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Service de Coordination de la Recherche
et de l'Innovation pédagogiques et technologiques

Media Compass

Media-savvy teaching and learning

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Content

1. FOREWORD

As media and digital technologies are finding their way into more and more areas of life and work, fostering media skills, especially digital ones, is becoming ever more important. Educational programmes to meet this need are intended to support children and young adults in exploring, understanding and helping to shape the digital world. In doing so, it is vital not only to promote media competencies at a practical level, but also to help children and young adults gain an understanding of the underlying functional principles. For more than three years, the Media Compass has been offering teachers a common definition, focus and aid to implementation when promoting media competency among children and young adults.

Increasingly, media applications also feature components based on artificial intelligence (AI). Children and young adults may encounter such systems in the form of smart language assistants or robotic dogs that listen to commands and can recognise different people, or when unlocking their smartphones using facial recognition. They are hugely interested in these functions and have fun testing the limits of these systems. Yet they (and presumably most adults, too) don't understand why their robotic dog only obeys certain commands, why they may receive a sensible answer to one query but not another, or why their smartphone unlocks when their sister looks into the camera, despite the fact that her biometric data isn't stored on it.

Being adept at dealing with phenomena and technologies like these requires a basic understanding of data and the way that artificial intelligence works. This is known as AI literacy and data literacy. Having this kind of understanding can prevent unfounded anxieties (e.g. of a super intelligent robot with its own consciousness) and unrealistic expectations (e.g. AI using vast amounts of data to find solutions to previously unresolved problems). It can also inspire reflective engagement and democratic discourse on how we want to learn about, experience and work with AI applications.

The Digital Competence Framework (DigComp 2.2) was devised as a reference instrument to assist with meeting these requirements. This was reworked for the Media Compass in Luxembourg to take account of new developments in artificial intelligence and data management. The basic structure of the areas of competence and the competencies themselves remain unchanged, but they have been expanded to include specific statements about knowledge, skills and mindset. Examples provide information about the specific competencies children and young adults need to be able to engage with data-based AI systems in a critical, self-assured and responsible manner.

This booklet shows how AI and data literacy have been integrated into the existing Media Compass.

2. DEFINITION OF MEDIA AND MEDIA COMPETENCE

2.1 Media

In everyday language, the term 'media' is variously used to refer to different means of communication, information channels, objects and entire organisations. In common parlance, the term tends to be equated with mass media. Depending on the focus of discussion, a distinction may be drawn between auditory, visual and audio-visual media, and analogue and digital media.

The word 'medium' originates from the Latin medius and roughly means a mediating element (Schaumburg & Prasse, 2018). In other words, media facilitate interpersonal communication.

↑ Figure 1 : Sender–receiver model (Shannon & Weaver, 1949)

2.2 Media competence

The term 'media competence' was coined in the 1970s by educationalist and media education expert Dieter Baacke. His concept of action-oriented media education does not focus on technical skills, but puts people front and centre. He developed an understanding of media competence as a special kind of set of communication skills and the ability to actively use all types of media in one's repertoire of communication and action. Baacke defined four areas of media competence: media critique, media knowledge, media use and media design.

COMMUNICATION	TARGET ORIENTATION
Media critique: • *analytical* • *reflective* • *ethical*	**Media use:** • *receptive, application-oriented* • *interactive, proffered*
Media knowledge: • *informative* • *reflective*	**Media design:** • *innovative* • *creative*

↑ Figure 2 : Dimensions of media competence (Baacke, 2002)

The notion of media competence has further evolved since, with more recent concepts tending to use the term 'digital competence' in relation to interactive digital media, as coined by Ilomäki, Kantosalo und Lakkala (2011). The very concept of digital competence makes it clear that the requirements for media competence have changed, and both terms are used practically interchangeably these days.

A broad definition of the term can be found in Ferrari (2012, p. 3 ff.):

> *Digital Competence is the set of knowledge, skills, attitudes ... that are required when using ICT and digital media to perform tasks, solve problems, communicate, manage information, collaborate, create and share content, and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socializing, consuming and empowerment.*

In this sense, media or digital competencies include the ability to use and engage with media and digital technologies in a confident, critical, creative and responsible way. This requires competencies in several different dimensions. The first dimension concerns the importance of the media and the way in which they are communicated (media use). The second dimension relates to their technical function and the way we understand and use them (media knowledge). The third dimension is social in nature and highlights the sociocultural context in which media operate and how they are designed (media critique, media design).

This encompasses information and data competence, communication and collaboration, content creation, data protection and security, problem solving, critical thinking and acting responsibility within media domains.


Network
7:49 PM
100%
TOMATO
Solanum lycopersicum
AVG. 123 grams - 22 kcal
Nutrition Facts: Tomatoes, red, ripe, raw - 100 grams
Calories 18
Water 95 %
Protein 0.9 g
Carbs 3.9 g
Sugar 2.6 g
Fiber 1.2 g
Fat 0.2 g
Saturated 0.03 g
Monounsaturated 0.03 g
Polyunsaturated 0.08 g
Omega-3 0 g
Omega-6 0.08 g

3. DEFINITION OF AI AND DATA LITERACY

3.1 AI literacy

Artificial intelligence is finding its way into more and more technologies. Until now, however, general understanding of artificial intelligence has been somewhat limited, which can lead to misunderstanding, and users are not always aware that they are interacting with AI. In a world where AI is growing in importance, it is crucial to consider what competencies people need as AI changes how people communicate, work and live with one another and with machines.
According to Long & Magerko (2020, p. 2), AI literacy is

> *... a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace.*

As such, we see AI literacy as a cluster of competencies that encompass the basic functions of AI technologies, using and interacting with AI systems, using AI creatively, and ensuring critical reflection and ethical debate.

In all of this, AI systems should be at the service of people, not the other way around. Luxembourg's official AI policy states that 'AI is designed by people, for people' (Digital Luxembourg, 2019, p. 9). In this sense, AI literacy does not only allow AI systems and services to be used passively, but also fosters conscious engagement with the underlying techniques and concepts behind the technologies.

3.2 Data Literacy

Data literacy is considered vital for active participation and responsible shared contribution to the digital transition (Schüller et al., 2019).
Ridsdale et al. (2015, p. 2) describe data literacy as

> *... the ability to collect, manage, evaluate, and apply data, in a critical manner.*

Secure data handling therefore requires a combination of different skills: collecting and/or providing data, processing and evaluating data, interpreting data, deriving actions and establishing a well-considered data culture (Schüller et al., 2019).

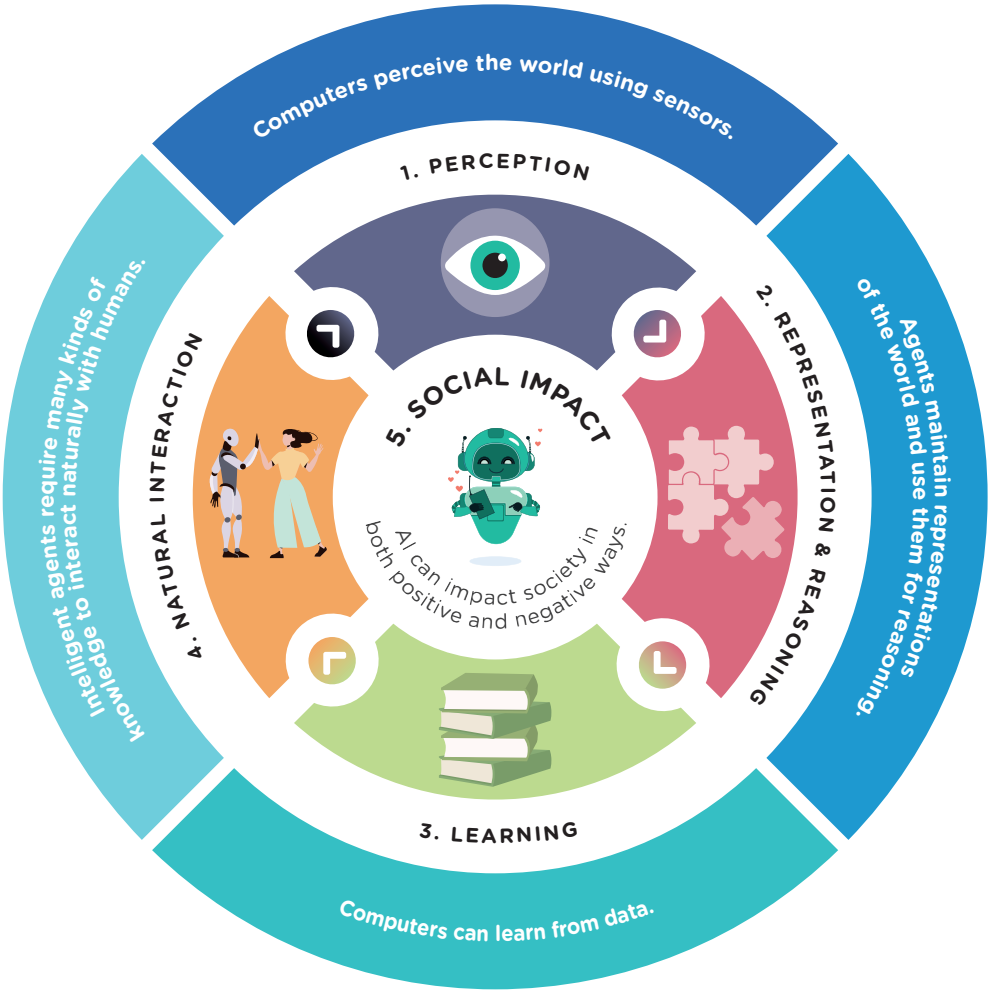
AI systems are based on colossal amounts of data available. Lots of users 'pay' for social media and digital services with their personal data, which allows AI systems to create profiles of people and make predictions. Harari (2020) bemoans the fact that '[i]n the twenty-first century our personal data is probably the most valuable resource most humans still have to offer, and we are giving it to the tech giants in exchange for email services and funny cat videos.'

When it comes to big data, competencies in handling data are not just important for computer scientists. It is vital to inform children and young adults about the hows and whys of data usage and foster informed, critical debate. Aspects of data protection, privacy and safeguarding technological devices are also crucially important here.

Key terms relating to AI and data literacy are set out and briefly explained in the Glossary (p. 62).

4. THEORETICAL FRAME OF REFERENCE

Given the array of approaches and research directions within artificial intelligence, it is worth focusing on the topics that are particularly pertinent for children and young adults. The child's experience of life and the world at large offer useful points of reference, as do the five 'big ideas' of AI (AI4K12, 2021).



↑ Figure 3 : The five big ideas of artificial intelligence (Source : AI4K12, 2021)

The AI4K12 initiative sets out five basic ideas of artificial intelligence and describes each one with a key sentence (Fig. 3). This means conveying to children and young adults that:

1. computers can only perceive their environment through sensors (idea 1: perception);
2. their 'thinking' is based on simplified representations of their environment, which can be manipulated using algorithms to generate new information from what is already known (idea 2: representation and reasoning);
3. they need huge amounts of data to learn, which mostly have to be supplied by humans (idea 3: learning);
4. human interaction with intelligent systems poses an immense challenge, as they can only discern human language, feelings and intentions to a limited degree (idea 4: natural interaction);
5. AI applications can have both positive and negative effects on society (idea 5: societal impact).

This can be achieved by children and young adults discovering aspects of AI within familiar applications and looking at how AI systems work (e.g. classifying images).

These five basic ideas largely cover the competencies involved in AI and data literacy. All these ideas are equally important and build upon one another: the idea of representation and reasoning, for instance, presupposes perception, while the idea of learning requires representation and reasoning. Natural interaction calls for prior learning about AI systems.

5. THE MEDIA COMPASS IN CONTEXT

5.1 European framework

5.1.1 Key competencies for lifelong learning

In a knowledge-based society, digital technologies are becoming ever more important and permeate the personal and private domains almost entirely. Societal participation increasingly relies on digital media, too. The European Union takes this development into account by deeming competent and carefully considered handling of digital technologies to be one of the eight key competencies for lifelong learning (European Union, 2018):

- *Literary competence*
- *Multilingual competence*
- *Mathematical competence and competence in science, technology and engineering*
- *Digital competence*
- *Personal, social and learning to learn competence*
- *Citizenship competence*
- *Entrepreneurship competence*
- *Cultural awareness and expression*

Digital competence involves the confident and critical use of digital technologies for information, communication, and problem-solving strategies in all areas of life. In this sense, digital competence as an overarching competence also supports the acquisition of other competencies, such as communication or language skills.

5.1.2 European Digital Competence Framework for Citizens

The European Commission's Digital Education Action Plan 2021–2027 envisages integrating AI literacy and data literacy into the European Digital Competence Framework for Citizens (Vuorikari et al., 2022), which provides a frame of reference for media education. The aim is to raise awareness of the risks and opportunities of AI systems and provide learners with the skills necessary to act responsibly in an AI-supported world.

The development of basic AI and data literacy and a critically conscious mindset is especially important for children and young adults as they regularly use AI systems, even though they are not usually designed for children. As such, these systems are having a direct or indirect impact on the lives of young people and can variously protect or undermine the rights of children, depending on how they are used. For that reason, in 2020 UNICEF issued guidelines to protect the rights of children against AI systems (UNICEF, 2020, p. 17).

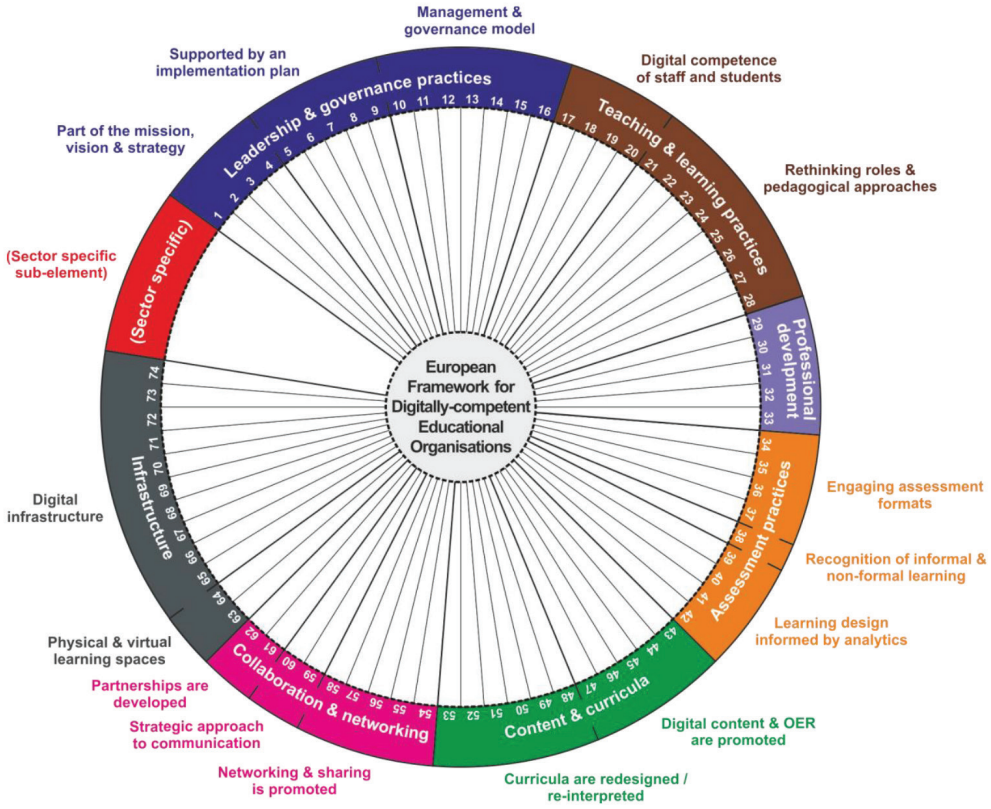
In order to consolidate the new focus on AI and data literacy in terms that are as specific as possible, a fourth dimension has been added to DigComp 2.2, besides the areas of competence, competencies themselves and performance levels: examples of knowledge, skills and mindset for each competence.

5.1.3 European Framework for Digitally Competent Educational Organizations

A corresponding competence framework – the European Framework for Digitally Competent Educational Organisations (DigCompOrg) – was developed in order to enhance the ability to innovate at an organisational level and fully harness the potential of digital technologies and content.

The DigCompOrg model can be used by educational institutions, from primary and secondary schools to vocational colleges and universities, to initiate and oversee a process of self-reflection that will lead to the comprehensive integration and effective use of digital learning technologies.

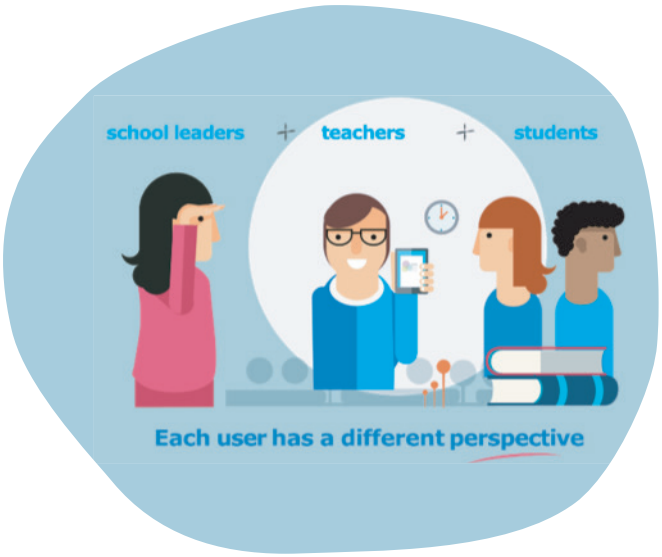
It consists of seven key elements and 15 sub-elements. When represented as a diagram, this results in a circle that emphasises the interrelationships between the individual elements.



↑ Figure 4 : Competence areas according to the EU reference framework DigCompOrg (European Union, 2022)

A user-friendly online tool has been developed to help organisations easily implement this process of self-reflection, called Self-reflection on Effective Learning by Fostering Innovation through Educational Technologies (SELFIE). It collects the anonymised views of learners, teachers and school management on the way technology is used in their institution. The statements cover the areas of school management, infrastructure, professional development, teaching and learning, assessment practices and the digital competence of learners.

SELFIE helps schools to integrate digital technologies into the classroom by highlighting what is working well, identifying areas where improvements are needed and pinpointing what should be prioritised.



↑ Figure 5 : SELFIE as a tool for self-reflection (European Union, 2022a)

5.1.4 European Framework for the Digital Competence of Educators

Teachers need to have an ever-broader range of skills if they are to promote and harness the potential of digital media for teaching and learning. For this purpose, there is an adapted version of the framework for digital competence: The European Framework for the Digital Competence of Educators (Punie & Redecker, 2017). This science-based framework defines what it means for educators to be digitally literate. It constitutes a general frame of reference aimed at helping teachers to use digital media to improve and take innovative steps with their educational endeavours. Rather than focusing on technical skills, it is about improving and innovating in education and training using digital media. DigCompEdu is aimed at educators working at all levels, from early years to higher and adult education, including academic and vocational education, special-needs education and non-formal learning contexts.

The competence framework is divided into six areas of competence, with 22 competencies in total. These six areas of competence are divided into educators' professional competencies, educators' pedagogic competencies and learners' competencies.

↑ Figure 6 : Competence areas according to the EU reference framework DigCompEdu (Punie & Redecker, 2017)

SELFIE for Teachers (https://educators-go-digital.jrc.ec.europa.eu) was developed to enable teachers to assess and reflect on their digital skills within an educational context. It is based on the SELFIE tool for whole-school digital planning (https://education.ec.europa.eu/selfie?etrans=en) and the EU Digital Competence Framework for Educators. SELFIE for Teachers sparks a process of self-reflection and thus helps primary and secondary school teachers to assess and develop their digital competence and deploy digital technologies in their professional practice.

5.2 Development in Luxembourg

5.2.1 Reference framework for media education and literacy

An initial reference framework was commissioned by the Ministry of Education in August 2008 with the aim of developing a concept for comprehensive and systematic media education and literacy in Luxembourg schools.

↑ Figure 7 : Media education and literacy at school (MEN, 2010)

The reference framework thus sets out the requirements for education and literacy that stem from the rapid development of information and communication technologies and the media landscape. It also points out ways in which the growing demands can be met, especially in schools.

Given the sheer pace of technological and social development, however, this frame of reference should only be viewed as the first step in a process that will require ongoing re-examination and further development.

The reference framework was developed by Gerhard Tulodziecki, Emeritus Professor of General Didactics and Media Education at the University of Paderborn, in conjunction with experts from Luxembourg.

5.2.2 Media education in the Luxembourg curriculum

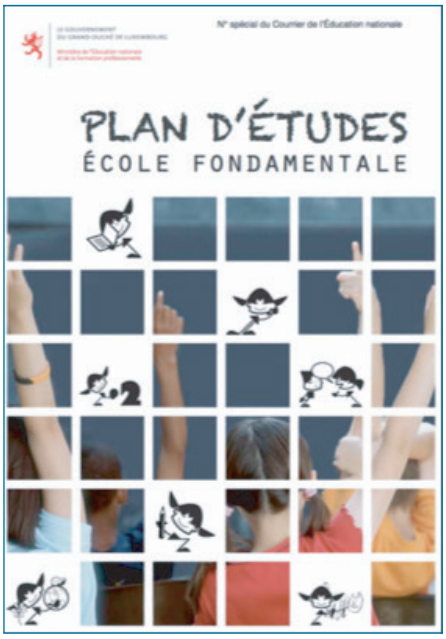
The policy groundwork for integrating media education into the Luxembourg education system was laid on 3 February 2010 with the Media Education Act draft. In primary school *(Enseignement fondamental)*, media education already formed an integral part of the curriculum *(Plan d'Études)* by Grand-Ducal regulation[1] and was deemed a competence that cuts across different disciplines. Five competence areas were identified:

- *Sélectionner et utiliser judicieusement les offres des médias*
- *Concevoir et diffuser ses propres médias*
- *Comprendre et évaluer les conceptions des médias*
- *Reconnaître et faire un travail de réflexion sur les influences de médias*
- *Détecter et évaluer les conditions de production et de diffusion des médias*

In the 2020/21 academic year, coding (computational thinking) was embedded into the maths course for Cycle 4 classes (primary school). Since September 2021, computational thinking has been taught across different subjects in all primary school cohorts.

There is no regulation for systematic, mandatory media education at secondary school level *(Enseignement secondaire)*. However, media education is covered as part of different subjects, such as modern languages or in science subjects and modules. This content is determined by the relevant curriculum committees *(Commissions nationales de l'enseignement secondaire)*.

Many subjects or modules allow teachers to incorporate media-related topics. The subject VIESO *(Vie et Société)* is worth highlighting in this respect, as it offers a number of links to media-related topics. The 'Culture and communication' section, for instance, covers the topics of 'Media and myths' and 'The influence of social networks'.

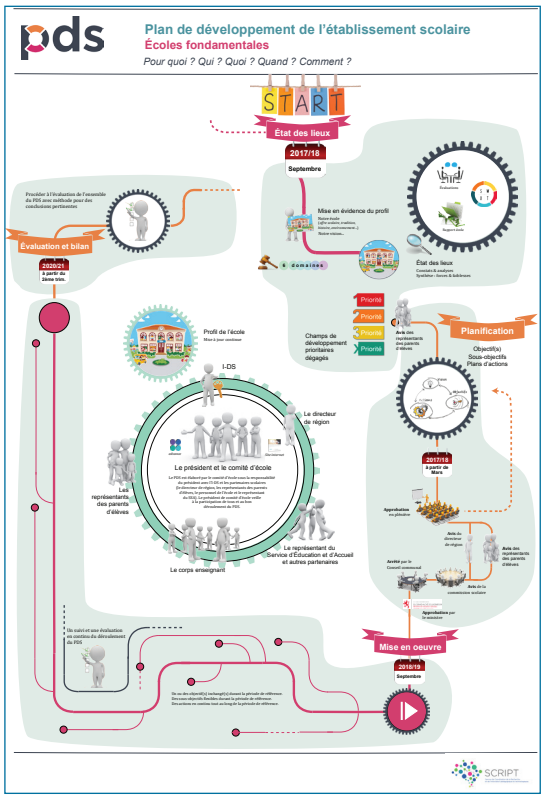


↑ Figure 8: Teaching plan for primary schools (MENFP, 2011)

[1] Grand-Ducal Regulation of 11 August 2011 establishing the study plan for the four cycles of basic education. Available on the website : http://data.legilux.public.lu/eli/etat/leg/rgd/2011/08/11/n1/jo [accessed on 18/11/2022].

Since 2022, a new subject, 'Digital Sciences', has offered a general introduction to living in a digital society for pupils in the lower classes of secondary school. The new subject is based on six major subject areas that deal with the scientific, technical and ethical/moral dimensions of digitalisation:

- My digital world and me! #communication
- The world wide web, online networks and me! #critical thinking
- Do you speak IT? My language, your language! #big data/ internet of things
- Gaming: the whats, the hows and the whys #programming, computational thinking, collaboration
- Robots: trusty partners in good times and bad? #robotics
- Can a machine be brighter than me? #Artificial intelligence, creativity



↑ Figure 9 : School development plan structure (MEN, 2009)

5.2.3 School development plan *(Plan de développement de l'établissement scolaire)*

The 2009 reform led to the introduction of a school development plan in primary schools. It confers schools a degree of autonomy in responding to the local needs of school populations, including in developing the curriculum. The school development plan *(Plan de développement de l'établissement scolaire, PDS)* was revised in the 2016/2017 academic year based on the experiences of primary schools and subsequently became mandatory for all primary and secondary schools in the 2017/2018 academic year.

As a result, schools now devise their own development concepts and present them in their three-year school development plan. The IFEN's School Development Division *(Division du développement des établissements scolaires)* assists them in their efforts.

Every school needs to base its educational offer on six or seven areas (six for primary schools, seven for secondary schools). The common areas are:

- *l'organisation de l'appui pédagogique*
- *l'encadrement des enfants à besoins spécifiques ou particuliers*
- *la collaboration avec les parents d'élèves*
- *l'intégrataion des technologies de l'information et de la communication*

In addition to these, primary schools need to consider:

- *l'amélioration de la qualité des apprentissages et de l'enseignement*
- *la collaboration entre l'école et la maison relais*

Secondary schools, on the other hand, are also required to focus on:

- *l'assistance psycho-sociale des élèves*
- *l'orientation des élèves*
- *l'offre périscolaire*

As part of a detailed stock-taking exercise, schools present what they have already implemented and made part of their institutional approach within the aforementioned areas. Schools are then free to determine the areas that they would like to develop further in the years to come. The field of media and information technology constitutes a possible field of action with potential for development.

5.2.4 Projects

While individual teachers may incorporate elements of media education into their teaching out of personal initiative, there are also many initiatives, proposals and school-specific projects.

The law of 4 September 1990 on the reform of technical secondary schools and vocational training allowed the creation and implementation of school-specific projects *(Projet d'établissement, PE)*. Project teams receive support from the *Centre de Coordination des Projets d'etablissement* (CCPÉ).

The PE is an educational initiative that allows every secondary school to choose its own area of intervention freely if it matches up with one of the three fields of action defined by law:

- *Promotion of educational initiatives and measures*
- *Organisation of extracurricular activities*
- *Implementation of measures to facilitate access to working life*

Au cours des dernières années, beaucoup de lycées ont proposé aux élèves des options dans les domaines « Médias » et « Éducation aux et par les médias », dans le cadre de l'autonomie scolaire.


NEWS
Top 1

6. INCLUSIVE MEDIA EDUCATION

The aim of digital inclusion is to give every individual an equal opportunity to participate in digital society. The health crisis triggered by Covid-19 has shown all too clearly how crucial digital inclusion is for economic and social cohesion: while some people appear to have taken up the opportunities offered by digital administration, "homeschooling" or social media with the utmost of ease, many others feel overwhelmed or even left out by the new possibilities of the digital world. Unequal use of digital media, often resulting from different socio-economic backgrounds, can lead to cumulative disadvantages through algorithmic calculations by AI systems and increase the phenomenon of 'digital inequality' (Kutscher, 2018, p. 381).

As such, there are myriad reasons for vulnerability regarding digital technologies. Factors such as age, physical or mental conditions, and language skills have an impact on the degree of digital inclusion, as do cultural and social factors. Against this backdrop, the gulf between the digitally savvy and those who are less used to using digital media threatens to become ever wider.

In order to counteract this and promote the emergence of a digitally inclusive society, the Ministry of Digitalisation has developed a National Action Plan for Digital Inclusion (2021). This action plan focuses on the development and promotion of digital citizenship, so that people can navigate the digital world more safely and independently, regardless of their age, level of education or gender. Within that context, the plan focuses on three fields of action: strengthening motivation and building trust in the digital environment, facilitating access to digital media, and developing digital skills. This action plan is currently being implemented in schools, particularly in the areas of (basic) digital competencies and accessibility of systems and content. Inclusive media education refers both to learning with media, such as software functions to promote language, and about media, including addressing problematic media content, such as hate speech or cyber-bullying, in class.

Expanding upon conventional forms of teaching and learning through active media work, such as producing photos, videos and audio files, offers particularly effective opportunities for inclusive media education. By providing a variety of forms of reception and expression, every learner can get involved in a project corresponding to their own preferences and abilities. 'In this respect, inclusive media practice does not have to be reinvented, but can fall back upon well grounded, long-established approaches, although these must be further developed, tested and evaluated in relation to media education' (Kamin et al., 2018).

The focus should be on accessible media design, making use of technology such as video cameras, tablets, computers and software. Said technology should be easy to use for everyone, with the inclusion of assistive technologies to aid readability, the display of information or simple user interfaces. Artificial intelligence systems are also increasingly being used in assistive technology to aid accessibility; for instance, AI systems can be trained to make everyday life easier for people with visual impairments. Such applications can identify short texts, documents, barcodes and colours and read them out to the user or reproduce the displayed information in acoustic form.

The overall focus should be on achieving a universal design for objects, devices and technological systems so that they can be used by most children and young adults without further adaptation or specialisation.

Given the fundamental importance of digital inclusion, the implementation of the Media Compass should consider the diversity of all school children to facilitate their digital participation.

7. THE MEDIA COMPASS IN DETAIL

7.1 Development process

This Media Compass is a version of the European DigComp reference framework adapted for the Luxembourg education system. The Luxembourg model diverged from the European template in the sense that it was adapted to the national context on the relevant points and translated into French and German. The research and consultation process roughly comprised two phases.

In the first step, preliminary talks were held with representatives of the education ministries of France, Belgium and Germany in the 2017/18 academic year. The first draft of the national Media Compass created on this basis was then scrutinised by and discussed with members of school management, teachers and participants from educational institutions who had all volunteered to take part in a testing phase in the academic year of 2018/19. From July 2021 to March 2022, the Media Compass was revised and reworded according to the feedback.

In a further step, the initial version of the Media Compass (SCRIPT, 2020) was revised to take account of the latest developments at a technological and political level. The omnipresence of artificial intelligence (AI) systems in our everyday life, including schools, in the form of voice-controlled assistants, purchase recommendations, facial recognition, photo filters and 'smart' learning support services, means that a fundamental examination of the topic is necessary. In order to make the most of the existing possibilities in a responsible way and make a realistic assessment of the risks, it is vital to teach children and young adults the core concepts of data and artificial intelligence (AI) literacy and to delve into the mysteries of AI together. In its updated version of the Digital Education Action Plan 2021–2027, the European Commission consequently sets out to promote the conscious use of AI-based technologies and data in the field of education. The European Commission's Joint Research Center has published two reports on the topic so far (Tuomi, Cabrera, Vuorikari & Punie, 2018; Vuorikari, Punie & Cabrera, 2020) and found that a wide range of AI technologies and applications is currently being developed for educational purposes and may transform teaching and learning in the coming years. UNESCO also points to the importance of AI in promoting teaching and learning (Beijing Declaration, 2019).

Against this backdrop, it made sense to bring the Luxembourg Media Compass up to date (SCRIPT, 2022): elements of data literacy were included in the first version, with specific statements about AI literacy added.

7.2 Overview: Update to areas of competence and competencies

The Media Compass divides the broad array of media skills into five areas and describes them in terms of a total of 15 individual skills. The basic structure of the original Media Compass (SCRIPT, 2020) remains unchanged, but AI and data literacy were added as new areas of focus within the existing competencies. The descriptions of the areas of competence are also broken down into 'knowledge', 'skills' and 'mindset'.

COMPETENCE AREA	COMPETENCE
1. **Information and data**	1.1 Filtering and researching data, information and digital content 1.2 Analysing and assessing data, information and digital content 1.3 Storing and managing data, information and digital content 1.4 Processing data, information and digital content
2. **Communication and collaboration**	2.1 Working with others 2.2 Sharing and publishing data, information and digital content 2.3 Using appropriate forms of expression (netiquette)
3. **Creating content**	3.1 Creating digital content 3.2 Knowing and applying copyright 3.3 Modelling, structuring and coding
4. **Data protection and security**	4.1 Protecting devices 4.2 Personal data and protecting your privacy
5. **Digital world**	5.1 Resolving simple technical problems 5.2 Interacting with digital media in a critical, reflective way 5.3 Interacting with the digital world in a socially responsible way

↑ Figure 10 : Competence areas and competencies of the Media Compass 2022 (SCRIPT, 2022)

The subdivision into knowledge, skills and mindset and the corresponding examples are intended to provide information about the specific competencies children and young adults need to be able to engage with media, data and AI systems in a critical, self-assured and responsible manner. The relevant changes can be summed up as follows:

The 'information and data' area of competence already included elements of data literacy, such as meaningful and targeted research and the critical evaluation and use of information. These are now enhanced by making learners aware of the automated processes involved in data processing and enabling them to take a critical approach when looking at personalised search results and recommendations.

'Communication and cooperation' is all about mastering the rules for secure and targeted communication and using media responsibly in collaborative endeavours. This also leads to a growing awareness that communication and cooperation processes are not limited to human beings; AI systems rely on them as well.

The third area of competence, 'Creating content', aims to familiarize pupils with media design options and how to use them. The competencies 'Creating text documents' and 'Creating multimedia documents' have been merged into a common competence ('Creating digital content'). The associated descriptions point out that digital content can also be created fully automatically by AI systems, without the need for human intervention. The 'Computational thinking' competence is set out in terms of the four steps of problem solving: problem analysis, planning, implementation and review.

The topic of 'Data protection and security' is about dealing responsibly with personal and third-party data and taking the appropriate security measures. In the new version, it includes two competencies: one relating to the security of devices and one to the security of (personal) data. The competence 'Protecting health, well-being and the environment' is integrated into competence area 5 in a slightly modified form.

The 'Digital world' area of competence covers the IT basics of solving simple technical problems, along with a critical examination of media offerings and the associated opportunities and risks, including at a social level. Discussions also cover how participants can interact in the digital world in a creative yet responsible way. In this sense, this area of competence comprises three competencies in the current version: solving technical problems related to devices, careful use of digital media as an individual and responsible interaction in (digital) society. The opportunities and risks of digital media for people, nature and society are discussed here, and a contemplative mindset towards media and technologies is encouraged.

7.3 A detailed look: Update to areas of competence and competencies

In the current version of the Media Compass, the 15 key media competencies are divided into five areas of competence and supplemented by descriptions in terms of knowledge, skills and mindset. The examples serve as suggestions for specific implementation in teaching.

According to Weinert (2001), competencies are more than just 'knowledge'. Instead, they connect knowledge, skills and mindset.

- Knowledge: The outcome of acquiring information through learning (cognitive skills). Knowledge is the body of facts, principles, theories and practices related to a subject or field of work.
- Skills: The ability to apply knowledge and use one's know-how to carry out tasks and solve problems (expertise). In the European Qualifications Framework, skills are described as cognitive (involving logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).
- Mindset: This motivates performance and provides the basis for ongoing competence. Mindset encompasses values, attitudes, aspirations and priorities.

This triad of aspects is not new in principle, but it is especially pertinent in the debate about AI and data literacy, given that whenever people are solving problems in a particular situation, they are using their knowledge to shape their actions in a targeted manner, and this action is always based on a mindset.

The breakdown into knowledge, skills and mindset and the corresponding examples are intended to provide information about the specific competencies children and young adults need in order to be able to engage with AI systems in a critical, self-assured and responsible manner. In summary, the following structure is established in the area of AI and data literacy:

KNOWLEDGE	SKILLS	MINDSET
Explaining the importance of data for AI systems	Identifying, using , interacting and communicating with AI systems	Willingness to reflect on the opportunities and risks of AI systems
Presenting the basics of data collection by AI systems		Critically reflecting on the trustworthiness of AI systems
Understanding how results are derived from automated data processing		Evaluating the use of AI systems from an ethical perspective
Understanding conclusions from presented results		Assessing human influence and possibilities for control

1. INFORMATION AND DATA

COMPETENCE	DESCRIPTION IN TERMS OF KNOWLEDGE, SKILLS AND MINDSET	EXAMPLE
1.1 Filtering and researching data, information and digital content	**Knowledge** • Articulating the need for information • Identifying and differentiating between sources of information • Acknowledging the relationship between the need for information and research approaches **Skills** • Searching for and accessing data, information and digital content • Filtering data, information and digital content according to criteria • Developing and updating personal research strategies • Developing strategies to avoid being flooded with information **Mindset** • Questioning the motives behind different sources and presentations of information • Understanding that search results, social media activity and content recommendations are influenced by different factors online	• Need for information: (research) questions, keywords, search terms, etc. • Sources of information: search engines, books, journals, newspapers, magazines, TV, social media, blogs, newsletters, etc. • Media: films, text, images, etc. • Search criteria: current date, language, topic, etc. • Search options: search engine, contents, index, etc. • Repertoire of reliable sources of information • Factors influencing search results and recommendations: search terms, context, device, local regulations, previous online behaviour of users, etc.
1.2 Analysing and assessing data, information and digital content	**Knowledge** • Recognising indications of the credibility and reliability of sources of information • Outlining the influence of data and algorithms on personalised search results **Skills** • Checking and assessing credibility and reliability of sources of information • Analysing data, information and digital content and checking it for bias **Mindset** • Understanding that data and/or algorithms may be biased • Understanding that personalised search results and recommendations are generated by data and/or algorithms • Critically questioning personalised search results	• Analysis and comparison of sources of information: publisher, topicality, etc. • Analysis and comparison of search results from different search engines • Intention behind information: advertising, reportage, parody, etc. • Equality, fairness, bias or stereotypes in information • Disinformation: fake news, hoaxes, deepfakes, trolls, bots, etc. • Filter bubbles and echo chambers
1.3 Storing and managing data, information and digital content	**Knowledge** • Becoming familiar with digital and analogue storage and management options • Outlining data collection and processing by applications and AI systems **Skills** • Saving data, information and digital content, finding it again and retrieving it from different places **Mindset** • Understanding that AI systems collect data • Having a critical understanding of the collection of (personal) data	• Digital and physical file management/file management and folder structure • Local and cloud-based storage: Hard drive, storage medium, Office 365, etc. • Data collection through digital (AI) systems: sensors, smart devices, etc. • Data backup: Back-up, cloud systems, etc. • Databases: Excel, MS Access, etc.
1.4 Processing data, information and digital content	**Knowledge** • Specifying strategies and techniques for encapsulating information • Specifying strategies and techniques for visualising results • Presenting possibilities for data collection and processing using digital technologies and AI systems **Skills** • Structuring and summarising data, information and digital content • Gaining and presenting insights from data, information and digital content **Mindset** • Understanding that AI systems use automatic data processing to create profiles • Understanding that AI systems draw conclusions from profiles • Reflecting critically on the processing of (personal) data	• Reading strategies • Summary • Folder structure • AI system learning mechanisms: supervised/unsupervised learning, machine learning, reinforcement learning, deep learning, etc. • Probability and formal mathematics

2. COMMUNICATION AND COLLABORATION

COMPETENCE	DESCRIPTION	EXAMPLE
2.1 Working with others	**Knowledge** • Explaining the meaning of different communication channels • Specifying options, technologies and tools for (digital) communication • Specifying options, technologies and tools for collaborative work and the shared creation and development of resources and knowledge **Skills** • Working together with others in analogue and digital contexts • Assessing the opportunities and risks of digital technologies and AI systems in communication and collaborative work **Mindset** • Understanding that communication and collaborative processes take place when using AI systems • Reflecting on the collaborative work and communication in analogue and digital and/or AI-supported contexts	• Electronic communication: email, instant messaging, chat, etc. • Shared calendars • Data formats for editing and/or collaborative work: PDF, Word, Excel, OneNote, etc. • Presentation: oral, written, visual, etc. • Video conferencing systems: Teams, etc. • Platforms and file-hosting services Office 365, ZendTo, etc. • Collaborative systems and whiteboards: OneNote, Microsoft Whiteboard, etc. • Speech- and text-based chatbots and translation systems: text-to-speech, speech-to-text, etc.
2.2 Sharing and publishing data, information and digital content	**Knowledge** • Specifying the options and formats for publishing information • Presenting possibilities for data collection and processing using digital technologies and AI systems **Skills** • Using appropriate digital technologies to exchange and share data, information and digital content **Mindset** • Reflecting on the consequences of data collection using digital technologies and AI systems	• Selecting and restricting permission in the document • Platforms and open-source editors: • Office 365, etc. • Social networks • Blogs and podcasts: WordPress, Sway, etc. • Forums and wikis
2.3 Using appropriate forms of expression (Netiquette)	**Savoirs** • Explaining modes and standards of behaviour in collaborative work and communication in analogue and digital contexts **Aptitudes** • Developing a personal toolbox of appropriate modes and standards of behaviour for (digital) communication and collaboration • Using appropriate forms of expression (Netiquette) **Attitudes** • Understanding the modes and standards of behaviour and rules for digital communication and collaboration • Observing ethical principles and sociocultural standards	• Opportunities (home schooling, online collaboration ...) and risks (Cyber-bullying, hate speech, sexting, filter bubbles, echo chambers ...) of digital communication systems • Rules of communication and conduct for analogue and digital collaboration: www.beesecure.lu, www.netiquette.lu, etc.

3. CREATING CONTENT

COMPETENCE	DESCRIPTION	EXAMPLE
3.1 Creating digital content	**Knowledge** • Being familiar with multimedia design tools and formats • Describing the possibilities of creating digital content with AI systems	• Text processing and formatting • Visualisation and presentation • Recording and editing images, sound, video and animations • Automatic AI-supported creation of digital content: text, photos, tweets, art, music, video, etc.
	Skills • Creating multimedia documents • Discussing the opportunities, risks and ethical principles of automated content creation	
	Mindset • Developing an open and reflected attitude towards the options for designing content • Reflecting on the consequences of automated content creation	
3.2 Knowing and applying copyright	**Knowledge** • Specifying the legal basis for personality, copyright and usage rights • Specifying source indication and referencing standards	• Copyright and usage rights: open content, open source software, creative commons, exchange platforms, downloads, uploads, streaming, etc. • Specifying sources: images, text, quotes, etc.
	Skills • Applying the legal basis for personality, copyright and usage rights • Applying source specification standards when producing and presenting own and third-party content	
	Mindset • Reflecting on the ethical and moral basis for personality, copyright and usage rights	
3.3 Modelling, structuring and coding	**Knowledge** • Describing the problem-solving process in terms of computational thinking • Identifying problems and reformulating the task (problem analysis)	• Visual coding: Scratch and other block-based programming environments • Diagrams and models: Decision tree • Basics of algorithms: loops, conditions, iteration • Evaluating algorithms: optimisation, adaptation, equality, fairness, bias, stereotypes, etc.
	Skills • Working out the core aspects and breaking the task down into several coherent steps (planning) • Setting up a targeted sequence of actions (implementation) • Defining criteria for success and extrapolating solutions through systematic testing and targeted action (checking) • Reflecting on the problem-solving process and identifying potential for improvement or alternatives	
	Mindset • Approaching problems in a structured way	

4. DATA PROTECTION AND SECURITY

COMPETENCE	DESCRIPTION	EXAMPLE
4.1 Protecting devices	**Knowledge** • Recognising and specifying risks and threats in digital environments • Specifying security and safeguarding measures for digital devices	• Risks: malware, ransomware, cookies, phishing, skimming, identity theft, social engineering, etc. • Security measures and updates: anti-virus software, firewalls, software updates, security updates, wireless encryption, etc. • Biometric and multi-factor authentication: facial recognition, iris scanning, fingerprints, etc. • Password management
	Skills • Taking appropriate security and safeguarding measures to protect devices and digital content	
	Mindset • Developing awareness of the need to protect one's own devices	
4.2 Personal data and protecting your privacy	**Knowledge** • Explaining personal and identifying data • Specifying security measures for personal and identifying data	• Data protection regulations: General Data Protection Regulation, Luxembourg data protection law • Safeguarding data: password, PINs, back-ups, usage rights, etc. • Data encryption: files, storage media, • digital signatures, etc. • Data collection through digital systems: chatbots, language assistants, smart devices/Internet of Things, etc. • Opportunities, risks and ethical principles of digital and/or biometric identification technologies, digital assistance systems and smart devices
	Skills • Dealing responsibly with personal and identifying data and the third parties involved • Protecting your privacy in digital environments	
	Mindset • Developing an awareness of one's own personal and identifying data and privacy • Knowing one's rights in relation to the use of personal and identifying data by third parties or data-based systems	

5. DIGITAL WORLD

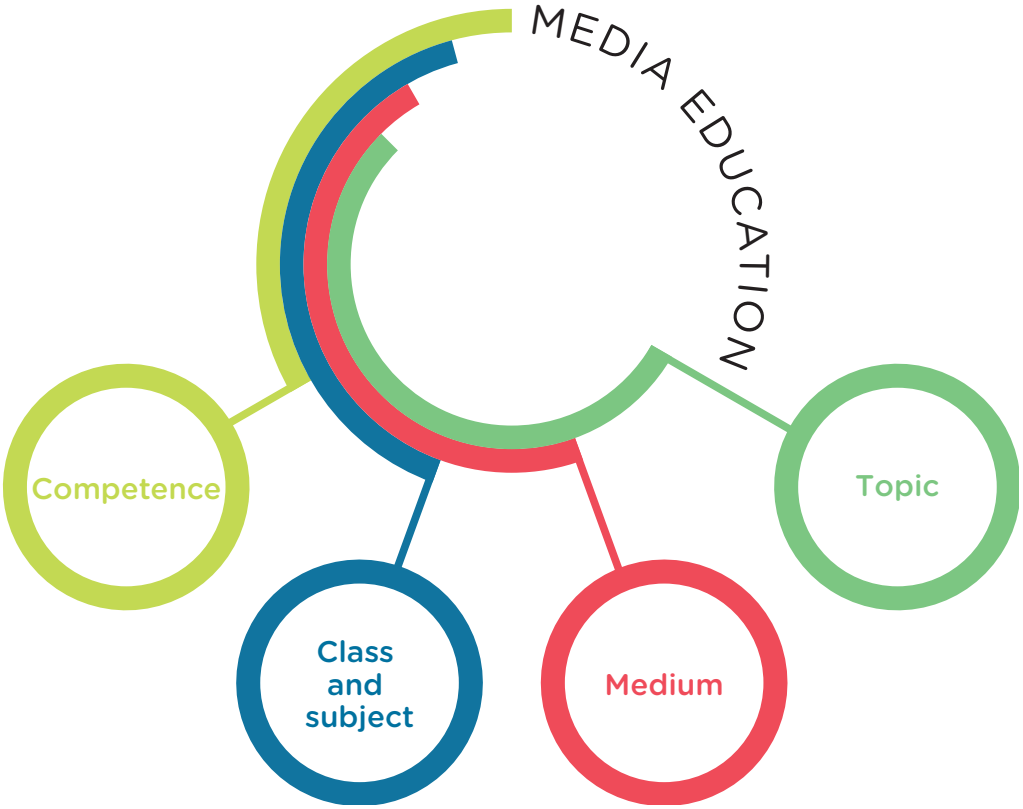
COMPETENCE	DESCRIPTION	EXAMPLE
5.1 Resolving simple technical problems	**Knowledge** • Specifying configuration options and digital-device settings • Explaining common and straightforward technical problems when operating devices and using digital environments	• Connection and cabling • Configuration • Back-ups • Restoring files • WiFi and network connections • Installing new hardware and device managers • Archiving data
	Skills • Configuring digital devices according to requirements • Identifying and solving straightforward technical problems when operating devices and using digital environments	
	Mindset • Being willing to take simple steps oneself	
5.2 Interacting with digital media in a critical, reflective way	**Knowledge** • Explaining basic concepts and how media and digital technologies work • Defining measures to protect one's own identity and that of others in digital environments	• Digital identity: personal, professional, social • Reflection: Friendship in the digital world, life without electronic media, social media and self-esteem, etc. • Reflection of opportunities and risks of media and digital tools in relation to efficient use
	Skills • Creating and managing personal user profiles and digital identities • Identifying and reflecting critically upon media, digital tools, technologies and their effects	
	Mindset • Willingness to continually update one's own digital competencies	
5.3 Interacting with the digital world in a socially responsible way	**Knowledge** • Specifying and assessing the opportunities and risks of media and digital technologies for physical and mental wellbeing, the environment and society	• Dangers (cybermobbing, deepfakes, hate speech, influencers, social media stress, fear of missing out (FOMO), ...) and opportunities (networking, collaborative work, easy access to information, ...) • Effects on health and wellbeing: posture, addiction, digital stress, biodata tracking, etc. • Environmental effects: lifespan of electronic products, raw materials, energy consumption, etc. • Reflection: Populism and extremism on the web, digitalisation and democracy, ethics in media, automation of work, etc.
	Skills • Analysing effects of media and digital technologies on different target groups • Using digital technologies while considering the opportunities for and risks to physical and mental wellbeing • Using digital technologies while considering the opportunities for and risks to physical and mental wellbeing • Using digital technologies while taking account of the opportunities for and risks to the environment	
	Mindset • Being willing to protect oneself and others against potential dangers in digital environments	


The European Landscapes
ALGEBRA
X+2 = 1 exam 7
X1=2 exam 5
X+1=3 exam 6
(x+2)+(x+1)+x = 18
x+x+x= -2 -1 +18
3x = 15
x = 15
x = 15/18
x = 5
14 Rectangles

8. THE MEDIA COMPASS IN PRACTICE

8.1 Access points

This Media Compass is intended to serve as a guide to the development and promotion of media competencies in school settings. Nevertheless, the effectiveness of this instrument depends heavily on the respective target group and the area of application. As such, the Media Compass needs to be translated for the respective teaching context in a specially adapted, flexible way. The following strategies or approaches may be taken in order to make the implementation of the competence framework as flexible and practicable as possible:



↑ Figure 11 : Strategies for implementing the Media Compass (SCRIPT, 2020)

These four different approaches offer teachers the opportunity to choose their preferred approach and cultivate media skills among their pupils in their own way.

8.1.1 Access point 1: Competence

In this case, the teachers specifically select one or more competencies that they would like to work on as part of the lessons for a specific class or grade. Depending on the type of school and age group, the work can be differentiated based on the complexity and the specific tasks and content used in the lesson. In primary school, for instance, competence 1.1 – 'Filtering and researching data, information and digital content' – may consist of extracting topic-related information from a given text. In secondary school, meanwhile, the focus can be on formulating correct search queries or using filter functions in search engines. In order to ensure that a competence-based approach of this kind is implemented efficiently, it is advisable for the teachers to agree on this in a staff meeting beforehand *(conseil de classe)*. This should involve a binding agreement on the particular competence to be addressed in the specific subject or module, and the point at which this will occur in the term or semester. Such agreements prove useful given that many teachers are already using media in their lessons.

8.1.2 Access point 2: Topic

This approach assumes that a specific topic is planned out in the schedule for the subject, module or week. Various elements of media education are implemented as part of the selected topic, such as information research, critical handling of information and presentation. This approach is particularly useful and practicable in the case of interdisciplinary work. The topic of 'the rainforest', for instance, can be addressed from a research angle, with presentations on flora and fauna, or by looking at the news coverage and information provided by various interest groups, e.g. indigenous population groups, business delegates, politicians and human rights organisations.

8.1.3 Access point 3: Medium

This implementation strategy assumes that a teacher wants to work with a specific medium, such as a podcast or explanatory video. Various media skills can be developed as part of a media-oriented approach. Depending on the topic, complexity and duration, creating a short film may include skills of research, analysis, storage and processing of information, along with collective digital processes and the responsible handling of personal data, such as film or photo material.

8.1.4 Access point 4: Class and subject

Using this approach, the teacher selects from the provided teaching suggestions (www.edumedia.lu) while considering the respective class level and subject. Depending on the resources available, time constraints and pupils' prior knowledge, this suggestion can and should be adapted to the specific teaching situation.

8.2 Additional initiatives

Promoting media skills is a key task in education and cannot be performed based solely on this competence framework. The following initiatives have also been devised to ensure a media education that is as wide-reaching and efficient as possible:

Media Passport

Learners use the Media Passport to document the media skills they have acquired. In primary school, the Media Passport takes the form of a booklet that accompanies the curriculum and is used to record pupils' progress. In secondary school, it may take the form of an online portfolio.

Lesson ideas

Examples of best practice for efficiently teaching media skills are provided as clearly structured teaching suggestions. Recommendations based on class level, required resources and timings are provided alongside specific topics and step-by-step guides.

eduMedia website

The website www.edumedia.lu serves as a central point of contact for all teachers and educators in Luxembourg. It explains the concept of the Media Compass and Media Passport, provides practical teaching ideas and highlights current projects and events.

eduMedia newsletter

Interesting materials, programmes, applications, national & international events and projects are compiled in a monthly newsletter which is sent to interested educators. You can subscribe to the newsletter at https://www.edumedia.lu/aktuelles/.

Further and advanced education

A wide range of further training formats on media studies topics are offered in conjunction with IFEN. These include specific platforms and applications such as Office 365, along with methodical approaches to teaching media-related skills, such as problem-solving approaches and coding in primary school.

Extracurricular collaboration and places of learning

There are many different players in Luxembourg's media sector, ranging from state institutions to individual companies. They offer an array of enrichment options, such as lectures, excursions and workshops.

Evaluation on a personal and organisational level

The previously mentioned SELFIE and SELFIE for Teachers tools are freely available to participants to reflect on and evaluate their own media skills or the organisational strengths and weaknesses of the school system in the implementation of digital technologies.

9. THE MEDIA PASSPORT: DOCUMENTATION OF PROGRESS IN COMPETENCE

In order to ensure a systematic build-up of competencies throughout pupils' schooling, all 15 competencies are currently being worked out in detail for the primary school cycles and secondary school years.

This will provide guidance as to how media competence can be structured and built up in a practical way, while also providing teachers with a good overview that will allow them to pinpoint learners' progress and help them advance accordingly.

The Media Compass descriptions and examples have been set out and specified for use in the classroom in the following table. This overview also provides the starting point for the Media Passport in primary schools. The Media Passport documents the development and promotion of media skills across all four primary school cycles, and thus represents an important element in ensuring a basic level of media and digital education.

1. INFORMATION AND DATA

COMPETENCE	CYCLE	TEXT IN THE MEDIA PASSPORT	EXAMPLE
1.1 Filtering and researching data, information and digital content	C1	• I can identify the right person to provide me with answers.	Address a specific question, e.g. "When are we going for a forest walk again?" to the teacher.
		• I can identify information from different media sources and give an account of it.	Identifying and giving an account of the essential information (e.g. characters, setting, events) after listening to a story, watching a film or reading a book.
		• I can sort objects based on their properties.	Sorting objects or images by colour, size or other properties.
	C2	• I can use several media sources when searching for information.	Searching for information on a particular topic (e.g. bees) using the media specified beforehand by the teacher, e.g. books, images, videos, newspapers.
	C3	• I can use keywords to perform a targeted search for information.	Identifying core aspects of a topic and narrowing down the search using keywords, e.g. when looking something up in an index or using a search engine.
	C4	• I can use different approaches to search for information.	Performing a targeted search for information, by personally choosing media (e.g. books, images, videos, newspapers) related to a topic and narrowing down the search results with keywords and/or search filters.
1.2 Analysing and assessing data, information and digital content	C1	• I can distinguish between real and fictional representations.	Telling stories and discussing the things that distinguish fantasy elements from reality, e.g. monsters, fairies, magical powers.
	C2	• I am aware that information can be deceptive.	Discussing deceptive information, e.g. manipulative images, advertising.
	C3	• I can compare information from different media and assess its credibility and reliability.	Gathering information on current topics from different sources (e.g. newspapers, magazines) and identifying and discussing the differences. Comparing the results of a web search using different search engines.
		• I can recognise personalised information.	Identifying ads in search engines. Comparing content suggested by online platforms (e.g. YouTube, Netflix) in class.
	C4	• I am aware that not all sources of information are trustworthy and reliable.	Checking and comparing information sources against a list of trusted sources put together in class. Questioning the possible intentions behind the source of information.
		• I am aware that personalised information is generated using data and/or algorithms.	Putting scissors, glue, pens, artwork and toys in their assigned place, e.g. pencils in the pencil case, just-finished paintings in the drying rack, toys in the right box. Locating cameras and microphones on digital devices (e.g. tablet, smartphone, laptop, computer) and robots (e.g. Botley).

1. INFORMATION AND DATA

COMPETENCE	CYCLE	TEXT IN THE MEDIA PASSPORT	EXAMPLE
1.3 Storing and managing data, information and digital content	C1	• I can put objects in their designated places.	Putting scissors, glue, pens, artwork and toys in their assigned place, e.g. pencils in the pencil case, just-finished paintings in the drying rack, toys in the right box.
		• I can locate and identify sensors on digital devices.	Locating cameras and microphones on digital devices (e.g. tablet, smartphone, laptop, computer) and robots (e.g. Botley).
	C2	• I can sort information based on previously defined criteria.	Sorting the results of a web search into different categories; e.g. the topic of bees might have 'appearance', 'diet' and 'habitat' categories.
		• I am aware that data is stored digitally with the help of sensors.	Retrieving photos, videos and audio recordings from a digital storage system.
	C3	• I can save information according to my own criteria and retrieve it again.	Naming digital data clearly and storing it in a folder system
		• I am aware that sensors register my surroundings and store the resulting data.	Knowing and being able to distinguish between different types of sensors and their uses, e.g. motion detectors, light sensors, noise sensors, gyroscopes Using data generated by sensors (e.g. stopwatch, laser measuring device, thermometer) in lessons (e.g. maths, science).
	C4	• I can store and access information on several devices.	Storing, accessing and sharing data in cloud systems (e.g. OneDrive).
		• I am aware that digital content contains metadata.	Conducting class discussions on which metadata are captured in text documents, e.g. time of creation, edits, language, word count, authors) Group discussion on which metadata are captured in image and video files, e.g. location and time of recording, device name, format, length of exposure.
1.4 Processing data, information and digital content	C1	• I can draw conclusions from the features of objects.	Differentiating between animal species and identifying features, e.g. most animals with wings can fly; animals with legs can walk; animals with fins can swim.
	C2	• I can draw conclusions from information.	Gaining new insights from the results of a search for information, e.g. 'benefits for the ecosystem' and a new insight into the topic of bees.
		• I am aware that AI systems draw conclusions.	Discussing examples from everyday life, e.g. cameras use certain features to recognise faces.
	C3	• I can prepare data for knowledge acquisition in various formats.	Presenting data in various visual and textual format (e.g. profiles, posters, drawings).
		• I understand that AI systems need data to create representations.	Conducting a class discussion on the way that data form the foundation for AI systems – without them it would be impossible to create models (representations) Creating an own machine learning model using the Machinelearning4Kids website.
		• I am aware that AI systems draw conclusions from representations.	AI systems use representations to generate inferences (e.g. weather forecasts, personalised ads).
	C4	• I can use diagrams to structure data and gain insights.	Putting data into various graphic formats (e.g. diagrams, mind maps, decision trees).
		• I have a basic understanding of how AI systems build representations from data and use them to draw conclusions.	Class discussion on how recommendations (e.g. film suggestions on streaming services) or conclusions (e.g. plant identification) are often based on percentages.

2. COMMUNICATION AND COLLABORATION

COMPETENCE	CYCLE	TEXT IN THE MEDIA PASSPORT	EXAMPLE
2.1 IWorking with others	C1	• I can collaborate to create an analogue product.	Doing a craft project together.
	C2	• I can collaborate to create a digital product.	Working on a shared document – a story, for example – as a group.
		• I am aware that communication does not only take place between human beings.	Discussing different communication channels (direct, telephone, etc.) and the parties involved (people, animals, language assistant, etc.)
	C3	• I actively participate in collaborative work.	Working actively as a team to create a poster.
		• I can identify where AI applications are used in everyday communication.	Class discussion on everyday applications, such as chatbots and language assistants.
	C4	• I actively participate in a group project.	Creating a multimedia project together (e.g. student newspaper, stop-motion film).
		• I am aware that natural interaction with AI applications is only possible to a limited extent.	Testing the possibilities and limitations of AI-supported language assistants and chatbots in conversations (natural interactions), e.g. Eliza or Turing test.
2.2 Sharing and publishing data, information and digital content	C1	• I can share my own work with others.	Sharing pictures, experiences or stories (visual or verbal information) with others.
	C2	• I can share data and information through various analogue means.	Sharing information with others in writing or verbally, e.g. in a letter, poster or story.
	C3	• I can share data and information using various digital means.	Sharing information with others in writing or verbally, e.g. USB stick, Outlook email, Office 365, Nearby Share (e.g. wirelessly from tablet to tablet), video conferencing.
	C4	• I can make data and information available online to a specific target group.	Using Office 365 software and/or the school server Familiarizing yourself with approval settings and appropriately applying them to the situation.
2.3 Using appropriate forms of expression (netiquette)	C1	• I use polite language at school.	Using rote songs to recall the forms of address, e.g. 'Give me five' Developing routines, e.g. sitting in a circle, exchanging greetings.
	C2	• I can apply the rules of communication and collaboration in class.	Devising and applying class rules.
	C3	• I can apply the rules of communication and collaboration in digital settings.	Devising and applying rules for online communication (e.g. email, chat) Discussing and establishing netiquette rules.
		• I am aware that communication and collaboration are shaped by cultural and social norms.	Discussing the diversity of cultural values, e.g. welcoming rituals, religions.
	C4	• I adapt my way of communicating to the cultural and social norms of the target group.	Applying the different rules in different contexts, e.g. conversations between students, messages to teachers.

3. CREATING CONTENT

COMPETENCE	CYCLE	TEXT IN THE MEDIA PASSPORT	EXAMPLE
3.1 Creating digital content	C1	• I can create digital images and audio recordings.	Taking photos using a digital device Using an app to record voice memos about a hidden object game.
	C2	• I can create multimedia documents.	Illustrating documents with suitable photos.
	C3	• I can put together multimedia documents that are coherent and well structured.	Using easy-to-read headings, sections, fonts, and formatting.
	C4	• I am mindful of my usage of multimedia design resources.	Using sensible layouts in PowerPoint presentations. Comparing different design resources and using them as appropriate to the situation.
		• I am aware that AI systems generate digital content automatically.	Viewing or listening to works (music, pictures, poems, etc.) created by AI systems. Discussing deepfakes.
3.2 Knowing and applying copyright law	C1	• I can acknowledge others and myself as authors.	Distinguishing own work from that of others. Appreciating own work and that of others.
	C2	• I am aware that authors hold the copyright of their own work.	Discussing and getting to know creators of works in class (works of art and literature).
	C3	• I respect personality rights when creating content.	Asking for permission when making a recording (audio and video recordings or photographs).
		• I respect copyright and usage rights when using third-party content.	Knowing settings for finding copyright-free media using search engines. Knowing specific websites to search for copyright-free media (Creative Commons).
	C4	• I can cite the sources when producing and presenting content.	Citing sources (authors, titles, list of sources).
3.3 Modelling, structuring and coding	C1	• I can execute a predefined sequence of actions.	Carrying out several predetermined actions in a preset order (e.g. in a PE class).
		• I can check the result of the sequence of actions and adjust the sequence if necessary.	After carrying out the sequence of actions, checking whether the desired goals have been achieved (e.g. putting clothes on).
	C2	• I can break down a simple task into several steps, carry them out and adapt them as required.	Identifying, performing and, if necessary, changing the individual actions necessary to carry out an activity (e.g. determining the steps for conducting an experiment).
	C3	• I can plan a target-oriented sequence of actions and transfer it to other situations.	Applying a problem-solving strategy in multiple contexts (e.g. highlighting important information in texts, operational tasks).
		• I take a systematic approach when working on a task.	Discussing processes in advance, setting up a structured procedure for implementation (e.g. operational tasks) achieved (e.g. putting clothes on).
	C4	• I can work out the core aspects of a task in order to devise a model.	Identifying important elements, omitting unimportant details, setting up a simplified model of the task (e.g. summarising a text). conducting an experiment).
		• I can define criteria for success in order to evaluate the sequence of actions.	Identifying the objectives of the sequence of actions and creating a checklist.

4. DATA AND SECURITY

COMPETENCE	CYCLE	TEXT IN THE MEDIA PASSPORT	EXAMPLE
4.1 Protecting devices	C1	• I treat devices with care.	Discussing and observing the sensitivity of digital devices (correct handling, holding the device with both hands, etc.).
	C2	• I handle my passwords carefully.	Keeping passwords confidential and storing them securely.
	C3	• I create secure passwords.	Knowing and implementing criteria for a secure password.
	C4	• I am aware of the risks that digital devices are exposed to in networks.	Discussing the risks of computer viruses and cyber-attacks (e.g. ransomware, botnets).
		• I am aware of measures to protect digital devices against threats.	Being familiar with antivirus programs and carrying out regular system and app updates. Avoiding risky behaviour.
4.2 Personal data and protecting your privacy	C1	• I am aware that I have the right to refuse being recorded or filmed.	Objecting verbally if personal recording is not wanted.
	C2	• I am aware that I must handle information, data and digital content responsibly.	Discussing the fact that some private information should not be shared.
	C3	• I know which personal and identifying information, data and digital content need to be protected.	Knowing that confidential information should not be shared online (address, telephone number, name, date of birth, etc.).
	C4	• I am aware of the risks and dangers that digital networking poses to my data and privacy.	Discussing risks online in relation to identifying data (e.g. phishing).
		• I know what measures I can use to protect my information, data and digital content.	Understanding the restrictions and settings of the apps (restricting apps to accessing only what is necessary).

5. DIGITAL WORLD

COMPETENCE	CYCLE	TEXT IN THE MEDIA PASSPORT	EXAMPLE
5.1 Resolving simple technical problems	C1	• I can tell whether a device is turned on.	Display lights up when touched (e.g. tablet), etc.
	C2	• I recognise when a device needs to be charged.	Locating and understanding the battery symbol Charging device after use (if necessary).
	C3	• I know how to charge a device.	Recognising the shapes of different connectors and using them for charging (USB-A, USB-C, etc.).
		• I can tell whether a device is connected to a network.	Identifying network symbols and checking whether the device is connected to a network.
	C4	• I try to determine the causes of minor technical issues and resolve them.	Weighing up potential solutions and acting accordingly to address problems by process of elimination. Adapting the application settings to one's own needs: checking and changing the parameters for different applications (language, font size, audio settings, etc.) and observing security measures.
5.2 Interacting with digital media in a critical, reflective way	C1		
	C2	• I am aware that I shouldn't spend too much time in front of a screen.	Discussing screen time.
	C3	• I am mindful of using media responsibly.	Devising criteria for responsible media use. Creating a media journal and discussing it in class.
		• I consider the impact of AI applications in everyday life.	Pinpointing and discussing facial recognition, virtual assistants and driving assistants in everyday life.
	C4	• I reflect critically on media content and its impact on certain target groups.	Discussing sexist, racist, etc. media content. Discussing the impact of photo filters and the number of likes.
		• I can create user profiles and manage digital identities.	Being mindful of different profiles (school & private) and their functions.
		• I am aware that I need to keep developing my personal media competencies on an ongoing basis in order to keep up with technological progress.	Discussing the importance of openness to technological developments.
5.3 Interacting with the digital world in a socially responsible way	C1		
	C2		
	C3	• I know who to turn to if I encounter risks online..	e.g. BeeSecure, Kanner-Jugendtelefon social welfare service, family.
		• I am aware of the opportunities and risks that AI applications pose to society.	Examples of applications: medical AI applications, self-driving cars, deepfakes, virtual assistants.
	C4	• I know various protective measures against potential dangers in digital environments.	e.g. always contacting the relevant authorities in the event of cyber-bullying, hate speech or grooming, protecting one's user profile, etc.
		• I am aware that digital technologies represent opportunities and risks for the environment as well as the physical and mental wellbeing.	Doing a project on sustainable development, discussing digital addiction (FOMO, real vs. online friendships, etc.)

10. IMPLEMENTATION: LESSON IDEAS

Actual implementation of media competencies is possible and indeed necessary in every school subject and in all grades. Specific examples and ideas for how to incorporate data and AI literacy into lessons are set out below. For more inspiration, check out **www.edumedia.lu**.

WHO IS THE PRINCESS?

Materials:

- Images of Disney princesses

Relation to the curriculum:

- Science

Media competencies:

- **1.2** Analysing and assessing data, information and digital
- **1.4** Processing data, information and digital content
- **2.1** Working with others

Relation to everyday life:

AI systems are a ubiquitous feature of our day-to-day lives, from search engines to virtual assistants such as Siri, Alexa and Cortana. Children learn to interact with these technologies from an early age. AI systems use sensors to perceive their environment. Perceiving goes beyond seeing; it is about giving meaning to the information received and analysing and evaluating it. Unlike people, AI systems cannot fall back on knowledge of everyday life; they do not possess general intelligence. Instead, their intelligence is restricted to a specific area of application.

A computer cannot 'see' a photo in the same way as a person would, but it is good at comparing a list of characteristics. By splitting up an original image into a set of characteristics, a computer can behave like a person when it comes to recognising a person in a photo.

The facial recognition feature shows us that a camera's built-in AI system does not just see the image on the viewfinder; it also interprets it. Faces are recognised and outlined with a rectangle, and the photos are automatically added to the folder that the AI system creates for a person it recognises.

Process:

At the start of the activity, the teacher explains that the game is about guessing which princess picture has been assigned to each child. For the game, the teacher prepares two pictures of a princess printed in colour for each child, ideally showing them in different situations or postures. The teacher also thinks about questions about some external characteristics in advance, such as dress colour, hair colour, skin colour and hair length.

Each child is given a copy face down. This could be attached to their backs, for instance, so that the picture is visible to others. The second copies of the pictures should be hung up around the room. The children can now ask each other questions about the external characteristics of their princesses, which should only be answered with 'yes' or 'no'. Depending on the developmental stage of the children, the teacher may need to provide some ideas or categories using pictures. When the children think they have identified their princess, they should stand next to the picture of their princess hung up in the room. Once everyone has chosen a princess, the game is complete.

After the game, the teacher can explain that facial recognition is not as easy for AI systems as it seems. A computer can compare two photos

pixel by pixel to verify that there is an exact match. But if there were a slight deviation, the computer would no longer be able to recognise the image. In real life, however, the same person may appear different in each photo due to different posture, clothing and facial expressions. Humans find it easy to recognise faces as our brain extracts the most important features of the person in the photos, matches them and develops an algorithm.

Pupils should now work out the most important characteristics. The teacher can ask them to talk about how they recognised their princesses and which questions helped them. The characteristics are discussed and the princesses compared accordingly. For instance, Snow White has short dark hair and always wears a dress, whereas Ariel has long red hair and a fishtail.

More links:
http://www.edulink.lu/t1ku

SMART CAMERA

Materials:

- camera, photos of animals

Relation to the curriculum:

- *Éveil aux sciences, sciences naturelles et humaines : S'informer de façon ciblée et exploiter l'information recueillie*

Media competencies:

- **1.1** Filtering and researching data, information and digital content
- **1.2** Analysing and assessing data, information and digital content
- **2.1** Working with others
- **3.3** Modelling, structuring and coding

Relation to everyday life:

AI systems interact with people and react to the environment. They need to be able to perceive the environment to perform such tasks. Perceiving goes beyond seeing; it is about giving meaning to the information received, and analysing and evaluating it. Unlike people, AI systems cannot fall back on knowledge of everyday life. AI systems do not possess intelligence in the general sense. Instead, their intelligence is restricted to a specific area of application.

The facial recognition feature shows us that a camera's built-in AI system does not just see the image on the viewfinder; it also interprets it. It recognises faces and outlines them with a rectangle.

Process:

The pupils close their eyes. The teacher rearranges some conspicuous objects within the room. The pupils then open their eyes briefly and say what has changed.

The subsequent discussion highlights the fact that they may have seen the change but not noticed it.

The teacher explains to the pupils that cameras not only see the pictures they take, but also perceive them. This is evident from the rectangles that the camera inserts around the faces. The pupils now explain how the camera recognises faces. They define features that allow a face to be uniquely identified. It should be noted that these features should preferably apply to all human faces.

Now the pupils look at the animal photos and try to define clear characteristics for different animal species. These are then tested against other animal photos.

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More links:
http://www.edulink.lu/t1ku

WEATHER FORECASTS

Materials:

- weather station and computer

Relation to the curriculum:

- *Éveil aux sciences, sciences naturelles et humaines : Exercer un jugement critique*
- *Mathématiques : Grandeurs et mesures : Utiliser des grandeurs dans des situations de la vie courante*

Media competencies:

- **1.1** Filtering and researching data, information and digital content
- **1.2** Analysing and assessing data, information and digital content
- **1.3** Storing and managing data, information and digital content

Relation to everyday life:

The weather affects our daily lives and the activities of those working in many professions. The data that we collect using many different sensors is used to document and forecast developments in the weather. The more data is available, the more accurate the weather forecasts can be.

Weather forecasts are just predictions. They cannot be absolutely accurate, as there are too many factors influencing the weather.

Process:

In groups, pupils discuss what weather is and how weather changes are observed and predicted. They then discuss their ideas as a whole class.

The teacher talks about the weather station and its sensors. The pupils look at the sensors and discuss how they might work. The teacher provides explanations and asks the class to think about the units that correspond to the different measurements. The pupils learn that sensors can measure the environment.

They then discuss which other factors can affect the weather. Weather reports or reference books can be consulted for this purpose. Pupils should recognise that the more data is available, the more precise predictions become. Nevertheless, a weather forecast is only a statement of probability.

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Tips & tricks:

The weather station is installed. At regular intervals, the pupils record the temperature, precipitation, hours of sunlight, wind speed, etc.

The data collected is digitally organised and saved by the pupils.

The measurement data are analysed and linked to the weather conditions observed. The pupils draw up bar and line charts.

THE 'SMART' SHEET OF PAPER

Materials:

- The 'smart' sheet of paper

Relation to the curriculum:

- *Langues : Production orale : Parler en interaction*
- *Éveil aux sciences, sciences naturelles et humaines : Exercer un jugement critique*

Media competencies:

- **2.1** Working with others
- **5.2** Interacting with digital media in a critical, reflective way

Relation to everyday life:

Humans program computers so that they can perform actions autonomously. These instructions for action are called algorithms. A machine that follows an algorithm is not intelligent.

In this lesson, pupils consider intelligence and recognise that many systems that appear intelligent are simply performing specified algorithms.

Process:

The teacher claims to be holding a 'smart' sheet of paper in their hand. As a whole class, pupils should discuss whether it is possible for a piece of paper to be intelligent.

The teacher then states that the intelligence of the paper can be proven by an example. The children draw a noughts-and-crosses grid on pieces of paper. They now play against the 'smart' piece of paper by following the instructions.

The following instructions are written on the piece of paper (which the teacher reads out loud):

- **Move 1:** Whoever is holding the sheet of paper in their hand begins. Place a counter in a corner box
- **Move 2:** If the other player does NOT place their counter in the opposite corner, place a counter there. **Otherwise,** place a counter in an empty corner box.
- **Move 3:** If there are two counters and an empty box in a row, then place a counter in that empty box. **Otherwise,** if the other player has two counters and an empty box in a row, place a counter in that empty corner box.
- **Move 4:** If there are two counters and an empty box in a row, place the last counter in that box. **Otherwise,** if the other player has two counters and an empty box in a row, then place the counter in that empty box. **Otherwise**, place a counter in an empty corner box.

The pupils will realise that either the sheet of paper wins or the game ends in a draw. The sheet of paper also proved to be 'smart' even when it drew, as the human failed to win.

A subsequent discussion addresses the subject of why the piece of paper cannot lose. Pupils engage with the concept of intelligence: What is intelligence? How can you tell whether something is intelligent? Can machines, animals and plants be intelligent?

The concept of artificial intelligence can then be explained with the help of the suggested videos.

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Source:
http://www.edulink.lu/n830

Videos

https://youtu.be/unAdsyOZB9c

https://youtu.be/W1LseFyZNuk

http://www.edulink.lu/Ose2

DECISION TREES, MONKEYS AND ARTIFICIAL INTELLIGENCE

Materials:

- **Monkey cards**

http://www.edulink.lu/9289

- **Presentation**

http://www.edulink.lu/vdtr

Learning objectives:

- Developing criteria and classification models
- Understanding how AI systems work (supervised learning)

Media competencies:

- **1.2** Analysing and assessing data, information and digital content
- **2.1** Working with others
- **3.3** Modelling, structuring and coding

Relation to everyday life:

AI systems can make autonomous decisions based on data. They use machine-learning techniques such as classification to do this. Data are divided into different categories based on their characteristics using a decision tree. The criteria created are checked using test data and adjusted if necessary. This technique is called supervised learning.

Process:

Zookeepers need to know which monkeys might bite them. Based on experience, some zookeepers have already collected some information (training data).

Simple version (20 blue cards):
The teacher displays the presentation for 'Activity 1: Monkey cards' or attaches some of the blue monkey cards to the board, divided into the categories 'biting' and 'non-biting'. Pupils look at the test data and criteria that determine whether a monkey will bite. If they need help, this can be illustrated with an example, such as by looking at the shape of the mouth. Now they create a decision tree in order to assign the monkeys to the two categories – 'biting' and 'non-biting' – as accurately as possible. The teacher then shows the remaining monkey cards (test data) and the pupils use their diagram to evaluate the biting tendencies of the monkey shown.

Advanced version (40 blue and green cards) :
In teams of two, pupils consider how they can use criteria to differentiate the training data into biting and non-biting monkeys. They create a decision tree that allows clear assignment to one of the two categories if a certain characteristic is present or absent. The decision trees are then swapped with another team. The teams now decide whether the monkey will bite or not based on their diagram for the remaining monkey images (test data). Each team writes down the decision made. Once all the test data has been shown, it is determined which team rated the biting behaviour of the most monkeys correctly. Many classification models correctly

categorise most of the monkeys, but that it is difficult to classify all animals correctly.

The teacher then explains how the monkey problem and decision trees relate to artificial intelligence: in supervised learning, the AI observes training data and learns how they relate to each other. Patterns detected this way are then used to classify new elements into one of the categories. There is not a single correct solution, but different sets of rules. Test data for which we know the categories but not the model are used to evaluate the quality of the classification model. In all likelihood, none of the classification models will work with 100% accuracy, but the model that best classifies the test data is chosen.

Tips & tricks:

Classification can also be carried out by computer on the website Machine Learning for Kids.

You can use your own instructions to practise classification using decision trees, for instance: 'Draw a decision tree about what to wear to school depending on whether it's raining, dry, summer or winter.'

More links:

http://www.edulink.lu/yf66

NIM GAME

Materials:

- Ten items (pencils, coins, buttons, etc.)
- Eight cups, labelled 3 to 10, each with three folded slips of paper reading 1, 2 and 3 respectively
- A cup labelled 2, containing two slips of paper reading 1 and 2 respectively

Learning objectives:

- Understanding how AI systems work (reinforcement learning).

Media competencies:

- **1.2** Analysing and assessing data, information and digital content
- **2.1** Working with others
- **3.3** Modelling, structuring and coding

Relation to everyday life:

In machine learning, an AI system draws conclusions based on specific features of the data at its disposal. One method of machine learning is reinforcement learning. Just as humans learn through interacting with their environment and receiving repeated rewards and punishments, AI systems learn through reinforcement learning. The systems record the status of their environment first before carrying out an action. A reward or punishment is then issued to the system of rules. If it is given a reward, the system performs the action more often; if it receives a punishment, it does so less often. After many runs, only the actions that lead to a reward remain: the system has learned on its own.

People use similar learning strategies in everyday life – punishments at school, good grades on a test, traffic tickets and penalty points on driving licences are just a few examples.

Process:

The pupils get into pairs. The teacher explains the rules of Nim:

The ten items are laid out in front of the two players. They take turns taking one, two or three items away. Whoever gets the final item loses. The pupils then play the game several times and try to figure out winning strategies.

The teacher then explains that AI systems can identify winning strategies on their own. The rules are the only input they need. The teacher gives each pair the resources prepared (cups with slips of paper).

The pupils decide who is going to make the first move: the AI system or them. When it is the AI's turn, they count how many items are left and take any piece of paper out of the cup with that number. The number on it is the number of items the AI takes. At the end of the game, all the slips of papers are put back in the cups. With this style of play, the AI is easy to beat as it only makes random decisions, which can sometimes have very bad outcomes.

In other words, the AI needs to be trained to improve. It is also punished for any bad decision made. The game is played as before, but if the AI loses, the slip of paper from its final move is no longer put back into the cup at the end of the game. The AI learns that this was a bad decision, so it won't repeat it. However, each cup must contain at least one slip of paper. If the cup is empty, the corresponding slip is put

back, and the slip of paper from the previous turn is taken away instead.

If the game is played enough times, each cup will end up with just one slip, which represents the perfect move in this situation. The AI is fully trained: it will win whenever it plays first and can only lose if the pupils go first and make perfect decisions throughout the game.

Tips & tricks:

The principle of reinforcement learning can also be examined with a simple online game (Beat the Crocodile):http://www.edulink.lu/0jz7

More links:

http://www.edulink.lu/my33

http://www.edulink.lu/j65b

MORAL MACHINE

Materials:

- https://www.moralmachine.net/hl/de

Learning objectives:

- Thinking about and discussing the societal implications of AI systems

Media competencies:

- **5.2** Interacting with digital media in a critical, reflective way
- **5.3** Interacting with the digital world in a socially responsible way

Relation to everyday life:

Intelligent machines are increasingly being used to support complex human activities, or even take them over completely. Such applications range from self-driving cars on public roads to autonomous aircrafts, and even reusable rockets that land on self-navigating ships. The high degree of independence granted to such intelligent machines may mean that they have to make decisions about people's lives and health. This requires a better understanding not only of how humans make these types of decisions, but also of how they evaluate the decision-making processes of intelligent machines.

Process:

Pupils work in pairs and go to the website. There they are presented with moral dilemmas in which a self-driving car must choose the lesser of two evils, such as the decision to kill two passengers or five pedestrians. As outside observers, the pupils decide which outcome they feel is more acceptable.

At the end, the pupils can compare their answers with those given by other participants. This comparison offers a good basis for whole-class discussion to address key issues.

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Tips & tricks:

If you want to get creative yourself, you can also devise your own scenarios on the Moral Machine website.

TURING TEST

Materials:

- Worksheet with Turing test questions for the entire class (alternatively: showing the questions on screen), 1 copy of the answers to the Turing test questions (source: https://computingeducation.de/1bab7c363416670069ad3273e1e9ac79/Fragen-und-Antworten-Turingtest.pdf)

Learning objectives:

- To define the concept of intelligence
- To apply processes to distinguish between artificial and human intelligence
- To think about and discuss the societal implications of AI systems

Media competencies:

- **5.2** Interacting with digital media in a critical, reflective way
- **5.3** Interacting with the digital world in a socially responsible way

Relation to everyday life:

What should a machine do to be considered 'intelligent'? What is artificial intelligence exactly? Such questions have occupied researchers since the very beginnings of artificial intelligence. In 1950, Alan Turing came up with the Turing test as a way of determining whether a machine is intelligent. This activity recreates the Turing test with pupils, with the intention of fostering discussion about whether computers can actually demonstrate anything like human intelligence.

Process:

Before initiating the actual activity, the teacher discusses with the pupils whether they think computers are or can ever become intelligent. At this point, it may also be interesting to examine how we decide whether a computer is intelligent. The teacher then gives a brief introduction to the Turing test, which the activity simulates in the form of a question-and-answer game.

Before the actual Turing test, four volunteers are selected: one takes on the role of the computer, one the role of the human and two the roles of runners who facilitate the game. The roles of human and computer are secretly assigned by the teacher and those two pupils taken into two separate rooms. The pupil playing the computer is given a copy of the answers to the Turing test questions.

The class must now find out who is playing the role of the computer. For this purpose, the pupils look at the worksheet and choose one question that they would like to ask the computer and the human in each round. After they have selected the question, the pupils should explain why they think this question is suitable for distinguishing between humans and computers. This reasoning is the key element of the exercise, as it prompts pupils to think about how to distinguish between the answers of a human being and an 'intelligent' computer.

The runners then take the question into the adjoining rooms containing the 'human being' and the 'computer'. The pupil who is playing the role of the computer selects the corresponding answer from the worksheet or works out a short answer of their own according to the instructions

printed in italics (e.g. current time). The pupil who is playing the role of the human being must answer the question honestly and succinctly. The runners bring the answers back to the class, being careful not to reveal who they have been interacting with.

The class now discusses which answer is likely to have come from a computer. The process can be repeated with a few questions until the class can make clear decisions on which pupil is playing the role of the computer. If the class cannot confidently distinguish between the human and the computer, the computer has passed the Turing test.

Tips & tricks:

A similar scenario can also be run through using the chatbot ELIZA (https://web.njit.edu/~ronkowit/eliza.html). ELIZA was an early forerunner of the chatbots that communicate with customers on the online portals of big companies today. Try out a chatbot of your choice (e.g. www.facebook.com/getnovibot, www.mitsuku.com) using a previously drafted list of questions.

More links:

https://www.youtube.com/watch?v=3wLqsRLvV-c

http://www.edulink.lu/yf66

11. AI AND DATA LITERACY GLOSSARY

Artificial general intelligence	Artificial intelligence (AI) with its own consciousness, as often depicted in science fiction films. This does not exist in real life.
Algorithm	A clear and finite sequence of instructions
Autonomous driving systems	Cars, mobile robots and other driving systems that drive largely automatically, i.e. without human intervention
Big Data	Very large data sets that are analysed by computers to identify patterns and relationships
Image recognition	Method of identifying objects, places, people, writing and actions in images
Black box system	System used in science and technology in which only the inputs and outputs are visible, not the procedures and processes that take place on the 'inside' and lead to the output
Bot	Computer program that performs automated, structured and repetitive tasks. Bots are used for simple conversations online
Chatbot	Application that uses artificial intelligence to converse with humans in natural-sounding language
Deep Learning	Method of machine learning that consists of multi-layer neural networks, with a structure based on the human brain
DeepMind	The first AI-supported computer program to win the board game 'Go' against the reigning world champion (2016)
ELIZA	Computer program developed by Joseph Weizenbaum to demonstrate the potential for humans and computers to communicate using natural language
Fake news	Targeted false reports, often for propaganda purposes or for conspiracy theories
GOFAI	'Good Old-Fashioned Artificial Intelligence' from before 1990. It could not deal with uncertainty and required very large data sets and computing capacity.
Intelligence	Collective term for cognitive or mental performance
Internet of Things	Networking of everyday digital devices
AI	Artificial intelligence – the concept of creating a human-like machine. AI mimics human thought processes and copies how the human brain works

AI Winter	A period in the history of AI marked by a downturn in interest and funding. There have been two AI winters so far (1974–1980 and 1987–1993).
LIDAR	Light Detection And Ranging, also known as Ladar (Laser Detection And Ranging), a radar-related method for measuring optical distance and speed, and for remote measurement. Laser beams are used here, instead of the radio waves used in radar.
Natural interaction	The seamless integration of computers into everyday life, so that they are barely perceived as machines (e.g. operating computers or smart virtual assistants via spoken language)
Representation	Simplified image (model) of reality
Conclusion	Decision based on representation
Semantic network	Mathematical representation of information and relationships between verbal concepts, similar to mind maps used when brainstorming
Sensors	Technical component that can measure properties of its environment (e.g. temperature, humidity, pressure, speed or tilt)
Smart Wearables	Devices with intelligent functions for measuring physiological parameters (e.g. smartwatches and fitness trackers)
Virtual assistant	Intelligent personal assistant (often a networked speaker) that prompts a search based on voice commands
Voice recognition	Method for recognising spoken language and converting it into text
Language processing	Method for understanding, recognising and interpreting human language
Turing machine	Model of a computing machine that can perform any calculation imaginable, provided that it can be represented as an algorithm
Turing Test	Test designed to determine whether a computer (i.e. a machine) has the ability to think in a way that is equivalent to that of a human
Web crawlers	Internet bots that automatically search for and index information online

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