

A Bottom-Up Approach to Data-Informed Teaching, Croatia

Case studies: Data Literacy Initiatives in Schools

Introduction

This case study is one of five developed from interviews with members of school teams and national policy authorities who have contributed to school initiatives focused on the development of teachers' data literacy or the implementation of practices of using data for teaching and learning in schools. The schools are located in five countries: Malta, Italy, Croatia, Slovenia and Greece. The data literacy initiatives represented in these

cases have been implemented at different levels: two of them represent data literacy initiatives developed by schools, one of them has been developed by teachers, and two of them have been developed at national level, with the case studies focusing on how particular schools have implemented it. The purpose of data collection and analysis varies between case studies: in some cases, improving teaching quality is the main focus, in other cases, it is observing and monitoring students' performance, and in one case the focus is on preventing early school leaving.

The intention of these case studies is to illustrate how data can be leveraged to improve education processes and inform education policy at school level. Therefore, we hope they help as inspiration and illustration for other educators and schools. To navigate these case studies, we recommend that you take a look at the yellow text box. Here, you can find a summary of the key characteristics of each of them. Bear in mind that each school is situated in a different location and context. Therefore, to replicate an initiative you may want to modify its activities. We have included a section about "Transferability" which may help in adapting the initiative to your context.

The EVIDALI project¹ (Evidence-Informed Data Literacy for Policy & Practice), coordinated by European Schoolnet, is an Erasmus+ European Policy Experimentation project that brings together ministries of education, regional authorities, research institutes, and teacher training organisations from four education systems (Malta, Castilla y León in Spain, Madeira in Portugal, and Trento in Italy). Its overall aim is to strengthen the capacity of policymakers and practitioners to design and implement effective, evidence-informed data literacy strategies for schools. The project aims to take an early step in understanding how data can be more efficiently utilised to improve teaching and

This Data Literacy Initiative at a glance

Country: Croatia

Age of students: 7 to 11 years

Level of implementation: Teacher level

Focus on the initiative: Enhancing student performance and personalising learning

Keywords: personalisation, student performance; data literacy; context data analysis

¹ <https://evidali.eun.org>

learning processes at schools. This comes at a crucial time for digital education, with the introduction of Artificial Intelligence (AI) in education, new regulations surrounding data privacy, and new approaches to keep young students safe in a digital world. The project examines existing different data literacy initiatives in primary and secondary schools across EU Member States and explores how these initiatives are being implemented in schools.

National context

The Croatian Education System

Croatia's education system comprises preschool education, a compulsory cycle of **primary education** lasting eight years (from ages 6/7 to 14/15), **secondary education** offering both vocational education and training (VET) and general secondary education through different types of programmes (general, language, mathematics and science-oriented), and subsequently higher education. (Eurydice, 2025). In policy terms, the Ministry of Science, Education and Youth (MZOM) steers system development through the **National Plan for the Development of the Education System until 2027** (adopted in 2023), which frames priorities around improving quality and equity and explicitly emphasises digital transformation and stronger evidence/ data-informed governance and decision-making across the education system.

The Croatian National Data Literacy initiatives

At the national policy level, Croatia's approach to data use is framed within broader digital transformation policies rather than a dedicated data literacy strategy. The **Digital Croatia Strategy 2032**, adopted by the Government of the Republic of Croatia, promotes the development of data-driven infrastructures, open data, and advanced digital technologies, alongside strengthening digital competences needed for effective participation in a data-rich society. While the Strategy does not explicitly target data literacy in education, it establishes an enabling policy environment for data-informed practices across public sectors, including education, within which school- and teacher-led initiatives can emerge (Government of the Republic of Croatia, 2022).

In the context of education, the above-mentioned National Plan emphasises that the horizontal reform priorities are “management, leadership and decision-making based on data and evidence”. This is further operationalised through measures aimed at improving education system monitoring, use of administrative and learning outcome data, and analytical capacity at national and institutional levels. The National Plan emphasises **data-based decision-making as a strategic pillar of education system modernisation**.

As a concrete example of data use within the Croatian education system, the Ministry of Science, Education and Youth has developed **ŠeR – Školski e-Rudnik**², a national education data platform that provides open, structured access to administrative and achievement data drawn from the Central Education Records System (e-Matica system). ŠeR enables policymakers, school leaders, educators, researchers and the public to **explore interactive datasets on schools, students, demographic trends, attendance, pedagogical measures and national exam (Matura) results, including**

² <https://mzom.gov.hr/ser-skolski-e-rudnik-3419/3419>

comparisons across schools, regions and years. Its existence illustrates Croatia's shift toward system-level transparency and evidence-informed governance and demonstrates how educational data is not only collected but also visualised and reused to support monitoring, analysis and decision-making. In the context of data literacy, ŠeR represents an institutional foundation that enables stakeholders to interpret, compare and critically engage with educational data.

Furthermore, the **BrAln project**³ ("Application of Digital Technologies Based on Artificial Intelligence in Education") implemented by the Croatian Academic and Research Network⁴(CARNET) in cooperation with partners in the period from 2023 to 2029 has developed and piloted **AI school curricula "Artificial Intelligence: From Concept to Implementation"**⁵ aimed at strengthening students' AI literacy and their understanding of emerging technologies and artificial intelligence, across primary and secondary education. The curricula not only expose students to AI concepts and applications but support the development of data literacy skills. Students are encouraged to learn about **data interpretation and data-informed reasoning** through hands-on engagement with data-rich digital technologies and data in real-world contexts. In addition to student learning, the BrAln project incorporates professional learning for teachers, such as the **"Teachers for Teachers" webinar series**, which equips educators with the knowledge, practical examples, and pedagogical confidence to **integrate AI and data-rich activities** into their teaching practice and to support student data literacy effectively.

School context

This case study focuses on a data initiative carried out by two teachers from two Croatian primary schools. **Sanja Janeš**, a Maths teacher, teaches students aged from 10 to 15 (upper primary years) at **Primary School Petar Zrinski⁶ in Čabar**, a rural school in the mountainous region of Gorski Kotar. This main central school operates four branch schools in nearby villages, which provide education for younger pupils in geographically dispersed villages. The school serves a close-knit community where access to specialised resources and high-speed digital infrastructure may be more limited. The school fosters a range of curricular and extracurricular activities and inclusive programmes. It serves around 200 pupils, supported by a teaching staff of approximately 50 teachers.

Valentina Blašković, an ICT teacher, teaches students aged from 7-11 at **Primary School Prva osnovna škola Ogulin⁷**, located in the historic town of Ogulin. As in the case of the school described above, this main central school also operates in surrounding villages with one branch school offering full eight-year primary programme and three additional smaller branch units with combined classes covering the first four grades. The school has historic roots in the region's educational tradition, dating back to 1871, and currently serves a diverse student population of approximately 550 pupils from Ogulin and surrounding local communities, which reflects both urban and rural characteristics. The school fosters inclusive learning, community engagement, a broad range of curricular and

³ <https://brain.hr/en/>

⁴ <https://www.carnet.hr>

⁵ https://www.carnet.hr/wp-content/uploads/2025/09/Kurikul_za-5-i-6-razred_08092025.pdf

⁶ <https://os-pzrinski-cabar.skole.hr>

⁷ <https://prva-osnovna-skola.hr>

extracurricular activities and provides professional development opportunities for educators. The school employs around 70 teachers.

Implementation

Data literacy initiative

Teachers for data literacy

This case study describes a **voluntary, teacher-led collaboration** as part of a larger, **international pilot project**, which aimed at meaningful use of learning data to improve teaching practices and student outcomes. It was selected as a case study because it represents a **fully bottom-up, voluntary teacher-led effort to engage with data use in education** in the absence of formal support from either the school level or the wider education system. Rather than initiated through institutional structures, this initiative emerged from the teachers' own recognition of a need to better understand and respond to their students' learning through data. Its relevance lies in demonstrating how **data literacy practices can develop organically through professional agency, intrinsic motivation, and peer collaboration**, despite the absence of formal school or system-level

The teachers engaged in a pilot project initiated by the developers of the digital tool. The objectives of the pilot project objectives focused on exploring how learning data can be collected and interpreted in ways that resulted in **adaptive learning opportunities**. In addition to data collection and data use, piloting activities also included teachers' assessment of the quality and clarity of the Croatian translation of the **problem-solving tasks** included in the digital tool to ensure that students did not encounter misunderstandings or learning difficulties due to language-related barriers.

While Croatia does not yet have a dedicated national data literacy strategy, the initiative nevertheless aligns with broader national priorities articulated in the National Plan mentioned above, notably those related to digital transformation and evidence-informed decision-making. As such, the case provides valuable insight into the **gap between policy and classroom realities** and highlights both the **potential and the limitations of relying on voluntary teacher initiatives** to advance data use in education.

Problem identification

Both teachers identified a recurring classroom challenge related to **pupil engagement, motivation and progression in learning mathematics and computer science**. They frequently encountered the limitation of a "one-size-fits-all" approach, as pupils completed tasks at very different speeds and demonstrated varying levels of understanding. As a result, traditional whole-class instruction often left some pupils disengaged once tasks became too easy, while others required additional support when tasks proved to be too demanding. To address this imbalance, the teachers looked for ways to

monitor learning processes in real time and to **adapt learning activities to individual pupils' needs**. The teachers also identified a need to better understand what kind of support their students needed to develop mathematical understanding and how effective their teaching practice is. In addition, one of the teachers was working with pupils from the Roma minority in the lower primary grades (ages approximately 7–10), many of whom attended additional support classes due to difficulties with basic mathematical concepts. The teacher recognised the need to dedicate more focused time and targeted support to this group. Her intention was to see how data can help her to better understand learning gaps, to adapt instruction accordingly and to reflect on how to improve and adapt their teaching strategies.

This motivation led both teachers to respond to an open call published in an online community of practice for educators, to **pilot a digital tool designed to identify hidden gaps in mathematical understanding** and to guide both students and teachers step by step through a multi-tiered system of support, over the course of a semester. Even though the two teachers work in schools that are geographically distant from one another, they decided to undertake the pilot together so that they could support each other and help each other use data to inform their teaching practice.

Activities

During the pilot, the teachers integrated the digital tool into regular classroom practice by assigning integrated exercises to their students. The platform **automatically collected data on student performance**, including completion rates, accuracy, time on task, progression through levels, as well as self-reported perceptions of task difficulty. The collected data was **visualised through clear dashboards and progress graphs**, which enabled the teachers to quickly identify learning patterns at both individual and class levels. This in turn enabled teachers to provide more **personalised learning pathways** for individual students and to support more **inclusive teaching practices** for students at risk of falling behind.

Use of data

Based on the collected data, the teachers were able to **adjust their instruction and adapt it to each student based on their real-time needs**. Students who demonstrated mastery and reported tasks as easy were offered more challenging activities, while those who struggled received additional practice and scaffolded tasks. Although the platform supported adaptive learning, **pedagogical decision-making remained in the hands of the teachers, who determined the pace, level of difficulty and assessment outcomes**. For example, data from the platform revealed that students were making errors in mathematical problem-solving tasks that required reading and interpreting written instructions. Based on this insight, one of the teachers introduced short reading comprehension activities prior to problem-solving tasks to better prepare students for understanding the task requirements. As a result, the number of errors caused by misinterpretation of the problem significantly decreased.

The use of data significantly enhanced student engagement and motivation. Gamified elements such as levels, stars and avatars encouraged students to voluntarily try additional tasks and reflect on their own progress. From the teachers' perspective, **the initiative strengthened their capacity to use data to inform their teaching**.

The students were not required to register using their personal data. Instead, the teachers created anonymised student accounts, which students accessed via codes. The pilot implementation was approved at the school management level, and informed parental consent was obtained prior to the implementation, so that the use of data complied with data protection regulations and ethical requirements.

Challenges and solutions

The teachers reflected on the broader usefulness of the collected data. They questioned whether data generated could serve as meaningful feedback for someone who does not know the students personally. This highlights an important consideration regarding the interpretation of learning data, namely that **data is most valuable and informative when combined with contextual knowledge of students' needs, interests, prior knowledge and learning context rather than being viewed in isolation. Professional judgment and human oversight** therefore remain essential for accurate data interpretation and responsible data-informed decision-making.

One of the options explored during the project was to introduce parents to the tool and encourage its use at home together with their children. However, this approach did not prove feasible in practice and highlighted the challenges of extending data-informed learning tools beyond the classroom context without extensive **additional support and guidance**.

Outcomes and added value

The use of learning data helped the teachers distinguish between students who needed more time and those who were disengaged. Rather than relying on assumptions, the teachers could see from the data how much effort pupils invested in completing tasks and attempting to solve problems. This made it possible to **track individual progress over time and to identify improvements**, even when initial performance was low. For example, some pupils struggled with mathematical problem-solving at the beginning of the pilot. However, the collected data clearly showed steady progress by the end of the implementation period.

Impact

The impact of the pilot project was an eye-opener for the teachers and encouraged them to **continue using learning data to inform their teaching even after the pilot had ended**. Following the project, they continued with the use of the tool, and, more importantly, felt empowered to explore, interpret and apply data available in their school learning management systems (LMS) and integrate data-informed reflection more systematically into their everyday pedagogical decisions.

Lessons learned and recommendations

- **Timely, visual learning data** can significantly support teachers in understanding student progress and making more responsive instructional decisions.
- Data-informed teaching is most effective when it remains **teacher-led and context-sensitive**, supported by **professional judgment and knowledge of students**.
- **Collaboration within the school**, involving teachers and school leadership in reviewing and discussing learning data contributes to coherent and sustained student support.
- **Joint planning and coordination of interventions** based on collected data help address students' learning needs more effectively.

Transferability

In terms of transferability, this approach is highly adaptable and can benefit teachers across subjects and school contexts, as it relies on practices and data sources that are already available in many classrooms, such as digital learning tools and school LMS platforms. **With appropriate guidance and peer support**, similar initiatives could be successfully implemented by a wide range of teachers who want to enhance student motivation, engagement, differentiation and learning outcomes through data use.

Conclusion

This case study illustrates how **data use in education can emerge from teacher initiative** rather than system mandate, even in contexts where formal support structures are limited. By engaging with learning data to **address real classroom challenges**, the teachers demonstrated how data can support more engaging and **personalised learning**. The initiative highlights the importance of **human judgment, contextual knowledge, and ethical oversight in interpreting data and making instructional decisions**. Overall, the case study underscores the potential of **teacher-led, data-informed approaches** to strengthen learning processes and professional practice. However, it also points to the need for more structured support to scale such practices sustainably across the education system.

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