

## Data Literacy Competencies Framework for Compulsory Education: A Quick Reference Guide

The DATA-READY Data Literacy Framework should be read as a complete but flexible cycle of data engagement. The seven domains cover the main phases through which learners work with data:

- recognising ethical and social issues,
- asking meaningful questions,
- collecting and managing data,
- representing and visualising data,
- analysing and interpreting evidence,
- using models or automated processes,
- communicating findings for informed action.

However, these domains are not intended as a rigid teaching sequence. In classroom practice, learners may enter the cycle at different points and move iteratively between domains depending on the subject, age group, task, and learning context.

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You can find the detailed description of the Framework here: <https://data-ready.eu/results>

### DOMAINS



1. **Awareness, Ethics & Agency (AE&A)** - privacy, bias, rights, and social use of data.
2. **Questioning & Problem Framing (Q&PF)** - posing data-driven questions.
3. **Data Acquisition & Management (DA&M)** - collecting, cleaning, storing data.
4. **Representation & Visualization (R&V)** - tables, graphs, maps, digital displays.
5. **Analysis & Interpretation (A&I)** - reasoning with data, recognizing patterns, uncertainty.
6. **Modelling & Automation (M&A)** - using algorithms, spreadsheets, simulations.
7. **Communication & Action (C&A)** - reporting, storytelling, applying data to decisions.

### PROGRESSION BANDS

- Primary 1 (Grades 1–3)
- Primary 2 (Grades 4–6)
- Lower Secondary (Grades 7–9)

The progression bands **ensure** age-appropriate expectations across all domains, **provide** a coherent structure for multi-year curricular planning, **guide** the design of learning experiences that build cumulatively and **complement** the proficiency levels by distinguishing when learning typically develops from how well it is demonstrated.

### PROFICIENCY LEVELS

- Foundations (L1)
- Developing (L2)
- Expanding (L3)

The proficiency levels **describe** observable patterns of performance within each progression band, **support** formative assessment and differentiated instruction, **help** learners recognize their own growth and identify next steps, **ensure** that learning expectations remain flexible and responsive to diverse classroom contexts.

## Awareness, Ethics & Agency (AE&A)

### Domain Description



This domain develops students' understanding of the social and ethical dimensions of data.



From the earliest years, learners start to notice that some data is personal and requires protection.



As they grow, they become aware that the way data is collected, represented, and used can include or exclude certain groups, sometimes unfairly.



By the end of the lower secondary school, students are expected to recognize issues of bias, privacy, consent, and ownership, and to evaluate how data influences decision-making in society.



The goal is to foster not only technical skills but also a sense of agency and responsibility, enabling young people to act as informed citizens who can protect their own data and critically examine the practices of others.

In this context, AE&E becomes particularly important, as the use of automated and AI-driven data processes raises new ethical, societal, and epistemic challenges.

### Competencies

**AE&A1** Distinguish between personal, shared, and public data and explain why some data should be protected.

**AE&A2** Identify examples of bias or unfairness in how data are collected, presented, or used.

**AE&A3** Explain basic principles of data consent, privacy, and ownership in everyday digital contexts (e.g., social media, surveys, apps).

**AE&A4** Describe the potential social impact of data-based decisions and propose ways to make them fairer or transparent.

**AE&A5** Demonstrate responsible data behavior in school projects, seeking permission, anonymizing data, and acknowledging sources.

**AE&A6** Reflect on their own role as data producers and users, recognizing both rights and responsibilities in digital environments.

### Descriptors

#### Primary 1 (Grades 1–3) – Foundations

**P1-AE&A-L1** Student recognize that some data (e.g., name, photo) is personal and should be kept private.

**P1-AE&A-L2** Student can give examples of personal data and explain simple ways to protect it, such as asking before sharing.

**P1-AE&A-L3** Student explains why privacy matters and can describe how to act responsibly when using or sharing data.

#### Primary 2 (Grades 4–6) – Developing

**P2-AE&A-L1** Student identifies personal data in everyday contexts (e.g., forms, photos, online profiles).

**P2-AE&A-L2** Student explains why some data should be protected and follows agreed class rules for safe data use.

**P2-AE&A-L3** Student recognizes examples of bias or unfairness in data displays and suggests how to make data collection fairer.

#### Lower Secondary (Grades 7–9) - Expanding

**LS-AE&A-L1** Student describes examples of personal and public data and recognizes potential risks in sharing them online.

**LS-AE&A-L2** Student identifies bias, privacy, and consent issues in data collection or use and explains their importance.

**LS-AE&A-L3** Student evaluates real or simulated data practices for fairness and transparency and proposes responsible alternatives.

## Questioning & Problem Framing (Q&PF)

### Domain Description



This domain develops students' ability to formulate meaningful, data-informed questions and to understand what kinds of data are required to investigate them.



In the early years, learners begin by asking simple factual questions about familiar phenomena or curiosity-driven questions such as "Which fruit do we like most in class?" They observe that different questions require different kinds of data.



As they gain experience, they learn to distinguish between questions that can be answered through observation, measurement, or simple data collection, and those that require external sources or broader context.



At the end of lower secondary education, students are expected to pose investigable questions, articulate the purpose of an inquiry, identify relevant variables, and anticipate the type of data or evidence needed to answer their questions.



The goal is to support learners in framing purposeful, data-driven investigations that guide analysis and deepen understanding across subjects. This progression ensures that learners view data not as isolated numbers, but as a tool to explore and solve real problems.

### Competencies

**Q&PF1** Pose clear, testable questions that can be answered using data, distinguishing between factual, opinion-based, and investigable questions.

**Q&PF2** Identify what data is needed to answer a question and suggest how such data could be collected.

**Q&PF3** Define measurable variables and anticipate how they may relate to one another (e.g., cause-effect, comparison, or correlation).

**Q&PF4** Recognize the limits of available data and propose refinements or new questions when data is insufficient or ambiguous.

**Q&PF5** Connect data questions to real-world contexts, explaining why the question matters and who might use the findings.

**Q&PF6** Work collaboratively to refine a question into a small, feasible classroom or community investigation, recognizing ethical and practical constraints.

### Descriptors

#### Primary 1 (Grades 1–3) – Foundations

**P1-Q&PF-L1** Student poses simple questions about familiar topics (e.g., "Which fruit do we like best?").

**P1-Q&PF-L2** Student suggests what data is needed to answer a question and how it could be collected.

**P1-Q&PF-L3** Student refines a question to make it measurable and predicts what kind of data might be useful.

#### Primary 2 (Grades 4–6) – Developing

**P2-Q&PF-L1** Student asks specific, measurable questions that can be answered with data (e.g., "How many students walk to school?").

**P2-Q&PF-L2** Student identifies variables to measure and suggests simple ways to collect data.

**P2-Q&PF-L3** Student refines questions to compare groups or explore relationships (e.g., "Do older students read more than younger ones?").

#### Lower Secondary (Grades 7–9) - Expanding

**LS-Q&PF-L1** Student formulates clear, data-driven questions that can be tested through collection or analysis.

**LS-Q&PF-L2** Student defines measurable variables and explains how they relate to the question under investigation.

**LS-Q&PF-L3** Student designs an investigable question involving multiple variables or criteria and anticipates possible limitations of the data.

## Data Acquisition & Management (DA&M)

### Domain Description



Here the focus is on the processes of collecting, recording, storing, and managing data.



At the foundation stage, children engage in simple activities such as counting, tallying, or sorting items.



Later, they begin to design surveys, measure quantities, and record data systematically.



By the time they reach secondary school, students are introduced to sampling strategies, data cleaning, and digital organisation, including awareness of secure storage and backup practices.



Ultimately, this domain equips students with the capacity to design and manage a small-scale data pipeline, paying attention to quality, accuracy, and security at every stage.

### Competencies

**DA&M1** Plan and carry out simple methods for collecting data through observation, measurement, or survey, using appropriate tools.

**DA&M2** Record data systematically using tables, tally marks, or digital forms, ensuring clarity and consistency.

**DA&M3** Distinguish between different types of data (categorical, numerical, continuous) and choose suitable recording formats.

**DA&M4** Apply basic sampling principles, such as fairness, representativeness, and avoiding duplication, when collecting data.

**DA&M5** Detect and correct obvious errors or inconsistencies in collected data, explaining why data quality matters.

**DA&M6** Organize and store datasets in digital environments (e.g., spreadsheets, shared drives) with attention to security, privacy, and backup.

**DA&M7** Reflect on the data collection process, discussing how choices about what and how to collect can influence results and interpretation.

### Descriptors

#### Primary 1 (Grades 1–3) – Foundations

**P1-DA&M-L1** Student counts or sort objects and records results using marks or pictures.

**P1-DA&M-L2** Student collects data systematically (e.g., tallying classmates' preferences) and records it in a table.

**P1-DA&M-L3** Student checks collected data for completeness or simple mistakes and explains how to keep records organized.

#### Primary 2 (Grades 4–6) – Developing

**P2-DA&M-L1** Student collects data carefully using simple surveys, measurements, or observations.

**P2-DA&M-L2** Student organises data on a table or spreadsheet and checks for missing or repeated entries.

**P2-DA&M-L3** Student applies basic sampling ideas (e.g., asking a fair group) and explains how accurate data improves conclusions.

#### Lower Secondary (Grades 7–9) - Expanding

**LS-DA&M-L1** Student conducts small-scale data collection using surveys, sensors, or online sources, following basic ethical guidelines.

**LS-DA&M-L2** Student applies sampling methods, records data digitally, and identifies incomplete or inconsistent entries.

**LS-DA&M-L3** Student plans a data workflow (from source to storage), justifies data choices, and ensures accuracy and security throughout.

## Representation & Visualization (R&V)

### Domain Description



This domain develops the ability to choose, construct, and interpret visual and numerical representations of data.



In the early years, students work with pictographs and simple tables that match their everyday experiences.



As their education progresses, they encounter a wider range of representations, including bar charts, line graphs, and pie charts, learning how each can highlight different aspects of a dataset.



In secondary school, they compare more sophisticated visualizations such as boxplots, histograms, or scatterplots, and they learn to critique misleading displays.



By the final stages of their compulsory education following the present Competence Framework, learners are expected to design effective, multi-layered visualizations, making deliberate choices to reveal patterns, relationships, and uncertainty for different audiences.

### Competencies

**R&V1** Read and interpret simple data representations such as pictographs, tally charts, and basic tables, linking them to real-world contexts.

**R&V2** Create clear and accurate visual displays (bar, line, and pie charts) using collected or provided data, choosing suitable scales and labels.

**R&V3** Compare how different types of graphs or tables can emphasize particular aspects of the same dataset.

**R&V4** Identify and explain common sources of misrepresentation in charts or graphics (e.g., distorted scales, selective categories).

**R&V5** Construct and interpret more advanced visualizations such as histograms, boxplots, or scatterplots using digital tools where appropriate.

**R&V6** Annotate visualizations to communicate meaning effectively, highlighting trends, outliers, or uncertainty.

**R&V7** Critically evaluates visual representations found in media or online sources, distinguishing between accurate, biased, and manipulative displays.

### Descriptors

#### Primary 1 (Grades 1–3) – Foundations

**P1-R&V-L1** Student reads simple pictographs or tables showing familiar objects or class data.

**P1-R&V-L2** Student creates a pictograph or bar chart from collected data and labels it correctly.

**P1-R&V-L3** Student compare two visual displays and explains which shows the data more clearly.

#### Primary 2 (Grades 4–6) – Developing

**P2-R&V-L1** Student creates bar and line charts from collected data using correct labels and scales.

**P2-R&V-L2** Student chooses an appropriate graph type for given data and explains what it shows.

**P2-R&V-L3** Student compares two different graphs or tables of the same data and evaluates which is clearer or more accurate.

#### Lower Secondary (Grades 7–9) - Expanding

**LS-R&V-L1** Student constructs and interprets charts or graphs (e.g., bar, line, or pie) with appropriate scales and annotations.

**LS-R&V-L2** Student uses digital tools to create more complex visualisations such as histograms or scatterplots, describing trends and patterns.

**LS-R&V-L3** Student designs multi-layered or comparative visualizations and critiques misleading or biased data presentations found in media.

## Analysis & Interpretation (A&I)

### Domain Description



This domain develops students' ability to examine data, identify patterns, and draw reasoned conclusions.



At primary level, this may mean simple observations such as identifying what is "most" or "least."



As students advance, they calculate and interpret measures such as mean, median, and mode, and begin to describe variability in data.



In lower secondary, learners extend these skills by using percentages, rates, and simple correlations, and they start to reason about error and sampling.



Beyond calculation, this domain also nurtures statistical thinking, i.e. the ability to connect data patterns to real contexts, to consider uncertainty, and to draw reasonable conclusions. The domain builds steadily towards the capacity to use evidence critically and responsibly in decision-making.

### Competencies

**A&I1** Describe data patterns in everyday terms (e.g., most/least, higher/lower, increasing/decreasing).

**A&I2** Calculate and interpret basic summary measures (mean, median, mode) and recognise what each tells about the dataset.

**A&I3** Identify and explain variation within data, using range or simple visual cues (e.g., spread of bars or scatter points).

**A&I4** Use proportions, percentages, and rates to compare groups or trends, linking results to practical contexts.

**A&I5** Recognize the concept of sampling and explain how sample size or method might influence conclusions.

**A&I6** Identify possible sources of error or uncertainty in data and suggest ways to reduce or account for them.

**A&I7** Draw and justify conclusions based on evidence, clearly distinguishing between correlation and causation.

**A&I8** Reflect on how personal bias, selective attention, or incomplete data can affect interpretation and judgement.

### Descriptors

#### Primary 1 (Grades 1–3) – Foundations

**P1-A&I-L1** Student points out what happens "most" or "least" in a data display.

**P1-A&I-L2** Student describes simple patterns or differences in data and begins to use words like "more" or "fewer."

**P1-A&I-L3** Student uses data to answer a question, explaining what the results show about the group or situation.

#### Primary 2 (Grades 4–6) – Developing

**P2-A&I-L1** Student finds simple patterns in data, such as increases, decreases, or clusters.

**P2-A&I-L2** Student calculates averages (mean, median, mode) and uses them to describe data.

**P2-A&I-L3** Student interprets results using percentages or rates and begins to discuss possible reasons for observed trends.

#### Lower Secondary (Grades 7–9) - Expanding

**LS-A&I-L1** Student describes relationships and simple trends in data using everyday language.

**LS-A&I-L2** Student applies statistical measures (mean, range, percentage, correlation) to interpret findings and explain variability.

**LS-A&I-L3** Student draws evidence-based conclusions, distinguishes between correlation and causation, and discusses uncertainty and possible error sources.

## Modelling & Automation (M&A)

### Domain Description



This domain addresses the use of rules, algorithms, and digital tools to extend what can be done with data.



In the early years, children follow step-by-step instructions to sort or classify data, often in unplugged or playful activities.



Later, they begin to use simple spreadsheet formulas or calculators to transform and combine data.



In lower secondary, students design small-scale simulations and digital experiments, using randomness or algorithms to explore possible outcomes and test ideas.



This domain develops both computational and analytical thinking, helping learners understand how patterns and rules can represent real situations, and how automated procedures can make data work more efficiently and consistently. It prepares young people to engage in an increasingly automated world where algorithms shape decisions and everyday experiences.

### Competencies

**M&A1** Follow and explain simple step-by-step procedures (algorithms) for sorting, counting, or classifying data.

**M&A2** Use calculators or digital tools to perform repetitive or multi-step operations accurately.

**M&A3** Apply basic formulas in spreadsheets or similar tools to organize, transform, and summarise data.

**M&A4** Recognize and describe simple patterns or relationships that can be expressed as rules or models.

**M&A5** Use digital simulations or random experiments to explore variability, chance, and prediction.

**M&A6** Modify given rules or procedures to test “what if” scenarios, interpreting the changes in outputs.

**M&A7** Explain in simple terms how algorithms or automated processes influence everyday decisions (e.g., recommendations, sorting, or grading).

**M&A8** Reflect on the benefits and limitations of automation, including fairness, transparency, and human oversight.

### Descriptors

#### Primary 1 (Grades 1–3) – Foundations

**P1-M&A-L1** Student follows step-by-step instructions to sort or group data.

**P1-M&A-L2** Student describes a simple rule or sequence (e.g., “If it’s red, put it here; if not, there”).

**P1-M&A-L3** Student creates or modifies a simple rule to solve a problem or classify new data.

#### Primary 2 (Grades 4–6) – Developing

**P2-M&A-L1** Student uses spreadsheet functions or calculators to perform basic calculations.

**P2-M&A-L2** Student creates simple formulas or rules to automate repetitive steps in data handling.

**P2-M&A-L3** Student modifies formulas or uses simple digital tools to explore “what if” changes and predict possible results.

#### Lower Secondary (Grades 7–9) - Expanding

**LS-M&A-L1** Student uses basic spreadsheet or coding tools to perform calculations and summarise data automatically.

**LS-M&A-L2** Student builds or modifies simple models or simulations to explore “what if” scenarios or predictions.

**LS-M&A-L3** Student analyses algorithmic or automated processes (e.g., recommendations, classifications) and discusses their advantages, risks, and biases.

## Communication & Action (C&A)

### Domain Description



The final domain focuses on how data is transformed into knowledge that can guide communication and decision-making.



From the earliest years, children learn to express findings in words, pointing to evidence in a chart or table.



As their skills grow, they move beyond description to structured explanations that connect claims, evidence, and reasoning.



In secondary school, students are introduced to tailoring their communication to different audiences, making choices about language, format, and medium to maximize clarity and impact. By the final stage of compulsory education, learners are expected to produce evidence-based reports or briefs that integrate analysis, reflection, and recommendations, while acknowledging limitations and ethical considerations.



The overarching aim of this domain is to prepare students to act as responsible and reflective citizens in a data saturated society: able to engage in dialogue, influence decisions, and adapt their actions based on the effectiveness and consequences of prior decisions.

### Competencies

**C&A1** Describe data derived from data clearly in spoken or written form, referring to specific evidence (e.g., tables, graphs).

**C&A2** Construct simple explanations linking claims and evidence, using appropriate reasoning or comparison.

**C&A3** Select suitable formats and media (oral, visual, digital) to communicate results effectively to a target audience.

**C&A4** Summarize key insights from data and propose possible actions or decisions based on the evidence.

**C&A5** Discuss different interpretations of the same data and explain how perspective or context can influence conclusions.

**C&A6** Collaborate in presenting data findings, integrating text, visuals, and argument into a coherent group report or presentation.

**C&A7** Reflect on the consequences of data-informed decisions, evaluating whether they were effective, fair, and ethical.

**C&A8** Demonstrate civic responsibility by using data to participate in discussions or initiatives that address community or environmental issues.

### Descriptors

#### Primary 1 (Grades 1–3) – Foundations

**P1-C&A-L1** Student says or shows what they found, pointing to a chart or table as evidence.

**P1-C&A-L2** Student writes or tells a short explanation linking results to the original question.

**P1-C&A-L3** Student shares findings with others, using clear language or visuals and suggesting what the results mean.

#### Primary 2 (Grades 4–6) – Developing

**P2-C&A-L1** Student presents data findings in written, oral, or visual form with clear evidence.

**P2-C&A-L2** Student explains results, connects them to the initial question, and suggests possible conclusions.

**P2-C&A-L3** Student discusses the meaning of results with peers, identifying what could be done differently or improved next time.

#### Lower Secondary (Grades 7–9) - Expanding

**LS-C&A-L1** Student presents results in an organised format using text, visuals, or digital media to explain what the data show.

**LS-C&A-L2** Student prepares short, evidence-based reports or presentations, drawing clear conclusions from data.

**LS-C&A-L3** Student communicates data findings for a specific audience, proposes informed actions, and evaluates the fairness and impact of possible decisions.