

Introducing Data Literacy into Compulsory High School Education: Insights from the DATA READY Project

Daniel Wójcik

University of the National Education Commission

Department of Mathematics

ORCID: 0000-0002-2264-0178

Abstract

This short note discusses the introduction of data literacy into compulsory high school education, drawing on findings from Polish focus group and data collection within the international Erasmus+ DATA READY (ERASMUS-EDU-2024-POL-EXP-DIGITAL) project. Data literacy is increasingly recognized as a key competence for active participation in a digital society, yet it remains underrepresented in school curricula. The project mapped existing national frameworks and identified significant gaps in integrating data skills into compulsory education. Based on this analysis, the note outlines a proposed learning path for high school students, emphasizing practical engagement with data in mathematics, science, and social studies. Recommendations will include cross-curricular approaches, teacher training, and alignment with policy frameworks.

Keywords: data literacy, compulsory education, high school, curriculum design, digital competences

Introduction

The rapid expansion of data-driven technologies has created a demand for new competences in education. Data literacy understood as the ability to access, interpret, critically evaluate, and use data, has become fundamental for informed decision-making and civic participation (Mandinach & Gummer, 2016). Despite its importance, data literacy is not yet systematically embedded in high school curricula. Recent work has shown that many students leave school without sufficient

skills to critically engage with data in everyday contexts (Pangrazio & Sefton-Green, 2021). The DATA READY project (2025–2028) is designed to explore how data literacy can be integrated into compulsory education across Europe.

Methods

The project applies a three-stage approach:

1. **Mapping** existing references to data literacy in national curricula, focusing on how data-related skills are addressed in mathematics, ICT, and science (OECD, 2021).
2. **Designing** a developmental learning path for students in high school, identifying age-appropriate skills (DATA READY Project, 2025).
3. **Stakeholder Consultation and Policy Alignment** will be the final stage involving engaging with policymakers, teacher training institutions, and educational experts to validate the learning path and ensure alignment with broader digital competence frameworks. This phase also considers international trends in data-intensive scholarship and open science (Borgman, 2019), highlighting the importance of preparing students not only for academic advancement but also for participation in data-driven societies.

Results

The analysis carried out so far, revealed that references to data skills are fragmented, often limited to mathematics and ICT lessons. At the high school level, students are rarely given opportunities to work with real-world datasets or to connect data analysis with societal challenges (OECD, 2021). The proposed learning path emphasizes:

- **Practical engagement** with open datasets in mathematics, natural sciences, and social sciences.
- **Critical thinking** about data sources, biases, and ethical issues.
- **Application** of visualization tools and simple programming environments.

Combining curriculum analysis, pedagogical design, and policy consultation, the methodology ensures that the proposed recommendations will be both context-sensitive and scalable.

The interim findings of the DATA READY project indicate that the integration of data literacy into compulsory high school curricula remains fragmented, with significant variation across subjects and countries. Mathematics education, while offering natural entry points for developing data competences, often remains confined to traditional domains such as algebra, geometry, and calculus. The project's curriculum analysis suggests that the statistical and probabilistic components of mathematics are the most directly connected to data literacy, yet they are frequently taught in abstract ways that limit students' opportunities to engage with authentic datasets.

At the same time, mathematics classrooms are uniquely positioned to foster both the technical and critical dimensions of data literacy. Working with real and complex data sets ranging from climate statistics to demographic indicators provides students not only with practice in applying mathematical tools, but also with the chance to reflect on the reliability, bias, and context of data. This shift aligns with OECD's (2021) emphasis on preparing learners with capabilities to navigate AI-driven and data-intensive environments, where competence extends beyond calculation to interpretation and decision-making.

Early feedback from teachers involved in the project highlights the importance of connecting mathematical concepts such as functions, distributions, and correlations with the skills needed to analyze and visualize real-world data. Embedding these experiences into mathematics lessons strengthens students' quantitative reasoning while also contributing to a broader set of civic competences. Importantly, teachers stressed that integrating data literacy should not dilute the rigor of mathematics, but rather enrich it by providing applications that make abstract concepts more tangible and relevant.

The project also revealed challenges. Many teachers reported limited confidence in using digital tools for data exploration, which suggests that professional development will be essential for successful implementation. Furthermore, assessment systems continue to emphasize procedural fluency in mathematics, leaving little room for evaluating students' abilities to interpret and critique data. These tensions indicate that aligning mathematics education with data literacy needs will require systemic adjustments, not only at the level of curriculum design but also in teacher training and assessment policy.

The emerging results suggest that mathematics education has the potential to serve as the backbone of data literacy in high school, provided that it is reframed to emphasize authentic data engagement, interdisciplinary links, and critical reflection on the role of data in society.

Discussion

Integrating data literacy requires both **curricular innovation** and **teacher professional development**. Cross-curricular approaches ensure that data is not treated as a narrow technical skill but as a broad competence relevant to multiple subjects (Pangrazio & Sefton-Green, 2021). The DATA READY findings suggest that collaboration between policymakers, schools, and universities is essential for sustainable implementation.

Conclusion

Data literacy should be recognized as a compulsory component of high school education. The DATA READY project highlights practical strategies for embedding it within existing curricula and aligning with policy frameworks. Future efforts should focus on teacher training, development of open educational resources, and fostering interdisciplinary collaboration (DATA READY Project, 2025).

References

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