KOMPASS

STRATEGIC FRAMEWORK FOR ARTIFICIAL INTELLIGENCE IN SCHOOLS

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LE GOUVERNEMENT
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Foreword by the Minister of Education

Artificial intelligence (AI) is now part of everyday life. It shapes how we access information, changes our professional practices and influences the ways we learn, communicate and make sense of the world – sometimes invisibly. Schools cannot remain on the sidelines of these developments. On the contrary, they have a vital role to play in helping young people understand them, navigate them and engage with them in an informed way.

In responding to AI, rather than choosing between enthusiasm and mistrust, we need to create a calm space for reflection, grounded in dialogue, experience and sound judgement. It is in this spirit that I initiated a consultation process involving a wide range of stakeholders from across the education sector. Through this dialogue, more than 180 practitioners and experts – including teachers, trade union representatives, school leaders, competence centres and members of the Higher Council for National Education of Luxembourg – were consulted to help shape a rich and widely shared vision.

This document is the result: a strategic framework that provides a clear and coherent direction, grounded in shared principles, to guide the use of AI in education in a responsible and sustainable manner. It offers reference points, a common direction and a shared language for addressing AI across different educational contexts. It is aligned with national priorities for digital and educational transformation, while also integrating with European and international frameworks that place people, responsibility and ethics at the heart of technological development.

One conviction underpins this entire approach: artificial intelligence must neither define the aims of education nor take their place. It can, however, become a valuable support when its use is considered, transparent and fully acknowledged. A school's mission is to help pupils learn to think, to question, to verify and to work together – with or without technology. AI can support these processes, but it does not replace them.

This also means recognising that learning is not limited to acquiring technical knowledge. It involves fundamental human dimensions: our relationship with effort, mistakes, self-confidence and other people. In an increasingly powerful digital environment, school must remain a place where young people learn to stay in control of their choices, develop a critical perspective and build a balanced relationship with technological tools.

With the support of pedagogical and institutional steering structures, every education professional is called upon to play an active role. This includes raising awareness among pupils and young people about the uses of AI, explaining its human, ethical, societal and environmental implications, and fostering critical discussion of emerging practices. The aim is to assist pupils on their path to becoming informed, responsible citizens who are able to maintain independent judgement in a constantly evolving digital environment.

The strategic framework presented in this document lays the foundations for a progressive approach, adapted to pupils' age and maturity level and shared by the entire education community – while leaving room for experimentation, adjustment and the ongoing development of pedagogical practice.

Education in the age of artificial intelligence can only be built over time, through collective learning and continuous dialogue. This strategic framework is a key milestone, intended to evolve with experience, so that our schools can move forward with humanity, responsibility and ambition.

Claude Meisch

Minister of Education, Children and Youth

1. Towards an augmented intelligence

Artificial intelligence – particularly generative AI – is transforming the way we access information, write texts and create images, sounds or videos. As part of the daily lives of pupils and teachers alike, it generates a mixture of curiosity, enthusiasm and concern. It raises fundamental questions about what still distinguishes human capabilities from those of machines and calls for a clear response from the education system.

A **national survey** conducted in Luxembourg in the summer of 2025 among more than 4,000 pupils and 200 teachers confirms this ambivalence: AI is already used in schools. Half of teachers and almost 40% of pupils report using it regularly, mainly to search for information and translate, summarise or simplify texts.

Pupils generally consider themselves more competent, more at ease and more optimistic than their teachers when it comes to these technologies. While most teachers perceive both opportunities and risks, many pupils primarily see AI as a tool for learning more easily and in a more personalised way.

Nevertheless, both groups share concerns regarding the risk of fraud (plagiarism), the spread of false information and a potential decline in individual effort. Pupils and teachers agree on the need for a critical and responsible use of AI, as well as for clear rules. A large majority of teachers (95%) and pupils (77%) believe that learning about AI and its uses must now become an integral part of school education.

We are convinced: **AI must remain at the service of human beings**. It does not replace free thought, critical thinking, creativity or the relational and emotional dimensions of learning. Schools must neither ignore AI nor be subjected to it; they must support its use in a considerate manner, taking into account both its opportunities and its risks.

Our guiding principle is therefore twofold: **learning to think with AI while preserving the ability to think without it**. AI is not a substitute, but a co-agent that can support and extend human capacities when its use is carefully contemplated, transparent and clearly framed. This document proposes a progressive framework to achieve this, based on expected competences, digital maturity, gradual pedagogical integration and safeguards for academic integrity.

The objective is clear: The use of AI must support the educational mandate of schools, strengthen the individualisation and differentiation of learning, and **contribute to improving the quality of educational processes for every learner**.

1.1. What opportunities does AI offer for schools?

Artificial intelligence offers genuine opportunities for the education system, provided that its use is judicious, clearly framed and guided by explicit pedagogical objectives.

In the classroom, when integrated into a clearly structured pedagogical approach, AI can help to enrich and differentiate certain learning processes. It can support the exploration, structuring and contextualisation of knowledge, for example through activities such as reformulation, comparison of hypotheses or the visualisation of complex concepts. In this context, AI can stimulate pupils' creativity through writing projects, problem-solving activities or design projects, while at the same time strengthening their ability to analyse, discuss and improve their own work.

Beyond classroom practice, the considered use of AI constitutes an educational opportunity in its own right. It enables pupils and education professionals to develop a critical understanding of the legal, human, ethical, societal and environmental issues associated with digital technologies, and to strengthen a **shared and responsible digital culture**. Used in this way, AI can also help to **make learning processes more visible**, in particular by encouraging pupils to discuss their reasoning, justify their choices and compare human-produced work with AI-assisted outputs.

Finally, AI can also provide valuable support for education professionals, notably by assisting with pedagogical preparation and certain **organisational or administrative tasks**. The structuring of content as well as the rephrasing, translation or adaptation of teaching materials can all help to free up time for educational support, individualised pupil follow-up and collaborative work within teams, without ever replacing professional judgement.

Focus 1

Artificial intelligence, equity and educational inclusion

From an equity and inclusion perspective, artificial intelligence can serve as a complementary tool to better address the diversity of the pupils' linguistic and cultural backgrounds, linguistic and cultural backgrounds, as well as certain specific educational needs. It can support pedagogical approaches aimed at ensuring a participation in the school's learning processes that is as equitable as possible.

Certain AI-based applications, such as assistive tools, augmented communication systems or adaptive digital environments, can support pupils with diverse needs – for example by facilitating access to content, communication or the adaptation of pedagogical approaches. In some cases, teachers may also use them to adjust pace and levels of difficulty, in order to promote the most equitable possible participation in learning.

These potential benefits come with clear limitations and conditions. Many solutions are still based on partial scientific evidence, so their long-term effectiveness must be assessed with caution. The use of learning data also requires heightened vigilance with regard to data protection, ethics and respect for pupils' dignity.

As with all uses of AI in education, humans are ultimately responsible for the pedagogical decisions. AI is considered a co-agent, deployed in a measured way to strengthen inclusive and equitable education. Where pedagogically justified, the progressive model may be adapted in a targeted way in order to respond to specific educational needs, while respecting educational objectives and the development of pupils' autonomy.

1.2. What risks need to be considered?

The integration of artificial intelligence into educational contexts involves real risks that require careful attention. These risks stem not only from the technology itself, but above all from the conditions under which it is used, the degree of automation involved and the role assigned to it within learning processes.

The first key issue concerns the **risk of excessive cognitive offloading**. When pupils become accustomed to delegating activities such as information searching, writing or problem-solving to automated systems, their own learning strategies may weaken. Early or poorly regulated dependence on AI can lead to reduced cognitive effort, narrower reasoning and weaker critical thinking. One of a school's core responsibilities is therefore to preserve and strengthen fundamental human competences, ensuring that AI neither replaces personal effort nor interferes with cognitive processes.

Beyond cognitive dimensions, **relational, social and psycho-emotional aspects** must also be taken into account. Excessive or insufficiently guided use of digital systems can reduce human interaction and undermine the collaborative and relational dimensions of learning. For some pupils – particularly younger or more vulnerable learners – AI may blur the distinction between technological support and authentic human relationships, calling for heightened vigilance in terms of educational guidance and socio-emotional development.

From an informational perspective, another major risk lies in **overreliance** on generated content. Without explicit competences in verification, contextualisation and critical thinking, pupils may be exposed to forms of misinformation that are difficult to detect. The development of critical thinking, source evaluation and an understanding of bias therefore represents a central challenge for education in the age of AI.

The use of AI also raises **legal, ethical and institutional challenges**. Unregulated use of certain tools may result in breaches of the legal framework, particularly with regard to personal data protection, copyright and academic integrity. The limited transparency of many systems further hinders the users' ability to understand underlying mechanisms and to retain control over decision-making processes. In addition, environmental and social concerns must be considered, notably those linked to the ecological footprint of AI technologies and the conditions under which certain systems are developed and trained.

Taken together, these risks underline the fact that **artificial intelligence is not a neutral tool**. It shapes how information is produced, selected and interpreted, and can directly affect the quality, reliability, depth and equity of learning processes. For this reason, schools can neither ignore nor respond to these challenges through blanket prohibitions. Instead, they must establish clear points of reference, develop explicit competences and put in place usage frameworks to manage risks while fully harnessing the educational opportunities offered by AI.

Focus 2

Artificial intelligence and non-formal education

Within the framework of this strategy, the use of artificial intelligence in non-formal education is approached in a targeted and differentiated manner, in line with its specific missions.

Non-formal education primarily aims to support the holistic development of children and teenagers, fostering their autonomy, socialisation, well-being and active participation in society, within educational contexts that complement formal schooling. Its primary purpose is not the development of competences related to the media, the digital world at large or AI among children.

The use of AI in non-formal education therefore mainly concerns professional, organisational and administrative functions, such as activity planning, team coordination, documentation, communication or support for certain management tasks. In these areas, AI can serve as a relevant support tool, provided that its use remains proportionate, transparent and under human responsibility.

Moreover, the context of non-formal education involves close proximity to the everyday lives of children and teenagers. Therefore, it is essential that staff have sufficient knowledge to understand the issues and common uses associated with AI. This awareness-raising does not follow a formal teaching logic; rather, it aims to enable professionals to identify, acknowledge and, where appropriate, discuss questions, practices or concerns related to AI, as observed among children and teenagers. In this way, it supports a reflective and attentive educational stance, shaping the overall coherence of educational action, in line with formal education.

1.3. What is a shared strategic framework?

The ambition underpinning this strategic framework extends well beyond classroom pedagogy. It is based on a systemic and shared approach that considers **artificial intelligence as a cross-cutting educational issue**, embedded in all the core missions of schools. From this perspective, AI is addressed at three complementary and interdependent levels:

- **AI in support of education professionals**, used to assist with preparation, differentiation, learner support and pedagogical reflection
- **AI in support of learners**, integrated progressively, critically and within a clearly defined framework into learning processes
- **AI in support of the education system**, mobilised to support organisation, planning, communication and certain administrative processes

This articulation aims to ensure long-term coherence between education about AI, media literacy, data literacy and digital citizenship, and to anchor these issues firmly within the fundamental missions of schools, beyond classroom use alone.

A considered use of AI cannot rely solely on isolated initiatives. It requires a **shared framework**, based on common principles, clearly defined responsibilities and close coordination among all involved actors. This framework is intended to support professional practice, ensure equity between schools and guarantee that the implementation of AI is consistent with educational objectives and national orientations in the field of artificial intelligence.

The success of this approach depends on **collective responsibility within the education community**. All the stakeholders involved - school leaders, teachers, educators, counselors, non-formal education professionals, pupils and parents - contribute within their respective roles to a coherent, responsible use of AI that is oriented towards the development of learners' competences.

Focus 3

Alignment with the national AI strategy

Luxembourg's national strategy on artificial intelligence identifies education as a high-impact sector and associates it with a flagship project: the development of a sovereign AI chatbot to assist in the implementation of educational programmes. This project aims to create a robust and interconnected curricular database, hosted in Luxembourg, enriched with intelligent search capabilities and a pedagogical assistant powered by a large language model.

The ambition is twofold: i) to provide teachers and decision-makers with planning and analytical tools that enable better differentiation and informed steering; and ii) to strengthen continuing professional development in order to foster a genuine culture of AI literacy in education.

This strategic framework specifies how the national AI strategy is implemented in education. It translates government policy into concrete actions, ensuring that AI integration remains guided by pedagogical objectives, data sovereignty and human-centred values.

2. Towards a shared understanding

In order to build a common educational approach to artificial intelligence, it is essential to rely on shared reference points and a common understanding.

In both public debate and educational practice, the term *artificial intelligence* covers a wide range of realities. The purpose of this chapter is to establish shared reference points in order to facilitate informed dialogue and the development of considered pedagogical uses.

2.1. What is artificial intelligence?

Artificial intelligence refers to a set of computer systems capable of processing and analysing large volumes of data using probabilistic algorithms. These produce outputs such as predictions, classifications, recommendations or generated content, which may resemble certain human cognitive activities. These systems are capable of learning and improving over time.

Focus 4

Definition of AI within the European legal framework

The European Artificial Intelligence Act (AI Act) defines an AI system as a "machine-based system that is designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations or decisions that can influence physical or virtual environments".

2.2. What is generative AI?

One particular category of AI systems is now gaining an increasingly prominent role in education: generative artificial intelligence. It is characterised by its ability to respond to an instruction formulated by the user, known as a prompt, in order to produce new content – such as texts, images, sounds, videos or computer programs – based on statistical and neural models that predict the most likely elements.

In a school for example, this may involve generating a summary adapted to a pupil's age, producing an illustration or drafting a text.

Focus 5

Specific characteristics of generative AI

Generative AI relies on very large training datasets and considerable computing power. It can produce texts, images, sounds or videos within seconds from a natural-language query (prompt). Through conversational agents, users can refine their requests and obtain outputs that are increasingly tailored to their needs.

However, its functioning remains purely statistical: it calculates the most probable sequence of words or multimedia elements, without understanding or any notion of truth. The generated outputs may appear plausible, yet may be incorrect, biased or stereotypical, as they can reproduce inequalities present in the training data. Generative AI therefore cannot be considered "intelligent" in the human sense of the term.

These systems are evolving rapidly, ranging from widely distributed commercial models to more transparent open-source solutions. In the educational context, their use must be informed and clearly framed, with due regard for the legal framework, data protection requirements, transparency of use, vigilance with regard to bias and consideration of environmental impacts.

2.3. What is a competent user of AI?

Schools bear a major responsibility: to strike a **sustainable balance** between preserving and developing fundamental human competences and the mindful use of artificial intelligence, oriented towards improving the quality of learning and educational processes. This balance cannot be considered independently of learners' cognitive and socio-emotional maturity, or the educational contexts in which AI is used or the pedagogical objectives pursued.

A competent and reflective use of AI primarily aims to develop the capacities that enable individuals to assume informed responsibility and make well-founded decisions. It is in this sense that the concept of **augmented intelligence** is applied: AI is mobilised as a co-agent, serving clearly defined pedagogical, educational or organisational purposes, in order to support teaching, learning or organisational processes – without automating them or replacing human action. Human responsibility remains central in all cases.

Being a competent user of AI does not merely mean mastering tools. It means **knowing when, why and how to use them**, while understanding their contributions, limitations and implications. This includes the ability to distinguish between what requires human effort and what may be supported by AI, to understand the objectives and conditions of use of AI systems, and to anticipate their cognitive, emotional and ethical consequences.

In this framework, competences related to the use of AI are understood as **evolving reference points, to be developed progressively according to age, context and level of digital maturity**. They do not constitute a fixed profile to be attained at a given moment, nor a uniform prerequisite for using AI; instead, they are a set of complementary dimensions.

- **Fundamental human competences**

  These competences, which are not specific to AI, underpin any meaningful use of it:
  - communicating, expressing oneself and creating, whether orally, in writing or through other forms of production
  - reading, writing and reasoning critically
  - applying basic concepts in mathematics, logic and statistics
  - exercising judgement, structuring thought and formulating arguments
  - regulating emotions and maintaining an autonomous and discerning relationship with digital tools
  - cooperating, managing collective situations, and developing empathy and creativity

- **Transversal self-regulation competences**

  Competent use of AI also requires metacognitive and reflective capacities, such as the ability to:
  - organise one's work autonomously
  - define appropriate objectives and evaluate one's own progress
  - adjust learning strategies
  - remain in control of one's choices, without delegating responsibility to the machine

- **AI- and data-specific competences**
  These competences form the core of AI and data literacy. They are based in particular on the ability to:
  - understand what AI and data are, and how they function in general, as well as their limitations and biases
  - use AI and data in a safe, critical and legally compliant manner (data protection, copyright, academic integrity and transparency)
  - analyse the effects and impacts of AI and data on oneself, on human relationships, on society and on the environment
  - mobilise AI as a co-agent in creative, analytical or collaborative processes, while knowing when its use is appropriate and when it should be avoided

In summary, a competent user of AI is not someone who systematically delegates tasks to the machine, but someone who knows how to choose, use and evaluate AI as a co-agent, integrating it consciously into learning and professional practices while remaining in **control of reasoning and decision-making**.

All of these competences are developed over time, following a **progression adapted to learners' digital maturity**. This is why schools are organised around a progressive model (*Stufenmodell*), alternating phases without AI, about AI and with AI. This gradual pathway aims to strengthen the competences of all educational actors, while avoiding the risks associated with early dependency or poorly regulated use.

Focus 6

Four dimensions of AI and data competences

To help us understand the framework outlined above, competences related to data and artificial intelligence can be grouped into four complementary dimensions:

- **Technological understanding:** knowing what AI is, how it works, and recognising its limitations and biases
- **Competent use:** using AI safely, critically and in compliance with laws and regulations (e.g. data protection, copyright and academic integrity)
- **Societal and reflective perspective:** analysing the impacts of AI on oneself, on society and on the environment
- **Critical and creative co-creation:** mobilising AI to create, innovate and collaborate in an augmented manner

These dimensions serve as reference points for progressive development, according to age, educational contexts and learners' level of digital maturity. They do not describe a fixed target profile, but rather a process of gradual development.

3. Towards a progressive framework of competences and uses

3.1 How can progression be structured in a gradual manner?

The development of competences in artificial intelligence and data literacy on the one hand, and the progressive introduction of AI use by pupils on the other, should be conceived together and built upon a prior foundation of general digital competences. Both are embedded in a gradual and spiral progression, in which key concepts are regularly revisited and consolidated, with an age- and context-appropriate level of complexity, autonomy and responsibility.

This progression is based on **two complementary dimensions**:

- the **development of AI and data competences** (AI and data literacy), including an understanding of the general functioning of systems, their biases and impacts, as well as the gradual acquisition of a critical, responsible and citizenship-oriented digital culture
- the **use of AI** by pupils, initially introduced within a clearly defined framework, then through guided practice, and progressively extended towards responsible autonomy – particularly at the upper levels of secondary education, when permitted by the learners' maturity and the pedagogical framework.

	AI and data competences	Use of AI by pupils
EF I[1]	Human foundations: curiosity, self-regulation, language, logical thinking, respect for social rules; initial awareness of principles related to technologies and automated systems	No direct use of AI; analogue and playful activities, storytelling to raise awareness that tools have effects and limitations
EF II	Introduction to digital and data literacy: written expression, source verification, technological understanding of basic algorithmic principles; awareness of rights, rules and responsibility	Illustrative and clearly framed use: comparison of generated images, small guided activities, supported critical reflection
ES I	Consolidation: development of critical thinking and media analysis; understanding of data models, bias, and social and environmental impacts; strengthening a critical and civic digital culture	Guided use: occasional mobilisation of AI to organise, summarise or generate ideas, within an explicit pedagogical framework, accompanied by critical discussion of validity, limits and conditions of output generation
ES II	Advanced mastery: in-depth development of data literacy and algorithmic analysis; ethical and critical reflection on the societal impacts of AI (democracy, work and ecology); ability to make informed decisions about whether or not to use AI; understanding its benefits, limits and implications	Increasingly autonomous and responsible use within a defined school framework: integration of AI as a co-agent in creative, research or co-construction projects, with explicit requirements for transparency, verification and individual responsibility

Table 1: Spiral learning pathway – progressive introduction of AI approaches

EF I: elementary school - cycles 2 and 3
EF II: elementary school - cycle 4
ES I: secondary school – 7e to 4e
ES II: secondary school – 3e to 1re

The use of AI never precedes competences, but is grounded in them: Each stage of technological growth is preceded by work on understanding, critical reflection and the consolidation of fundamental human competences.

By articulating use and competence, pupils first learn to develop their core human capacities, then to understand the underlying logics of AI and data systems, and finally to use them critically and creatively as co-agents.

A competent learner remains in control of their own learning and is able to **decide, with full awareness, when and how to use AI – or when not to use it**.

3.2 How can autonomy be developed progressively?

In line with the Ministry of Education, Children and Youth's (MENJE) position on screen-life balance, certain developmental phases – particularly adolescence – require heightened vigilance regarding the use of digital tools and artificial intelligence. For younger children, the primary focus is on the development of fundamental competences, autonomy, socialisation and their understanding of effort, within learning environments that are only minimally mediated by digital technologies. The period roughly corresponding to the ages of 12 to 16 constitutes a sensitive phase during which AI uses should be **guided, clearly framed and explicitly supported**, within well-defined pedagogical contexts.

Before a sufficient level of digital maturity is reached – generally expected before the age of 16, without this age constituting an absolute threshold – the use of AI by pupils is envisaged in a **targeted, occasional and supported** manner. It is embedded in transparent and age-appropriate pedagogical approaches. The development of fundamental human competences, the gradual understanding of AI mechanisms and critical reflection are strongly prioritised over its autonomous use.

Once a more advanced level of digital maturity has been attained – most often in the upper years of secondary education – **greater autonomy** may be considered within the school context. This autonomy remains conditional upon explicit pedagogical objectives, clear rules regarding transparency of use, responsibility and data protection, as well as appropriate pedagogical guidance. Within this framework, AI may be mobilised more broadly in learning activities and selected projects, while remaining integrated into a structured and clearly regulated educational framework.

Focus 7

Implications of AI in everyday (educational) contexts

Artificial intelligence is increasingly embedded in everyday digital environments, often in subtle or indirect ways. Many tools and services used in educational contexts now incorporate AI functionalities in the background. Examples include AI assistants, automated recommendations or co-agent-type supports, which may influence practices without being explicitly identified as AI.

This evolution is gradually reshaping the conditions of teaching, learning and the organisation of educational work. AI no longer appears solely as a distinct and occasional tool, but as an integrated component of digital environments; it may become unnoticeable in everyday practice if it is not explicitly questioned, clearly framed and made visible.

In this context, the *KI Kompass* aims to provide sufficiently stable reference points to guide usage while remaining adaptable to rapidly evolving technologies. This openness is a necessary condition for enabling a critical, responsible and informed use of artificial intelligence.

4. Towards a pedagogical translation of the progressive framework

On a pedagogical level, this progression is reflected in three complementary approaches that structure learning. These are closely linked to competence development, within a framework in which human cognitive effort remains central at all stages:

- **Learning without AI:** developing and consolidating the fundamental human competences essential to all learning – reading, writing, numeracy, reasoning, cooperation, autonomy and self-regulation – while laying the first foundations of digital literacy. AI does not directly intervene in pupils' learning processes.
- **Learning about AI:** progressively building an understanding of the functioning of artificial intelligence, its potential and its limits, as well as its individual, social, ethical and environmental impacts, in order to enable a critical, responsible and constructive use.
- **Learning with AI:** mobilising AI in a critical, transparent and creative manner as a co-agent in support of learning. The use of AI adapted to pupils' age, digital maturity and level of autonomy, forms part of a continuum ranging from illustrative experimentation to more advanced forms of autonomy; these remain situated, clearly framed and reversible.

These three approaches form part of a progressive and spiral learning pathway, as defined by the progressive model. They coexist to varying degrees at different points of the educational journey: *learning without AI* remains essential at all levels; *learning about AI* is introduced from fundamental education onwards and progressively deepened; *learning with AI* is introduced gradually, without ever replacing the first two dimensions.

4.1. Learning without AI

The *learning without AI* approach constitutes a foundational axis of schooling and plays a central role in the early years, particularly in cycles 1 to 3. The focus is on core competences: reading, writing, numeracy, oral expression, social cooperation, curiosity and learning autonomy.

- **AI and data literacy competences:** initial exposure to logic, rules, sequences and self-regulation, alongside awareness-raising in digital literacy, often through analogue activities. Pupils become aware that tools have effects and limitations.
- **Use of AI:** no active use by pupils. AI may exist in the background as a co-agent of the teacher, while pupils' cognitive effort and learning processes remain central.

Even when other approaches are introduced later, learning without AI remains essential throughout schooling. This approach ensures the preservation of personal effort and the development of fundamental human competences.

Objective: to strengthen learning autonomy and core human competences

4.2. Learning about AI

The *learning about AI* approach gradually complements *learning without AI* over the course of schooling. Its aim is to help pupils develop an age-appropriate manner, and in line with their level of maturity, an explicit understanding of what artificial intelligence is: its general functioning, the origin of its outputs, its opportunities and its limitations.

- **AI and data literacy competences:** introduction to data literacy, computational thinking, algorithms and bias, as well as to the broader development and implications of AI systems
- **Use of AI:** illustrative and clearly framed uses (for example, comparing a generated response with manual research, analysing a bias or discussing basic ethical issues)

This approach remains essential and is progessively deepened throughout the educational journey, without ever replacing the fundamental learning processes developed without AI.

Objective: to develop an understanding of technology and foster critical thinking

4.3. Learning with AI

The *learning with AI* approach is introduced progressively and within a clearly defined framework, once the pedagogical context, the established rules and pupils' level of maturity allow it. Pupils may then mobilise AI as a co-agent for learning and creation, for example to support research or engage in co-writing or multimedia production. A critical and reflective stance remains crucial: assessing the quality of outputs, cross-checking sources, reformulating, enriching and contextualising generated content.

- **AI and data literacy competences:** consolidation of algorithmic understanding and advanced data literacy skills; ability to make informed decisions about whether or not to use AI; in-depth critical reflection on ethical, democratic and environmental issues
- **Use of AI:** increasingly autonomous and responsible uses, depending on pupils' maturity, within a clearly defined and regulated school framework. These may include research activities, co-writing, multimedia projects or collaborative knowledge construction. The focus is on critical judgement, creativity, transparency and the ability to make informed choices about tool use.

Learning with AI is neither an obligation nor an automatic endpoint, but a pedagogical possibility that is introduced in a measured way that builds on *learning without AI* and *about AI*. Once introduced, this approach must itself continue to be developed, so that pupils gradually acquire an autonomous, competent, critical and creative use of AI.

Objective: to develop a competent, critical and creative use of AI

By combining these three approaches within a **spiral learning pathway**, pupils first learn to think independently, then to understand AI and finally to use it in a critical and creative manner. The ultimate objective is to develop a competent user: a learner who can decide when and why to use AI – or not to use it – in a responsible and informed way.

Focus 8

AI tools and validated environments on ki-kompass.lu

The *KI Kompass* serves as a key point of reference for supporting pedagogical, educational and organisational uses of artificial intelligence within the Luxembourg education system. In this context, it also guides the identification and use of validated AI tools. As a continuation of this strategic framework, the *KI Kompass* is supported in particular by a dedicated online platform as its operational and evolving component. Its purpose is to provide educators with clear and reliable guidance on which digital environments may be used in a compliant, regulated and responsible manner, in coherence with this strategic framework.

The tools and platforms referenced in the *KI Kompass* are subject to a selection and validation process based on pedagogical, legal and technological criteria. This process aims to ensure that the proposed solutions demonstrate a clear educational value, comply with data protection requirements and can be used under conditions that are compatible with the institutional responsibilities of the national education system.

Within this framework, certain tools and platforms are explicitly identified in the *KI Kompass* as secure environments that enable supported pedagogical uses of artificial intelligence. Their use is authorised and may be encouraged, provided that they serve as a clearly defined educational objective, respect the applicable usage frameworks and remain under human control at all times.

During phase 1 of the implementation process (2025-2026), the focus is placed primarily on teacher-centred tools, particularly those supporting lesson planning, pedagogical preparation and the creation of differentiated learning materials (e.g. *fobizz* and *teachino*). In parallel, tools dedicated to learning about artificial intelligence, such as *vittascience*, enable pupils to engage with the principles, functioning and key issues of AI from a perspective that is appropriate to the learners' age and the educational context.

This progressive approach allows for a measured and responsible introduction to the use of artificial intelligence, while ensuring coherence of practice, legal security and pedagogical responsibility. It is conceived as an evolving process, designed to adapt to feedback from practice, the needs of educational settings, and ongoing developments in technological and regulatory frameworks.

	Learning without AI	Learning about AI	Learning with AI
EF I[1]	Development of self-regulation, curiosity, language and logical thinking through analogue activities or the use of concrete objects (logic games, sequences and unplugged coding)	Initial playful discoveries: What is a machine? Why are some things considered "intelligent"? Awareness that tools have effects and limitations	No active use of AI; gradual awareness through stories, symbolic play or mediation by the teacher
	Objective: to strengthen learning autonomy and fundamental human competences; to lay the foundations of digital literacy		
EF II	Strengthening of written expression, autonomous reasoning, and social and digital rules	Introduction to how AI works (algorithms and data) through stories, experiments or guided games; awareness that AI learns, can make mistakes and is not neutral	Illustrative and clearly framed use: comparison of generated images, simple collective creations, guided critical reflection
	Objective: to develop a basic understanding of technology and foster critical thinking within secure frameworks		
ES I	Consolidation of autonomy, media analysis and logical reasoning	Progressive understanding of how AI functions (data, models and algorithms) and analysis of personal, social and environmental impact	Guided use of AI to organise, summarise or generate ideas, always accompanied by critical discussion and framed by the teacher
	Objective: to develop digital sovereignty, a solid understanding of technology and informed critical thinking		
ES II	Maintaining the ability to produce and reflect without AI; making an informed decision whether to use tools or not; valuing personal effort and equity	In-depth analysis of AI's impacts on democracy, work and the environment; ethical debates; critical understanding of models and intentions	Responsible integration of AI in creative, research or co-construction projects; transparent and regulation-compliant use, with an increased level of autonomy
	Objective: to develop a competent, critical and creative use (co-creation), strengthening augmented autonomy and responsibility		

Table 2 : Stages of progressive integration

EF I: elementary school – cycles 2 and 3
EF II: elementary school – cycle 4
ES I: secondary school – 7e to 4e
ES II: secondary school – 3e to 1re

5. Towards academic integrity and responsible assessment in the age of AI

When artificial intelligence is introduced into school learning, it must be done within a climate of transparency and trust across the school community. It must not lead to generalised suspicion towards pupils, particularly in assessment contexts. The prevention of inappropriate uses should be based primarily on clear expectations, pedagogical dialogue and adapted assessment formats, rather than on systematic control mechanisms.

Within this framework, the use of AI in school learning must comply with clear rules that guarantee academic integrity, transparency and the educational value of pupils' work. The use of such tools by pupils can only be accepted if the meaning of learning and personal effort are preserved. Summative assessment remains entirely under human control: **AI does not determine the value of a pupil's work.**

5.1. General principles

- **Transparency is a fundamental principle:** Any use of an AI tool must be explicitly declared.
- Personal effort must remain identifiable in all school work.

5.2. Practical guidelines for classroom use

- Pupils may use AI tools only if explicitly permitted by the teacher.
- Instructions must specify clearly whether, when and to what extent AI may be used (e.g. planning, drafting, revising or multimedia production).
- Pupils must indicate transparently which tool was used, for what purpose and, where appropriate, what the prompts were.
- Teachers are encouraged to prioritise assessment formats that value process and traceability (intermediate drafts, portfolios, oral presentations, AI-free assessments, etc.).

5.3. Prohibitions and sanctions

- The use of AI is prohibited in formal examinations except if a clearly argued decision has been submitted in writing beforehand.
- For homework or project-based work involving AI, pupils may be required to provide a written reflection or explanation of how AI was used.
- Any concealment of AI use or plagiarism constitutes academic misconduct and entails the same disciplinary consequences as any other form of academic fraud.
- No summative assessment may be carried out by AI; responsibility for grading and pedagogical judgement lies exclusively with teachers.

5.4. Limits of AI detectors and pedagogical alternatives

At this stage, AI detection tools have no legal value and **do not constitute sufficient proof of academic dishonesty**. They frequently produce false positives (human work identified as AI-generated content) and false negatives (undetected AI-generated content).

It is therefore prohibited to base a disciplinary decision exclusively on such tools. Teachers are encouraged to rely instead on pedagogical strategies, such as:

- comparison with the pupil's previous work
- analysis of writing style, typical errors and citation practices
- requests for drafts, outlines or learning logs
- quizzes or oral presentations to verify genuine understanding

In case of doubt, the teacher should engage in an open conversation with the pupil and, if necessary, involve parents or legal guardians. The aim is to examine the coherence of the work, clarify expectations and support the pupil towards responsible and transparent use of AI.

Focus 9

Principles and good practice for fair assessment

The risk of cheating is not new: AI is merely yet another means of doing so and must be addressed within the same framework of academic integrity.

- **Prioritise process-oriented tasks:** Prefer analysing, comparing, reflecting and creating over the simple reproduction of content.
- **Clarify the rules:** Explicitly indicate what must be done with or without AI, to guide pupils towards transparent and responsible use of AI.
- **Value transparency:** Encourage pupils to declare how AI was used in their work, specifying the tool and its role.
- **Diversify assessment methods:** Combine written work, oral presentations, intermediate stages and learning logs to make personal effort visible.
- **Reasoned monitoring:** Consider the use of AI detectors in cases of doubt, while remembering that they are not entirely reliable and must never serve as the sole basis for a disciplinary decision.
- **Foster explanation and dialogue:** Where uncertainty exists, ask pupils to explain and justify their approach (e.g. discussion, short oral tasks or drafts) to demonstrate genuine understanding.
- **Assessment remains entirely under human control:** Ensure that AI never determines the value of a pupil's work.

6. Towards a shared approach: outcomes of the consultation process

The impact of artificial intelligence in the field of education affects teachers, pupils, parents and school administrations in different ways. While the education system has already faced major technological changes in the past, the speed and dynamics characterising the current development of AI represent a particular source of concern for the entire education community.

That is why it was essential to support the development of the first edition of the *KI Kompass* with **an in-depth, open and structured dialogue** involving the main education stakeholders. The purpose of this process was to reconcile the proposed strategic framework with practical concerns in the field, to identify expectations, concerns and needs, and to inform collective reflection.

Over a period of six weeks, the Minister of Education, Children and Youth met with **more than 180 experts and representatives** to present the draft strategic framework, discuss feedback and address, in a transparent manner, the practical questions raised by the introduction of AI across different educational contexts.

This approach is distinguished by a clear commitment to treat the strategic framework as an **evolving document**, designed to integrate future technological, societal and pedagogical developments. It reflects the need to to continuously adapt to a rapidly changing environment.

"The KI Kompass helps to address the many questions that have been raised, but it will be important to remain vigilant in the face of ever-accelerating technological developments. At the same time, schools must help preserve creativity, keep human values at the centre, foster critical thinking and remain open – yet cautious – towards new teaching methods."

Parent representative

6.1 Shared opportunities and challenges

Faced with the potential disruptions and risks associated with the use of AI across different educational contexts, the dialogue with stakeholders **identified a number of shared priorities, needs and challenges**. These have been widely agreed upon and **incorporated either into the present document or into the design of the next stages of implementation**.

Among the most frequently highlighted **opportunities** were the potential of AI to better prepare young people for the realities of the world of work, the perspectives it opens up in terms of inclusion and equity, its capacity to reduce certain administrative burdens on teachers and school leadership, and its ability to support creativity and pupil engagement.

A broad consensus also emerged regarding the **concerns and risks** associated with the use of AI in schools. Depending on the availability of tools and the quality of pedagogical support provided, AI may help to reduce certain inequalities, but may also, conversely, exacerbate others. Poorly regulated or insufficiently thought-through uses can lead to cognitive impoverishment or foster forms of dependency, including at a psycho-emotional level, due to the lack of neutrality and accountability inherent in these technologies.

At an organisational and technological level, the absence of a shared framework and common reference points, particularly with regard to tools, also **risks fragmentation**, as individual schools may be tempted to develop or adopt their own solutions. This would be detrimental to the coherence, security and equity of the education system as a whole.

6.2 The role of humans in relation to AI

All stakeholders emphasised the **importance of placing humans at the centre of any approach** to AI in education. This requirement applies first and foremost to children and young people, but also to professionals working within the education sector.

From this perspective, **AI is understood as a co-agent**, capable of **supporting certain pedagogical or organisational processes**, without ever replacing teachers' work or pupils' cognitive effort. The exchanges highlighted the importance of preserving – and indeed **strengthening – fundamental, social and relational competences**, as well as **the capacity for critical thinking**.

Artificial intelligence should enhance teaching, promote inclusion and support young people to develop their creativity and cognitive abilities.

6.3 Progressive access to AI

The **progressive and spiral pathway** (*Stufenmodell*) received broad support from education stakeholders. It is perceived as a balanced framework that both protects children from overly early exposure and prepares them to navigate a world where AI is increasingly pervasive.

The shared objective is to integrate AI only when it provides clearly identifiable educational value, ensuring that **technology remains a learning tool instead of being an end in itself**. Pupils must be able to understand not only the benefits of AI, but also its limitations.

Stakeholders also emphasised the importance of maintaining and valuing **analogue forms of learning** in order to maintain a screen-life balance. They highlighted the role of non-formal education actors (e.g. childcare and youth services), particularly in promoting activities that encourage movement, creativity and a learning environment connected to nature.

"Artificial intelligence has a place in schools and must not be ignored. It is important not to shun AI out of fear, as it also represents an opportunity to improve education."

Pupil representative

6.4 The role of AI in equity and inclusion

The dialogue highlighted strong support for the **potential of AI as a facilitator of inclusion**. AI-based technologies can play a key role in facilitating access to education, reducing certain barriers, and strengthening autonomy and active participation. The core objective remains to **ensure equitable, dignified and inclusive participation for all children and adolescents**. Innovation should therefore be encouraged in a targeted manner, so as to provide tools that offer genuine benefits for pupils' educational pathways.

„It is frustrating to see many children and teenagers fail in school because they don't have access to AI tools. In the real world, they would be able to succeed and find their place, and they would be able to meet job requirements with the help of AI."

Director of a competence centre

During the participatory process, education stakeholders highlighted the need to take into account the potential of AI for educational **differentiation and supporting learners with specific educational needs** (SEN). Adaptive tools may, for example, help to adjust levels of difficulty or support pupils with certain specific learning difficulties, such as dyslexia or dyscalculia.

It was therefore agreed that AI may support learners with specific educational needs, but only through **technical tools that do not replace the pedagogical role or responsibility of teachers**.

Stakeholders also advised caution given the **sensitive nature of the data and the vulnerability of certain groups of pupils**. At the same time, they recognised that flexibility is required in situations that are pedagogically justified.

6.5 Practical needs

The dialogue also helped to prioritize a set of operational needs. These include above all the provision of a clear framework to support teachers in **adapting assessment methods**. Beyond such a framework, there is a strong need for **targeted professional development**, enabling teachers to manage this new situation in the classroom – especially when **designing lessons without AI, about AI and with AI**.

Furthermore, stakeholders emphasised the need for the Ministry to act as a **distribution hub for programmes, applications and licenses** that incorporate AI. The Ministry should also check the appropriateness of these tools for the various groups of pupils. Such an approach is essential to guarantee the quality of the tools used, their security and their legal compliance. Finally, partners stressed the **need to involve all actors within the education system, including parents and professionals in non-formal education**, and to strengthen **awareness of the impact of AI on the world of work**; doing so will support young people in their educational choices and career decisions.

Involving all education stakeholders in this broad and intense dialogue led to a **general consensus** on how to address both the opportunities and the major challenges presented by artificial intelligence. Multiple practical recommendations, reflections and key arguments were were discussed and considered by the Ministry. These contributions have enriched the **first version of the strategic framework**, which will be implemented through **ongoing dialogue with stakeholders across the education sector**.

„We may need guidelines to ensure that this new technology is applied consistently. Establishing these guidelines may take some time, but the benefits will make up for the time that has been lost."

Headteacher of a secondary school

7. From strategy to practice: the *KI Kompass* as a central reference

7.1 How can the strategy be translated into concrete practice?

The use of AI in education requires clear reference points. The table below provides a concise overview of practices to encourage and to avoid. These recommendations form a shared general framework for education stakeholders, promoting a responsible, critical and creative use of AI. They do not cover all possible rules.

Do	Don't
Use AI as a support tool and co-agent, serving clearly defined pedagogical, educational or organisational objectives, **without ever replacing human action.**	**Use AI as a replacement for human action or as an automatic solution** for tasks that fall under pedagogical, educational or organisational responsibility.
Develop the necessary competences before expanding use, taking into account age, digital maturity and the role of those involved.	**Introduce AI uses without prior preparation**, or assume that the mere use of tools automatically develops competences.
Define a **clear usage framework**: objectives, rules, limits, degree of autonomy and conditions of use.	**Allow or tolerate implicit, unclear or unregulated uses**, particularly by pupils.
Make uses explicit and transparent, indicating when, how and for what purpose AI is used, and encouraging the declaration of use.	**Tolerate opaque, undeclared or ambiguous uses**, or leave uncertainty about the conditions and purposes of AI use.
Maintain explicit human control over all decisions, particularly those related to assessment, guidance, educational support or organisation.	**Delegate human decisions, judgements or responsibilities to AI**, especially in situations involving high educational or personal stakes.
Verify, cross-check and discuss AI outputs, fostering a critical stance towards results, sources, bias and limitations.	**Consider AI-generated content as reliable by default**, or use it without verification or critical contextualisation.
Provide times and spaces "without AI" to preserve cognitive effort, autonomy, independent thinking and human interaction.	**Impose AI systematically or permanently**, to the detriment of personal effort and fundamental learning processes.
Use AI to support differentiation, inclusion and accessibility, where this is relevant, well framed and proportionate.	**Standardise practices** or promote uses that reinforce inequalities, dependency or simple copy-and-paste behaviour.
Stimulate creativity, analysis and critical thinking by encouraging pupils to enrich, transform and question AI outputs.	Limit learning to **mere reproduction or passive consumption** of AI outputs.
Take into account psychosocial and relational dimensions, and safeguard pupils' cognitive autonomy and well-being.	Neglect human and psychosocial aspects, or use AI as a **substitute for human support**, especially in vulnerable situations.
Strictly protect data and rights, prioritising authorised tools, secure frameworks and open or legally usable content.	Enter or expose **personal, sensitive, confidential or protected data.**
Rely on validated or institutionally provided tools, institutional resources and shared frameworks.	Use unauthorised AI tools, **encourage off-framework uses** (e.g., unmanaged personal accounts, non-approved tools).
Engage in training, exchange and consultation in case of doubt, with school leadership or the SCRIPT AI contact point (kikompass@script.lu).	**Act in isolation**, without training or support, or continue legally or pedagogically uncertain practices.

Focus 10

Non-negotiable compliance rules

- **Data protection:** Do not enter any personal, sensitive or confidential information into AI tools. Teachers mustn't oblige their students to create a personal or school account for AI tools that have not been approved by the ministry or their respective schools.
- **Copyright compliance:** Do not submit protected materials (e.g. textbooks, paid platforms or colleagues' work) to AI systems without the explicit consent of the rights holders.
- **Professional responsibility:** AI may provide support, but it never replaces human judgement. Teachers remain responsible for marking, assessment and pedagogical guidance. Pupils remain responsible for the authenticity, personal effort and integrity of their work, even when using AI tools.

In practice, AI should be regarded as a co-agent: useful in specific scenarios, but never as an automatic solution. The teacher remains the guide; pupils remain the active agents of their learning.

7.2 What does the *KI Kompass* offer to support implementation in practice?

The integration of artificial intelligence in schools raises complex pedagogical, ethical, organisational and legal questions that cannot be addressed in isolation by individual actors. It requires a **coordinated, progressive and shared approach** on a systemic level.

In this context, the *KI Kompass* (https://ki-kompass.lu/) serves as the **central point of reference** for guidance, implementation and exchange related to artificial intelligence in Luxembourg's schools. It is designed as a single access hub to support education stakeholders in using AI responsibly.

The *KI Kompass* brings together three closely interrelated dimensions:

- **Guidance: the strategic framework**
  The *KI Kompass* is grounded in the strategic framework. It translates the principles, objectives and the staged model of AI use into a shared orientation framework. It also incorporates insights from national surveys, as well as information on pilot projects and ongoing initiatives, in order to foster a common understanding of key issues and emerging practices.
- **Practice: resources and tools**
  The platform provides access to:
  - validated and secure AI tools for educational use
  - examples of pedagogical and organisational practices
  - didactic resources and support materials

  The objective is to offer concrete support for implementation, both for lesson preparation and follow-up, and for the progressive development of professional competences related to AI and data literacy.
- **Exchange: communities and continuous improvement**
  The *KI Kompass* also provides an overview of continuing professional development opportunities and communities of practice. It is conceived as a living, co-constructed instrument, developed in collaboration with schools, and designed to promote experience-sharing, collective learning and the continuous evolution of practices, notably through:
  - communities of practice
  - training and support schemes
  - a central point of contact (kikompass@script.lu) for questions, feedback and emerging needs

Through this approach, the *KI Kompass* positions itself as a key instrument for the implementation and support of a coherent, responsible and evolving integration of artificial intelligence within the Luxembourg education system.

8. Towards the future: synthesis and perspectives

The integration of artificial intelligence into education marks a **new stage in the education system**. It calls on us to rethink the school, not as an institution overwhelmed by technological change, but as an actor capable of retaining control over these developments – for the benefit of learning, human development and pupils' well-being.

The Luxembourg approach is based on a fundamental principle: artificial intelligence is neither a substitute nor an autonomous authority. It is a co-agent, mobilised in a considered manner to enrich the educational experience, without ever replacing the pedagogical relationship, educational support or human judgement.

This approach is fully aligned with **international dynamics** promoted by the European Union, UNESCO and the OECD. Luxembourg actively contributes to this collective effort by sharing its experiences, drawing inspiration from good practice and participating in a shared reflection on the responsible and sustainable integration of AI in education.

The **spiral pathway** – learning without AI, learning about AI and learning with AI – remains the guiding thread of this strategy. It enables pupils to progressively develop competences that empower them to understand, question and use these technologies in a critical, responsible and autonomous manner, while preserving the meaning of learning and personal effort.

Several structuring priorities emerge for the years ahead:

- **Assessment and learning support** represent a first major challenge. The rapid development of AI tools calls for in-depth reflection on the evolution of assessment practices, both in formative contexts and in summative assessment. The aim is to strengthen approaches that value process, reflection, understanding and the authenticity of pupils' work, while ensuring academic integrity and full human control over all evaluative decisions.
- A second central axis concerns the **well-being and psychosocial balance of pupils and education professionals.** The growing use of digital and AI-based tools requires increased vigilance with regard to cognitive autonomy, mental load, motivation and the quality of educational relationships. Existing support structures play a key role in promoting an approach to AI that respects the emotional, social and relational needs of young people.
- A third key issue relates to the use of **AI outside the school context, within the private and family sphere**. Schools cannot ignore the fact that pupils are often exposed to AI tools at a very early age in their everyday lives. Raising awareness among parents and legal guardians, and maintaining an open dialogue with families, constitute important tools for building a shared understanding of the opportunities, limits and risks associated with these technologies, and for fostering educational coherence between school and pupils' living environments.

In conclusion, the school of tomorrow will be neither a school driven by artificial intelligence, nor a school that turns away from it. It will be a school that masters these technologies, embedding them within a human-centred educational project: **a school where human intelligence, discernment, relationships and well-being remain at the core**, enriched by technological tools which – when used with care and judgement – can contribute to a more equitable, more conscious and more sustainable education.

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