



Agile
EDU

Guidelines for educators and school leaders

Guidelines for inclusive, pedagogically meaningful and responsible use of data in school and classroom practices



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Rue de Trèves, 61
1040 Brussels, Belgium

Author: Antoine Selim Bilgin, European Schoolnet

Editor: Roger Blamire, European Schoolnet

Design: Mattia Gentile, European Schoolnet

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Summary

This document provides practical guidelines for teachers, school leaders and other education professionals on how to use education data ethically, inclusively and meaningfully to enhance students' academic and socio-emotional development and school improvement. It draws on nine case studies, 18 learning stories, a literature review, and numerous workshops for education stakeholders under the Agile Edu project, supported by evidence from research.

The guidelines aim to promote a nuanced approach focused on the competent and reflective professional use of data (both digital and non-digital) with an emphasis on learning, focusing on self-reflection, professional and organizational learning, rather than considering data only for accountability and efficiency.

The guidelines can help schools and educators to:

- improve their practices and the school climate as a whole,
- increase intra- and inter-school collaboration,
- give students more voice,
- become more critical users of AI and data-driven EdTech,
- increase school and student dialogue, and
- develop students' problem-solving and critical thinking.

The guidelines are set out under 12 key ideas:

Start by defining the question before looking for data - First identify the challenges to address before collecting or analysing data.

Beginning with clear inquiry questions ensures that data collection remains purposeful, reduces unnecessary workload and protects privacy.

Address data literacy in professional development - Both teachers and school leaders should look for (and ask for) modular, ongoing training in data literacy to interpret data accurately and use it to address inclusion challenges. Peer learning communities and long-term mentoring can support meaningful adoption of data-informed practices.

Collaborate with students - Involving students in collecting and analysing data builds their motivation, sense of belonging and ownership, and data literacy, while generating creative ideas. Student participation — through surveys, projects, or playful inquiry — helps schools co-create solutions that improve wellbeing, competence development and inclusion.

Analyse group data to identify trends and patterns - Instead of focusing solely on individual performance, examine group data to identify trends in teaching and learning. Aggregated analysis supports reflection on teaching methods and equity in assessment.

Keep student data private - Schools must ensure that tools comply with privacy laws and minimise data sharing with third parties. Open-source or collectively procured tools can strengthen data security while promoting data ownership and privacy in schools.

Establish a data team in the school - A cross-functional "data team" helps manage inquiry cycles, analyse data and translate the results into actions for students' growth and school improvement. This collaborative structure supports shared understanding, capacity building and sustainable data use.

Develop a school data strategy - Schools should have a written strategy that integrates data use into their digital action plans, linking teacher professional development, data ethics and innovation.

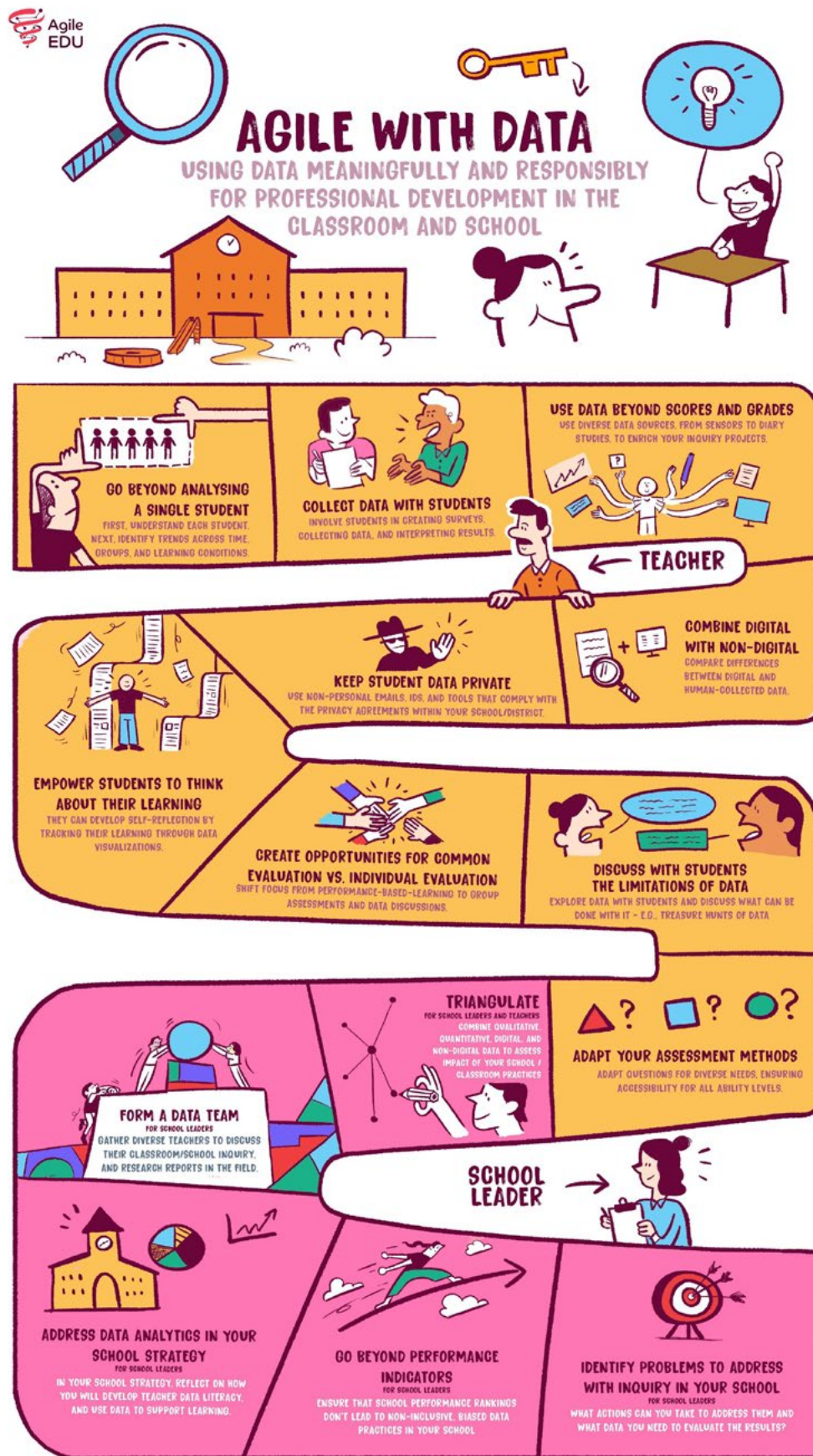
Empower students to think about their learning - When students interpret their own learning data, they develop self-regulation and metacognitive skills. Teachers can guide this process carefully to avoid comparison pressures and ensure data supports reflection and student-teacher dialogue, rather than competition and isolation.

Develop students' critical data literacy skills - Students must understand how data shapes society and influences equity. Activities comparing digital and non-digital data, or exploring local civic data, help students become informed, responsible digital citizens.

Reflect on how data-driven EdTech shapes practice - Schools should evaluate how digital tools affect pedagogy, student wellbeing and inclusion. Data-driven echnologies can bring value but also take something away in return, and shape classroom behaviour in unintended ways.

Go beyond performance indicators - Schools should go beyond analysing test scores to include wellbeing, inclusion and environmental factors in their reflections. Focusing only on performance risks exclusion, stress and reduced educational breadth and depth.

Triangulate data sources - Combining multiple data types, e.g., quantitative and qualitative, digital and observational, creates more valid and nuanced insights. Triangulation supports evidence-informed reflection while respecting the complexity of learning.



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Figure 1. Using data meaningfully and responsibly for professional development

Introduction

Who is this for?

The guidelines in this document are to be used by teachers, school leaders, and other education professionals. They suggest actions that will help promote the pedagogically meaningful, ethically responsible, and inclusive use of education data for improving students' learning and socio-emotional outcomes, teachers' professional development and school improvement. The guidelines also aim to develop a critical approach to data to help teachers and school leaders be ready to address the risks and challenges associated with data in schools.

What is meant by data?

Education data refers to any information that is collected and analysed to inform decisions about teaching and learning, and educational systems in diverse, data-informed education systems. In this document we go beyond data about students, to encompass a wide range of data types related to students, teachers, school staff and other stakeholders around the school, and data giving information about student learning, teacher practices, teaching and assessment material, the school curriculum, the school environment and the actions, views and beliefs of all school stakeholders.

Data in education can come from digital or non-digital sources and can be in various forms. It can be collected with a feedback form or questionnaire, from a learning management system or even environmental sensors (e.g., a sensor to measure air quality, noise, etc.) and circuits (e.g., to collect the number of times a button was pressed as a satisfaction rating).

Data is also not only about numbers; it can be qualitative, such as classroom observations or related written documents. Observations are about what all teachers do intuitively; reading the room, gauging the mood, checking for understanding, etc. What makes observation more systematic is a set of criteria or a rubric. This also applies to analysing student written assignments and created media, such as presentation slides, posters, infographics, and concept maps.

Such data falls into three categories¹:

- System-level data: School administrative data, e.g., grades, school attendance, education history, student demographics.
- Learning data: E.g., exam and quiz results, time spent on tasks, engagement in group discussions, hand drawing tracking or eye tracking while reading.
- Self-report data: E.g., Interviews, focus groups to collect student or teacher views, surveys to measure, e.g., student beliefs about a learning activity, interest in Science or Math.

How were the guidelines developed?

The guidelines were developed through consultations and knowledge sharing activities in the Agile EDU project. The project aimed to identify the key factors needed to develop and implement data-informed education practices that enable an inclusive and high-quality education for all students, and to develop an expertise and community of knowledge exchange of these factors. These key factors were translated into recommendations for

¹ For a more detailed typology, you can view the [interactive infographic](#) that shows types of education data and some example questions that can be answered through collecting them. The nodes on the infographic reveal the questions.

policy makers and guidelines for practitioners: mainly teachers and school leaders, but also teacher educators and school ICT coordinators.

The guidelines are based on insights collected from multiple project activities:

- Nine case studies conducted in Portugal, Switzerland, Netherlands, Denmark, Spain, Norway, Sweden, France, and Finland. These studies involved interviews with multiple education stakeholders.
- Eighteen smaller-scale case studies called [learning stories](#), based on interviews with education stakeholders from Portugal, Netherlands, Denmark, Spain, Norway, Sweden, Finland, Greece, Ireland, Italy, Belgium and Slovenia.
- ‘Country Dialogue Labs’ (national on-site workshops) and European Dialogue Labs (international online workshops) that brought stakeholders together, focusing on the public sector representatives as well as, teachers, students, teacher trainers, school leaders, municipal authorities, EdTech developers, researchers, and non-profit organisation officers.
- The country dialogue labs in Spain were organised by Empieza por Educar (EXE)² and hosted both educators and students, which enabled hearing students’ experiences with learning and discussing inclusion related challenges emerging from data use and data-driven education technologies. This helped in integrating considerations for inclusion in the current guidelines.
- A series of four ‘expert validation workshops’ that mainly brought education researchers together to review the case studies and learning stories and discuss the questions raised by them.
- A literature review conducted by the Scientific Advisory Board of the project. This review was performed at the start of the project and then updated at the end to include the latest research on the topic. The guidelines are further supported by the results of the literature review and other relevant research.

² EXE is a non-profit organization located in Spain working for promoting equal opportunities for all children in education. <https://empiezaporeducar.org/>

Guidelines

Start by defining the question before looking for data

“We have a lot of data. But we don’t know how to use it.” This point was made many times in discussions with education stakeholders in the project. They also mentioned that there is a tendency to collect more data than needed, ‘just in case.’ Moreover, some data are increasingly collected automatically when students and teachers use digital educational tools. Therefore, it is often the case that data collection is already in place, without knowing why or for what.

One issue with this ‘collect first, ask questions later’ approach is that some data might not be needed even though it takes time to collect and may undermine the privacy of personal data.

A second issue is that if staff analyse data first, it can create bias in the inquiry questions they formulate and lead the school to overlook alternative sources of data that are not so readily collected. Numerical data from school administration platforms and learning management systems (LMS) tend to be more easily available while qualitative data is either not collected or lacks a systematic procedure for collection. Eventually, schools can simply be overwhelmed, not knowing where to begin with their data analysis and reflection.

What teachers can do

Start by reflecting on the challenges you want to address; on the goals you would like to achieve with your students. Based on these, formulate systematic inquiry questions such as: Why are some students not doing their homework? Are they overloaded with

homework from all subjects? Do they have enough support at home? Do students really assimilate online feedback provided by teachers? Do some need one-to-one tutoring support? Use the TISL³ model, or the Agile Edu inquiry plan template and rubric to guide reflection.

To find inspiration, discuss with colleagues how to answer their inquiry questions and identify which types of data are needed. The Agile Edu learning stories can also help (e.g., wearable technologies or wellbeing) as they show how other educators have approached their inquiry.

What school leaders can do

For school leaders interested in analysing data to support school improvement, the starting point should not be to look at what data is available, but at what problems and questions they have, what they are curious about.

Discussions with the school board or teachers about the school’s challenges. It is important to create a shared understanding of the school’s needs and formulate common goals:

- What actions can be taken to address the challenges of the school and what data are needed to evaluate the results of these actions?
- What indicators can be monitored to understand key aspects that are important for improving the school’s practices?

The school leadership and teachers can discuss improvement goals. They can look at existing data and how they can use that to understand their starting point and think about what they can do to improve the situation. They can then think about new data to evaluate the impact of actions they will take and how to collect it.

3 Hansen, C. J., & Wasson, B. (2016). Teacher inquiry into student learning: The TISL heart model and method for use in teachers’ professional development. *Nordic Journal of Digital Literacy*, 11(1), 24-49.

School leaders can also work with ICT administrators and a team of teachers to consider all data points collected and see if some can be dropped to save time and resources. Then they can discuss how they can limit future 'just in case' forms of data collection.

Include data literacy in professional development and learning communities

Discussions in the expert validation workshops and dialogue labs indicated that *data literacy* is not formally addressed in many teacher education and professional development programmes. Teachers can benefit from a peer learning and mentoring system for helping teachers with low data literacy skills, supported by teachers with more advanced skills. This is in line with the research conducted on data teams in schools (discussed in a separate section below). Research also suggests that teacher collaboration and school leader support leads to more appropriate data use in learning communities⁴.

Teachers need a diverse range of skills and knowledge to self-reflect and improve the data they examine⁵. As mentioned above, a common challenge for teachers is how to formulate a problem that they can investigate by collecting data. This requires the ability to define challenges in a measurable way and formulate possible outcomes. Furthermore, education data takes many forms, even more with the rise of artificial intelligence-based tools. Some data sources are traditional, analogue, such as classroom observations and grades, while others are increasingly digital. Meaningful use of digital tools for collecting data requires not only good data analysis and

What is data literacy?

Agile Edu adopts a definition of data literacy adapted from Mandinach & Gummer (2015) to refer to the role of both teachers and school leaders, and includes knowledge of practices to keep student data private:

Data literacy is the ability to transform information into actionable instructional knowledge and practices by collecting, analysing, interpreting and communicating all types of data (assessment, school climate, behavioural, snapshot, longitudinal, moment-to-moment, and so on) to help determine steps to improve classroom or school-level practices. It combines an understanding of data quality (e.g., validity) and data privacy practices, curricular and pedagogical content knowledge, and an understanding of how children learn.

interpretation skills but also digital literacy, knowledge of data privacy related safeguards (e.g., see [a GDPR guide by UNESCO for educators](#) and [page 9 of the Digital Futures for Children report](#), listing relevant articles for children's rights when using AI from the UN Committee on the Rights of the Child) and the ability to critically evaluate the impact of technology. Teachers need skills to evaluate the diverse needs of students of different abilities and backgrounds and to investigate inclusive practices and technologies. Media literacy is also needed in order to validate results communicated through graphs, news articles and reports and understand how data is being used - and misused.

An important issue is to find a balance between using data for accountability and basing practices on evidence gathering and

4 Abrams, L. M., Varier, D., & Mehdi, T. (2021). The intersection of school context and teachers' data use practice: Implications for an integrated approach to capacity building. *Studies in Educational Evaluation*, 69, 100868.

5 Mandinach, E. B., & Gummer, E. S. (2016). What does it mean for teachers to be data literate: Laying out the skills, knowledge, and dispositions. *Teaching and teacher education*, 60, 366-376.

using data for the holistic development of the student, professional learning, and school improvement. Education systems tend to promote teacher data literacy as a way to increase the evidence base of schools' practices. However, this can lead to standardised accountability-based data collection that actually hinders the formative use of data⁶, due to, for example, over-simplified assessments creating more work for teachers⁷.

What teachers can do

Look for online and face-to-face professional development opportunities about data literacy, online resources from EU-funded projects such as the MOOCs developed by Agile Edu or [Learn2Analyze](#). There are also EU-funded projects providing adult education material on data literacy⁸.

Evidence suggests that short-term training sessions on data literacy might be ineffective in adoption of new data practices⁹. It is more effective to take part in longer training programmes. Longer PD programmes (3 to 6 months or longer with multiple cycles of meet-up moments to share experiences) create opportunities to try out ideas in schools and report back to receive ongoing support and supervision.

Teacher beliefs influence whether they are likely to use data to inform practice. They need to think about their beliefs about data use and about learning in general, because they may have preconceptions limiting expectations about students. Look for opportunities to learn more about the inclusive use of education data and consider training focused on inclusive strategies such as co-teaching,

clear expectations, positive reinforcement, student choice, consistent routines, and high expectations with scaffolding.

What school leaders can do

The first step before carrying out any data literacy training in the school should be for the school leadership to establish what education professionals need to know.

Being in a peer community and open to experimentation are significant factors determining whether teachers will adopt new practices. Trainings should always ask teachers to implement small changes in their classrooms immediately after a training session. School leaders can provide space and time for teachers to do this and also to meet regularly to discuss and evaluate new practices.

You could encourage teachers to join national training programmes and then organise deeper, practice-focused in-school training with peer support. You can also support teachers to join training organised by higher education institutions or with the EdTech industry ([example, Sweden](#)).

Public authorities also have a role in ensuring that school leaders have the time, resources and guidance needed to plan and implement teacher training. Make your voice heard when these needs are not being met. Administrative structures should ensure equitable access to infrastructure, long-term funding for professional development and institutional support for data-informed practice in schools. Additionally, you can offer incentives for teachers who participate in training to recognize and motivate professional growth.

Ensure that data literacy training helps

6 Lockton, M., Weddle, H., & Datnow, A. (2020). When data don't drive: Teacher agency in data use efforts in low-performing schools. *School Effectiveness and School Improvement*, 31(2), 243-265.

7 Shepard, L. A. (2017). Formative assessment: Caveat emptor. In *The future of assessment* (pp. 279-303). Routledge.

8 <https://dalicitizens.eu/> and <https://www.datareisen.no/en>

9 Koh, K. H. (2011). Improving teachers' assessment literacy through professional development. *Teaching Education* (Columbia, S.C.), 22(3), 255-276.

teachers support the development of their students in collaboration, social and emotional skills, complex thinking skills and critical data literacy (to understand how their data as citizens are being used by the public sector and private sector, and how these uses can both promote or compromise equity.)

To strengthen equity in digital environments, training should also address inclusive classroom management strategies, such as:

- Co-teaching models that allow for differentiated support.
- Clear expectations to ensure all students understand what is required and how to succeed.
- Positive reinforcement to build motivation and a safe learning atmosphere.
- Student choice
- Consistent routines that create stability and reduce uncertainty.
- High expectations for all learners, coupled with the necessary scaffolding.
- Coexistence agreements developed with students to encourage respect, responsibility, and shared accountability.

Teachers may not see immediate results when trying out unfamiliar practices. Supporting them, possibly through mentoring, is part of the role of the school leader.

Collaborate with students

In the limited time available, it can be easy to overlook what data are pointing out. Therefore, it is important to involve students in looking at data and in decisions, as they affect them directly. Students have a different perspective which can inspire new ideas. Teachers could design project-based learning (PBL) about the generation and analysis of data, developing problem-solving and data literacy skills, building dialogue with students, improving the classroom climate and students' wellbeing.

A PBL approach to data collection can work especially in contexts of low academic performance or social vulnerability. It can increase motivation, group cohesion, and self-confidence, while reducing teachers' feelings of isolation.

What teachers can do

Research¹⁰ suggests two ways of involving students in data-informed decision making in schools:

- Engaging students in data collection and analysis. For example, in one school eighth grade students evaluated the teacher on the promptness of homework feedback, responsiveness to students' inquiries and evaluated the general school climate and instruction methods.
- Engaging students in discussions about the implications of data. For example, in one school math teachers asked students to analyse their own assessment scores, to identify strengths and weaknesses, the curriculum areas in which they have progressed and those where they need to work on. They also presented their analysis and progress at meetings with parents.

Both approaches can help students feel more ownership of their learning, especially relevant in contexts of low academic performance or social vulnerability. Working with their own data can help them feel judged on their abilities and progress rather than their shortcomings. This can empower them, raising their ambitions and developing a positive narrative of their educational journey, while at the same time helping them learn statistical concepts that are part of their math curriculum.

Involve students in one or more steps of investigations, brainstorming research questions, and methods, or conduct a focus group or individual interviews to collect

¹⁰ Kennedy, B. L., & Datnow, A. (2011). Student involvement and data-driven decision making: Developing a new typology. *Youth & Society*, 43(4), 1246-1271.

student feedback, ensuring all students have equal opportunities to participate. This includes providing access to resources and materials, such as tablets or other devices, as well as adequate spaces for the activity.

Organise interdisciplinary projects that incorporate both surveys and environmental sensors, enriching learning experiences and contributing to STEM education. For instance, a case study by the Future Classroom Lab in Copenhagen illustrates ways to engage students in data collection and interpretation through the use of robots, circuits and sensors (common evaluation and well-being with small data). These activities were also carried out with a playful learning approach, where students had the freedom to choose how they will carry out their activities. This approach worked well to develop students' data literacy as well as problem-solving skills and help them think out-of-the-box, without concern for being evaluated by the teacher, thus also promoting joy during school hours. These learning stories illustrate how teachers can enhance the quality of the everyday learning environment in the classroom by jointly implementing experiments that involve students in collecting/producing small data about the learning environment. It is a valuable data literacy development opportunity for students to focus on small data instead of topics of big data, because it is more meaningful to them, relating to their immediate physical and psychological environment. carried out with a playful learning¹¹ approach where young children could choose how to carry out activities. This approach developed data literacy as well as problem-solving skills and helped them think differently, without worrying about being judged by the teacher. These learning stories

illustrate how teachers can enhance the quality of the everyday learning environment through experiments that involve students in collecting small data. It is a valuable data literacy development opportunity for students to focus on such small data rather than topics about big data, because it is more meaningful to them, relating to their immediate physical and psychological environment.

Organise activities to develop critical data literacy and technological empowerment. Such activities make students responsible for data collection and analysis and for evaluating the quality and validity of the data collected (e.g., if they are using a noise level sensor, what does a loud classroom indicate? Excitement? How well does this method capture real excitement?). These activities can foster creativity and collaboration, guiding students to explore data critically and constructively while connecting findings to their academic performance.

Student data collection projects can take time. Therefore, you should plan for enough time for the task, allowing students to immerse themselves in producing and analysing data about their learning environment and wellbeing. If a technological tool or platform is introduced, it should also involve teaching students how to use them autonomously; discussions with students in the Dialogue Labs indicated that they need more time and support to learn using the digital tools required in their lessons.

What school leaders can do

Begin by asking students about their views on general school policies, in fact, starting from data-informed decisions at school level. They can ask what students think about using EdTech.

11 Playful learning is a process of creative experimentation without constraints or expectations set for the outcome, in which learners often use objects and spaces that are unconventional for education to create and build in collaboration with other learners and can engage in make-believe or other forms of play with them. Use of physical material, free choice, exploration, physical movement, social interaction, and outdoor learning are central to playful learning. For more information, you can read the EUN Perspective Paper on playful learning.

This form of feedback/data collection can be democratising, helping students be more involved in school life.

For school-wide decisions, consult regularly with a panel of students and jointly plan how to collect the views of students in the school in general, such as conducting a survey about a smartphone use policy in school, or decisions about extracurricular activities, the timetable and school catering. Regarding the benefits for the school as a whole, students would be given more voice and their sense of belonging to the school can be nurtured. Students can also have a different perspective when interpreting the results of an investigation in the school, providing creative ideas. For instance, in [a project by the Future Classroom Lab in Copenhagen](#), students were asked to conduct a survey about mobile phone use in the school. They also did an experiential study, where they spent some time in school without mobile phones. They presented their findings and recommendations to the school and parents. Although their findings led to the decision that students will keep their mobile phones in school, the research helped understand that they used their phones for many purposes, e.g., for socialising and paying for food. In short, their decision was better-informed, and students were happy that their voice mattered.

If teachers are to develop data-collection projects, school leaders should ensure equitable participation for all students: it is essential to explore strategies that support students without access to technology outside school (a device loan plan or spaces made available) or who need additional classroom support to participate fully. Anticipating these barriers and designing inclusive solutions (adaptation of the learning space and proficiency level or group work) will ensure that all students can benefit from these innovative, student-centred approaches.

Open-ended activities can make some students less comfortable to actively participate, while they can offer more means of engagement to others. Therefore, if teachers are to implement playful, open-ended activities to collect data with students, then they need inclusive classroom management skills. School leaders can support teachers in acquiring these skills. First of all, teachers should be able to support students in brainstorming for solutions and using technologies for data collection and analysis. Technology is not the only means for data collection, but they offer many possibilities: online survey tools, digital diaries, environmental and biometric sensors, etc. Teachers need to experiment with playful approaches, to feel comfortable with having less control over students' activities. Playfulness thrives with open-ended tasks, where there are no right and wrong answers, and where the teacher together with the students are curious to investigate phenomena around good school life, digitisation, and data collection. Encourage teachers to experiment with such open-ended approaches, starting with pilot projects that allow them to explore and adapt practices to their context, and then move forward with implementation in a progressive manner. Although this approach may raise concerns among teachers about potential disruption, evidence shows that student-centred learning combined with clear, consistent high expectations significantly improves motivation and reduces disruption in the classroom.

Organise PD opportunities where teachers can learn to foster curiosity in themselves and their students, and learn to design activities that combine playful approaches, data collection, and data literacy for students. These training opportunities should include reflection on potential biases like assuming that all students have the same digital skills, level of motivation or access to resources when introducing this type of activity.

Any data collection activity with students, regardless of being playful or project-based, requires a flexible schedule, where teachers and students can immerse themselves in various steps of inquiry over a continuous period. School leaders can find ways to accommodate time for such activities in the weekly timetable, e.g., combining it with other activities such as interdisciplinary projects, or implementing it as an extracurricular activity club. In addition, school leaders can set aside specific time for teacher training so that they feel prepared to guide these processes. Encouraging collaboration between departments or other schools in the region can facilitate planning and prevent teachers from feeling alone or overwhelmed by additional responsibilities. Interdisciplinary approaches not only lighten the load but also enrich the project by integrating different perspectives and connecting learning across subjects.

Analyse group data to identify trends and patterns instead of individual performance

Education data can be analysed and interpreted in many ways and at many levels, from individual to national level to inform decisions about school improvement. However, both the [learning stories](#) and discussions in the Dialogue Labs in the project indicated that education data is more often analysed at the individual, student level. This is also in line with case studies in the research literature showing that student data is typically used for getting to know students better and improving teacher-student dialogue¹². For example, students with special education needs can be better supported if their data is well organised and

accessible by all their teachers, as illustrated by the learning story of the Killorglin School in Ireland.

Teachers also typically use individual data (e.g., grades, observed performance of effort in the classroom) for making high-stake decisions such as deciding to which school track to allocate each student¹³. The case study on adaptive learning technologies suggest that teachers could also discuss with their students about their learning curve on the digital tool's dashboard, both as a self-regulated learning practice for the student and a way to strengthen the dialogue between teacher and student. Therefore, analysing the data of a single student have many benefits. However, this leaves out other beneficial approaches.

If teachers aggregate the data they collect from their students, they can analyse it to identify trends over time and reflect on what kind of teaching material works better. In other words, the subject/unit of inquiry is not the student but the method, process, or material. For instance, did students retain more vocabulary this semester when the teacher asked students to find videos of conversations in English, compared to using teacher-provided videos last semester?

Furthermore, group data can inform teachers about the quality of their assessment. In the busy schedule of teaching, teachers might have little time to consider the quality of their questions and tasks. Are their exams and quizzes difficult enough to measure student achievement? Are their questions clear enough for all kinds of students, or are they working more reliably with a specific type of student group?

What teachers can do

Identify trends across time (e.g., days, weeks,

12 Selwyn, N., Pangrazio, L., & Cumbo, B. (2022). Knowing the (datafied) student: The production of the student subject through school data. *British Journal of Educational Studies*, 70(3), 345-361.

13 Vanlommel, K., & Schildkamp, K. (2019). How do teachers make sense of data in the context of high-stakes decision making?. *American educational research journal*, 56(3), 792-821.

semesters), groups (e.g., classrooms, cohorts, across schools), and learning conditions (e.g., blended, online or in classroom) taking their teaching activities as the unit of their inquiry. Inspect aggregated data and see if it provides ideas to improve the assessment quality of questions or the quality of teaching and learning activities.

Investigate whether the instructions are clear for all students in assessment questions or surveys. In mixed-ability classrooms, AI tools can help with adapting the format of questions to students with special education needs. For some students, it might also be easier to hand in answers in a different format, e.g., in voice recording instead of in written. Students can also do zero-stake practice tests that can help them adapt to take tests that will be considered for assessment. This will ensure that the actual test will be fairer for disadvantaged students and give more reliable information about student learning to the teacher.

Not everything should be datafied and not everything should be analysed at group level. Teachers need to handle students' feedback about issues of confidence or motivation with conversations with the students directly. Individual data can also help teachers watch out for the wellbeing of their students. A clear example is the learning story of a teacher in Greece. She used digital trace data and timestamps to observe changes in behaviour. She discovered, for example, that some shy students were more engaged in online than face-to-face discussions and discovered that some lacked access to devices or had to share a computer with family members, and some felt overwhelmed by the workload, taking time away from sleeping. This allowed her to reflect on her teaching practices and foster more inclusive student participation.

What school leaders can do

School leaders can support such activities by

reserving time in teachers' schedules enabling them to meet together and discuss data collected, its implications and possible actions to take. Investigate what kind of education technologies can aggregate, analyse, and visualise data. This can be a challenge because most EdTech tools have features that monitor individual student progress and predict future performance. Data mining platforms and business intelligence applications can also help schools manage and visualise data. Since data analysis can be time consuming for schools, they could seek partnerships with local universities and meetings where researchers present insights from education research and school staff discuss implications for their school.

Keep student data private

Although EdTech products should be GDPR compliant, the complexity of the data ecosystem creates uncertainties regarding where student data is stored and how it is used. For instance, a Europe-based product may rely on cloud-storage based outside Europe or use other third-party tools that do not adhere to the GDPR.

For classroom activities such as quizzes or creating media, many digital tools allow use without creating a student account. For one-time data collection, teachers can even consider using email addresses with pseudonyms that do not contain student data (if national legislation allows such practices). However, a student account is necessary for long-term data collection and monitoring which requires careful consideration of the impact on privacy.

What can teachers do

When using free tools that require student login, check the privacy policy, and make sure that students' personal data is not used by the platform or transferred to third parties. Paid versions of tools are more likely

to offer possibilities to keep student data private or even keep it within the school, for instance, as is the case in some agreements between schools and EdTech providers in the Netherlands.

Teachers can design activities that raise students' awareness of their digital footprint and anonymise data they provide on digital platforms and generative AI tools. In some schools, closed generative AI environments enable students to use prompts without worrying about their personal data, for instance, as explained in the learning story about the municipality of Oslo's chatbot for schools. Another example is the chatbot called SkoleGPT from Copenhagen, which is currently open to use and can be tried by teachers from other countries.

Finally, it should be noted that when using pseudonyms to maintain student privacy, it might become difficult to link multiple data points about the same individual (e.g., when comparing data collected at the beginning and end of an activity or project). Therefore, teachers should carefully plan the data identification process to avoid errors in data collection and monitoring.

What school leaders can do

Schools could consider using open-source software instead of free versions of paid software, if the school has the means, such as setting up small servers and installing these tools. In some countries open-source platforms developed in-house are now provided by the state. Some can also be open to use by other countries, such as the personal learning environment and learning management system called e-Me in Greece, which grants open access thanks to the EU Horizon 2020

programme.

When procuring digital products, school leaders can contact other schools to draw up collective purchase agreements to increase their negotiation power and reduce costs and to obtain data agreements that minimise commercial exploitation of student data. Such joint purchase agreements are already common practice in the Netherlands, as explained in a learning story about the non-profit organisation SIVON. Data processing agreements can be a heavy administrative burden for schools on their own and this could be remedied by collaboration between schools and school networks.

In addition, school leaders should be aware of data being compiled (even if it is not acted upon yet), such as information about families' country of origin, and ensure it is used in a responsible, safe, and non-discriminatory way.

Establish a data team in the school

Data-informed decision making is time consuming and complex for one person. Moreover, data may lack objectivity¹⁴ as it is collected, cleaned, and interpreted by humans. When interpreting data, each person can have a different opinion. Even with numerical data, a rating of 6 out of 10 can appear as fair to one person¹⁵, and not good enough to another. Therefore, data use can succeed better if it is led by a 'data team,' an approach developed by Schildkamp, Handeltzalts and Poortman (2012)¹⁶. Data teams are defined as a form of professional learning community consisting of teachers and school leaders who formulate inquiries, collect, analyse, and interpret data collaboratively. Data teams follow a structured

14 Pangrazio, L., & Selwyn, N. (2023). *Critical data literacies: rethinking data and everyday life*. MIT Press.

15 Mentioned by Kim Schildkamp, '[Leading data use in schools' webinar](#)

16 Schildkamp, K., Handeltzalts, A., & Poortman, C. L. (2012). Sustainability of data teams for school improvement. In annual meeting of the American Education Research Association. Retrieved from the AERA Online Repository <http://www.aera.net/repository>.

eight-step procedure outlined in Figure 1.

Discussions with educators in the Dialogue Labs highlighted the importance of the data coach role. In most cases, when schools set goals related to data or digital proficiency, teachers rely solely on peer support. Moreover, educators consistently emphasised the need for a role such as a digital mentor when introducing new technological tools. To successfully develop a digital strategy and build digital skills across the entire teaching staff, school leaders can establish an expert teacher position to support teachers. This role should focus on the pedagogical impact of data-informed technologies, while also serving as a reliable point of contact for teachers facing challenges or questions.

An example of the implementation of a technological tool without adequate support was the introduction of digital whiteboards in Madrid. During the Dialogue Labs, several teachers said they had not been provided with sufficient training to explore the didactic possibilities of digital whiteboards and to incorporate them into regular classes with the aim of improving teaching and learning. Nor was there an officially designated person in each school to guide them in using this new tool. Instead, the responsibility fell on informal teacher support networks, where colleagues were expected to help one another, further increasing teachers' already considerable burden. These cases highlight the importance of creating a formal role, whether as mentor or peer support ('buddy'), to help teachers not only on technical aspects but also on the pedagogical integration of digital tools.

What can teachers do

Research on data teams shows that discussions around data in school should be iterative, with cycles of feedback, planning and monitoring new actions. Data from a single teacher

can stimulate fruitful discussions for other teachers. Therefore, not all teachers need to continuously collect data. An inquiry can be carried out by one teacher supervised and supported by the rest of the data team in developing data collection instruments (interview questions, observation sheets, etc.), collecting data (e.g., collecting survey data from students of other teachers) and interpretation. If one teacher performs a systematic inquiry into a new learning activity they implemented, they can share their results with colleagues.

Data management creates extra workload and requires technical and statistical skills. As a result, only a small number of school staff might actually end up handling data. However, all teachers can learn from data, whether from a single teacher and classroom or from whole-school datasets about student achievement, opinions, motivation, or engagement.

What can school leaders do

As it is often difficult to analyse data, the data team and the Theory of Action framework¹⁷ can provide a solution. Data teams could be established by a school leader comprising school leadership, teachers of different subjects and specialisms, and education professionals. Research offers some success factors, notably, a supportive school leader; setting a common, clear purpose, involving external colleagues from the beginning (e.g., other teachers and staff in school); technical support by a person acting as data coach; the quality and validity of data (e.g., minimal missing values, access to students' education history), and to focus on one problem at a time.

17 Schildkamp, K., Poortman, C. L., & Handelzalts, A. (2016). Data teams for school improvement. *School effectiveness and school improvement*, 27(2), 228-254.

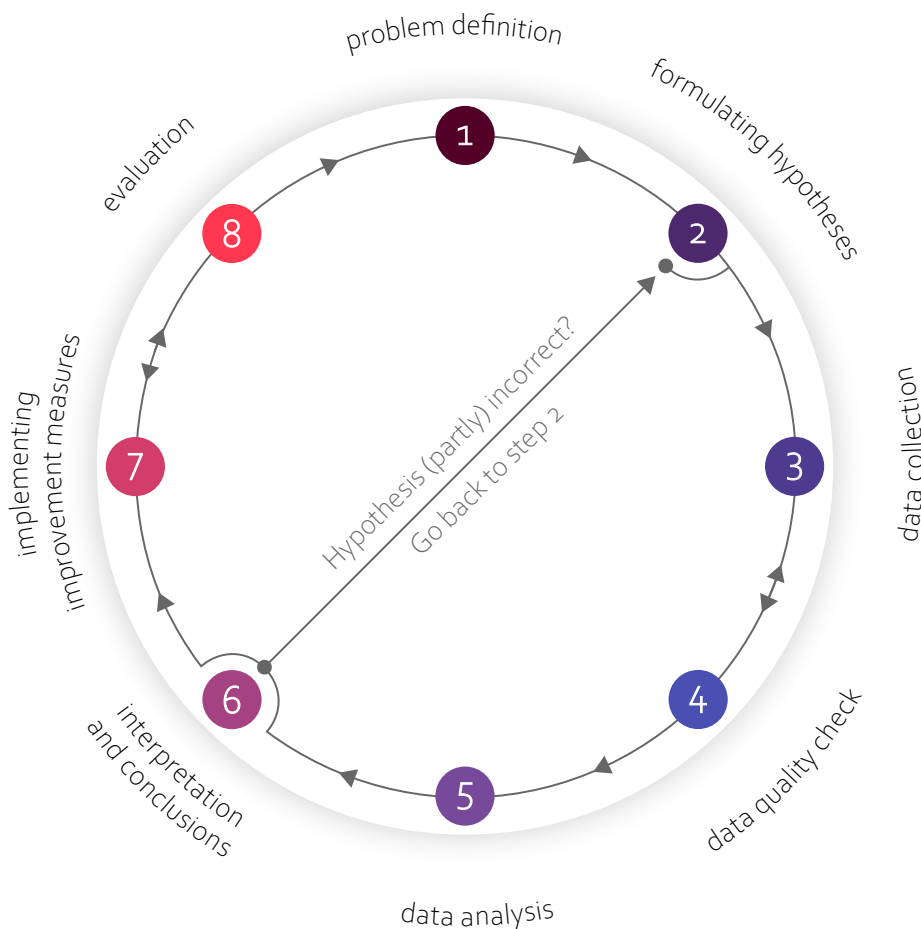


Figure 2. The eight-step data team procedure. Figure adapted from Schildkamp & Ehren, 2013¹⁸

Develop a school data strategy

Since the COVID-19 pandemic, countries have increasingly updated national digital strategies and/or required schools to develop their own, self-assessing their digital maturity. However, these strategies tend to focus on digital infrastructure, and digital skills in general such as professional development for teacher and student digital competencies, digital citizenship, and assessment methods. To implement data-informed professional development, schools need to plan and establish a range of supportive conditions. The starting point is to produce a data strategy co-

developed with teachers that addresses data use in all its contexts.

What teachers can do

Initiate discussions with school leaders on how to create a school data use strategy that includes a professional development plan. Involve teachers already using data analytics in their own teaching in training activities. Discussions with educators in Dialogue Labs revealed that mathematics teachers are more likely to use data analytics spontaneously because they understand statistics and may be more open than others to trying out such practices.

¹⁸ Schildkamp, K., & Ehren, M. (2013). From "intuition"-to "data"-based decision making in Dutch secondary schools?. *Data-based decision making in education: Challenges and opportunities*, 49-67.

What school leaders can do

School leaders can include data analytics in the school's digital action plan, develop the data literacy of the school staff, identify indicators and data collection tools, and examples of decisions that could be informed by data analytics.

They could use models such as the Theory of Change, as explained in the [Agile Edu MOOC](#), to reflect on the school data strategy. They can incentivize teachers who are innovative and already using data analytics to organise trainings and informal discussions around data within the school. School leaders can also encourage annual self-assessment of digital competencies and focus on the data analytics areas, e.g., in the SELFIE self-assessment, consider areas of "Assessment" and "Facilitating Learners' Digital Competence," under which analysing evidence and data literacy practices are identified.

Empower students to think about their learning

Data use is often considered to be a teachers' activity more than students. In principle, formative assessment or longer-term teacher inquiry relate to teachers' use of learning data as information to make decisions that will improve their teaching. EdTech tools are also often designed with a similar approach. Learning management systems and adaptive learning technologies provide learning data visualisations, but they are usually intended for teachers.

However, students can benefit from looking at their own data. If carefully planned and differentiated according to age and the characteristics and capabilities of the individual, data analysis can be a metacognitive exercise, in which they analyse patterns, how they improve over time and understand how

they learn best. In this way they can become better at setting learning goals for themselves and be more motivated because they feel more ownership of their learning. Looking at data with teachers can also build teacher-student relationships.

Discussions with students in the Dialogue Labs showed that they are interested in learning to interpret their own data as it can be useful for organising their learning. However, teachers must consider which data can be accessible by students. For instance, if not anonymised, a student's data can be used by their classmates for grade comparisons or making judgements about academic performance. Grade comparisons and incorrect conclusions about data can have a negative impact on students' well-being. Therefore, teachers should share whole class data only with a clear goal in mind, such as working together to solve a collective problem. Even when looking at anonymous data, teachers should also discuss how their students interpret classroom-wide data and check whether students made wrong conclusions.

Furthermore, students need self-regulation skills to make the most of data-driven education technologies such as adaptive learning tools. Some tools are intended for individual, self-paced learning, adapting to student needs and personalising learning paths. Some digital solutions incorporate features that encourage students to self-regulate learning. A learning story about self-regulated learning in EdTech investigates two examples: one is a learning management system that offers teachers features like creating pre-defined prompts and checklists for students to self-regulate learning. The other is an add-on for adaptive learning technologies, presenting visualisations to students and prompting them to inspect and interpret their

progress¹⁹ ²⁰.

If students can reflect on and learn from their own data, this can help them develop self-regulation skills. In addition, it can be a valuable method to empower students with learning difficulties or those who have experienced failure at school. Working with their own data can direct the focus on their abilities and progress rather than shortcomings. This can motivate and empower them to change and develop a positive attitude to their educational journey.

Nevertheless, teachers should not rely solely on student-facing data; it should only be used as an additional way for the student to think about their own data and learn to read data graphs in general. Otherwise, it can create performative pressures on students. Furthermore, such digital tools still rely heavily on individual behaviouristic learning models. While high performing students may feel comfortable with such tools, they may unintentionally disadvantage those who need a different structure or encouragement. Without teacher scaffolding, autonomy risks becoming isolating for the least confident students.

What teachers can do

Support students' development of self-regulated learning skills. This includes practising strategies such as formulating learning objectives, clearly defining instructions for each step and reflecting on what students need to make progress in their tasks. Rubrics can offer SRL practice, especially if in diverse forms: weighted rubrics, for example, have different scores or weighting for each criterion, and assessment modes that vary according to the criterion (e.g., individual peer assessment, group peer assessment,

teacher assessment, self-assessment). You can also assign multimodal tasks based on quizzes, e.g., concept maps, digital storytelling) to build self-regulation skills gradually.

Discussions with students during Dialogue Labs emphasised the importance of continuous guidance from the teacher when analysing data. This means that teachers must be prepared to dedicate time to accompany students through this process, helping them interpret the information correctly and make informed decisions about their learning. Teachers remain central in SRL as problem-solvers and guides, addressing potential blind spots such as emotional factors or reading comprehension issues that algorithms might well miss or misinterpret.

Make time to sit down with students to view data and discuss its implications, how learning (or other objectives such as social and emotional development) is going and how it could be improved. Students can develop their self-reflection and self-regulation skills thanks to activities that ask them to monitor their own learning before setting learning goals.

Students can get a better understanding of their learning by discussing the meaning of their learning data with teachers. Especially at younger ages, this can help them cope with disappointing grades by acknowledging that it only represents one aspect of their learning and personal development.

What school leaders can do

When buying digital products for the school, consider those that can present detailed student-facing results (possibly in dashboard format) and features that support self-regulated learning.

19 Molenaar, I., Horvers, A., Dijkstra, R., & Baker, R. S. (2020). Personalized visualizations to promote young learners' SRL: The learning path app. In *Proceedings of the tenth international conference on learning analytics & knowledge* (pp. 330-339).

20 Molenaar, I., de Mooij, S., Azevedo, R., Bannert, M., Järvelä, S., & Gašević, D. (2023). Measuring self-regulated learning and the role of AI: Five years of research using multimodal multichannel data. *Computers in Human Behavior*, 139, 107540.

Develop students' critical data literacy skills

More than ever, daily life functions with data, and will increasingly do so, with the growing influence of big data and artificial intelligence. Young people therefore need to learn how their data is used, not only helpfully, but also how it can be misused and be misleading.

The concept of 'critical data literacy' has emerged. It combines the knowledge to use data for learning with the knowledge of the implications of data in students' daily lives. Everyday life is governed by data, and its use is pervasive, e.g., managing national lotteries and traffic lights, allocating financial support to disadvantaged families, and personalising content in social media. Students need the skills to understand how data revolves around them, and that their learning data is part of it. This skill is called critical data literacy, defined as 'the ability to critically engage with datafication by reflecting on the societal implications of data processing and implementing this understanding in practice'²¹
²².

Critical data literacy includes understanding the commercial exploitation of student data and the inequalities that can be generated through data exploitation by EdTech and online services used by students in their daily life.

What teachers can do

You can design activities to foster students' critical data literacy such as these:

- Comparing digital and non-digitally collected data. The translation (i.e. reduction, simplification) of student learning into digital data can be a learning opportunity. For instance, digital education platforms typically provide insights about student engagement (online activity, forum interactions, log data, etc.) or proficiency levels as measured by exercises. This leaves out engagement outside the platform and student performance observed by the teacher or classmates²³. This provides a discussion point regarding inclusion, because students who are shy or have learning difficulties can be more engaged in specific contexts (e.g., on online learning platforms at home, or during classroom discussions) (see a [learning story about data analytics](#)). Inequalities can also stem from differences in digital competences among students.
- Data treasure hunts. Students can take a small set of data in a bigger dataset and discuss what questions they can answer with it and those they can't (see a [case study on small data in schools](#)).
- Data for social actions and policy, as well as business decisions. Data literacy projects can show how business decisions are made about community loans for example. Existing examples can raise awareness of data use and provide inspiration for aligning critical data literacy topics with the school curriculum²⁴ ²⁵.
- Data and me. Students can learn how data affects them, and about promoting

21 Brand, J., & Sander, I. (2020) Critical data literacy tools for advancing data justice: A guidebook. Data Justice Lab. Retrieved from <https://datajusticelab.org/wp-content/uploads/2020/06/djl-data-literacy-guidebook.pdf>

22 Sander, I. (2020). What is critical big data literacy and how can it be implemented?. *Internet Policy Review*, 9(2), 1-22.

23 Jarke, J., & Macgilchrist, F. (2021). Dashboard stories: How narratives told by predictive analytics reconfigure roles, risk and sociality in education. *Big data & society*, 8(1), 205395172111025561.

24 Dangol, A., & Dasgupta, S. (2023, June). Constructionist approaches to critical data literacy: A review. In Proceedings of the 22nd Annual ACM Interaction Design and Children Conference (pp. 112-123).

25 Macgilchrist, F., Hartong, S., & Jornitz, S. (2023). Algorithmische Datafizierung und Schule: kritische Ansätze in einem wachsenden Forschungsfeld. In *Bildung für eine digitale Zukunft* (pp. 317-338). Wiesbaden: Springer Fachmedien Wiesbaden.

inclusion, democracy, and diversity²⁶. For instance, students can work with data collected in their community, e.g., a project about how lottery money is gathered and distributed; a project in which students can look at statistics of car accidents, consider which street corners have more accidents and observe that there are fewer traffic lights in disadvantaged parts of the city. Such activities would give them a critical data understanding.

What school leaders can do

Consider including healthy digital habits and digital responsibility in a school-wide digital strategy to promote critical data literacy. The school's digital strategy could include critical data literacy issues raised when using new digital tools. One way to do this is by including a formal statement, such as this, that sets out the school's stance with regard to AI:

- AI technologies such as ChatGPT are becoming part of everyday life at home and at school, alongside spell-checkers, translation tools, and calculators.
- Rather than banning AI (even if it could be), we emphasise the importance of using it ethically and in line with academic integrity principles.
- Any AI-generated content, even partially, must be clearly credited in the text and included in the bibliography.
- AI tools pose both challenges and opportunities, and they should be leveraged to enhance critical thinking and creative problem-solving.

Reflect on how data-driven EdTech shapes education practices

Collecting data takes time and often requires using digital tools to facilitate it. EdTech products are increasingly able to use student data to automatically personalise learning and help teachers modify teaching by analysing student activity.

Data-driven education technologies can promote equity and improve education practices through, for example:

- Faster and detailed evaluation. Digital tools enable faster and more detailed tracking of student progress, enabling better and earlier detection of learning issues such as dyscalculia or dyslexia and design interventions to help students.
- Communication with families and students. Digital tools make it possible to inform families about their children's progress, and students about their learning, which can promote more engagement.
- Data analysis for decision-making. Digital tools can enable the relationship between achievement in school and socio-economic background to be investigated, providing an indication of the equity of the education system and helping in planning supportive actions.

However, education technologies can have unintended or undesirable effects, shaping teacher and student behaviour, such as increased screentime, misjudgement of student activity, indirect modes of surveillance and increased pressure on students to perform. This is illustrated in a case study on Study Screen, a tool that monitors students' screen time activity and flags moments of distraction and being off-task²⁷, and a case study by Agile Edu on adaptive learning technologies.

AI raises new questions. Education

²⁶ See also a critical data literacy project, e.g., unblackthebox.org and <https://www.civicsoftechnology.org/curriculum>

²⁷ Pangrazio, L., & Sefton-Green, J. (2023). Digital literacies as a 'soft power' of educational governance. In *World Yearbook of Education 2024* (pp. 196-211). Routledge.

technologies increasingly incorporate AI powered features, such as chatbots and generative AI for lesson planning or assignment assistance. However, these tools pose risks by not being transparent about the underlying algorithms or not practising what they commit to in their regulations. For instance, although an AI tool may tell a student that their conversation is private, the school might still have access to it²⁸, leading to a false sense of trust and privacy in the student while creating a new layer of surveillance.

Therefore, it is important to reflect on the overall impact of a new digital tool, whether its pedagogical value outweighs its cost. Although integration of a digital tool in the school should not be the sole responsibility of teachers, their own digital and data literacy will help in addressing unexpected changes in the classroom. The experience of Spanish teachers who use EdPuzzle shows that meaningful and inclusive learning depends not only on a tool's design but how educators integrate them in their teaching.

What teachers can do

Based on discussions with experts in the Agile Edu, a list of guiding questions in the form of a poster has been produced (below). Use these questions to reflect on the digital tools you are using and evaluate them in collaboration with students, using a checklist and activity example such as the Tektjek (Tech Check, a translated version is available), created by the University College Copenhagen.

When you start collecting data through EdTech tools, focus on those that make collection easier. Selecting some data collection methods rather than others could mean that you avoid using teaching approaches that don't generate easy to process data, even though they might

actually be beneficial to students' learning. Reflect with colleagues about data practices to understand better what is omitted when introducing a new data practice and how it shapes overall teaching and learning. In short, datafication of students should not take precedence over student learning²⁹.

Finally, consider whether data-driven technology impacts specific groups of students differently: students with lower digital skill levels, for example, or those who are less motivated, lack persistence, have learning difficulties, or have a migrant background.

What school leaders can do

When deciding on purchasing a data-driven (or AI-enhanced) education technology, use the same guiding questions and discuss options with the data team or an existing professional learning community in the school that discussed teaching and learning.

Include strategies to avoid possible digital and learning divides that can be introduced by EdTech tools. These strategies may include some of the measures mentioned above, for example, allocating time for teachers to teach students how to use the tools autonomously, not relying solely on technical training provided by EdTech suppliers, organising pedagogical discussions to reflect on experiences with digital technologies; loan schemes to ensure all students have access to devices; investigating the evidence on EdTech tools' benefits, and appointing teachers as digital mentors or ambassadors to support colleagues in understanding and integrating these tools into their teaching practice.

28 See the report on MagicSchool AI and other tools: <https://www.digital-futures-for-children.net/our-work/genai-edtech>

29 Schildkamp, K., Poortman, C. L., & Handelzalts, A. (2016). Data teams for school improvement. *School effectiveness and school improvement*, 27(2), 228-254.

Agile EDU

TEACHER

TO USE OR NOT TO USE A DIGITAL TOOL

EVALUATING DATA-DRIVEN EDUCATION TECHNOLOGIES

- 1. WHAT DOES THE TECHNOLOGY OFFER USING YOUR DATA?**

 - DOES IT SUPPORT CLASSROOM MANAGEMENT?
 - DOES IT ENHANCE STUDENT LEARNING?
 - HOW DOES IT MEASURE ENGAGEMENT, PERFORMANCE, AND COLLABORATION, ETC.?
- 2. WHICH PEDAGOGICAL APPROACHES UNDERPIN THE TECHNOLOGY?**

 - BEHAVIOURISM, COGNITIVISM
 - SELF-REGULATED LEARNING, MASTERY LEARNING
 - CONSTRUCTIONISM, CONNECTIVISM
 - UNIVERSAL DESIGN FOR LEARNING
 - EXPERIENTIAL LEARNING
 - ETC.
- 3. WHAT DOES THE TEACHER TRADE FOR THE BENEFITS?**

 - TIME SPENT ON DASHBOARDS, ASSIGNING TASKS, OR MANUAL DATA ENTRY.
 - HOW WOULD TEACHING CHANGE WITHOUT THIS TECHNOLOGY?
- 4. WHO BENEFITS FROM THE TECHNOLOGY ?**

 - TEACHERS, STUDENTS, PARENTS, EDETECH PROVIDERS AND/OR COMMERCIAL THIRD-PARTIES?
- 5. WHAT DOES THE TECHNOLOGY REQUIRE FROM TEACHERS AND STUDENTS?**

 - SKILLS & TRAINING: HOW MUCH TIME IS NEEDED TO LEARN IT?
 - DATA & INPUT: WHAT KIND OF INFORMATION DOES IT COLLECT?
- 6. WHAT ARE THE UNINTENDED CLASSROOM IMPACTS?**

 - INCREASED COMPETITION AMONG STUDENTS?
 - FEELINGS OF BEING MONITORED?
 - MORE SCREEN TIME FOR STUDENTS/TEACHERS?
 - DISTRACTIONS, LOW MENTAL/PHYSICAL HEALTH?
- 7. DOES THE TECHNOLOGY PROMOTE INCLUSION?**

 - DOES IT SUPPORT DISADVANTAGED STUDENTS?
 - CAN ITS DESIGN OR ALGORITHM CREATE BIASES?
 - COULD IT LEAD TO INEQUALITIES IN LEARNING?
- 8. HOW DOES THE TECHNOLOGY HANDLE STUDENT DATA?**

 - DOES IT COLLECT PERSONAL DATA?
 - IS IT GDPR COMPLIANT?
 - DOES IT HAVE A PRIVACY AGREEMENT WITH SCHOOLS?

SCHOOL LEADER

STUDENT DATA

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Figure 3. Guiding questions to evaluate data-driven EdTech tools

Go beyond performance indicators

Education data can be used for more than student grades and school performance and accountability, but, according to research, which is how most schools see data³⁰.

Average grades, when aggregated, provide a convenient source of information because they allow easy comparison between different groups (e.g., classes, schools) and conditions (e.g., years, cohorts). Some degree of accountability is also useful as a benchmark and in communication with parents, and it can help schools think about investigating causes and remedies and making informed changes. However, this narrow focus comes with challenges and risks:

- Risks for inclusion. Interventions may focus on improving the overall indicators, on students at grade boundaries, at the expense of others who could benefit from support³¹⁻³². Without context, looking only at grades, it could be assumed that all students have equal opportunities. However, schools in disadvantaged areas appear to be performing poorly if only held accountable by grades, although they may have a positive overall impact on disadvantaged students³³. Furthermore, students with behavioural or learning difficulties and those with disadvantaged backgrounds are

reduced to a grade point and they may not get support if this context is not included in schools' performance indicators.

- Bureaucratic procedures. Monitoring performance creates manual, time-consuming work entering, checking, and managing data³⁴, suggesting that monitoring quantitative data is not always as efficient as may be assumed.
- Impact on wellbeing. An emphasis on performance can have an impact on students' (and teachers') physical and mental health, and on the overall school climate. Surveys in Danish schools suggest a decline in the wellbeing of students in recent years³⁵. As this has coincided with increased digitalisation of schooling, educators reconsidered how digital tools should be used³⁶. One point raised in workshops at the University College Copenhagen, for example, is that digital learning platforms focus heavily on test scores and individual numerical data, promoting performativity and competitiveness that put pressure on students. Instead of helping students develop their data literacy using grades and learning dashboards, the Future Classroom Lab in Copenhagen implemented playful learning activities focusing on 'small data' and aggregated, class-wide not individual student data.

30 Selwyn, N. (2016). 'There's so much data': Exploring the realities of data-based school governance. *European Educational Research Journal*, 15(1), 54-68.

31 Grant, L. (2017). Don't Use Professional Judgement, Use the Actual Number: The Production and Performance of Educational Data Practices in an English Secondary School (Doctoral dissertation, University of Bristol).

32 Grant, L. (2022). Reconfiguring education through data: how data practices reconfigure teacher professionalism and curriculum. In: A. Hepp, J. Jarke, L. Kramp (Eds.), *New perspectives in critical data studies: The ambivalences of data power*. Springer.

33 Schneider, J. (2017). *Beyond test scores: A better way to measure school quality*. Harvard University Press.

34 Selwyn, N. (2021). The human labour of school data: Exploring the production of digital data in schools. *Oxford Review of Education*, 47(3), 353-368.

35 Rosendahl Jensen, H. A., Thygesen, L. C., Møller, S. P., Dahl Nielsen, M. B., Ersbøll, A. K., & Ekholm, O. (2022). The Danish Health and Wellbeing Survey: study design, response proportion and respondent characteristics. *Scandinavian Journal of Public Health*, 50(7), 959-967.

36 Görlich, A., Katznelson, N., & Pless, M. (2024). Not well enough: acceleration, performance and psychologization in young people's lives. *Journal of Youth Studies*, 1-15.

- Narrow focus. Grades tend to focus on content knowledge not higher-order skills. Therefore, prioritizing grades, 'teaching to the test,' might undermine activities aiming at skill development. Other important indicators are also neglected, such as the school climate, students' wellbeing, health, active citizenship, sustainability and environmental (e.g., noise pollution, air quality, etc.).
- Focusing on performance promotes performativity and can create pressure for schools to make decisions or take action based on data. However, not all information has to lead to a concrete decision. Rather, when schools reflect on their own practices, they can learn things about their and consider longer-term, holistic interventions.

What teachers can do

Inspired by the [learning story about small data activities](#), shift focus from performance-based learning to group assessments and data discussions, for instance, by asking students to evaluate a lesson or a new initiative in the school. Students can either be involved in planning data collection or interpretation, or both. Such projects can be organised as extracurricular activities, and give voice to students, adding to their sense of belonging.

Gather data other than grades about the school as part of project-based learning activities with students, collected through various instruments, from surveys or diaries to environmental sensors. For instance, a learning story tells about a project conducted by teacher and researcher in Finland, where activity trackers were used to raise awareness about physical and mental wellbeing.

What school leaders can do

Instead of being data-driven and using it

only for accountability, you, as experienced professionals, should ensure that data informs and not dictates their decisions. Encourage open discussions about what can be learned from data concerning the school climate as a whole for example. Data discussions with school staff as well as students should not just be about high-stakes decisions like whether a student should repeat a class year, but also to stimulate collaborative reflection about school-wide practices. While some degree of accountability (e.g., school inspections) can motivate systematic thinking about data use for improvement, if school leadership puts too much emphasis on performance, it can negatively impact the school climate.

Open access to school data has been tested as a way to improve existing processes, if not to challenge them³⁷. If there are regulations that require schools to monitor data for accountability, ensure that it does not lead to non-inclusive, biased data practices.

Develop a plan to regularly collect alternative types of data that can inform the school leadership about the overall quality of life in school. For instance, a regular well-being or school belonging survey can be conducted. Install environmental sensors in different areas of the school, guided by a pre-defined question (e.g., Are there areas in the school that have lower air quality? Are there different times of the day when the air quality outdoors is bad due to car traffic?).

Triangulate

If educators focus on only one type of indicator/measure in data analysis, then they might omit other aspects. Research suggests that teachers often rely on their professional judgement, but less often look for other forms of evidence to rule out alternative explanations³⁸.

37 Selwyn, N., Henderson, M., & Chao, S. H. (2017). The possibilities and limitations of applying 'open data' principles in schools. *Cambridge Journal of Education*, 47(2), 167-187.

38 Vanlommel, K. (2018). Opening the black box of teacher judgement: The interplay of rational and intuitive processes. University of Antwerp.

Day-to-day decisions about teaching usually have few major consequences and need to be made quickly; therefore, a single source of evidence is more to be expected in this context. In high-stakes decisions however, or when it comes to decisions about school-wide practices, it is more important to look for multiple sources of information to make better informed decisions.

What teachers can do

Combining multiple sources of information and evidence can mean collecting both qualitative and quantitative data, and from digital and non-digital sources. For instance, consider the engagement and persistence of a student as evidenced by student reports and classroom observations, as well as their relatively lower grades.

Find a balance between digital and non-digital data collection. Challenge the argument that the only form of valid, actionable data is quantitative, collected automatically. Be systematic with data collection, either by having a predefined set of criteria for classroom observation, or a rubric for assessing students' work, leaving room for non-digital information. EdTech tends to give prominence to individual and numerical data, framing discussions on quantitative data and how student learning can be converted, reductively, to numbers.

What school leaders can do

Lead by example, using both survey feedback and performance data in planning and encouraging teachers to do the same in student-level decisions.

Create a routine of team meetings to discuss student progress using multiple forms of data – test scores, student interviews, parent input, etc. This makes judgements about learning more transparent and nuanced; where teachers can feel supported by their colleagues while avoiding siloes of differing data use practices from teacher to teacher.



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