Work Package 2: Diagnosis

D2.3 AI-DL FRAMEWORK FOR TEACHERS AND SCHOOLS

DATA LITERACY
IN THE AGE OF
AI FOR EDUCATION

Work Package 2:

Diagnosis

Deliverable D2.3

AI-DL Framework

for Teachers and Schools

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ABSTRACT	This report presents Version 1.0 of the AI-DL Framework, an emerging framework developed within the Erasmus+ KA3 Policy Experimentation project *Data Literacy in the Age of AI for Education (AI-DL)*. The framework responds to the growing presence of generative artificial intelligence (GenAI) in schools and positions this development as an opportunity to strengthen students' data literacy across subjects in upper secondary education. Building on an extensive desk review, projects, frameworks and policy analysis, and iterative consultation with teachers, school leaders, researchers, and Advisory Board members, the framework reconceptualises data literacy for the GenAI era. The report argues that GenAI transforms what counts as data, how data are produced and interpreted, and how analytical processes are carried out. As a result, data literacy must extend beyond technical skills to include critical evaluation, ethical awareness, and reflective human–AI collaboration. The AI-DL Framework is designed not as a prescriptive competency model, but as a flexible, cross-curricular "tool to think with" that supports professional dialogue, classroom reflection, and policy alignment across diverse educational contexts. The framework is structured around four interconnected areas. Area A focuses on foundational concepts of data in the GenAI era, including data types, provenance, value, and vulnerability. Area B addresses the critical evaluation of data, models, and GenAI outputs, with particular attention to reliability, bias, and evidence. Area C centres on human-GenAI co-production, exploration, and sense-making, emphasising purposeful and transparent collaboration. Area D extends data literacy to responsible communication, ethics, and civic participation in data- and AI-driven societies.
KEYWORDS	Data literacy; Generative AI; Teacher professional learning; secondary education.

Dissemination level		
PU	**Public**	**X**
PP	Restricted to project partner (including the Commission)	
RE	Restricted to a group defined by the consortium (including the Commission)	
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1. Introduction

The AI-DL Framework is an emerging framework that is being developed to help schools use the arrival of generative AI (GenAI) tools as an opportunity to develop student data literacy competences across all subjects in upper secondary education. The development of this framework is a key deliverable of Work Package 2, WP2, in the *Data literacy in the age of AI for education* Erasmus+ Project, henceforth referred to as the AI-DL Project. This document introduces the AI-DL Framework and the research and consultations that have led to the creation of the current framework, version 1.0 which will continue to evolve over the course of the project.

This report will firstly outline some key findings from the diagnostic report, Deliverable 2.1, before elaborating on why the framework is important in the context of developing teacher and student critical thinking, before charting the evolution of the framework and what is meant by a framework in this context, and how it might be used by teachers and students, before introducing the emerging framework. The final section of the report shares some initial critical feedback from the project Advisory Board and from a selection of teachers, whose schools will participate in field testing the framework during the 2026-27 school year.

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2. Desk Review Findings

The literature review identified three categories of data literacy components:

- **Disciplinary data literacy components,** which include understanding data basics, designing investigations, evaluating data quality and sources, creating datasets, sense-making that considers bias and social factors, processing and analysing data, making data-based claims, and publishing analyses ethically.
- **Personal data literacy components**, which draws on Pangrazio and Selwyn's (2023) framework "Critical Data Literacies: Rethinking Data and Everyday Life," encompassing five key dimensions: *Data identification*: *Data understandings*: *Data reflexivity*: *Data strategies*: *Data tactics.* This critical data literacies framework **shifts the emphasis from purely technical skills toward understanding data as a social, political, and cultural phenomenon that shapes power relationships**.
- **Teacher-specific components,** which address handling student data ethically, using data for iterative decision making, and understanding recommended pedagogical approaches for teaching data literacy.

The review of selected frameworks found that:

- While data literacy stays a foundational competence, **GenAI literacy extends it into interaction, creativity, and co-creation with AI systems.**
- Data literacy frameworks (e.g., DigComp, or UNESCO) offer partial reference points for proficiency and progression, but the literature **does not yet provide a single, formalised definition of data literacy for Generative AI.**

The analysis of previous Erasmus+ projects on data literacy provided us with the baseline on which we built the AI-DL Framework. In particular, it gave us an overview of the competencies related to the concept of data literacy, and a detailed view of the phases that characterise the data analysis process.

This enabled us to assess, first and foremost, how GenAI intervenes by radically changing or “enhancing” the data analysis process in each phase. This knowledge corroborated, on the one hand, the hypothesis that GenAI acts on the process by:

1) significantly expanding the audience of people who can potentially activate or be part of, even unknowingly, a data analysis process.
2) increasing the possibilities of activating data analysis processes even on new raw data that was previously difficult to manage (such as textual content) or non-existent (synthetic data derived from the probabilistic generation processes specific to GenAI).

Consequently, this awareness has led us to redefine the framework of data literacy competencies required in the GenAI era, extending what is already present in the literature with a minimal set of competencies specifically focused on the changes induced by GenAI.

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The review of Data Literacy policies and curricula in partner countries also highlighted that each partner country takes a different approach to developing student data literacy currently and thus the framework needs to recognise the wide range of approaches and contexts. It needs to be flexible so partner countries can embed it into their contexts in the future.

Data Literacy in the Context of using GenAI Tools

The desk review established the following in relation to the concept of data literacy.

- Data literacy definitions are highly contextual and evolve with technological change
- Traditional frameworks focus on "input-side" data practices (collection, management, evaluation) rather than GenAI-specific competencies
- Critical thinking, metacognition, and collaboration are essential aspects of data literacy
- Teachers require pedagogical approaches that encourage curiosity and creativity with emerging technologies

The desk review confirmed that there is a gap in relation to data literacy in the specific context of GenAI usage, and thus there is a need to help teachers and students understand what is different and why it is important to develop their data literacy in this context. The AI-DL Framework is an attempt to address this gap.

Thus, the AI-DL Framework, is a Data Literacy framework enhanced and transformed within the context of GenAI. We contend in AI-DL project that GenAI usage **radically changes what it means to 'know, use, analyse, interpret and create data'**.

Furthermore, GenAI does not simply add *'new tools'*, it fundamentally changes the very concept of data literacy, because it:

- **Transforms what we consider to be 'data'**, not only in terms of the form it takes, but also by changing many of the dimensions that characterise the very concept of data.
- **Supports those who carry out analytical processes** and **broadens the audience of users who can implement DL processes** (many steps typical of both exploratory and confirmatory analysis, from modelling to communication, can be carried out with the help of generative AI).
- **Transforms how skills are developed** (i.e. there is less emphasis on technical execution, and greater emphasis on critical thinking, control, auditing, and prompting).
- **Requires new skills for dialogue with systems** that process data in non-transparent ways.

Why is data literacy important?

The desk review affirmed that we live in an increasingly digital world where data-based technologies pervade all aspects of life and they are increasingly impacting on all aspects of our lives including privacy, the environment, equitable access and other concerns. Teachers and students are increasingly using AI, and specifically GenAI, in their private and educational lives and this presents an opportunity for schools to develop student data literacy when using these tools. Students can learn

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how to use these tools critically across the curriculum by developing both their technical and critical literacies in relation to data. The literature review suggested that all citizens be data literate, which includes teachers and students, needing to have a basic idea of how, when and where data is collected and how it can be used. Thus, the AI-DL Framework is being developed to support teachers and students to consider these basic questions, when using GenAI tools in their subject contexts and beyond the classroom. In this regard the framework attempts to balance the development of both technical and critical data literacy competences, so teachers and students can engage in informed discussions around using these tools, or not, in a range of educational contexts.

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3. AI-DL Framework

Adopting a co-creation approach to the AI-DL Framework

The desk review suggested that it is important in developing data literacy competences to engage in critical practices, such as "socially situated reflection and evaluation" (Ilomäki et al., 2023). The review also highlighted the advantages of school leaders, teachers and students co-constructing their data literacy competences and where possible, use active teaching and learning approaches. Teachers have already shared their initial views on the emerging framework at an in-person workshop in Naples in September 2025 and at an online workshop in January 2026. The participating schools will avail of professional learning on using the framework in the initial stages of the 2026-27 school year, before trialling the framework in their classrooms. The project will enable communities of practice, both within and across schools, to engage in such reflective practices and to develop appropriate policies, guidelines and supports for their school context.

The training phase of the project will provide multiple opportunities for teachers and students to refine the existing framework and to capture and share how they use it in their classrooms. In early 2026, some teachers have already discussed the framework with their students, and they have shared ideas on how to further enhance the tool, so that it has maximum impact in their contexts.

What kind of a framework are we creating?

We typically use frameworks to "organise complexity" (Belshaw, 2026), and Doug Belshaw, the author of Essential Elements of Digital Literacies (Belshaw, 2011) suggests they should be viewed as tools that act "as a launchpad for conversation and thought", rather than merely a checklist. This framework has been designed as a *"tool to think with",* which guides a *"process of systematic reflection and critical analysis"* (Frauenberger et al., 2015), so that teachers and students can engage in critical discussions that require cognitive flexibility.

This framework differs from existing competency frameworks, such as DigComp 3.0, in that we are not creating a new competency framework but rather developing a framework that supports critical discussion among teachers and students. In this way it does not contain proficiency levels, and in time it may well include key questions that users might discuss and deliberate on in class. We anticipate that this framework will be used in conjunction with existing digital or AI frameworks, such as DigComp 3.0 (Cosgrove & Cachia, 2025), and or AILit (OECD, 2025), and it is not designed to replace such frameworks. It should be viewed as being additional to the data literacy components present in DigComp 3.0 and the AI-DL Framework can be used alongside the development of the DigComp competences, particularly those that pertain to Information Search, Evaluation and Management (i.e. Competences 1.1, 1.2 and 1.3).

It is only through further testing and revision in schools, that the project will evolve and become more stable, and this can occur over the course of the project. Belshaw suggests that "you can commit to a framework seriously and use it in earnest while still knowing that it's provisional", and this is very much the mindset we have with the AI-DL Framework.

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The evolution of the AI-DL Framework

The AI-DL framework is a work in progress that has already undergone multiple iterations and has been informed by contributions from partners during the course of the desk review (Le Capitaine, 2025). Earlier versions were reviewed by teachers in Naples, and by partners online and at the partner meeting in Madrid in November 2025. Feedback collected during these events further shaped the framework, which was also reviewed by a group of Irish teachers working for the Ministry's digital education support team, Oide Technology in Education, in December 2025. Their feedback was then taken on board and led to the creation of Version 1.0, below, which was then shared with the Advisory Board and a group of teachers whose schools will trial it in the next school year, during two online workshops in January 2026. The feedback from the latter two events has yet to be incorporated into the next iteration, but that will take place during Spring 2026, when we anticipate further interaction with the participating schools and the Advisory Board.

The AI-DL Framework Overview

The framework is structured around four interconnected areas.

Area A provides the conceptual foundations to understand what "data" are in the GenAI era. It focuses on distinguishing between observed and generated data and on understanding how GenAI models transform, reconstruct, and combine information. This area introduces key concepts such as data provenance, traceability, reuse conditions, and the economic, social, and personal value of data. It establishes the cognitive and ethical foundation upon which all other areas of the framework are built.

Area B develops the ability to critically assess information, data, and outputs produced by both humans and GenAI systems. The focus here is to recognise unreliable or fabricated content, identify biases, stereotypes, and privacy risks, and distinguish between plausible-sounding outputs and interpretations grounded in evidence. A core competence introduced in this area is the comparative evaluation of human and artificial reasoning processes. This area is essential to counteract uncritical automation and naïve reliance on generative models.

Area C positions GenAI as a cognitive partner, rather than a substitute for human thinking. It focuses on collaborative practices such as data co-production and transformation, AI-supported exploration, analysis, and visualisation, and human–GenAI collaboration in reasoning and decision-making. The focus is on iterative, documented, and deliberate processes that make goals, limits, and assumptions clear. This area represents the operational core of the framework, where data, models, and people jointly construct meaning.

Finally, **Area D** extends data literacy beyond analysis toward responsible communication and collective action. It includes competencies related to the transparent communication of findings and uncertainty, making the role of GenAI explicit in construction of meanings and decision-making. It connects data and GenAI to social justice, informed civic participation, and individual and collective agency. In this sense, data literacy becomes a key competence for democracy and citizenship in the age of AI.

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Table 1: The AI-DL Framework (Version 01/2026)

Competence		Description
AREA A: Foundations of Data in the GenAI Era	C1. Recognising Data Types and Transformations in the GenAI Era	To recognise that data can be real or generated; to understand how GenAI can transform, combine or reconstruct data; to distinguish between observed and artificially generated data; and to evaluate how formats and representations affect data quality and interpretation.
	C2. Evaluating Data Provenance, Traceability and Reuse Conditions	To identify where data comes from, who owns them and which licences apply; to recognise when provenance or documentation is unclear; to evaluate transparency and traceability; and to determine whether data can be reused responsibly.
	C3. Understanding Data Value, Vulnerability and Accessibility	To understand why data have personal, social and economic value; to recognise how data exposure and persistence can create risks or vulnerabilities; to identify possible misuse; and to understand ethical and legal protections.
AREA B: Critical Evaluation of Data, Models, and GenAI	C4. Assessing the Quality and Reliability of Human and GenAI Information Sources	To evaluate the quality, relevance and reliability of information produced by humans or GenAI systems by checking sources, coherence, evidence and context; to recognise low-quality, misleading or fabricated outputs, including large volumes of superficially plausible but uninformative content (“AI slop”); and to determine when deeper inquiry or alternative sources are required.
	C5. Assessing the Reliability of Human and GenAI Information Sources	To recognise how bias, stereotypes or privacy risks arise in data collection and GenAI systems; and to analyse how unbalanced datasets or unsafe processes may affect interpretations.
	C6. Critically Evaluating Interpretations, Models and Human–GenAI Reasoning Processes	To analyse whether interpretations or model outputs are coherent and evidence-based; to identify errors, gaps or hallucinations; and to compare human and GenAI reasoning.

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AREA C: Human–GenAI Co-Production, Exploration, and Sense-Making	C7. Co-Producing Data and Guiding GenAI Output	To interact with GenAI tools to create, clean, enrich or transform datasets; to define meaningful goals, constraints and prompts; to document data sources and transformations; and to iteratively refine outputs in line with ethical, educational and analytical intentions.
	C8. Human–Machine Co-Exploration, Analysis and Visualisation	To use GenAI tools to explore datasets, identify patterns, generate hypotheses, support creative inquiry and produce meaningful visualisations; to distinguish between searching, analysing, simulating and generating.
	C9. Integrating Human and GenAI Reasoning in Decision Making and Problem Solving	To combine human judgement with GenAI-supported analysis when addressing complex problems; to identify assumptions, uncertainties and trade-offs; to justify decisions through transparent, well-reasoned use of data and models; and to use GenAI as a partner in sense-making rather than a substitute for understanding.
AREA D: Communication, Ethics, and Civic Participation in Hybrid Systems	C10. Transparent and Responsible Communication in Human–GenAI Contexts	To communicate interpretations clearly and responsibly; to explain how human and GenAI contributions were verified; to represent uncertainty; and to adapt communication to different audiences.
	C11. Civic Participation, Justice and Collective Agency in Data and AI Driven Societies	To understand how data and GenAI systems shape social outcomes, opportunities and risks; to recognise and question unfair or discriminatory effects; and to use data and GenAI tools to support informed participation, advocacy, collective sense making and democratic engagement.

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4. Feedback and next steps

As mentioned above, WP2 members met with the Advisory Board and with a selection of teachers in early January 2026 to share the emerging AI-DL Framework with the participants during two separate online workshops. This section provides a synopsis of the discussions that took place and later we share some ideas on how these, and other emerging ideas, might be further incorporated into the Framework, as both groups have continued to share observations and suggestions with the Project Team since the conclusion of these online workshops.

Key Takeaways from the Advisory Board meeting

The Advisory Board members welcomed the ambition of the WP2 Team to design the AI-DL Framework as a cross-curricular, reflective tool that teachers can use alongside existing digital literacy frameworks. In welcoming the Framework, they also highlighted some potential issues that the project needs to consider in the short-term and these include the following:

They highlighted:

- the growing importance of data literacy for the responsible, ethical, and critical use of generative AI in schools.
- several key challenges such as the absence of a clear and shared understanding of what data literacy means, and the frequent overlap with other forms of literacy such as digital, media, and information literacy. Furthermore, they noted practical challenges, including curriculum structures that work in silos, unclear ownership of data literacy, and the crowded landscape of existing frameworks.
- the need for clearer and more consistent language, tailored to different audiences, especially teachers and students.
- the need to make the framework more practical and classroom ready. Here members suggested the inclusion of concrete examples, learning scenarios, toolkits, and a glossary to help teachers apply the framework in their daily practice.
- the framework was seen as having strong potential, provided it remains flexible, can adapt to the evolving data literacy landscape, and stays closely connected to teachers' practice and real classroom needs.

Subsequently Advisory Board members shared additional comments and suggestions, and these are currently being collated by the WP2 team, and they will be acted upon in due course. This is the next phase in further enhancing the emerging Framework.

Key Takeaways from the Teachers Workshop

The WP2 team met with a selection of teachers, whose schools will participate in professional learning activities and in trialling the Framework during the 2025-26 school year. The participating teachers were invited to the workshop via Ministries of Education and they received the emerging AI-DL Framework in advance of the session. The workshop was facilitated by Michael Hallissy from H2 Learning and Manuel Gentile from CNR, and it provided teachers a background to the project and to

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the Framework specifically, before collecting feedback from teachers on the existing Framework and on how it can be enhanced in the future. The discussions focused on how the Framework could support schools develop student data literacy in the context of using generative AI. The discussions were wide ranging and informative, as some teachers had used the Framework with students in advance of the online workshop.

The majority of teachers viewed the framework as a helpful reference to support student reflection, a shared critical understanding of data literacy in the context of using GenAI tools. At the same time, they stressed that the Framework would only be effective if it is properly introduced and discussed within schools. These discussions highlighted the need for teacher professional learning, which is planned in WP3, and the need to convince teachers of the importance of the Framework and how it can help them and their students.

Teachers also noted that the existing Framework, while good, needs further improvement. In particular they highlighted the need for it to contain clearer language, a stronger distinction between data literacy and information literacy, and the inclusion of practical classroom examples that are relevant across subjects. Some teachers even suggested developing two separate frameworks, one for teachers and one for students, based on their classroom experiences. Such feedback is invaluable in co-creating a Framework that is relevant for a range of school contexts in the partner countries, and these discussions have just commenced.

The feedback collected during the Teachers Workshop, together with input from the Project Advisory Board, will inform the next revision of the framework, which is expected to develop further as teachers gain experience and receive guidance on its use in real classroom settings as part of WP3 and WP4.

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5. References

Belshaw, D. (2014). The Essential Elements of Digital Literacies. Retrieved from http://digitalliteraci.es

Belshaw, D. (2026, January 14). Cognitive Autonomous Zones: against "framework fundamentalism." Open Thinkering. https://blog.dougbelshaw.com/cognitive-autonomous-zones/

Cosgrove, J. and Cachia, R., DigComp 3.0: European Digital Competence Framework - Fifth Edition, Publications Office of the European Union, Luxembourg, 2025, https://data.europa.eu/doi/10.2760/0001149, JRC144121.

Frauenberger, C., Good, J., Fitzpatrick, G., & Iversen, O. S. (2015). In pursuit of rigour and accountability in participatory design. International Journal of Human-Computer Studies, 74, 93–106. https://doi.org/10.1016/j.ijhcs.2014.09.004

Ilomäki, L., Lakkala, M., Kallunki, V., Mundy, D., Romero, M., Romeu, T., & Gouseti, A. (2023). Critical digital literacies at school level: A systematic review. *Review of Education*, *11*(3), e3425. https://doi.org/10.1002/rev3.3425

Le Capitaine, H. (2025, November). Rethinking data literacy frameworks in the era of generative AI [Unpublished working paper]. LS2N, Nantes Université

OECD (2025). Empowering learners for the age of AI: An AI literacy framework for primary and secondary education (Review draft). OECD. Paris. https://ailiteracyframework.org

Pangrazio, L., & Selwyn, N. (2023). Critical Data Literacies: Rethinking Data and Everyday Life. MIT press. https://doi.org/10.7551/mitpress/14155.001.0001

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