

The use of data and Digital Textbooks

LEARNING STORY – PORTUGAL

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Summary

The Digital Textbooks Pilot-Project (PPMD) is one of the initiatives of the Ministry of Education's Digitalisation Program for Schools, launched in 2020, aiming to dematerialise school textbooks so that students and teachers from all Portuguese schools can have fully access to digital textbooks and other digital educational resources. The Digital Textbook Pilot-Project not only challenges teachers but also school leaders. This Learning Story is based on the practical point of view from a School Leader that is integrated in the Digital Textbooks Pilot-Project since 2020. It underscores the importance of leveraging data from the platforms of Digital Textbooks to take pedagogical decisions and promote organisational improvements. It also highlights the evolving role of digital resources like textbooks and emphasises the importance of fostering data literacy and ethical data practices among teachers and students.

Quick reference sheet

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| Country | Portugal |
| For whom is the learning story? | Teachers and School Leaders |
| What is it about? | How digital textbooks and data use can support and enhance school leadership and teaching practices. |
| Target group in the learning story | Primary, Elementary and Secondary teachers |
| The focus of the learning story | Data use for teaching and learning |
| Keywords | Data, Digital Textbooks platforms, decision making, School Leaders |

Background

The Digital Textbooks Pilot-Project (PPMD) is one of the initiatives under the Ministry of Education's School Digitalisation Program, launched in 2020. Its primary goal is to replace traditional printed textbooks with digital versions, ensuring that students and teachers across all Portuguese schools have access to digital textbooks and other educational digital resources. The project aims to enhance student learning and foster skill development by promoting innovation in teaching and learning practices.

The Digital Textbooks Pilot-Project is framed within a perspective of transforming and improving teaching and learning processes, supported by technologies and digital educational resources. The Digital Textbooks Pilot-Project, in its educational purpose, aims to:

- Modernise the education system, promoting a paradigm shift in education towards more student-centred learning to address current and future challenges.

- Improve student learning through the provision of diversified learning paths.
- Promote the development of students' skills, particularly in multiple literacies, the use of ICT, and 'learning to learn.'
- Promote the development of teachers' digital skills.

Through this project, it is expected that students and teachers will have access to:

- Multiple digital educational resources in different formats and typologies (animations, simulations, three-dimensional videos, among others).
- The combined access to digital textbooks in a platform providing access to complementary multimedia resources.
- Tailored solutions not only for students with learning difficulties, enabling the mobilisation of support measures for learning, but also for students with high learning potential, through differentiated and enriching learning pathways.

To participate in the Digital Textbooks Pilot-Project, schools must first express their interest through a decision made by the school leadership, involving the Pedagogical Council, in a first approach, as well as the school community. Following this, each participating school designates a pedagogical-technical coordinator, appointed by the school leader, responsible for overseeing all procedures related to the project's implementation and management and appointed by the school leader. ICT Competence Centres and Digital Ambassadors, in close collaboration with DGE, support schools allowing a more adequate and quick response to the specific needs of schools, regarding pedagogical and didactic use of digital resources, the development of innovative initiatives in the area of ICT and the curriculum, as well as teacher training.

The pedagogical-technical coordinator serves as the liaison with the Directorate-General for Education (DGE) and is responsible for overseeing all procedures related to the project's implementation and management.

In the pilot classes, students do not use printed textbooks. Instead, they work with digital textbooks, which provide access to a range of educational resources through digital platforms. These resources are integrated into a hybrid learning environment, where digital textbooks coexist with traditional materials such as notebooks, printed books, writing tools, and art supplies, with the aim of enriching the learning experience.

While the use of digital textbooks offers significant potential, it also presents challenges for all stakeholders involved—students, teachers, schools, families, publishers, and others. For this reason, the project is being implemented in a phased and gradual manner. It is supported by continuous teacher training, the sharing of good practices among schools (including principals, pedagogical-technical coordinators, teachers, and students), and ongoing research and evaluation throughout the process.

Digital textbooks, data and the challenges for School Leaders

The Digital Textbook Pilot-Project not only challenges teachers but also school leaders. School Leaders play an important role in educational innovation, wielding influence that goes beyond the classroom. Their vision, guidance, and commitment are crucial in steering the course of educational initiatives, such as the Digital Textbooks Pilot-Project, towards success. First and foremost, school leaders streamline change, on the adoption of digital resources and pedagogical advancements within their schools, as they inspire the school community to embrace transformative approaches to teaching and learning. Moreover, school leaders play a crucial role in fostering a culture of collaboration and professional development among teachers, students and parents. By providing support and training opportunities, School Leaders should be able to empower teachers to harness the full potential of digital textbooks.

Additionally, school leaders play an important role on making the opportunities/conditions to equitable access to technology, ensuring that all students have the opportunity to benefit from the advantages offered by digital resources. In relation to the Digital Textbooks Pilot-Project, School Leaders have a new challenge: the power of data to inform and guide leadership practices at both pedagogical and organisational levels. Pedagogically, school leaders can use data to enhance instructional practices and student learning outcomes. For example, by analysing assessment data, identifying areas of strength and areas in need of improvement, school leaders can provide support and professional development opportunities for teachers. They can also promote data-driven discussions, empowering teachers to adapt strategies and their approach to achieve students' needs. Organisationally, school leaders and Pedagogical Councils can use data to decision-making. For example, by analysing demographic data and student performance data, they can identify challenges and develop strategic initiatives.

The implementation

Since 2012, P.A has been the School Principal (Director) of a School Cluster (Agrupamento de Escolas), a Portuguese school structure that typically includes all levels of education from pre-school to the 12th grade. In this particular cluster, however, the educational offer extends up to the 9th grade. Between 2008 and 2012 he was deputy school principal, and adviser of the school board between 2007 and 2008. In 2008, he completed his Specialisation in School Administration. He is the co-author of several textbooks for different school levels. P.A.'s School Cluster has taken part in the Digital Textbooks Pilot-Project since its 1st phase (school year 2020/2021). Since the beginning of the Pilot-Project his school has increased the number of classes and students involved (2020/2021: 5 classes-110 students; 2021/2022: 5 classes- 107 students; 2022/2023: 10 classes- 205 students and 2023/2024: 15 classes- 289 students).

How does data analysis influence pedagogical and organisational decision-making.

PA outlines various administrative contexts where data plays a crucial role. This includes tasks such as enrolment management, social school measures, transportation arrangements, licensing for e-learning platforms, and cooperation agreements with private publishers, regarding school textbooks. PA emphasises the significance of administrative data in streamlining processes and ensuring efficient resource allocation.

As a school leader, it is important to support teachers in discussing student data and making informed decisions. PA begins by stressing the vital role of fostering a culture of data use and literacy within the school. It is emphasised that without data, decisions are often based on assumptions and may not be effective. To support teachers, PA advocates for regular analysis of both whole-school data and data at the classroom or student group level. It is important to triangulate different types of data, such as socio-economic indicators, academic performance, and attendance records, to identify trends and highlight students who may need additional support. This triangulation helps teachers and school leaders reflect on the effectiveness of strategies and adjust them accordingly. For example, P.A. describes a case where mathematics unexpectedly showed low digital engagement on the data collected in the digital textbooks' platforms: "It didn't show up in mathematics... we later realised that this was due to an internal introduction issue... which gave us an indicator to investigate." This prompted pedagogical follow-up and helped to clarify whether the issue was linked to platform use or to teaching adjustments.

PA also highlights the need for professional development to enhance teachers' skills in interpreting and applying data, moving beyond simple averages to identifying meaningful trends. Collaborative discussions within School Subject Departments and other school teams are promoted to foster a shared understanding of data insights and to integrate them into everyday pedagogical practice. According to PA, this approach enables schools to implement more targeted and effective interventions, ensuring that decisions are informed by robust evidence. This encompasses socio-economic backgrounds, age, personal details, and academic performance metrics. He underscores the importance of triangulating these data points to gain insights into student performance and to evaluate the efficacy of educational strategies. In conclusion, "Data is the oil of today; without data, there will not be good decisions." PA encourages school leaders to:

- Promote regular data analysis, both at the macro level (whole school) and micro level (classroom, student groups).
- Support teachers in triangulating different types of data (e.g., socio-economic status, academic performance, attendance) to identify trends and outliers.
- Provide professional development focused on data interpretation skills, moving beyond simple averages to recognising patterns and tendencies.
- Encourage collaborative data discussions within subject departments and teams, allowing teachers to reflect on the effectiveness of their strategies.

- Integrate data analysis into feedback loops, enabling timely adjustments to pedagogical practices.

To PA, data analysis informs both pedagogical and organisational decision-making processes. He highlights the significance of examining student performance metrics, platform usage patterns, and other relevant factors to identify effective teaching methodologies and areas requiring improvement. When discussing how data can guide decisions about resource optimisation at the school level, PA outlines the use of various datasets, including administrative data (such as student enrolment, socio-economic indicators, and transportation needs) and pedagogical data (including performance records, attendance, disciplinary incidents, and participation in extracurricular activities). The school also uses data collected from digital collaborative platforms like Microsoft Teams, and other digital tools and platforms, which provide insights into student engagement and resource utilisation. This information is essential in determining where to allocate resources, whether it concerns teacher training, software subscriptions, or support programs. For example, by tracking which digital tools are most frequently and effectively used, the School Leaders can ensure that investments align with teaching and learning priorities. Likewise, monitoring attendance and participation in School activities such as thematic Clubs (Science Clubs, Robotics Clubs, Mathematics Clubs, etc.), enables the school to identify gaps and optimise its offerings.

PA emphasises that data do more than merely inform operational decisions. They also reveal which students may need additional support—not only those at risk of underachievement, but also high-performing students who may require differentiated approaches, such as enrichment or advanced learning opportunities, to stay motivated and reach their full potential.

By analysing academic performance data in conjunction with demographic and socio-economic information, the school can identify students at risk of disengagement or underachievement. Trends observed in assessment results, combined with data from digital platforms, can highlight students who might be struggling despite high engagement or reveal inconsistencies in progress. P.A. explains that these trends are cross-referenced with six regular evaluation periods each year: 'We compare those data with our six assessment periods... when we find an outlier, we investigate — sometimes it's a new teacher, sometimes a planning issue, sometimes something from previous years.'

Identifying patterns of low attendance, frequent disciplinary incidents, also provides a basis for proactive interventions, whether through mentoring, counselling, or individualised support plans. PA stresses that digital platforms, with their real-time data access, are invaluable not only for educators but also for families and students, allowing everyone to monitor progress and set goals collaboratively. He also highlights the role of data in fostering student self-regulation and promoting a culture where learners understand and act upon their own data trends. Trends observed in performance across different year groups can also allow for proactive adjustments in staff assignments, resource distribution, and the focus of professional development. PA stresses that this ongoing analysis forms a continuous feedback loop, allowing for the refinement of strategies and better alignment with student needs and school priorities.

According to PA “(...) the study is contextualised and relates to effectiveness and efficiency. Therefore, when we have the data, I usually say that data is the oil of today's world. So, without data, there will certainly not be good decisions, and sometimes, even with data, decisions are not the best. Data lead us to reflect on the pedagogical strategies we adopt. Whether the strategy is leading to success, to the path we wanted, if it is effective. There are situations where it is not effective. It's not because it's not good, it's because it's being poorly implemented, and therefore, it allows us to understand the effectiveness and efficiency with which we are implementing”.

How can the analysis of data collect from Digital Textbooks influence pedagogical and organisational decision-making.

As school leader, PA is “tasked with” overseeing the integration of digital resources to enhance learning outcomes. One significant component of this endeavour is the use of digital textbooks, which presents both opportunities and challenges in the pedagogical approach. PA school regularly uses data from digital textbook platforms provided to school leaders by one of the private publishers: ‘What they send us by default each term are access logs per weekday, per class, per resource, per grade level... I know which subject uses the platform most, and for how long.’ This data helps identify patterns of engagement across different subjects and time periods.

Digital textbooks offer many advantages, primarily in terms of data analytics and real-time feedback. PA emphasises the importance of leveraging data from digital platforms to inform pedagogical decisions and drive organisational improvements. For example, through the analysis of student usage patterns and performance metrics, teachers can gain valuable insights into individual learning behaviours and tailor instruction accordingly.

To PA one of the many challenges in data usage through digital textbooks is how data is collected and access to them. This challenge emerges in the interview as an example from one of the private publishers who frequently provides PA school with data on the usage frequency of learning platforms by students. For PA, “this data clearly indicates which classes, years, and subjects use this or that tool or digital resource. Therefore, I can understand who uses the platform, for what purpose, which subject it pertains to, and how often the student uses the platform, etc.”. This allows to observe trends over time enabling timely interventions. PA gives an example of the potential use of data: “We are comparing this year's seventh grade with last year's seventh grade, to look for what precisely? Trends! And the first question that some remember when we are discussing and looking for these trends is to say, but the students are not the same...Of course, they are not the same (...) but these are also not the same as those who were in seventh grade last year and are now in eighth grade, there is mobility, and what is taught is not the same either. We are looking for trends to understand, well, if everyone is following this trend line and there is one teacher going in the opposite direction, if all the teachers are having better results... Let's look for reasons, let's help overcome the reasons, and digital textbooks anticipate this reading in certain ways. Data from Digital textbooks enable more than just the structure. More than leadership, they enable teachers in the classroom to analyse this.” To PA one of the many challenges in data usage

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Despite all, PA notes challenges, particularly the “inconsistency” of data provision across different publishers. Some provide regular reports on platform usage, while others do not, which limits the ability to monitor student interaction with learning resources comprehensively.

Moreover, PA acknowledges the need for professional development to support teachers in using data from these platforms effectively. He also notes variance in teacher engagement: “I believe they are already using [the data] to some extent... but I can't say with 100% certainty how deeply or consistently.” The need for teacher training in data literacy to move beyond simplistic interpretations (e.g., averages) to recognising significant patterns. Teachers should develop the skills to interpret longitudinal trends that indicate sustained progress or identify when a student's performance unexpectedly changes. For PA, “Before Digital Textbooks, we hadn't been able to grasp that, so on our side, it's very important. And then there's data analysis literacy. We, as teachers, are not trained for it (...) I usually call it that, data literacy that we need to invest in, not just in a data collection culture, right? It's in the frequent use of data that we generally call feedback. But what is feedback? It's data usage culture. So that one can tell someone how data was used and what for? Because that's usually it, and therefore, I think that's the big challenge. It's to empower teachers and educational actors for that data usage culture (...).”

Furthermore, PA also highlights the role of digital textbooks in promoting student autonomy and data literacy. By providing students with access to their own learning data and encouraging self-analysis, teachers empower them to become active participants in their educational journey.

Data-Driven Leadership in Education: Balancing Security and Innovation.

The use of digital textbooks also poses certain challenges, particularly regarding data privacy and security. PA outlines the measures taken by his school to protect student data, including the adoption of strict regulations and agreements with publishers regarding data usage. As a school leader it is important to reassure that the school operates under a data protection regulation specific to the institution, which complements the broader legal framework. This regulation defines roles and responsibilities for managing data securely. For example: his school prioritises closed, secure learning systems with minimal data sharing, such as using Office 365 with anonymised student identifiers and regularly updated passwords. Agreements with digital textbook publishers specify the handling, retention, and deletion of data, including adherence to data protection rights such as the right to erasure. PA emphasises that this proactive approach fosters a culture of data security and minimises risks associated with unauthorised or experimental use of platforms.

Reflecting on the competencies required to manage data-driven leadership, PA identifies several critical areas. First, there must be a solid understanding of the legal and ethical frameworks that govern data use. Equally important is a high level of digital literacy, enabling teachers and students to use technology effectively, while safeguarding data. PA further warns that data must be interpreted within the digital literacy of the audience: "We need to adjust our language... otherwise we risk speaking and they don't understand a word we say."

Data literacy itself is essential, as it equips school leaders and teachers to analyse trends, draw meaningful conclusions, and implement appropriate interventions. Beyond technical skills, PA highlights the need for a strong sense of ethical responsibility, ensuring that data is used transparently and for the benefit of students. Identifying trends requires ethical caution: 'We risk creating a Pygmalion effect... associating specific characteristics with failure. We must avoid cataloguing students based on these data.'

He draws a parallel with environmental ethics, emphasising that just as schools teach students the importance of recycling, they must also model responsible data practices.

To PA it is very important to promote teachers and students' digital literacy, but it is important also to involve private publishers: "What concerns us all also concerns publishers. Publishers have also, in recent years, worked on establishing with schools a protocol for data sharing where everything is put in writing."

Fostering a culture of data literacy, ensuring data privacy and security, and promoting professional learning, highlights the transformative potential of data in education. By embedding these practices into daily routines, schools can optimise resources, personalise support for students, and drive continuous improvement in educational outcomes.

Lessons Learned

The experience of integrating digital textbooks and using their data in educational leadership offers several valuable lessons for schools undergoing digital transformation. This learning story offers some reflections that illustrate how data can significantly enhance school leadership and pedagogical decision-making.

1. Data Literacy as a strategic priority

A key takeaway is the essential role of data literacy across all levels of the school community. Data use is not merely a technical task- it is a cultural shift. Both teachers and school leaders must be empowered to interpret complex datasets — moving beyond averages to recognise patterns, trends or outliers. Without the appropriate skills and mindset, data remains underutilised, and decisions risk being based on intuition rather than evidence.

2. Triangulation enhances decision-making

Triangulating data — combining academic performance, socio-economic indicators, and digital engagement — demonstrates how schools can gain a richer understanding of students' needs. This holistic view enables more accurate identification of learning gaps, better targeted interventions, and a more equitable allocation of resources.

3. Real-time data enables timely interventions

Digital textbook platforms offer access to real-time data, allowing for immediate insights into student engagement. This timely access empowers teachers to adjust strategies and enables school leaders to proactively support areas of underperformance.

4. Professional Development is crucial

Despite the availability of data, its effective use depends on professional training. Teachers must be supported in developing skills for data interpretation, ethical analysis, and pedagogical adaptation. Without ongoing professional development, the potential of digital tools remains limited.

5. Data-driven leadership requires ethical vigilance

While data is a powerful tool, it must be handled with ethical care. The risks of overgeneralising or “cataloguing” students can reinforce bias. Responsible leadership requires protocols for privacy, consent, and purpose-driven use of information, aligning data strategies with the broader mission of student well-being.

6. The pivotal role of leadership in digital transformation

Leadership is essential for successful digital innovation. School principals must advocate data culture, model its use, and cultivate an environment where experimentation, reflection, and adaptation are encouraged. Their ability to coordinate across administrative, pedagogical, and technological domains is vital to achieving long-term impact.

7. Contextual sensitivity matters

Data must always be interpreted in context. Student performance trends, platform usage, and attendance metrics are influenced by multiple factors — teaching styles, curriculum changes, and student mobility among them.



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