss the results and the causes. Ask participants to reflect on what can be done differently for the website they chose to test in the first round.
Reuse	Prompt ChatGPT for ideas for your subject: "You are an experienced trainer and instructor for undergraduate students. You are creating a session for understanding the carbon footprint of websites in which participants learn to check the emissions associated with a website and see what can be improved. How can you link this activity to teaching [your subject]?"
Tools	<p>A virtual space for collaboration (Google Sheets / Miro)</p> <p>A tool to measure carbon emissions related to a website (WebsiteCarbon, Ecograder, Beacon)</p>
More information	<p>https://youtu.be/-nUZcGZYds</p> <p>https://www.webfx.com/blog/marketing/carbon-footprint-internet/</p>





4.5. Non-Formal Adult Education

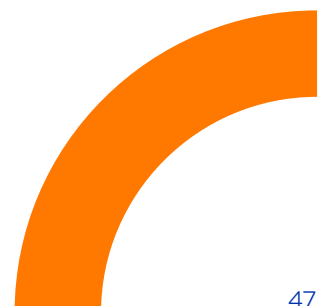
“Understanding the opportunities, challenges and impact of digitalisation on work and learning is important for every adult engaged in lifelong learning. It is key to supporting personal fulfilment and development, employability, social inclusion and active citizenship.” (Manifesto for Adult Learning in the 21st century: The Power and Joy of Learning, EAEA – European Association of the Education of Adults, 2019).

Lack of basic digital skills or digital literacy can affect the capacity of citizens to play an active role in society and even to access basic services and expose them to social exclusion. This risk becomes even more significant for citizens who may already be in a vulnerable situation of disadvantage, also considering the concept of intersectionality, a framework that identifies multiple aspects (social, political, personal etc.) that concur to a person identity and potential factors of advantage and disadvantage.

Digital literacy is more and more present in adult education programmes as one of the foundational literacies, together with language and financial skills, rather than a specialised set of competences only. The concept of literacy includes a broader perspective, considering the capacity to understand which kind of tools are relevant to the purpose and the context of use, the relations with social and ethical aspects, the characteristic of each tool, etc. In this view, digital literacy for all citizens can be seen as a fundamental right, a fundamental life skill and fundamental pillar for citizenship and personal development, not only related to employability and labour market or operationally oriented.

For adult learners (but not only), it is also important to consider the differences between technical skills (doing something), learning about digital technologies and learning through/with digital technologies, which is an advanced learning skill, linked to the “Managing learning” competence (as recently outlined in the LifeComp framework, a pillar for adult education programmes) and the possibility to have access to a broader offer of educational activities. In fact, one of the core purposes of non-formal adult education, beyond supporting global literacy, is also to foster general motivation for adults to re-join learning activities and to build a mindset of learning as life and continuous activity, within a life skills holistic perspective.

Finally, in comparison with formal education, non-formal adult education activities tend to have a higher level of accessibility and flexibility that allows also to focus more on very concrete learners needs. For adults, it in fact also fundamental to understand the ideal setting for learning, including for example logistics aspects.





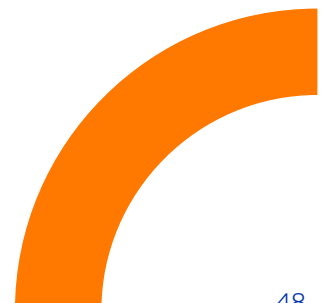
Based on these considerations, in this section and in the selection of good practices, we focus mainly on basic digital competences, across the 5 areas of the DigComp framework, with specific attention to the transversality of these competences (competences that serves multiple purposes in the lifelong learning process), as well as their role in the broader approach to life skills and general literacy (language, financial, digital, etc.).


In the Annex to this document (A digital literacy programme for adult learners), we also provide a tentative definition of the DigComp framework competences that should be considered and included in any digital skills and digital literacy non-formal education activities for adults.

Good Practices in ALE – Adult Learning and Education


The practices of this section have been selected among a wide range of activities developed in the last 5-10 years at European level and in various European countries. The selection approach has been to ensure representation in terms of geographical scope and level, main audience, topics and methods, with a particular focus on initiative implementing a holistic approach to skills and with a special emphasis on the transversality of digital skills, rather than their technical aspects.

Title	Citizen Curriculum – Digital Capability Framework
Authors	Learning and Work, United Kingdom
DigComp area(s) & proficiency level(s)	All DigComp areas except Programming competences – Foundation level
Level(s) of education	Adult non-formal education
Why is this selected?	This initiative is designed with a truly holistic approach to basic skills, addressing literacy needs and accessible for all citizens.
Learning objective(s)	The competences are organised in a non-prescriptive way into 3 area (digital capability): Computer Skills, Cognitive Skills and Problem solving.
Description	The Citizens' Curriculum is an innovative, holistic approach to ensure people have the English, maths, digital, civic, health and financial capabilities they need. It is developed by a civil society organisation that is also a national ALE provider.
Reuse	The Citizen Curriculum initiative offers a full framework and toolkits and resources to implement it in practice, in any context, including Coaching guide, Participatory Resource Pack and Case studies.
More information	https://learningandwork.org.uk/what-we-do/essential-life-skills/citizens-curriculum/ https://learningandwork.org.uk/wp-content/uploads/2020/02/Digital-Capability-3.pdf





Title	Digital SkillUp – Digital Revolution Course
Author	Digital SkillUp initiative (EU-funded project)
DigComp area(s) & proficiency level(s)	Information and data literacy, Safety, Problem solving – Foundation and intermediate level
Level(s) of education	Adult non-formal education
Why is this selected?	This learning resource is a valuable example of an online short course, self-paced, on digital technologies basics concepts and history, very accessible to all citizens. The course design considers at the same time the needs of understanding digital transformation from a personal and professional point of view. The whole course content is also available online for free and without registration, with a format (only text and visuals) that facilitates also technical accessibility.
Learning objective(s)	<p>At the end of this course, the learner will be able to:</p> <ul style="list-style-type: none"> • Understand the basics of what computers are, how they operate, what their main components are, and the impact of advancements in hardware technology • Understand the basics of coding languages, software, and applications as they impart logic to machine, while providing an interface for humans • Visualise the evolution of computer networks, from home and office networks to the internet, to cloud computing and beyond • Understand, based on these foundations, how the digital revolution has set the stage for big data, AI, and other emerging technologies that were only theorised before.
Description	<p>This course was developed within an EU funded project, Digital SkillUp, and it is available through the online training platform of one of the initiatives partners (MinnaLearn).</p> <p>The Digital Revolution course takes the learner through a journey of reflecting on the background, core elements and implications of digital technologies with real life examples from everyday life and work.</p> <p>This holistic approach emphasises that technology evolution has been dependent on multiple interconnected advances- preparing the student to comprehend the latest emerging technologies.</p>
Reuse	The course has been designed already with a European and global perspective in mind, with specific attention to technical accessibility of content (text and visuals without texts), which makes it ready for easy translation and adaptation to other contexts and purposes, for example with the addition of new topics and the integration of different case studies.
More information	https://courses.minnalearn.com/en/courses/digital-revolution/ https://www.digitalskillup.eu/





Title	GEMMA, Knowledge is Precious
Authors	Comune di Montone and partners, Italy
DigComp area(s) & proficiency level(s)	All DigComp areas except Programming competences – Foundation level
Level(s) of education	Adult non-formal education
Why is this selected?	The core characteristic of this initiative is its strong integration in the local context, focusing on digital culture and social inclusion.
Learning objective(s)	The various activities aim at supporting participants in improving their understanding of the digital culture and services: use of public online services, digital identity management, use of internet, smartphones and apps, digital citizenship competences, social innovation services.
Description	<p>#GEMMA is a project for digital inclusion and democracy, funded by the European Social Fund and developed in collaboration by a partnership of public and private organisations.</p> <p>It involves rural municipalities, whose inhabitants have less access to digital knowledge and online public services. The project promotes a model for social engagement that involves associations and public bodies in the development of free learning opportunities for citizens, offering digital animation itinerant events for citizens of all ages.</p> <p>The main aim of the initiative is to improve quality of life, well-being and digital culture in various areas of the region.</p> <p>The initiative offers diverse services for various audiences: all citizens, over 65, volunteers, families with children, employees and job seekers, students and schools.</p>
Reuse	The model is very light and flexible and easy to implement in other contexts, adapting the various services and events to the local needs, also possibly expanding the topics and the thematic activities addressing specific target audiences.
More information	https://medium.com/adumbria/gemma-il-sapere-digitale-aa4b7c7cc527 https://eaea.org/wp-content/uploads/2021/11/Grundtvig_Award_2021_B5_lowres.pdf

Title	Digital Village
Authors	Vienna Adult Education Centres - www.vhs.at in cooperation with Wohnpartner Wien - https://wohnpartner-wien.at/ and funded by the Vienna Chamber of Labour from the Digitalisation Fund - https://wien.arbeiterkammer.at/digifonds
DigComp area(s) & proficiency level(s)	All DigComp areas – Foundation level
Level(s) of education	Adult non-formal education
Why is this selected?	<p>Digital Village is a best practice project because it approaches (potential) learners in a low-threshold way and responds directly and very precisely to people's learning needs.</p> <p>All concerns are being dealt with, e.g., the use of smartphone apps, the creation of secure passwords for online shopping, the use of cell phone signatures, etc.</p>
Learning objective(s)	No curriculum describes what the participants should learn; instead, the residents of the housing buildings come with questions and challenges, seeking easy-to-understand "on-the-spot" solutions.



Description	<p>Digital Village is a project developed in Vienna (Austria), at local level, with the main aim to increase digital competences of individuals in a community-based approach.</p> <p>The project aims to give the residents of municipal buildings a low-threshold opportunity to ask questions in connection with digitalisation and to solve digital problems that arise in their daily lives. The target group of "Digital Village" are people from Vienna living in or around municipal residential buildings. The project especially addresses people with low levels of basic digital literacy and people who currently do not take advantage of formal or non-formal educational opportunities. The experts are usually trainers who work on basic education programmes.</p>
Reuse	<p>This educational outreach project is certainly transferable to different contexts, while good cooperation with and among local communities and local partners could be important for its success. However, a similar project could also be run in other places with different conditions. It would also be conceivable to offer this service in popular public places such as parks, cafés, etc.</p>
More information	<p>https://eaea.org/wp-content/uploads/2022/11/Digitalisation-and-Bildung-final.pdf www.vhs.at/digiinfotag</p>

Title	BeCode – Digital Sprint
Authors	BeCode, Belgium
DigComp area(s) & proficiency level(s)	All DigComp areas – Foundation and intermediate levels
Level(s) of education	Adult non-formal education
Why is this selected?	This training aims at helping participants to build a professional project based on existing knowledge and new skills in digital technologies acquired during the activities. The programme blends digital and transversal skills learning with a project-based learning approach, which has also a practical real-world application.
Learning objective(s)	<ul style="list-style-type: none"> • Understanding career paths in information technologies and how to develop own path • Being comfortable with a computer and using it effectively • Using collaborative tools that are important for professional development and career management • Training social skills • Reading and correcting code in HTML, CSS and JavaScript. • Creating own digital identity
Description	<p>The Digital Sprint activity is designed for all those who consider a career switch (active job seekers) and are looking to better understand what new technologies can offer and how to get started. The activity is developed over 6 weeks and in presence, with a pedagogical approach based on self-study together and experiential learning.</p> <p>The initiative is supported financially by the organisation and its partners, and it is developed in collaboration with the public employment system (Bruxelles Formation, Actiris etc.), which offer to participant other benefits in their job search period.</p>
Reuse	The approach and programme are easily applicable in other contexts, also with different form of funding (for example EU funded activities or individual vouchers), while a certain level of collaboration with public/private employment services would be of value.
More information	https://becode.org/all-trainings/pedagogical-framework-digital-sprint/



SECTION C

Supporting Environment



5. Professional Development for Educators

5.1. Introduction

Education is a never-ending process, especially nowadays in this global world. In every country, the role and functioning of schools are changing faster and faster, and the same is what is expected of educators. They are asked to teach in increasingly multicultural classrooms; to place greater emphasis on integrating students with special learning needs in their classrooms; to make more effective use of information and communication technologies for teaching; to engage more in planning within evaluative and accountability frameworks; and to do more to involve parents in schools.

It is not possible to prepare educators for all the challenges they have to face during their careers, but the education systems must provide educators with a variety of opportunities for their pre-service and in-service professional development.

Educators professional development aims to improve teachers and their pedagogy by adopting a holistic approach to developing a teacher as a professional practitioner. This process requires continuous development of practice and update during all teacher's careers through different activities that support teachers to reflect, learn and act.

5.2. Self-Assessment of Digital Skills for Educators

Self-assessment of digital skills for educators is an important step in identifying areas where they need to improve. SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies) is a free tool designed to help schools embed digital technologies in teaching and learning. It is an initiative of the European Commission and is funded through the Erasmus+ programme.

SELFIE anonymously gathers the views of students, teachers, and school leaders on how technology is used in their school. The tool is available for any primary, secondary, and vocational schools in Europe and beyond, and in over 30 languages.





It can be used by any school, not just those with advanced levels of infrastructure, equipment, and technology use. SELFIE has a strong basis in research and was developed based on the European Commission framework on promoting digital-age learning in educational organisations.

The tool generates a report - a snapshot of a school's strengths and weaknesses in their use of technology - based on the input gathered from short statements and questions that take around 20 minutes to complete. The questions and statements are answered using a simple 1-5 answer scale. SELFIE can help schools have a better understanding of how digital technologies are used to support teaching and learning. The tool is customizable, and each class is facilitated by a teacher to answer the questions for students in the SELFIE tool.

5.3. Resources for Professional Development

In addition to self-assessment tools, there are many resources available for professional development in digital skills for educators. These include online courses, webinars, conferences, and workshops. Some examples of resources for professional development include the European Schoolnet Academy, the European Commission's Digital Education Action Plan, and the European Distance and E-Learning Network.

Additionally, many universities and education institutions offer courses and training programs in digital skills for educators.

Some useful resources:

1. European Schoolnet Academy - This is Europe's first MOOC (Massive Open Online Course) platform offering high-quality free courses for primary and secondary teachers as well as other educational professionals.

<http://www.eun.org/professional-development/academy>

2. Digital Education Action Plan - This is a renewed European Union (EU) policy initiative that sets out a common vision of high-quality, inclusive and accessible digital education in Europe, and aims to support the adaptation of the education and training systems of Member States to the digital age.

[Digital Education Action Plan \(2021-2027\) | European Education Area \(europa.eu\)](#)





3. EDEN DIGITAL LEARNING EUROPE - This is an association that supports good quality research into open, distance, and e-learning by means of its conferences and bi-annual research workshops as well as by providing a high-quality peer-reviewed online journal for publication of research results and best practices from all around the world.
<https://eden-europe.eu/>
4. Applied Digital Skills - This is a curriculum offered by Google consisting of free resources that are designed to build digital literacy in education and for jobs.
<https://applieddigitalskills.withgoogle.com/s/en/home>
5. Garden of Learning - This is EDEN's platform for growth and inspiration that includes portals that offer many training opportunities and resources.
[Garden of Learning – EDEN's platform for growth and inspiration \(eden-europe.eu\)](#)





6. How Leaders can Support Digital Skills in their Institutions

Supporting digital skills in institutions is crucial in today's technology-driven world. Leaders can play a pivotal role in fostering digital skills among their teams by implementing, for example some of the following strategies:

- **Set a digital skills vision:** Clearly articulate the importance of digital skills within the organisation's mission and goals. Leaders should define what digital skills mean for their specific institution.
- **Lead by example:** When leaders show their own digital competence, it sets a positive example for the rest of the organisation.
- **Invest in training and development:** Allocate resources for digital skills training programs and courses to involve hiring trainers, subscribing to online learning platforms, or encouraging employees to attend relevant workshops and conferences.
- **Customised training plans:** different employees may have varying levels of digital skills, so the best way is to create personalised training plans to address individual needs.
- **Promote a learning culture:** leaders can emphasise the importance of upskilling and reskilling to adapt to rapidly changing technology landscapes.
- **Cross-functional teams:** Foster collaboration between departments to encourage knowledge sharing.
- **Mentorship programs:** Implement mentorship programs where experienced employees can guide and support those who are developing their digital skills.
- **Incorporate digital skills into job descriptions:** When hiring new employees, include digital skills as part of job requirements. This ensures that the organization continues to attract talent with the necessary digital competencies.
- **Regular assessments:** Conduct regular assessments of employees' digital skills. This can be done through self-assessments, peer evaluations, or formal testing to track progress and identify areas that need improvement.
- **Feedback and recognition:** Provide feedback and recognition for employees who make efforts to improve their digital skills.
- **Stay informed about technological trends:** Leaders should keep themselves updated on the latest technological trends and their potential impact on the organisation.





- **Resource allocation:** Allocate budget and time for research and development related to digital technologies.
- **Evaluate and adjust:** Continuously evaluate the effectiveness of digital skills initiatives to adjust strategies based on feedback and outcomes.
- **Celebrate successes:** Publicly acknowledge and celebrate achievements related to digital skills.
- **Compliance and data security:** Emphasise the importance of digital skills in ensuring compliance and data security.

6.1. Institutional Assessment (SELFIE & DigCompOrg, etc.)

Institutional assessment tools like SELFIE and DigCompOrg are designed to help educational institutions and organisations evaluate and improve their digital capabilities, policies, and practices. These tools can provide valuable insights into how well an institution is utilising technology for teaching, learning, and administration.

SELFIE is an initiative by the European Commission that provides a free online tool for schools and higher education institutions to assess their digital readiness and capacity. It covers various aspects of digital education, including leadership, infrastructure, teaching and learning, assessment, and learner engagement.

SELFIE aims to help institutions identify strengths and weaknesses in their digital practices, promote self-reflection, and develop action plans for improvement. It's a self-assessment tool where teachers, staff, and school leaders can respond to a set of questions and statements to generate a report.

Results per area

The bar charts below show the average responses for each statement/question of the selected area. To see the breakdown for each question and user profile review the online report. To analyse the breakdown of each of the statements you may consult the online report.

A. Leadership

B. Infrastructure and Equipment

C. Collaboration and networking

D. Continuing Professional Development

E. Teaching Support

F. Teaching Pedagogy

G. Assessment Practices

H. Student Digital Competence

Figure 4; Image source: European Commission (2021): SELFIE demonstration school report; <https://education.ec.europa.eu/document/example-of-a-selfie-final-school-report>, p.5.



7. How can NGOs Support the Academic Sector in Teaching Digital Skills

Proficiency in the digital realm is indispensable for employment, entrepreneurship, and daily life. Non-Governmental Organisations (NGOs) have emerged as key advocates for digital skill development within European academic institutions. In this text, we explore the significance of NGOs in supporting academic institutions in teaching digital skills.

Several NGOs in Europe recognise the pivotal role they can play in enhancing digital skill education within academic institutions. Here are some prominent European NGOs leading the charge:

- **Digital Europe:** Digital Europe is dedicated to promoting digital transformation and fostering digital skills across Europe. They collaborate with academic institutions to develop and implement effective digital education programs. Their initiatives often focus on preparing students for the evolving digital job market.
- **European Schoolnet:** European Schoolnet works closely with European ministries of education to advance digital skills in schools across Europe. They facilitate the exchange of best practices among educators and provide digital resources to enhance the learning experience.
- **Telecentre Europe:** Telecentre Europe focuses on digital inclusion and skills development. They work with academic institutions and community centers to provide digital training to diverse populations, including vulnerable and underserved groups.
- **All Digital:** All Digital promotes digital literacy and inclusion across Europe by partnering with academic institutions, libraries, and community organisations. They offer resources and training to educators and learners to improve digital skills.
- **ECDL Foundation:** The European Computer Driving Licence (ECDL) Foundation offers internationally recognised digital skills certification programs. They collaborate with academic institutions to integrate ECDL certification into curricula, ensuring students acquire essential digital competencies.

Thus, NGOs play a vital role in bolstering efforts within academic institutions to teach digital skills. Through collaborations with universities, schools, and educators, these organisations ensure that digital literacy and competence are accessible to all Europeans, regardless of their background. Their endeavors not only prepare students for the digital challenges of today but also contribute to a more inclusive and equitable European society, enabling individuals to thrive in the digital landscape.





One organisation that works on a diverse number of projects is the German NGO Stifterverband. As a non-profit organisation supported by companies, foundations, and individuals it plays a pivotal role in advancing education, science, and innovation in Germany. Its 3,000 members and 500 expert volunteers from business and science drive its mission through three core strategies: analysing educational trends, promoting innovative programs, and fostering stakeholder connections. The following part gives a brief overview of the key initiatives Stifterverband is involved in.

- **Future Skills Education:** Stifterverband has developed a Future Skills Framework, identifying critical digital competencies and launching programs to enhance digital skills education in German higher education. These efforts include creating guidelines for sustainable entrepreneurship education and fostering data literacy through the Data Literacy Charter.
- **Curriculum 4.0.nrw:** This initiative, with a 7.5 million Euro funding from the regional North Rhine-Westphalia government, focuses on integrating digital skills into curricula. It emphasises networking among institutions for knowledge sharing and project support, highlighting the importance of both external and internal networking and proactive problem-solving.
- **Data Literacy Program:** Aimed at promoting data literacy as a key future skill, this program involves networking activities and advocacy to establish data literacy education in universities. It underscores the need for dedicated advocates and collaboration among content providers.
- **Transformative Skills for Sustainability:** This project focuses on developing and implementing sustainability skills in higher education, collaborating with experts from various sectors. It includes industry-specific workshops and regional conferences to discuss and promote sustainability skills.
- **Fellowships for Digital Higher Education:** These fellowships, aimed at balancing the focus between teaching and research in higher education, encourage innovation in digital teaching methods. Beneficiaries of the program gain significantly from networking opportunities, enhancing their professional development as educators.

Overall, Stifterverband's initiatives exemplify the significant impact non-profit organisations can have on contemporary education, particularly in areas like Future Skills, digital literacy, and sustainability.





SECTION D

Conclusion



Conclusion

Improving the skills of generations of Europeans, whether in schools, colleges, universities or adult education is not a trivial task. Their needs are incredibly varied, and the pedagogical strategies for meeting them need to be similarly varied to raise their level of digital skills. However, we have demonstrated through this playbook that many tools, approaches and pedagogical resources are out there for educators to use, re-use and remix to meet the needs of their individual learners. The playbook has built on the excellent conceptual frameworks from the Joint Research Centre, on digital competence. Through the collective work of a wide range of experts, in the Digital Skills Squad of the European Digital Education Hub, we have identified diverse practice, validated and used by educators, that might provide inspiration or support for other educators in their own contexts. We hope that this contributes in our own way to improving digital skills provision in the EU. : As we look ahead, it is imperative to foster a multi-stakeholder approach, involving educators, technologists, policymakers, and citizens, to collaboratively shape an ethical digital future.





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Annex: A Digital Literacy Programme for Adult Learners

In this section, we attempt to identify the core competences of the DigComp framework that should be considered and included in any digital skills and digital literacy non-formal education activities for adults.

The competences are identified through the Area, the Competence name and the Proficiency level, with the related description.

Area	Competence	Level
Information and data literacy	Browsing, searching and filtering data, information and digital content	Foundation 2 At basic level and with autonomy and appropriate guidance where needed, I can: <ul style="list-style-type: none"> • identify my information needs, • find data, information and content through a simple search in digital environments, • find how to access these data, information and content and navigate between them. • identify simple personal search strategies.
Communication and collaboration	Interacting through digital technologies	Intermediate 3 On my own and solving straightforward problems, I can: <ul style="list-style-type: none"> • perform well-defined and routine interactions with digital technologies, and • select well-defined and routine appropriate digital communication means for a given context.
	Engaging citizenship through digital technologies	Intermediate 3 my own and solving straightforward problems, I can: <ul style="list-style-type: none"> • select well-defined and routine digital services in order to participate in society. • indicate well-defined and routine appropriate digital technologies to empower myself and to participate in society as a citizen.
	Managing digital identifies	Advanced 5 As well as guiding others, I can: <ul style="list-style-type: none"> • use a variety of digital identities, • apply different ways to protect my reputation online, • use data I produce through several digital tools environment and services.





Digital content creation	Developing digital content	<p>Foundation 2</p> <p>At basic level and with autonomy and appropriate guidance where needed, I can:</p> <ul style="list-style-type: none"> • identify ways to create and edit simple content in simple formats, • choose how I express myself through the creation of simple digital means.
	Copyright and licenses	<p>Foundation 2</p> <p>At basic level and with autonomy and appropriate guidance where needed, I can:</p> <ul style="list-style-type: none"> • identify simple rules of copyright and licenses that apply to data, digital information and content.
Safety	Protecting devices	<p>Foundation 2</p> <p>At basic level and with autonomy and appropriate guidance where needed, I can:</p> <ul style="list-style-type: none"> • identify simple ways to protect my devices and digital content, and • differentiate simple risks and threats in digital environments. • follow simple safety and security measures. • identify simple ways to have due regard to reliability and privacy.
	Protecting personal data and privacy	<p>Foundation 2</p> <p>At basic level and with autonomy and appropriate guidance where needed, I can:</p> <ul style="list-style-type: none"> • select simple ways to protect my personal data and privacy in digital environments, • identify simple ways to use and share personally identifiable information while protecting myself and others from damages. • identify simple privacy policy statements of how personal data is used in digital services.
	Protecting health and well-being	<p>Foundation 2</p> <p>At basic level and with autonomy and appropriate guidance where needed, I can:</p> <ul style="list-style-type: none"> • differentiate simple ways to avoid health risks and threats to physical and psychological well-being while using digital technologies. • select simple ways to protect myself from possible dangers in digital environments. • identify simple digital technologies for social well-being and social inclusion.





Problem solving	Solving technical problems	Foundation 2 At basic level and with autonomy and appropriate guidance where needed, I can: <ul style="list-style-type: none">• identify simple technical problems when operating devices and using digital environments.• identify simple solutions to solve them.
	Identifying digital competence gaps	Foundation 2 At basic level and with autonomy and appropriate guidance where needed, I can: <ul style="list-style-type: none">• recognise where my own digital competence needs to be improved or updated,• identify where to seek opportunities for self-developments and to keep up-to-date with the digital evolution.



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