# Hes·so

# Reference framework for digital competency at HES-SO

Long version

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# AIMS AND PRINCIPLES

## I/    AIMS OF THE DOCUMENT

In order to provide the university with a theoretical and practical framework incorporating all the necessary skills for everyone to learn, teach and work in an academic and professional environment subject to massive digital changes, the '*Compétence numérique*' working group at the Centre for Digital Expertise (*Centre de Compétences Numériques*, CCN) at the HES-SO was charged with putting together a reference document based on existing models in scientific literature and other institutions.

This document, entitled 'Digital Competency Reference Framework', which is associated with a platform to define digital learning objectives, represents the complete version. A shorter version that does not contain application examples for the dimensions of digital skills is also available.

## II/    DESIGN PRINCIPLE

In line with the general understanding of digital competency in international systems of reference, this document is based on the idea that the arena of activities linked to digital technologies (or carried out within a digital context) requires a single competency made up of multiple dimensions. These dimensions are required specifically in any action that necessitates using a digital technology. This is why we refer to a 'digital competency reference framework' rather than referring to digital competencies in the plural.

This reference framework itemises the dimensions of this unique, comprehensive and integrative digital competency. This choice distinguishes it from the 'competency dictionaries'' which break down activities into 'complex skills' in accordance with the definition of competency adopted by the *Glossaire Enseignement* of the HES-SO.

In effect, unless we work specifically as a professional within the digital sector, as an IT technician would (and the professional IT sector has its own expertise reference systems), no typical professional action is purely digital, even if it relies on tools, infrastructures or ideas which are linked to computerised technologies.

Therefore, this reference framework should be considered complementary, with some overlap to existing reference systems (see illustration below). The members of the teaching and research staff should refer:

- To the specific competency dictionary for their discipline in order to know what to teach their students,

- To the educational competency dictionary for HES-SO lecturers in order to conduct their professional development in their role as a lecturers,

- To the HES-SO research competency dictionary if they are in a research role,

- To the digital competency reference framework in order to define digital learning objectives for themselves, their students and their co-workers.

This reference framework is thus aimed at any persons or bodies affected by digitalisation within HES-SO. It is not a contractual or standardisation text, instead it aims to maintain the relationship between the students and staff of the HES-SO and the digital world and support their academic and professional development.
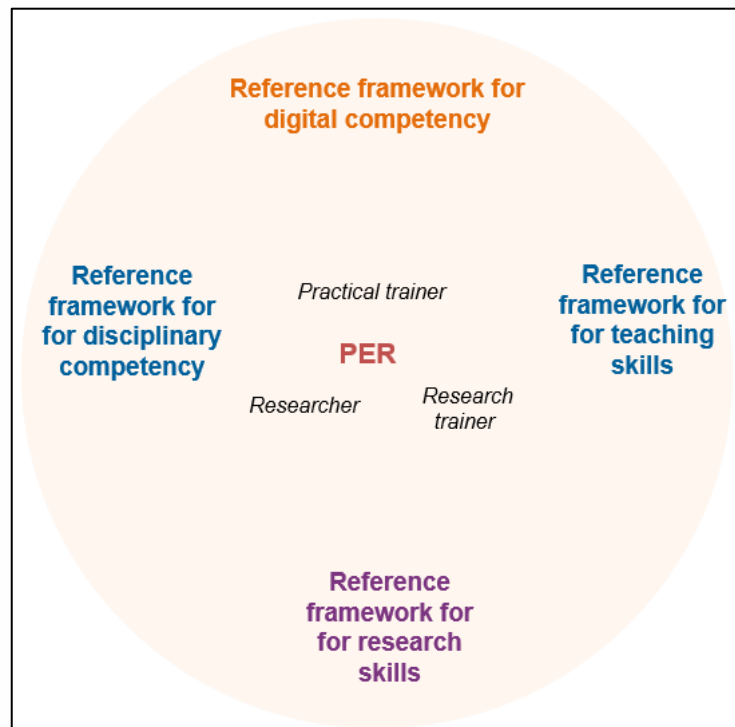


## STRUCTURES AND USAGE

## I/    STRUCTURE OF REFERENCE FRAMEWORK

All the dimensions of the HES-SO digital competency reference framework can be represented in the diagram above, which differentiates 11 dimensions. Each of these dimensions is itself broken down into sub-dimensions, which are not shown in the main diagram but are explained in more detail in the body of this document. Each of these sub-dimensions is described on the basis of key elements and application elements for four types of situations:

- learning situations

- teaching situations,

- research situations

- administration and technical situations.
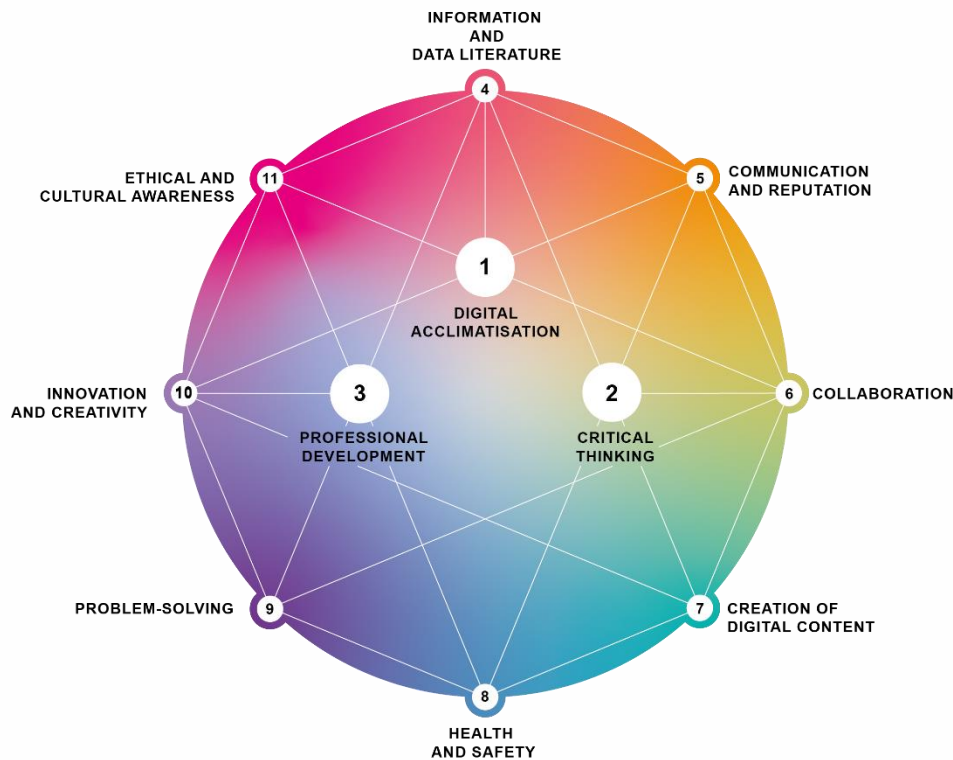
# II/ STAGES OF DEVELOPMENT OF DIGITAL COMPETENCY

For each dimension, the range of profiles (students, administrative and technical personnel, teaching and research personnel, etc.), tasks and usage situations is reflected in the different levels of planned or anticipated development. However, shared development levels can be defined for all the dimensions, i.e. for digital competency as a whole.

The diagram below shows a representation of these stages of development for each of the dimensions of digital competency or for digital competency as a whole.

# III/ FROM COMPETENCY TO DIGITAL LEARNING OBJECTIVES

Although the description of dimensions of digital competency allows us to specify its scope and its range, it does not give an indication of how it should be developed. In order to do this, we need to define more specific digital learning objectives. For a given dimension or sub-dimension, these arise not only based on the targeted level of development but also on the type of activity within which this dimension is to be developed.

A dedicated digital platform known as PEDALO (*Pedagogical Digital Assistant for Learning Outcomes)* has been developed in order to make it easier to define and formulate digital learning objectives (DLOs) and, in doing so, ease the operational implementation of this reference framework.

This platform can be accessed at the address below and allows users to specify the framework in which they wish to define their list of DLOs, the audience affected and the target level of development for each sub-dimension. It also guides them through formulating each of the DLOS: https://pedalo.hes-so.ch/.
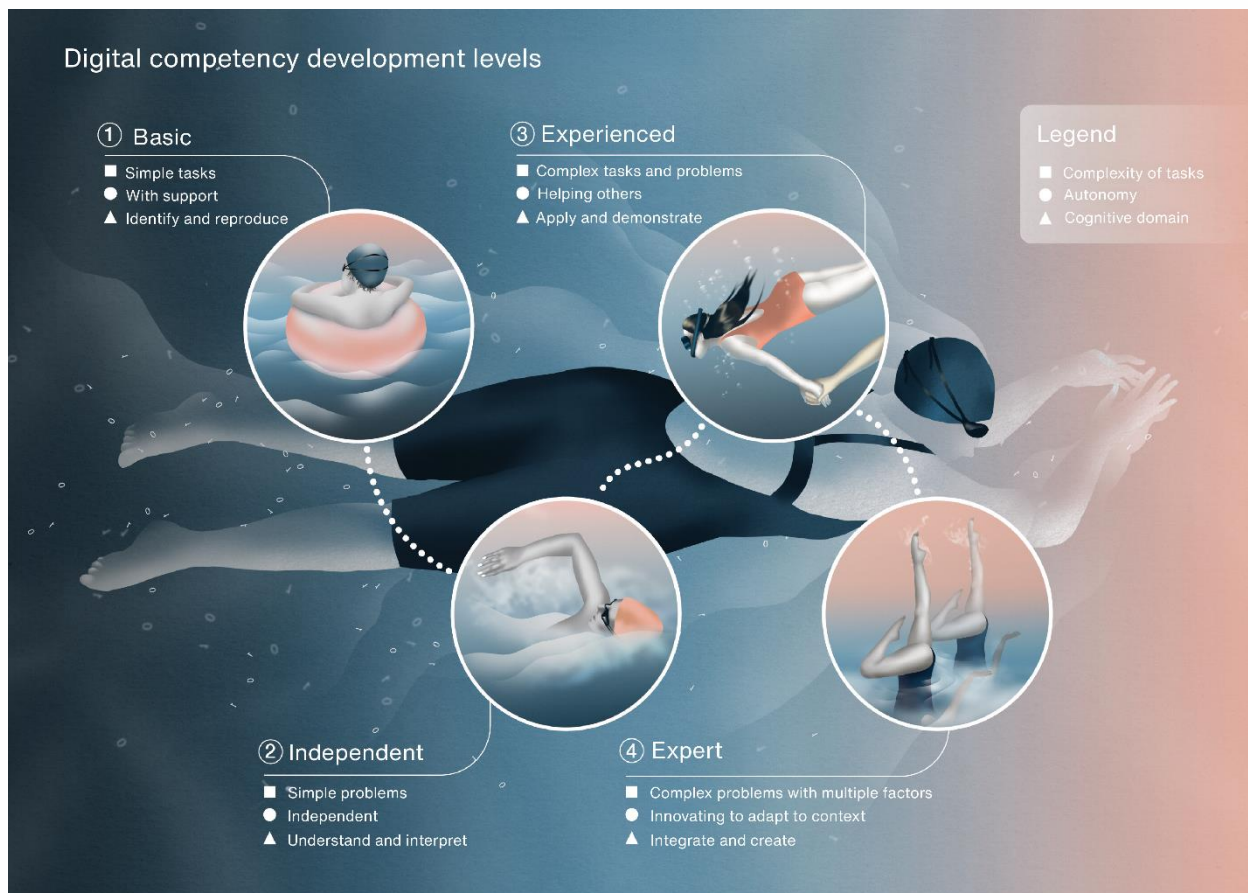
*The 4 levels of development which apply to each of the dimensions and sub-dimensions of digital competency. 1/ Basic, 2/ Independent, 3/ Experienced, 4/ Specialist*

# DESCRIPTION OF DIMENSIONS OF COMPETENCY

In the following, the dimensions of competency are described in the order of the numbers ascribed to them in the infographic above. The examples related to the different levels of development (1 to 4) and are distributed randomly across the different dimensions.

# I/    DIGITAL ACCLIMATISATION

Digital acclimatisation describes a process of adapting to various forms of digital culture: it goes beyond the understanding and mastering of the technical tools and aims to encompass the relationship with all things digital by referring not only to the way in which human practices have adjusted to the digital era but also the necessary skills for education and information.

**Sub-dimension 1:** Developing a digital culture (using digital tools)

Sub-dimension elements

- Being aware of the issues linked to using different software, digital platforms or applications in everyday life or in the context of educational or professional activities.
- Recognising and considering the human and socio-cultural changes brought about by changes in digital practices.

- Developing an understanding of the emerging phenomena associated with digitalisation and their long and short term consequences for education.

> **Example applications**
> *Learning situation*
> Students understand the importance of using digital tools to improve their written work, for example, by using collaborative online editing tools.
>
> *Teaching situation*
> Lecturers introduce the students to programming using a fun, interactive application.
>
> *Research situation*
> Researchers understand and master the impact of digital publication tools on the mechanisms of knowledge production through research. They are familiar with the issues surrounding collecting, sharing and archiving research data.
>
> *Administration and technical situation*
> Employees understand the risks associated with using digital tools, especially when working with their own tools. They can use appropriate resources to back up their IT installation.

## Sub-dimension 2: Developing computational thinking

Sub-dimension elements

- Leveraging IT software by identifying the specific objectives for which it provides added value (e.g. in teaching)
- Formulating a problem in such a way that a computer can process it or a developer can convert it into a program.
- Identifying the limits and potential synergies of human and artificial intelligence.

> **Example applications**
> *Learning situation*
> Students are capable of mastering a programming language suitable for solving exercises for a specific course.
>
> *Teaching situation*
> Lecturers present a critical analysis of the use of software tools to their students, identifying the specifics of the underlying algorithms in these software tools, especially if they are to be used during their studies.
>
> *Research situation*
> Researchers use library management software based on the automatic production of the appropriate publication format for the journal in question. In this context, they can adjust the underlying codes if changes are necessary.
>
> *Administration and technical situation*
> As part of their work, employees are capable of manipulating a range of digital resources based on the interaction logic of different software.

**Sub-dimension 3: Managing digital training**

Sub-dimension elements

- Self-training in the key elements of an operational digital culture and updating knowledge based on technological developments.
- Developing learning methods for and with digital systems.
- Knowing, or finding and utilising assistance to find out how to improve digital skills.

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**Example applications**
*Learning situation*
Students research the web for tutorials to help them use digital tools.

*Teaching situation*
Lecturers use HES-SO's Pedalo platform to define digital learning objectives for students in the discipline taught.

*Research situation*
In order to improve professionalism, researchers take part in training in various digital qualitative and/or quantitative data analysis tools made available to them by the university.

*Administration and technical situation*
Employees take part in training in order to understand how the digital tools used in line with their work can alter their working practices and also undertake critical assessment of their development.

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# II/ CRITICAL THINKING

Critical thinking towards digitalisation, its use, its content and its issues is a way of being forearmed against the potential risks and negative consequences associated with it. This is within the context of a forward-thinking approach which aims to overcome current and future digital challenges. Digitalisation can also be a critical thinking tool as it allows the research and interlinking of contradictory information or the use of content aimed to improve critical thinking.

**Sub-dimension 1: Developing critical thinking towards digitalisation**

Sub-dimension elements

- Adopting a critical attitude towards utilising tools for information processing and information and communication technologies, both when using them and when others are using them.
- Knowing how to make a critical assessment of the benefits, costs and limitations of digital tools and programs.
- Being permanently attentive to notifications received via digital technologies in order to back up both personal and university digital material and sensitive data.
- Being aware of the scope of anything (text, photograph, video) published on social media.

> **Example applications**
> *Learning situation*
> Students analyse all invitations to download and all messages containing unknown links carefully before making a decision.
>
> *Teaching situation*
> Lecturers question the prerequisites for the software and services they use during their teaching and any impact they may have on the students' learning.
>
> *Research situation*
> Researchers are aware of the impact of every one of their publications on social media on their scientific credibility.
>
> *Administration and technical situation*
> Employees are aware of the risks associated with extended use of digital tools and services, for example the impact on health and the quality of interactions with colleagues.

### Sub-dimension 2: Developing critical thinking using digital resources

Sub-dimension elements

- Checking and evaluating the legitimacy and reliability of sources of digital content before using them.
- Exercising self-criticism on use of digital resources. In particular, being aware of personal 'filter bubbles' and attempting to break free from them as often as possible.
- Using digital resources to develop critical thinking, especially through exchange on social media, without forgetting to explore different sources of information and select them carefully.
- Keeping abreast of the news and taking part in current discussions relating to the distribution, economics and use of digital technologies.

> **Example applications**
> *Learning situation*
> Students evaluate the reliability of information found on the internet by using different sources and applying rigorous criteria, such as those suggested in critical thinking resources.
>
> *Teaching situation*
> The teaching team puts on an artificial intelligence module in order to make the students aware of the ethical questions its development raises in a professional context.
>
> *Research situation*
> Researchers use semantic analysis software for the interviews carried out during their research, while keeping a critical eye on the procedure used by the software. They attempt to identify the theoretical assumptions on which the software is based.
>
> *Administration and technical situation*
> Employees consult specialist websites to give them a better understanding of the different techniques and traps used by hackers to gain access to computers and users' personal data.

## III/ PERSONAL AND PROFESSIONAL DEVELOPMENT

A person can use digital resources to aid their development on a personal or professional level. This requires openness to the training offered and the ability to self-study in order to develop and/or reinforce the skill of using digital tools to manage one's career and organise professional transitions.

### Sub-dimension 1: Managing one's career and learning throughout one's digital life

Sub-dimension elements

- Consulting appropriate digital content and professional social networks in order to keep abreast of new and future developments in one's profession and meet one's own training needs.
- Acquiring, maintaining and developing skills for present and future professional life using digital resources.
- Using digital tools to improve professional integration, especially by highlighting one's digital competency to one's employers.

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**Example applications**
*Learning situation*
Students create networks of professionals and future professionals who are active in the area where they plan to work in order to ease the transition into the working world and be in a position to manage their future career development.

*Teaching situation*
Based on professional developments outside their department, lecturers put in place teaching which promotes the development of proactive attitudes to the management of their future professional careers.

*Research situation*
Researchers find out about new software used in their area of work.

*Administration and technical situation*
Employees consult the online training catalogue provided by the university and take part in those courses they identify as relevant to the maintenance and development of the skills required to meet the changing needs of their workplace.

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## Sub-dimension 2: Utilising the potential of digital learning and teaching

Sub-dimension elements

- Knowing how to identify personal objectives and diagnose the dimensions of digital competency to be developed in order to achieve these objectives.
- Selecting and using digital resources to foster learning and allow self-evaluation.
- Utilising the potential of digital resources to develop and help develop disciplinary, educational and technical/educational skills.
- Integrating emerging digital technologies into professional practice (e.g. in teaching)

> **Example applications**
> *Learning situation*
> Students make conscious and strategic choices of the note-taking and reorganisation tools which are best designed to promote their retention of information and support their learning.
>
> *Teaching situation*
> Lecturers vary learning situations, using, for example, collaborative digital tools in order to allow students to identify and tackle problems in their future professional areas.
>
> *Research situation*
> Researchers join an online community dedicated to the issues relating to data analysis in order to optimise their own research.
>
> *Administration and technical situation*
> Employees use a digital platform provided by the institution that allows them to evaluate their skills at the main software tools used and identify training requirements. They can then be offered training tailored to their needs by the university.

# IV/ INFORMATION AND DATA LITERACY

Information and data literacy denotes the ability to identify, collect, organise, process, analyse and interpret data in order to understand the phenomena, processes and behaviours that have generated it while at the same time assessing it from a critical perspective. It also allows the creation of digital content and mastery of the typical information in the digital environment in order to resolve specific problems.

**Sub-dimension 1: Searching, filtering and evaluating data, information and digital content**

Sub-dimension elements

- Searching, filtering and differentiating digital data by adjusting searches to the specific of the problem in order to locate data which is relevant within the context of the problem to be solved.
- Manipulating digital resources and developing strategies to search for information which is suitable for the applications and tools used.
- Evaluating the usefulness, relevance, accuracy and integrity of resources, information and digital content.
- Asking key questions, especially relative to the use of digital resources, in order to evaluate the reliability of information and sources.
- Using digital information and data to answer questions or solve problems.

**Example applications**

*Learning situation*
Students research and sort information on a given topic using suitable keywords based on thorough analysis of sources.

*Teaching situation*
Lecturers offer training to students based on specific cases in order to introduce them to the process of evaluating the validity and reliability of information found on the internet based on the source.

*Research situation*
Researchers put in place various strategies for finding information by varying research tools in order to optimise the collection of data on a given subject.

*Administration and technical situation*
Employees use the digital tools available to them in line with their professional work, select appropriate information research strategies and consults the IT department if data seems dubious.

**Sub-dimension 2:** Managing and organising data, information and digital content

Sub-dimension elements

- Managing, classifying and sharing digital resources and information in accordance with a scheme and a data classification method.
- Communicating using digital resources and creating digital content for personal and professional purposes.
- Acquiring data visualisation techniques, especially for digital data.

**Example applications**

*Learning situation*
Students organise the different resources found on the internet into folders that are named and classified according to the topics covered in the lessons and using a method that allows them to find the information they want quickly (e.g. using tags).

*Teaching situation*
Lecturers share course materials and communicate exercises using digital platforms used by all students. They also share their teaching tips with other lecturers in online lecturer communities.

*Research situation*
Researchers adapt their information research strategies by keeping a professional eye on online scientific data research.

*Administration and technical situation*
Employees learn to program their spreadsheets in order to display their numerical data in graphical form.

# V/ COMMUNICATION AND REPUTATION

Digital technologies allow efficient communication, but sometimes lead people to forget the basic rules of healthy, respectful communication. They also allow the storage of huge volumes of data online but, because it is stored on servers which are sometimes inaccessible to those to whom the data relates, they generate digital identities which may not be known to their authors.

**Sub-dimension 1: Using appropriate forms of expression to share information effectively via digital technologies**

Sub-dimension elements

- Using a range of digital communication tools and strategies, selecting and utilising those that are appropriate as a function of needs.
- Communicating appropriately with others, adapting messages to the context and bearing in mind the rules and conventions of communication (Netiquette).
- Respecting ethical principles and socio-cultural norms.

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**Example applications**

*Learning situation*
Students are careful to use appropriate language in e-mails they send within an academic and university context, especially to their lecturers.

*Teaching situation*
Members of the teaching staff know the functionality of the different digital tools that allow quality remote teaching (e.g. digital tools used in class or for remote learning, communication and collaboration tools, design tools, tools for managing and sharing ideas, etc.).

*Research situation*
Researchers are aware of and use professional social networks for research personnel.

*Administration and technical situation*
Employees are careful to use inclusive language in the e-mails they send to their colleagues, co-workers, line managers and external contacts.

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**Sub-dimension 2: Managing one's digital identity**

Sub-dimension elements

- Recognising or defining the precautions necessary to preserve the confidentiality of one's communications and those of others.
- Adopting a conscious strategy towards establishing and protecting one's digital reputation.
- Managing different professional identities (personal and professional) appropriately.

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**Example applications**
*Learning situation*
Students are aware of what they post on social media in order to control the information that a potential employer could find out about them.

*Teaching situation*
Teaching staff are careful to separate their personal and professional digital identities.

*Research situation*
Researchers adopt a strategy allowing them to manage their academic digital identity and develop their digital reputation.

*Administration and technical situation*
Employees inform the communication department of any information which could suggest a non-compliant or negative image of their university.

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# VI/ COLLABORATION

Used wisely, digital technologies improve collaboration between people using communication, collaboration, co-design and co-creation tools. This requires not only compliance with the rules and principles designed to respect both people and their private lives but also a critical distance which means these tools are used in preference to direct interactions only when it is necessary or unavoidable.

**Sub-dimension 1: Interacting and collaborating using digital technologies**

Sub-dimension elements

- Taking opportunities for interaction and collaboration by playing a full part of the digital environment.
- Making appropriate use of a range of digital collaboration tools for different group tasks.
- Using digital technologies to develop and acquire shared resources and knowledge.
- Improving group work, especially using digital tools.

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**Example applications**
*Learning situation*
Students work in groups and use a shared document to collaborate and produce the work requested by the lecturer.

*Teaching situation*
The teaching team use the functionality of different tools to interact, collaborate and co-create remote and in-person lessons.

*Research situation*
Within the framework of an international project, researchers organise an online meeting using a digital application in order to discuss the data collected in the various research areas covered.

*Administration and technical situation*
Employees update shared documents in order to avoid duplicating work and having multiple versions.

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**Sub-dimension 2: Engaging through digital technologies**

Sub-dimension elements

- Utilising digital competency to benefit the needs of the collective.
- Creating and contributing to shared resources.
- Participating in online forums, teaching communities and interest groups.
- Sharing resources produced by colleagues and the university within one's network.

> **Example applications**
> *Learning situation*
> Students share their knowledge with their peers to ease individual and/or collective learning.
>
> *Teaching situation*
> Lecturers take the time to share tips on the digital tools they use with their colleagues and/or students. They are also involved in sharing these tips using the tools provided by the university.
>
> *Research situation*
> Researchers share their research and publications in Open Access.
>
> *Administration and technical situation*
> Employees help one another in their work using digital applications.

# VII/ CREATION OF DIGITAL CONTENT

Digital technologies allow content of various types to be programmed, developed, integrated and published. While respecting copyright and licences, these ideas and shared content benefit the whole professional community.

**Sub-dimension 1: Integrating, developing and modifying digital content**

Sub-dimension elements

- Using digital tools to create different types of digital content (text, audio, images, videos, mind maps, diagrams, etc.).
- Modifying digital content using basic and advanced editing functions.
- Combining different existing digital content in an appropriate manner in order to produce original content.

> **Example applications**
>
> *Learning situation*
> Students use presentation software (image or video) in order to present their work efficiently and in an original way.
>
> *Teaching situation*
> Lecturers enrich their courses using varied resources which are aligned with their teaching objectives, such as original productions and links to online videos.
>
> *Research situation*
> Using software, researchers create a visual representation of the different stages of their research for a symposium.
>
> *Administration and technical situation*
> Employees are able to reorganise content from various document formats (txt, xls, ppt) in order to create a final report.

## Sub-dimension 2: Respecting copyright and licences

Sub-dimension elements

- Knowing how to access information on licensing rules and copyright.
- Knowing the principle of *Creative Commons* licences and how to use them.
- Acting in compliance and with responsibility on matters of legality, licences and copyright.
- Acting in compliance with the basic principles of scientific integrity.

> **Example applications**
>
> *Learning situation*
> Students know how to identify the source of their references and use, for example, images with *Creative Commons* licences in their work.
>
> *Teaching situation*
> Lecturers know the law on intellectual property of digital work and ensure that they have sought permission from the various parties involved in a project before sharing it with their students or online.
>
> *Research situation*
> During symposia, researchers consistently indicate sources in their presentation documents.
>
> *Administration and technical situation*
> Employees use digital tools with valid university licences.

## Sub-dimension 3: Programming and configuring

Sub-dimension elements

- Using suitable digital resources to respond to real world needs.
- Creating complex models, simulations and visualisations of the real world using digital resources.
- Programming digital algorithms and functionalities.
- Modifying the parameters of specific digital resources.

**Example applications**

*Learning situation*
Students know how to configure their university messaging account in order to take part in the relevant meetings.

*Teaching situation*
Lecturers organises their LMS course space in order to offer students access to educational resources relevant for their modules.

*Research situation*
Researchers can program the software they use for data collection independently.

*Administration and technical situation*
Employees can independently configure the software they use for their work (for example a GANTT diagram) in compliance with their usage rights.

# VIII/ HEALTH AND SAFETY

As with all technologies, secure management and use is not a given with digital technologies. On the contrary, looking after one's health and safety with respect to these technologies means being forearmed against inappropriate use, protecting one's physical and mental health and considering hygiene in relation to the use of hardware.

### Sub-dimension 1: Protecting hardware

Sub-dimension elements

- Using computer hardware securely and responsibly.
- Identifying the problems, risks and malware threats of the internet.
- Guaranteeing the security of different applications against cyber-attacks.
- Protecting computer hardware when travelling in order to ensure it remains undamaged and fully functional.

**Example applications**

*Learning situation*
Students are careful to update their technical tools and make sure that they only visit secure sites.

*Teaching situation*
Lecturers access the help desk in order to quickly resolve any IT security issues they come across.

*Research situation*
Researchers ensure their tools are working correctly to guarantee optimum management of their research.

*Administration and technical situation*
Employees do not download and/or install anything that is not authorised or validated by the university's IT department.

**Sub-dimension 2: Protecting personal data and privacy**

Sub-dimension elements

- Protecting privacy in the digital world
- Collecting information about oneself in the digital world
- Deleting sensitive information about oneself or persons present in the digital world for whom one is responsible.
- Used different digital identities as a function of one's objectives and requirements.

> **Example applications**
> *Learning situation*
> Students are well aware of their digital status, protect their passwords and do not share them with anyone.
>
> *Teaching situation*
> Lecturers select a tool which preserves the anonymity of its users during collaborative online lessons.
>
> *Research situation*
> Researchers regularly check the accuracy of online information about them.
>
> *Administration and technical situation*
> Employees are careful to use their personal digital identity when their activity is not directly related to their professional work.

**Sub-dimension 3: Ensuring health and well-being**

Sub-dimension elements

- Recognising and preventing the fatigue and stress associated with using digital resources.
- Maintaining control over the distracting use of digital tools in both private and professional settings.
- Exercising the right to disconnect.
- Considering the cleanliness of equipment and ensure hands are clean when using it.

> **Example applications**
> *Learning situation*
> Between classes and study time, students can enjoy free time to relax and recuperate, spending time off-line doing everyday activities or taking physical exercise.
>
> *Teaching situation*
> Lecturers of online course who come across a class that seems agitated or tired suggest a break or an activity to relax the class or re-establish attention levels (e.g. get a few minutes of fresh air).
>
> *Research situation*
> Researchers take regular off-line breaks to stretch, rehydrate and prevent fatigue.
>
> *Administration and technical situation*
> Employees take care to restrict their digital working day and disconnect from any tools with links to their professional life outside of working hours.

# IX/ PROBLEM-SOLVING

Problem-solving is considered one of the key skills of the 21st century. Digital tools can help develop it, although they also generate new problems to solve. It involves not only knowing how to use digital tools but also knowing how to research, identify, compare and select them and differentiate between those that could be relevant to the needs of the moment.

**Sub-dimension 1: Identifying the requirements and the technical solutions**

Sub-dimension elements

- Identifying needs in terms of technical tools.
- Researching and comparing the different solutions available in order to meet these needs.
- Selecting the digital technology that is best adapted to the needs and problems.

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**Example applications**

*Learning situation*
Students acquire the online tools that best suit their needs, having explored the possible options.

*Teaching situation*
Lecturers select the applications best suited to their needs (e.g. carrying out work in sub-groups within the remote learning environment they prepare) by consulting the resources available online.

*Research situation*
Researchers discuss the advantages and disadvantages of different data processing software options with their team.

*Administration and technical situation*
Employees consult with their line managers to identify the principle tasks for their role and the technical tools they should use.

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**Sub-dimension 2: Technical problem-solving**

Sub-dimension elements

- Having access to a wide range of digital solutions which are suitable for solving various technical problems.
- Finding help online in advance and while problem-solving.
- Switching options as a function of the needs and issues encountered.

> **Example applications**
> *Learning situation*
> Students consult the help provided by the word processing software in order to understand how to change the line spacing on the texts they have written.
>
> *Teaching situation*
> Lecturers know how to use the IT equipment available in the university classrooms in order to find a solution when faced with a technical problem.
>
> *Research situation*
> Researchers know how to find solutions to migrate their data to different software if needed.
>
> *Administration and technical situation*
> Employees know how to manage their different digital accounts and identities (e-mail, video-conferencing software, shared workspaces, etc.) in parallel.

# X/ INNOVATION AND CREATIVITY

Innovation and creativity refer to an individual's ability to come up with new ideas, put them into practice, establish new connections and resolve problems using digital tools or methods. Creativity can also refer to the ability to express original ideas or develop innovative products and services.

## Sub-dimension 1: Developing creative and innovative skills

Sub-dimension elements

- Developing innovative skills by using digital tools to learn and implement project in an artistic, personal or professional context.
- Making the most of the technical possibilities to develop and express personal creativity and, where applicable, nurture that of others.
- Being receptive and open to others' innovations.

> **Example applications**
> *Learning situation*
> Students use digital technology to develop an overview of issues with learning and come up with original ideas in their discipline.
>
> *Teaching situation*
> Lecturers use brain-storming and creative thinking techniques to create learning environments where students are encouraged to think.
>
> *Research situation*
> Researchers use a 'design thinking' approach based on digital technologies to define a solution to a given problem.
>
> *Administration and technical situation*
> Employees take an active role in improving the efficiency of their work by putting forward optimisation ideas with the aid of digital technologies.

## Sub-dimension 2: Developing complex thinking

Sub-dimension elements

- Developing analytical skills.
- Using digital tools to research information around a given problem.
- Producing qualitative and quantitative data analyses using specific programs.
- Demonstrating ability to resolve problems and put forward solutions.

**Example applications**

*Learning situation*
Students demonstrate their ability to analyse a situation in detail before proposing solutions. Digital resources can help with this analysis.

*Teaching situation*
Lecturers give students opportunities to think in a structured, critical way about a contemporary situation, for example, through a debate on a current problem in the field.

*Research situation*
Researchers develop critical thinking through handling Open Access data during their research and their publications.

*Administration and technical situation*
Employees participate actively in giving their views on ideas proposed by other employees through an innovation management solution.

## Sub-dimension 3: Developing flexibility using digital resources

Sub-dimension elements

- Using digital resources to increase flexibility in carrying out work alone or in conjunction with others.
- Working together to adopt flexible, agile methods and utilise the opportunities offered by digital solutions.
- Embracing the changes brought about by digitalisation.

**Example applications**

*Learning situation*
Students use the available technologies in order to co-create, for example in a group project.

*Teaching situation*
If the educational context allows it, lecturers invite experts to join their lessons on a virtual basis or arrange virtual company tours.

*Research situation*
Researchers extend their research circles around the world by using digital technology to allow asynchronous collaboration.

*Administration and technical situation*
Employees use digital task management systems that are shared with their colleagues.

# XI  ETHICAL AND CULTURAL AWARENESS

As digital technologies are so powerful, they need to be used responsibly from an ethical, environmental, health, social and cultural perspective, and it must also be possible to promote their use by everyone while avoiding widening the digital divide.

**Sub-dimension 1: Acting as an ethical citizen in the digital era**

Sub-dimension elements

- Considering the social, cultural, economic, philosophical and religious diversity of the stakeholders in the digital society and not forgetting or offending anyone through digital consumption or production.
- Understanding the issues linked to the marketing of personal data and the mechanisms of the attention economy.
- Understanding the influence of social media algorithms on society's ability to agree on criteria of accuracy.
- Consistently questioning the current laws and regulations on digital systems, especially with respect to intellectual property.

> **Example applications**
> *Learning situation*
> Students verify the credibility of the digital sources they use for their work.
>
> *Teaching situation*
> Lecturers are careful to check the legal terms for sharing the media content they make available to the students for teaching purposes. For their remote learning sessions, they consider the quality of the students' hardware.
>
> *Research situation*
> Researchers are aware of the concept of predatory reviews and take care to verify the seriousness of the journal in which they are seeking publication.
>
> *Administration and technical situation*
> Employees monitor the laws on the storage and use of personal data in order to ensure permanent compliance.

**Sub-dimension 2: Utilising digitalisation as a vector for inclusion and to meet diverse needs**

Sub-dimension elements

- Utilising digital tools and strategies to meet diverse needs that are different to one's own or to overcome obstacles.
- Selecting and using a digital tool having carried out a suitable analysis of one's needs and those of one's colleagues.
- Analysing the functionality of each tool based on the requirements and cultural, social, physical, technical and economic accessibility constraints in order to evaluate the benefits and the limitations.

> **Example applications**
>
> *Learning situation*
> For group work, students use a collaborative work tool which is suitable for their needs but also available and usable for everyone.
>
> *Teaching situation*
> Lecturers help students with visual impairments by telling them about software with suitable accessibility functions that is recommended by the university.
>
> *Research situation*
> Researchers are aware of the issues relating to Open Access and take care to make their articles available on the platform specified by the university.
>
> *Administration and technical situation*
> Heads of department take the private lives of their staff into consideration when they are working from home.

## Sub-dimension 3: Protecting the environment

Sub-dimension elements

- Choosing equipment and methods for work and data storage based on their overall efficiency.
- Considering the environmental impact of its whole life cycle when buying and replacing equipment.
- Knowing how to evaluate the energy impact of sending, downloading and storing large files.

> **Example applications**
>
> *Learning situation*
> During video-conferencing sessions, students keep their cameras on when asked by the lecturer to do so but stop video streaming when it is not required.
>
> *Teaching situation*
> Lecturers check the size of attachments they send to students and the documents they store on the servers, especially if they are remote. They regularly delete files that are no longer required.
>
> *Research situation*
> Researchers are careful not to clog up servers with masses of useless data and avoid producing unnecessary videos that take up a lot of storage space.
>
> *Administration and technical situation*
> Heads of department endeavour not to order unnecessary IT hardware. When they place orders, they record the purchase order in a long-term plan for the requirements of their department.

# INSTITUTIONAL FRAMEWORK

This document is in addition to the other texts relating to digitalisation at HES-SO. It does not replace them.

## I/   OFFICIAL TEXTS

- Stratégie numérique de la HES-SO (2018) :
  https://www.hes-so.ch/data/documents/Strategie-Numerique-HES-SO-12293.pdf

- Référentiel de compétences de l'enseignant·e HES-SO (2021) :
  https://www.hes-so.ch/la-hes-so/soutien-a-lenseignement/ressources-pedagogiques/referentiel-de-competences-de-lenseigant-e-hes-so

- Glossaire enseignement de la HES-SO (2017) :
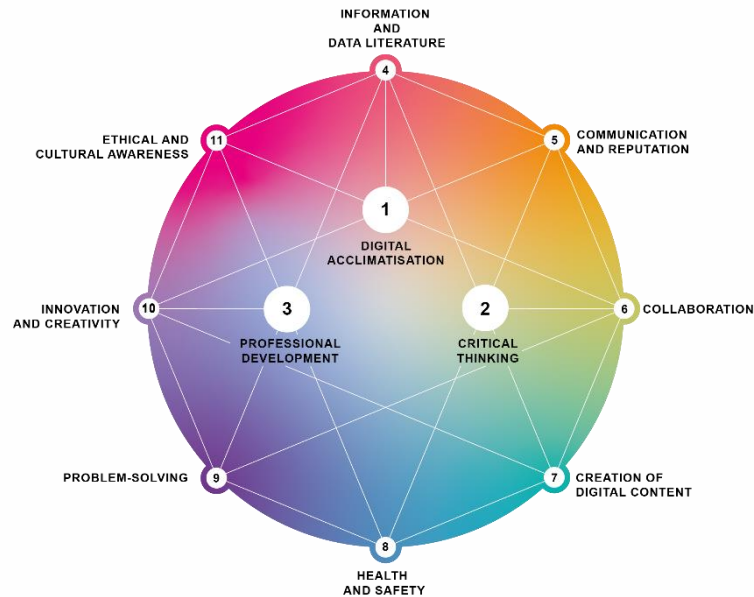  https://devpro.hes-so.ch/data/documents/Glossaire-enseignement2017-9164.pdf

## II/   RESOURCES

- Aide-mémoire enseignement - Enseigner avec le numérique, repères théoriques :
  https://www.hes-so.ch/data/documents/Enseignement-aide-memoire-Enseigneraveclenumerique-12062020-12379.pdf

- Aide-mémoire enseignement - Enseigner à distance grâce au numérique, conseils pratiques : https://www.hes-so.ch/data/documents/Enseignement-aide-memoire-EnseignerADistance-Numerique-12062020-12380-2-12415.pdf

- UNIL digital strategy: https://www.unil.ch/numerique/fr/home/menuinst/enseignement.html

- European digital competency reference framework (DigComp and DigCompEdu) :
  https://ec.europa.eu/jrc/en/digcomp and https://ec.europa.eu/jrc/en/digcompedu

- Cadre de référence de la compétence numérique (Ministère de l'enseignement supérieur du Québec) : http://www.education.gouv.qc.ca/dossiers-thematiques/plan-daction-numerique/cadre-de-reference-de-la-competence-numerique/

- Le numérique en culture(s) – An article by RE. Eastes in *The Conversation* :
  https://theconversation.com/le-numerique-en-culture-s-73780

- Pix & Pix HES-SO : https://pix.fr/ et https://lechaudron.io/chaudron/hes-so-geneve-deploiement-pix/

- HES-SO digital resources: https://numerique.hes-so.ch/

# SUMMARY OF DIMENSIONS AND SUB-DIMENSIONS





## 1. DIGITAL ACCLIMATISATION

1.1 Developing and utilising digital skills
1.2 Developing computational thinking
1.3 Managing digital training



## 2. CRITICAL THINKING

2.1 Developing critical thinking towards digitalisation
2.2 Developing critical thinking using digital resources



## 3. PERSONAL AND PROFESSIONAL DEVELOPMENT

3.1 Managing one's career and learning throughout one's digital life
3.2 Utilising the potential of digital learning and teaching



## 4. INFORMATION AND DATA LITERACY

4.1 Searching, filtering and evaluating data, information and digital content
4.2 Managing and organising data, information and digital content
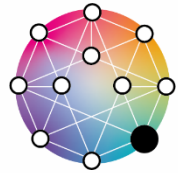


## 5. COMMUNICATION AND REPUTATION

5.1 Using appropriate forms of expression to share information effectively via digital technologies
5.2 Managing one's digital identity

**6. COLLABORATION**

6.1   Interacting and collaboration using digital technologies
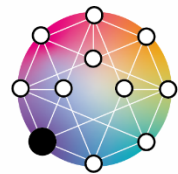6.2   Engaging through digital technologies



**7. CREATION OF DIGITAL CONTENT**

7.1   Integrating, developing and modifying digital content
7.2   Respecting copyright and licences
7.3   Programming and configuring



**8. HEALTH AND SAFETY**

8.1   Protecting hardware
8.2   Protecting personal data and privacy
8.3   Ensuring health and well-being



**9. PROBLEM-SOLVING**

9.1   Identifying the requirements and the technical solutions
9.2   Technical problem-solving



**10. INNOVATION ET CREATIVITY**

10.1   Developing creative and innovative skills
10.2   Developing complex thinking
10.3   Developing flexibility using digital resources



**11. ETHICAL AND CULTURAL AWARENESS**

11.1   Acting as an ethical citizen in the digital era
11.2   Utilising digitalisation as a vector for inclusion and
         to meet diverse needs
11.3   Protecting the environment

# Hes·so