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Cross-Country Differences in Teachers' Use of Learning Analytics: Insights from Finland, Estonia, and Azerbaijan

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Abstract

This qualitative study examined how K–12 teachers in Finland, Estonia, and Azerbaijan view and use learning analytics (LA). The three cases were selected to represent different levels of school-system digital maturity and institutional support for data use to enable a comparative view of teacher adoption across contrasting contexts. Twelve teachers joined online workshops in which six classroom scenarios were discussed. The findings show that national context shapes both expectations and everyday practice. Estonian and Finnish teachers, working in well-connected schools, described using analytics to adjust lessons and maintain pupil interest. Azerbaijani teachers, working with less reliable digital systems, treated analytics mainly as a way to record scores, detect cheating, and report progress to families. Across all three countries, teachers raised four shared concerns: whether the numbers truly reflect learning, how to read complex dashboards, how to respect student privacy, and how to keep professional judgment central. We suggest that LA will help in teaching only when tools fit local conditions and give educators clear, workable information. The study complements existing cross-national LA research by providing a teacher-centred comparison across three contrasting school systems and highlighting the need for teacher-centred design and continuing professional support.

Notes for Practice

- Previous research indicates that teachers adopt learning analytics (LA) only when dashboards are trustworthy, easy to interpret, and protective of student privacy.
- Our comparison of three national contexts (Finland, Estonia, and Azerbaijan) shows that the scope of any LA project should align with the school system's digital capacity; low-resource settings can begin with modest data uses and expand as infrastructure improves.
- Teachers benefit most from concise visual summaries and concrete examples of classroom action, rather than raw charts that require extra interpretation time.
- Ongoing, hands-on professional development that links data insights directly to daily lesson planning proves more effective than isolated workshops.
- Transparent privacy rules that give teachers control over which student data is shared with parents and school leaders help to build and sustain trust.

Keywords

Learning analytics, teacher perceptions, cross-cultural study, educational technology adoption.

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1. Introduction

Learning analytics (LA) initiatives have often focused on student-facing applications, with comparatively less attention to the crucial role of teachers (Chavan & Mitra, 2022; Viberg & Grönlund, 2021). In the early stages, much of the work in the field centred on analyzing student data to enhance learning outcomes (Tsai, 2022). During this time, instructors were often positioned as implementers of the findings rather than as active contributors to the interpretation and application of analytics (Elias, 2011). More recently, however, there has been increasing recognition of the value of involving teachers in making sense of LA findings and translating them into pedagogical practice. Several studies have called for a shift toward prioritizing teachers' roles in interpreting and applying LA insights (e.g., Banihashem et al., 2022). Verbert and colleagues (2013) highlighted the need for analytics tools that support not only learners but also instructors as end-users. This shows an early awareness of the value of teachers' involvement in bridging data and practice. Ifenthaler and Yau (2020) also noted that without teacher-centric approaches, even the most sophisticated analytics may struggle to inform pedagogical decisions in meaningful ways.

Positioning teachers at the heart of LA is important because they ultimately determine how data is understood and used in context (Sergis & Sampson, 2017). A dashboard or analytic indicator gains meaning only through a teacher's sensemaking process—how they relate the data to their knowledge of students, curriculum, and classroom dynamics (Mejia-Domenzain et al., 2023). Key factors, such as teachers' trust in LA systems, their ability to derive actionable insights, and how useful they perceive the analytics to be, are therefore crucial for meaningful adoption (Mukred et al., 2024; Tzimas & Demetriadis, 2025). Without trust in the data or a clear sense of value in the metrics, they are unlikely to integrate LA into their planning and teaching. Indeed, teachers' sensemaking and professional judgment remain indispensable, as educators must align data insights with the complexity of classroom environments (Campos et al., 2021). As such, the literature suggests that successful LA implementation depends on supporting teachers as informed decision-makers in the analytics loop (Alzahrani et al., 2023; Tsai et al., 2021). In summary, while students remain the ultimate beneficiaries, it is the teachers—as interpreters, facilitators, and change agents—whose engagement with LA will determine whether these tools lead to improved teaching and learning (Ifenthaler & Yau, 2020). A teacher-centred perspective on LA adoption is therefore increasingly seen as essential for bridging the gap between data and pedagogy.

While previous research has examined LA from the technological potential and student outcomes perspectives, it has only recently begun to acknowledge the central role of teachers as active interpreters and agents of change (Li et al., 2025). Existing studies have identified challenges such as limited data literacy, complex interfaces and design, and misalignment with instructional priorities, as well as the everyday experiences of teachers navigating these challenges (AlZoubi & Baran, 2024). This gap in understanding points to an urgent need to reframe LA initiatives to better support educators in translating data into meaningful teaching practices.

To fill this gap, this paper examines how K–12 teachers make sense of and use LA in three national contexts that differ in digital maturity and policy environments: Finland, Estonia, and Azerbaijan. We compare these countries to contrast two digitally mature European school systems (Finland and Estonia) with a context where digital integration and LA adoption are still emerging (Azerbaijan). This comparison allows us to distinguish teacher concerns and practices that appear common across contexts from those that are strongly shaped by local infrastructure and system-level conditions. Accordingly, we address the following research questions:

- RQ1. How do teachers in Finland, Estonia, and Azerbaijan describe the ways they currently use (or would use) LA, and what benefits do they expect for teaching and learning?
- RQ2. What challenges and ethical concerns do teachers report when interpreting and acting on LA, and how do these concerns differ across the three contexts?

By answering these questions, the study extends the geographic and contextual scope of LA research and provides

context-sensitive implications for the design and implementation of teacher-facing analytics tools.

This study contributes to LA research in three ways. First, it expands empirical evidence on teacher-facing LA by providing a comparative, cross-country view that includes a context underrepresented in LA scholarship (Azerbaijan) alongside Finland and Estonia. Second, using scenario-based workshops, it shows teachers' interpretive processes and decision rationales by demonstrating insights into how teachers would act on LA in concrete classroom situations. Third, it synthesizes cross-context implications for the design and implementation of LA by highlighting requirements for usability, interpretability, professional agency, and ethically responsible data use.

2. Literature Review

Existing literature has explored the potential of LA to inform teaching, yet studies often focus more on technological affordances than on the lived realities of educators (AlZoubi & Baran, 2024; Freitas et al., 2024). This section reviews the main barriers that hinder the meaningful adoption of LA by teachers, including issues of data literacy, platform usability, and ethical concerns. It also considers the contextual factors, such as national infrastructure, digital maturity, and cultural norms, that shape adoption across different education systems. Finally, it highlights gaps in current research, particularly the need for comparative and teacher-centred approaches that capture educators' perspectives across diverse settings. Together, these themes frame the rationale for our cross-country investigation.

2.1 Adoption Challenges

The availability of LA tools in educational settings does not automatically translate into their effective use by educators. Moving from mere access to meaningful adoption still poses significant challenges. Research indicates that several barriers can hinder teachers from fully adopting LA in their practice (R. S. Baker, 2019; Wilson et al., 2017).

A primary concern is the difficulty teachers face in interpreting complex data reports and statistical metrics (Karimov et al., 2024). Low data literacy can leave educators feeling overwhelmed or doubtful about how to use LA outputs (Michos et al., 2023). Moreover, skepticism toward the validity of analytics persists (Svaricek, 2024; Tsai et al., 2021). Teachers often express concern that simplistic indicators may ignore important nuances and contextual factors of learning. This type of skepticism has been widely recognized as one of the major barriers to adoption (Buchanan & McPherson, 2019; Kaliisa et al., 2022). For example, in response to the broader trend of educational "datafication," Buchanan and McPherson (2019) note that teachers may become cynical toward new metrics-driven approaches, perceiving them as a threat to professional judgment. This hesitation reflects a broader concern that LA might reduce teaching and learning to "numbers" devoid of context, which can lead some educators to resist or ignore analytics altogether.

Another major challenge is the complexity of LA platforms. Tools that are difficult to navigate, overly technical, or poorly aligned with teachers' workflows or classroom routines are unlikely to be adopted by time-constrained educators. Recent studies have shown that limited usability and ambiguous interfaces act as significant barriers to adoption (Joarder et al., 2023; Tzimas & Demetriadis, 2025). Teachers often report that dashboards with an overload of features or unfamiliar terminology can complicate rather than support their work. Thus, even when schools provide LA tools, if those tools are not designed with teacher-centred usability and simplicity in mind, meaningful use remains low. Simplifying interfaces and providing training in data interpretation are frequently recommended to address this barrier (Tzimas & Demetriadis, 2025). For example, the Learning Analytics and Visual Analytics (LAVA) model proposed by Chatti and colleagues (2020) integrates visual analytics into the LA process by emphasizing a human-centred approach. The model aims to enhance user acceptance and adoption of LA by improving the usability and interpretability of data through visual representations. This highlights the significance of designing LA systems that prioritize user experience to facilitate broader and more meaningful adoption among educators.

The perceived misalignment between what LA tools measure and the pedagogical values or goals that teachers hold is another challenge. Motz and colleagues (2023) argue that if analytics systems highlight outcomes or behaviours that teachers do not find pedagogically meaningful, teachers will understandably hesitate to use them. For instance, an LA tool that focuses on time spent online or number of clicks might conflict with a teacher's holistic view of learning quality. In such cases, educators may feel that the tool conflicts with their professional judgment about what matters in learning. Prior research suggests that LA implementations must be congruent with teachers' instructional approaches and values; otherwise, the analytics will be seen as irrelevant or even intrusive to the teaching process (Motz et al., 2023). Misalignment of this kind often results in low engagement or superficial compliance with analytics initiatives. Research by Tan and Koh (2017) shows the importance of situating LA within pedagogical contexts. They argue that without a clear connection to educational practices, LA is unlikely to yield meaningful insights and may be disregarded by educators.

Ethical issues further complicate LA adoption for teachers (Slade & Prinsloo, 2013). One concern is the perception of surveillance—the feeling that analytics are a means for administrators to monitor classroom behaviour or teacher performance (Selwyn, 2019). When teachers sense that LA could be used punitively or to undermine their autonomy, they are likely to resist using such tools (Proudfoot, 2021). As observed in Proudfoot (2021), the expansion of data monitoring in schools can evoke a

"panopticon" effect by raising teacher anxieties about being constantly watched and judged. In parallel, teachers are concerned about student privacy and the ethics of collecting granular learning data. Recent work also notes that educators have expressed apprehension about losing their professional autonomy if algorithms start dictating instructional decisions (Qazi & Pachler, 2024). As Qazi and Pachler (2024) argue, LA must be positioned as a tool that supports teachers rather than controls them. Without clear ethical safeguards and assurances that data will be used to empower (not evaluate) teachers, adoption will remain lukewarm. In summary, concerns about privacy, surveillance, and loss of teacher agency form a significant hurdle to embracing LA.

Considering all of these challenges, it is evident that merely providing teachers with access to LA tools is not enough. Effective adoption requires addressing teachers' skills and beliefs (data literacy and trust), designing user-centric tools, aligning analytics with educational values, and attending to ethical concerns. The literature suggests that overcoming these barriers demands a concerted effort in professional development, participatory design with teachers, and strong policy guidelines to ensure that LA are seen as meaningful, user-friendly, and ethically appropriate in the eyes of educators.

2.2 The Role of Context: Educational Systems, Digital Maturity, and Cultural Norms

Researchers have increasingly noted that the adoption of LA is heavily context dependent (Gašević et al., 2015; Wise & Vytasek, 2017). Factors at the national, institutional, and cultural levels can shape how and whether teachers engage with LA tools (Márquez et al., 2024). Given the wide variation in educational systems and levels of technological readiness, a one-size-fits-all approach is unlikely to succeed. For instance, national digital infrastructure and policy frameworks play a foundational role in enabling (or constraining) LA implementation (Tsai et al., 2021). In settings where robust educational data systems and supportive policies are in place, teachers are more likely to be exposed to LA initiatives and receive scaffolding guidance on their use. By contrast, in contexts where infrastructure is limited or policies are unclear, LA adoption may struggle to gain traction (Alonzo et al., 2024).

Cross-national comparisons help to illustrate these dynamics. Finland and Estonia are often cited as digitally mature education systems with innovation-friendly environments (European Commission, 2024). These countries have high levels of school technology access, established data practices, and professional cultures that encourage educational experimentation (Erss et al., 2016). Such conditions create fertile ground for teachers to experiment with LA tools as part of their routine practice. It is not coincidental that these contexts also have national initiatives and trainings around data use in education (Digital Watch Observatory, 2023; Education Estonia, 2024). Teachers in Finland and Estonia, operating in supportive digital ecosystems, may have more positive experiences and success stories with LA, which in turn reinforce continued adoption.

In contrast, a country like Azerbaijan represents a very different scenario where infrastructural and institutional limitations pose significant challenges (Karimov et al., 2023). With a developing education system, Azerbaijan faces constraints such as inconsistent internet access, limited edtech infrastructure, and underdeveloped policy support for LA (Chang et al., 2017). These constraints mean that even if teachers are interested in using LA, they may struggle with basic implementation barriers such as insufficient devices, patchy connectivity, or lack of technical support (Aliyev & Aliyeva, 2024). Moreover, educational norms and expectations differ: teachers in some contexts might be less accustomed to data-driven decision-making or might prioritize oral and intuitive knowledge over dashboards and charts (Kaliisa & Dolonen, 2023). Without the macro-level support of a strong digital strategy or an ingrained data culture, individual teachers in such environments carry the burden of innovating largely on their own (Ferguson et al., 2014).

This interplay between macro-level readiness and micro-level practice means that LA adoption must be understood as a socio-technical phenomenon (Gašević et al., 2019). System-wide factors (national information and communication technology (ICT) investments, curriculum mandates, training programs, etc.) set the stage upon which individual teachers operate (Molebatsi, 2015). At the same time, local cultural norms—such as attitudes toward innovation, privacy, or the teacher's role—mediate how analytics tools are perceived in the classroom (Viberg et al., 2023). Prior research suggests that even within ostensibly "ready" or well-resourced systems, school-specific or community norms can influence uptake. For example, a strong collaborative culture among teachers can facilitate peer learning about analytics, whereas a culture of teacher isolation can stifle it. In summary, context matters greatly: the same LA tool may be readily embraced in one environment and ignored in another. Tsai and colleagues (2021) advocate for more context sensitive approaches that account for both the digital maturity of educational systems and local pedagogical values. Comparing experiences across Finland, Estonia, and Azerbaijan illustrates that adoption is not merely an individual choice but is embedded within broader ecosystems in which teachers operate.

2.3 Gaps in Current Research: Comparative and Lived Experience Approaches

While the field of LA has expanded rapidly, there remain gaps in the research landscape concerning teacher adoption, with many studies focusing more on technological potential than on the practical realities teachers face in diverse educational contexts (Gašević et al., 2015). LA research employs a wide range of methods, including large-scale trace/log analyses and surveys, mixed-methods evaluations, and qualitative and human-centred studies that examine how educators interpret and act on analytics (Leitner et al., 2017; Papamitsiou & Economides, 2014). However, a substantial share of empirical work still

draws on single-institution implementations or relatively similar contexts, which can limit insight into teachers' day-to-day sensemaking and the way adoption challenges vary across educational systems.

Comparative research is particularly scarce (Ferguson et al., 2016). Few studies have explicitly examined and contrasted teacher adoption of LA in different countries or educational systems (Hilliger et al., 2024; Nouri et al., 2019; D. K. Evans & Béteille, 2021). However, comparative empirical work that foregrounds K–12 teachers' classroom-level sensemaking and decision-making across clearly contrasting school-system contexts remains less common. As noted above, context plays a significant role in understanding the effectiveness and acceptance of LA tools in different educational contexts, yet our evidence base remains largely drawn from a narrow set of "mature" systems (often universities or well-resourced schools in North America, Europe, or Australasia). Underrepresented regions—including many developing countries and emerging education systems—remain largely absent in mainstream LA research (Prinsloo & Kaliisa, 2022). As a result, we have limited understanding of how teachers in these settings experience LA: What unique challenges or opportunities do they encounter? Do their concerns mirror those reported in the U.S. or EU, or are there entirely different issues at play? The existing literature provides few answers to these questions, which indicates the need for more inclusive and contextually diverse research.

Furthermore, the voices of teachers are sometimes underrepresented even in studies about teachers (Kaliisa & Dolonen, 2023). Many investigations focus on what teachers do with analytics (or how rarely they use them) rather than why that is the case from the teacher's perspective. We have many frameworks and surveys identifying factors influencing adoption, but fewer ethnographic or narrative accounts that let teachers speak in their own words about their hesitations, enthusiasms, and day-to-day realities with LA (Borgnakke, 2019; Jensen et al., 2022). Those voices are critical for understanding adoption barriers that may not be visible through quantitative data alone. For example, a survey might reveal low usage rates, but only qualitative follow-up might uncover the fact that a school's assessment culture or a lack of time for professional development was the underlying issue (Bautista-Godínez et al., 2024; Shibani et al., 2020). In essence, current research could benefit from approaches that treat teachers not just as subjects to be measured but as knowledgeable partners whose insights can inform research and design. Recognizing these limitations, scholars have increasingly called for more diverse and context-rich and participatory approaches to studying teacher adoption of LA (Gašević et al., 2015). Comparative case studies, cross-cultural analyses, and participatory research with teachers are all approaches that can enrich the field's understanding beyond the "average" case in a high-resource and well-developed context (Bartlett & Vavrus, 2017; Davidov et al., 2018). Such approaches can help clarify whether well-documented adoption challenges manifest differently in distinct environments, for example in an Azerbaijani high school versus a Finnish one, and can also surface locally grounded strategies that have not yet been captured in mainstream research. In summary, the literature review shows a need for a more inclusive and qualitative research agenda that captures the complexity of real classrooms and values teacher perspectives as central to understanding adoption.

Building on existing cross-national LA research, this study broadens the evidence base on teacher adoption by focusing on K–12 teachers' scenario-based sensemaking across three contrasting national contexts, including an underrepresented setting (Azerbaijan) alongside Finland and Estonia. Rather than presenting the comparison as a first of its kind, we use it to clarify which adoption challenges appear broadly shared and which are strongly shaped by infrastructural, institutional, and cultural conditions.

By foregrounding teacher agency and the contextual factors that influence perceived value and usability, the study complements prior multi-country work and contributes practical implications for designing and implementing more context sensitive teacher-facing analytics systems that align with teachers' pedagogical practices and professional needs.

3. Methods

This study employed an exploratory qualitative comparative design where teachers' perspectives on LA were gathered in workshops where we presented teachers with one of six scenarios about potential challenges that teachers may encounter while using the LA (see Appendix A). This method, which is common in various fields of educational research (e.g., S. C. Evans et al., 2015; Cranmer & Ulicsak, 2015), was selected because it enables us to present realistic, context-specific examples of LA use in classrooms (e.g., using predictive analytics to identify students at risk of disengagement, or integrating real-time feedback systems to support formative assessment) and to prompt participants—teachers who attended the workshop—to reflect on potential benefits, challenges, and implementation considerations (Kerr et al., 2013; Põldoja et al., 2014). The scenarios served as standardized prompts across the three countries to support analytic comparison; given the small sample and the hypothetical nature of vignettes, cross-country differences are interpreted as indicative patterns rather than representative estimates. By leveraging the diverse experiences of teachers from three different countries, Azerbaijan, Finland, and Estonia, this study is able to compare the views on LA across varied educational contexts.

3.1 Cultural Context

The selection of Finland, Estonia, and Azerbaijan for this study was based on their contrasting educational and socioeconomic contexts, which allow for a comparative analysis of how LA is perceived and integrated across different levels of educational

capacity and digital transformation.

Finland serves as a reference point due to its longstanding success in large-scale educational assessments like PISA (OECD, 2024) and other measures of equity and quality (Honkasilta et al., 2019; Simola, 2005). Finnish schools are characterized by strong teacher autonomy, well-developed digital infrastructure, and advanced pedagogical approaches that reflect a strong emphasis on data-informed decision-making (Morgan, 2014; Saarela, 2017). In particular, the Finnish context includes early investment in digital infrastructure and well-established teacher professional development programs that provide training on data use and the integration of LA into pedagogical strategies (Ilomäki & Lakkala, 2018).

In contrast, Azerbaijan is representative of an education system where digital integration and LA adoption remain at an early stage. Since 2016 the Ministry of Science and Education has run a nationwide "diagnostic assessment" of teachers' knowledge and skills; assessment results determine workload, pay raises, and who is channelled into follow-up training (Ministry of Science and Education of the Republic of Azerbaijan, 2016). Because those follow-up courses are short and rarely address data-driven pedagogy, most teachers still lack practical experience with dashboards or analytics dashboards. With comparatively lower socioeconomic indicators and infrastructure limitations, the case of Azerbaijan provides insight into the challenges and barriers teachers face in adopting data-driven educational tools (Altstadt, 2020).

Estonia represents a high-performing education system that, while differing from Finland in size and historical context, has recently surpassed Finland in some international assessments (OECD, 2024). Its education system experienced rapid changes over the past two decades, with significant advancements in technology and policy (Taagepera, 2018). While Estonia and Azerbaijan had similar educational structures under the Soviet Union, Estonia has since implemented ambitious reforms and became one of the leading digital education systems in the world (Hartwell, 2013). These efforts appear to have paid off—PISA 2022 results show that Estonia now outperforms Finland in all three tested domains: reading (511 vs. 490), mathematics (510 vs. 484), and science (526 vs. 511), making it the top-performing education system in Europe (OECD, 2024), supported by other indicators of educational quality, such as equity and student well-being (European Commission, 2024). The contrasts between these three contexts allow us to explore how different levels of digital infrastructure, policy interventions, socioeconomic growth, and investment in education technology shape teachers' perceptions and experiences with LA. By comparing these three countries, this study provides a cross-contextual understanding of how LA is received and implemented under varying levels of educational advancement and digital readiness.

3.2 Scenario-Based Workshop Approach

Scenario-based workshops are a participatory method that facilitates collaborative exploration of complex topics by engaging participants in discussions around scenarios (Carroll, 2000; Rosson & Carroll, 2002), including the use of LA, in realistic classroom settings (e.g., Dalrymple et al., 2007; Ahmad, 2020). This approach helps teachers visualize how analytics might be used in everyday practice and encourages detailed reflection on benefits and challenges. It also supports participants in considering ethical, pedagogical, and logistical concerns through discussions grounded in specific, relatable examples.

In this paper, we use the term "workshop" to describe a structured, facilitated group session in which teachers collaboratively explored the scenarios, built on one another's experiences, and jointly generated interpretations and recommendations rather than participating in one-to-one interviews. In each country, one online session with four teachers was held, conducted in the participants' native language and following a standardized protocol. The workshop protocol consisted of three parts:

- orientation, where the facilitator introduced the study purpose, clarified what was meant by LA in the study, and reviewed consent and confidentiality;
- scenario discussion rounds, where teachers were presented with the pre-designed classroom scenarios and discussed (a) how they would interpret the analytics information, (b) what actions they would take in the classroom, (c) what practical barriers they anticipate (e.g., time, infrastructure, skills), and (d) what ethical or stakeholder issues may arise (e.g., privacy, fairness, parent communication); and
- wrap-up reflection, where participants summarized key concerns and the kinds of tool features or implementation supports they would need for meaningful classroom use; the emphasis throughout was on interactive discussion and collective sensemaking prompted by the scenarios.

In this study, six scenarios were used to provide teachers with hypothetical, yet realistic, classroom situations where LA tools and methods were integrated into teaching and learning processes. The development of these scenarios was led by two members of the research team with K–12 teaching experience (AK and SM), who sought to reflect typical challenges teachers might face, such as interpreting data dashboards, addressing privacy issues, adapting instruction based on analytics insights, and collaborating with colleagues using shared student data. Their firsthand knowledge of classroom dynamics and instructional challenges allowed them to craft scenarios that closely resembled the realities teachers face when considering the use of LA. Two additional members of the team (MS and HP) then reviewed and confirmed each scenario's clarity, pedagogical relevance, and alignment with the study's objectives. This iterative process helped ensure that the final scenarios were coherent, contextually grounded, and capable of eliciting meaningful discussions during the workshops.

Table 1 summarizes major details of these scenarios, which are also provided in Appendix A for reference and transparency. As the table shows, the scenarios included learning data related to science, mathematics, and language arts instruction. In three scenarios, teachers used analytics provided by the learning system, with varying degrees of success. The three other scenarios included a hypothetical LA toolkit that could be integrated into existing digital learning systems.

Table 1. LA scenarios

Scenario	Learning domain	Analytics scenario
Scenario 1: LA for a virtual DNA simulation	Biology (DNA simulation)	Teacher uses analytics that can pinpoint high/low levels of student engagement.
Scenario 2: Personalized approach to student struggles	Algebra (quadratic equations)	Teacher uses analytics that identify areas of struggle.
Scenario 3: Limited access to student performance data	Language Arts (vocabulary)	Teacher uses analytics that are underpowered and poorly displayed.
Scenario 4: Presenting students' performance through detailed data	Geometry	Analytics are underpowered, but teacher has access to an LA toolkit that can integrate into a game to provide information on mastery, progression, and error patterns.
Scenario 5: LA as a tool to communicate with parents	Chemistry (Reactions & Molecular Structures)	Teacher uses an LA toolkit to improve the nuance of student progress reports to parents.
Scenario 6: Ethical considerations in the adoption of LA	Chemistry	Teacher and principal design guidelines for informed consent, data storage, communication, access, and ongoing review.

After the final agreement on the scenarios, they were translated from English and localized into Azerbaijani, Finnish, and Estonian in close collaboration with the local workshop hosts. This process involved not only a literal translation of the text but also a careful review by national experts (AK, SM, TK, and HP) to ensure that each scenario's context, terminology, and pedagogical nuances were accurately conveyed in the local language. As a result, the scenarios remained both linguistically accessible and culturally relevant with the aim of enhancing the potential for meaningful engagement among the participating teachers in each country. All teachers answered all scenarios.

3.3 Data Collection

Workshops were conducted in the three countries: Azerbaijan (April 2024), Estonia (October 2024), and Finland (March 2024). Each workshop included four teachers and was held online in the participants' native language to facilitate communication and minimize any language barriers. Each workshop lasted between 100 and 120 minutes and followed a standardized agenda based on the agreed-upon workshop protocol. Participants were introduced to pre-designed scenarios, engaged in group discussions about the scenarios, and provided reflections in whole-group settings. All discussions were recorded via Zoom.

Video files were transcribed by authors proficient in the local languages, who removed personal identifiers and assigned a pseudonym to each participant. Each transcript included verbatim text, time stamps, and speaker identifiers to differentiate among participants. After the initial transcription in Azerbaijani, Finnish, or Estonian, research team members fluent in both the original language and English translated the transcripts into English.

3.4 Participants

A total of 12 K–12 teachers participated in the scenario-based workshops (four per country: Azerbaijan, Estonia, and Finland). Teachers were recruited from different schools and regions within each country and included representation from both rural and urban school settings. To protect anonymity in a small-sample cross-country study, we report participant information at an aggregated level. While teachers represented a range of grade levels and subject areas within K–12, we do not report teacher-by-teacher subject/grade profiles in this manuscript because doing so could increase re-identification risk and we did not collect a uniform set of comparable background variables (e.g., prior exposure to LA) across all participants.

Participants in each country were recruited through professional networks, local teacher associations, and referrals from school administrators. The recruitment criteria focused on selecting teachers who had at least a basic level of familiarity with technology-enhanced learning tools (i.e., having used any educational technology at least once). Prior to participation, all teachers received an information sheet explaining the purpose of the study, the voluntary nature of participation, and data protection measures. Informed consent was obtained in alignment with institutional ethics guidelines, and participants' confidentiality and anonymity were assured.

3.5 Data Analysis

We derived a codebook and conducted a thematic analysis to examine teachers' discussions during the scenario-based workshops. The goal was to identify key themes related to how teachers perceive and engage with LA in classroom settings. We used the sentence as the primary coding unit to keep the coding comparable across transcripts. Prior to coding, transcripts were segmented into sentences using a rule-based approach: (a) we split at sentence-ending punctuation; (b) we treated facilitator prompts as separate sentences; (c) we kept short acknowledgements (e.g., "yes," "exactly") as separate units only when they contained a substantive stance; and (d) where automatic punctuation produced run-on statements, coders manually corrected segmentation to reflect a single coherent idea per unit.

3.5.1 Codebook Development and Thematic Analysis

The analysis began with a predefined set of five deductive coding domains aligned with the scenario prompts and prior team discussions: (1) benefits of LA, (2) challenges of LA, (3) recommendations for improvement, (4) equity and control in education, and (5) professional development. After an open-coding pass using these deductive domains, three authors (AK, XL, ZW) independently proposed additional labels that appeared in the data. Through two consensus meetings we merged overlapping ideas, renamed items for clarity, and agreed on 18 refined codes. For readability, Table 2 groups these codes into higher-level thematic domains used for reporting (e.g., use/benefits, challenges, ethics/privacy/equity, teacher role, recommendations, professional development, parental interest); throughout the paper we use "code" to refer to the applied analytic labels and "thematic domain/theme" to refer to higher-level groupings of related codes.

After an open-coding pass with the five umbrella code categories (benefits, challenges, recommendations, equity and control, professional development), three authors (AK, XL, ZW) independently proposed labels that appeared in the data but were not captured by the umbrellas. Through two consensus meetings we merged overlapping ideas, renamed items for clarity, and agreed on 18 refined codes (Table 2). Each refined code was categorized under one of the five umbrellas. To analyze the qualitative data collected from the scenario-based workshops, we employed thematic analysis (Braun & Clarke, 2006). This method allowed us to systematically identify, organize, and interpret patterns of meaning within teachers' discussions. Thematic analysis was chosen for its flexibility in capturing both explicit and latent meanings in the data while allowing for a structured yet exploratory approach to analyzing teachers' perceptions of LA.

The process began with a thorough review of the dataset. AK and SM transcribed and reviewed all workshop discussions to ensure familiarity with the content before coding. This involved

- repeatedly reading the transcripts to identify potential patterns and key points;
- noting initial observations regarding common concerns, opportunities, and ethical dilemmas raised by teachers; and
- cross-referencing the discussions with the workshop scenarios to contextualize responses.

After the familiarization phase, AK and SM manually applied the binary coding to label each sentence for each code. A single sentence could receive multiple codes when it expressed more than one idea (e.g., a perceived benefit and a concern). For frequency reporting, coding was treated as binary per code per sentence (present/absent): if a code applied to a sentence, it was counted once for that sentence regardless of repeated wording. Code counts were then aggregated within each country dataset to produce the descriptive distributions shown in the results table. Percentages reported in Table 3 were calculated within each country. The count for each code was divided by the total number of coded instances in that country's dataset (Finland n = 119; Estonia n = 319; Azerbaijan n = 314), so percentages within each country column sum to 100%. Because a single sentence could receive multiple codes, these denominators refer to coded instances rather than unique sentences. An utterance was assigned 1 if it reflected a specific code and 0 if it did not correspond to any predefined code. AK and SM double-coded all transcripts and achieved substantial agreement (Cohen's $\kappa = 0.82$). Discrepancies were resolved through discussion, with XL acting as arbiter when required.

To strengthen trustworthiness, we used analyst triangulation (double-coding with substantial agreement and discussion-based resolution), scenario triangulation (six scenarios designed to elicit complementary facets of LA use), and cross-case comparison across the three national datasets. At the same time, our data source was limited to workshop discussions; we did not triangulate findings with classroom observations, platform log data, or student artefacts.

Table 2. Final analytic codebook: thematic domains and refined codes (sub-themes).

Thematic domain (reporting level)	Code (refined sub-theme)	Operational definition
Use and Perceived Benefits of LA	Benefits of LA	Any teacher statement about how analytics improve teaching or learning, e.g., faster feedback, earlier identification of at-risk students, richer progress tracking
	Student Engagement & Interaction	Teachers' perceptions that analytics-supported or data-rich activities make students more active, interested, or collaborative
	Interest & Motivation	References to analytics (dashboards, badges, progress bars) increasing learners' intrinsic or extrinsic motivation
	Gamified Platforms	Mentions of game-style systems whose embedded analytics track scores, levels, or challenges to boost engagement
	Platform Utilization	Comments on how frequently, or in what ways, teachers and students use digital platforms that produce analytics data
	Academic Outcomes	Claims that analytics use (or the platform providing it) is linked to higher grades, mastery, or test scores
	Simulations & Application	Examples of virtual labs, simulations, or authentic tasks where analytics capture application of knowledge or skills
Challenges	Challenges of LA	Any generic reference to barriers (technical, pedagogical, organizational) that impede adoption or usefulness of analytics
	Data Accuracy	Concerns that the numbers are incomplete, misleading, or easily "gamed," so they may not reflect true learning
	Cheating & Academic Integrity	Specific worries that analytics reveal or fail to reveal dishonest behaviour (copy-pasting, guessing, screen-switching)
Ethical, Privacy, and Equity Concerns	Ethical & Privacy Concerns	Issues of consent, surveillance, data storage, or security raised when collecting or sharing analytics
	Equity & Control in Education	How analytics might widen or reduce inequities (e.g., unequal device access, data-driven labelling, loss of student agency)
The Role of Teachers	Teacher Experiences & Perceptions	Teachers' personal views, emotions, or anecdotal experiences, including trust, skepticism, and enthusiasm, toward analytics tools
	Insights for Effective Teaching	Cases where analytics help educators spot misconceptions, adjust pacing, or redesign lessons for better learning
	Recommendations for Improvement	Teachers' suggestions for making analytics more actionable (better visualizations, clearer feedback, easier integration)
	Instructional Strategies	Descriptions of concrete pedagogical moves (grouping, scaffolding, re-teaching) made in response to analytics evidence
	Professional Development	Calls for, or experiences with, training, coaching, or peer learning needed to interpret and act on analytics
Parental Interest	Parental Involvement	Any instance where parents request, receive, interpret, or react to analytics about their child, including associated pressures

4. Results

Table 3 presents the distribution of codes across the three country datasets. The code Teacher Experiences and Perceptions appears most frequently, with a total of 87 instances (Finland: 20; Estonia: 35; Azerbaijan: 32). Platform Utilization is mentioned 57 times, with Estonia contributing 30 instances, Finland 8, and Azerbaijan 19. Student Engagement and Interaction occurs 56 times, mostly in Estonia (27) and Azerbaijan (19). Equity and Control in Education appears 29 times, with Azerbaijan contributing 20 instances. Parental Involvement shows 30 instances, with Azerbaijan again contributing the majority (17). Finland shows lower counts for several codes (e.g., 15 instances of Benefits of LA and 12 instances of Challenges of LA). However, given the small, workshop-based sample, these frequencies should be interpreted as descriptive indicators of salience in the discussions, not as evidence that national contexts differ in the broader population; we therefore use Table 3 to orient the reader and substantiate cross-country interpretations through qualitative excerpts and contextual explanation in the sections that follow.

To provide an initial overview of the comparative results, Table 4 synthesizes key patterns in teachers' perspectives across five thematic dimensions. The table contrasts the experiences reported by teachers in digitally mature educational systems (Finland and Estonia) with those in an emerging digital context (Azerbaijan) by showing how local conditions appear to shape the reported uses, benefits, and challenges of LA. The subsequent subsections provide detailed qualitative evidence and contextual explanations to substantiate these summarized patterns.

Table 3. Frequency of codes across country datasets.

Thematic domain (reporting level)	Code	Finland	Estonia	Azerbaijan	Total
Use and Perceived Benefits of LA	Benefits of LA	15 (12.6%)	28 (8.8%)	25 (8.0%)	68
	Student Engagement & Interaction	10 (8.4%)	27 (8.5%)	19 (6.1%)	56
	Interest & Motivation	6 (5.0%)	18 (5.6%)	14 (4.5%)	38
	Gamified Platforms	2 (1.7%)	10 (3.1%)	6 (1.9%)	18
	Platform Utilization	8 (6.7%)	30 (9.4%)	19 (6.1%)	57
	Academic Outcomes	3 (2.5%)	12 (3.8%)	15 (4.8%)	30
	Simulations & Application	4 (3.4%)	15 (4.7%)	8 (2.5%)	27
Challenges	Challenges of LA	12 (10.1%)	24 (7.5%)	29 (9.2%)	65
	Data Accuracy	1 (0.8%)	8 (2.5%)	13 (4.1%)	22
	Cheating & Academic Integrity	2 (1.7%)	5 (1.6%)	9 (2.9%)	16
Ethical, Privacy, and Equity Concerns	Ethical & Privacy Concerns	5 (4.2%)	18 (5.6%)	22 (7.0%)	45
	Equity & Control in Education	3 (2.5%)	6 (1.9%)	20 (6.4%)	29
The Role of Teachers	Teacher Experiences & Perceptions	20 (16.8%)	35 (11.0%)	32 (10.2%)	87
	Insights for Effective Teaching	6 (5.0%)	22 (6.9%)	20 (6.4%)	48
	Recommendations for Improvement	7 (5.9%)	20 (6.3%)	21 (6.7%)	48
	Instructional Strategies	5 (4.2%)	14 (4.4%)	11 (3.5%)	30
	Professional Development	7 (5.9%)	17 (5.3%)	14 (4.5%)	38
Parental Interest	Parental Involvement	3 (2.5%)	10 (3.1%)	17 (5.4%)	30
Total		119 (100%)	319 (100%)	314 (100%)	752

Note. Percentages are computed within each country column: code count divided by the total number of coded instances in that country (Finland $n = 119$; Estonia $n = 319$; Azerbaijan $n = 314$). Because a sentence could receive multiple codes, totals reflect coded instances, not unique sentences.

Table 4. Summary of qualitative findings on teacher perceptions of LA across contexts.

Thematic dimension	Finland and Estonia (digitally mature contexts)	Azerbaijan (emerging digital context)
Primary Reported Uses	Used for formative assessment, adjusting lesson plans to individual student needs, and reflecting on teaching strategies	Used primarily for monitoring student compliance during assessments, deterring cheating, and recording scores
Perceived Benefits	Emphasized early identification of struggling students for proactive support and enhancing student engagement or motivation	Emphasized ensuring assessment integrity (fairness during tests) and identifying common error patterns on quizzes
Dominant Challenges	Focused on data fragmentation across disparate tools, the workload of interpreting complex dashboards for large classes, and potentially demotivating data presentation	Focused on basic infrastructure limitations (devices/internet), reliance on free or trial tool versions, and skepticism regarding the accuracy of data from platform-based quizzes
Ethical and Privacy Concerns	High awareness of data privacy regulations, focusing on managing informed consent processes, handling opt-outs, and data minimization	High trust in major external platform vendors to manage privacy; data protection viewed primarily as an institutional responsibility
Role of Teacher vs. Data	Stressed that analytics should complement professional judgment rather than replace it, with emerging concerns about data being used for teacher surveillance	Emphasized the superiority of traditional teaching methods and direct teacher observation over platform data, valuing human expertise over automated insights

4.1 Teachers' Uses of LA and Perceived Benefits

Teachers from the three countries (Finland, Estonia, Azerbaijan) described using LA in ways that reflected their local educational priorities, assessment practices, and approaches to student support. To reduce conceptual overlap, we distinguish between (1) how teachers reported using LA in practice and (2) what benefits they perceived from these uses.

4.1.1 Reported Uses of LA in Teaching

Azerbaijani teachers described LA use primarily in connection with assessment design, monitoring, and ensuring fairness during digital testing. Teacher A3 explained, "I create quizzes on Blackboard, where the order of questions is randomized for each student, which serves as a deterrent to cheating." Similarly, Teacher A2 highlighted use of platform monitoring features, describing a "Screen Lock function, alerting me if a student navigates away from the quiz screen," illustrating how teachers used available analytics-related functions to monitor compliance during quizzes and discourage academic dishonesty.

Beyond these immediate classroom practices, teachers' accounts suggested that LA use was shaped by contextual constraints in technology integration and analytic capacity. Extending platform use depended on school-level resources and administrative support (e.g., requesting new resources "requires the involvement of the entire school staff"), and some teachers reported technical barriers when transferring or sharing data with stakeholders. These conditions help explain why Azerbaijani teachers emphasized monitoring and assessment integrity over more exploratory or student-centred analytics applications.

In Estonia, teachers more often described LA as supporting instructional decisions and helping them respond to students' learning needs. Teacher E3 explained the value of combining activity information with outcomes: "When I see what a student has done and how long they spent, and I can compare that with their results, that is useful for me." Teachers also discussed tool selection as part of making analytics instructionally actionable. Teacher E2 stated, "Then I would rather think about taking the paid version, to get this data from there." They added that such tools are most valuable when they are "linked very specifically to the curriculum," so that the resulting analytics show precisely what students still need to do to achieve their learning goals.

Finnish teachers described using LA to support student-centred adjustments, early identification of learning difficulties, and reflection on teaching. Teacher F1 explained how analytics could help provide support proactively: "If you notice that those tasks are not successful, then you could already offer something more to that student on your own, so that the teacher does not necessarily have to do that by providing additional material or something else." Teacher F2 similarly emphasized using analytics to identify students needing support: "We are able to identify who needs help and support and provide guidance." Finnish teachers also described using analytics as a reflective tool for improving instruction; for example, Teacher F3 reported reviewing analytics after each lesson so they can spot patterns and refine their teaching accordingly.

4.1.2 Perceived Benefits of LA

Across the three contexts, teachers described benefits that aligned with their reported uses, but the emphasis differed by country.

Azerbaijani teachers highlighted LA's role in tracking performance and supporting assessment integrity. Teacher A2 noted, "It displays how many students made mistakes on the 13th question, along with the specific mistakes made by each student," showing how item-level information helped identify common errors and patterns in student responses. More broadly, teachers' emphasis on screen-lock alerts and item-level error counts suggests that LA was valued for producing defensible evidence related to performance and misconduct, consistent with day-to-day priorities of fairness and accountability in platform-based assessment.

Estonian teachers emphasized that LA provided a more informative view of student understanding than simple participation indicators. As Teacher E3 described, comparing what students did, the time spent, and their results was "useful" for interpreting learning progress. Teachers also framed analytics as most beneficial when tightly connected to the curriculum (Teacher E2), because such alignment made the data more directly actionable for identifying gaps and tailoring instruction.

Finnish teachers emphasized LA's benefits for identifying students needing additional support and enabling timely intervention (Teacher F2). They also highlighted benefits for personalization (Teacher F1) and for reflecting on and refining teaching practices (Teacher F3), positioning LA as part of an ongoing cycle of instructional improvement rather than primarily an assessment-monitoring tool.

Teachers in Estonia and Finland also linked analytics-supported digital platforms to student engagement and comfort. Teacher E2 stated that "digital tools are stress-free for students," suggesting that technology-enhanced learning environments could reduce pressure and support participation. Teacher F3 similarly emphasized motivation, explaining, "it is taken into account that we are actually interested in this, so then we can draw more from it and in a way then maintain that motivation." In contrast, Azerbaijani teachers did not foreground engagement; their accounts focused more on practical assessment and integrity applications.

4.2 Challenges and Barriers to Adoption

A key challenge highlighted by teachers is the reliability of LA data. Teacher A3 questioned the accuracy of analytics, stating, "It can give the wrong information because it is not a reliable resource for me; students can click done for reading materials even though they have not done it." Teacher A4 also expressed skepticism about the assessment tools, mentioning, "I don't believe there's a specific platform that reliably provides the data I need about students. I have doubts about the accuracy of results from platforms like Kahoot and other quizzes, so I don't rely on them for assessment purposes." Teacher E2 also noted that some games allow students to click randomly without actually learning, which makes the data "meaningless." These responses

suggest that teachers from different contexts find the data generated by LA tools unreliable, which raises concerns about its validity for assessing student progress.

Another common issue involved the complexity and usability of LA features. Teacher E3 mentioned, "Sometimes, the learning analytics features themselves are so difficult to understand. Then I do not even use them." This suggests that complex systems discourage teachers from integrating analytics into instruction. Teacher F2 added, "The data is already accumulating; it's just terribly heterogeneous and in different places, and applying it all at once can be difficult," highlighting how the fragmented nature of analytics tools creates barriers to adoption. Teacher A4 pointed out that platforms can interfere with student engagement, stating, "I found that when students were focused on joining the platform during my explanations, they weren't fully engaged with my teaching." These responses indicate that a lack of user-friendly design and integration hinders the effective use of analytics in classrooms.

Time constraints also emerged as a significant barrier. Teacher E3 admitted, "Due to lack of time, I sometimes just stop learning the new learning analytics features because I have many other things to do." Teacher A4 described the effort required to design an analytics model: "My students have been using Tinkercad to create models for their lessons. While it's a valuable tool, designing a model can be time-consuming, often requiring 2–3 lessons for upper-secondary students." Teacher F4 raised another issue related to workload, stating, "When you think that there can be 40 students in a course in high school, I can't see myself browsing each student separately from the dashboard." These responses indicate that the time required to understand, implement, and effectively use LA remains a major challenge for teachers, particularly when they have large classes.

Financial and technological limitations were also discussed. Teacher E2 highlighted the lack of resources, explaining, "Because there are not enough for the number of students in the school, we have one computer class for every four hundred children." To navigate financial constraints, Teacher A4 found alternative solutions, stating, "I start by exploring free options until the need arises for a tool that requires purchasing. To navigate this, I've registered with multiple accounts to take advantage of trial periods." However, as Teacher E3 pointed out, disparities in students' access to technology remain a challenge: "Students' cell phones have such different capacities, and some children do not have cell phones at all or they have been taken away as a punishment. Many students do not have computers at their home."

Concerns about the effectiveness of LA in assessments were also raised. Teacher A2 shared a concern about cheating, stating, "While I used to rely on homework checks to assess student progress, I've become wary of their reliability due to increased opportunities for cheating." Teacher E2 also mentioned that some platforms only offer limited data in their free versions, which restricts the depth of analysis available for assessing students. Teacher F1 pointed out that LA tools do not provide a comprehensive solution, stating, "It is not comprehensive, which could be used more widely. It was a bit of a hassle to use one thing like this for studying one thing. And then there would be others for others." These responses indicate that teachers face difficulties in using analytics for assessment because of both technological limitations and concerns about academic integrity.

Another challenge involved the way LA platforms present data. Teacher E1 criticized the current formats, explaining, "Graphs are not a very good way to present data, because every time you have to start interpreting it yourself. It seems much more reasonable if the data is presented either as some kind of recommendations or as a plan of sentences." Similarly, Teacher E3 raised concerns about the psychological impact of analytics on students, stating, "No, I didn't consider any such comparison with the average either; it seems rather demotivating to me. Does it matter to the child that the average in the class was this percentage and you got that percentage? It would be much better if we could simply say: before you were here and now you are there." These responses suggest that teachers prefer analytics tools to provide actionable insights rather than raw data, and they remain mindful of how analytics can affect student motivation.

Across the three contexts, teachers converged on three shared barriers to meaningful LA adoption: limited trust in data validity, high effort caused by complex/fragmented tools, and time/workload constraints. However, the emphasis and underlying causes differed by country. Azerbaijani teachers tied unreliability and assessment concerns to platform limitations and academic-integrity pressures (e.g., doubts about quiz accuracy and heightened concern about cheating) and described pragmatic workarounds such as relying on free versions or trial periods. Estonian teachers more often emphasized problems of interpretation and presentation (e.g., graphs requiring extra interpretation and concern that comparative metrics could demotivate students), alongside concerns about unequal student access to devices. Finnish teachers highlighted fragmentation and scale-related workload (heterogeneous data across tools and difficulty reviewing dashboard information for large classes), pointing to a need for more integrated, actionable analytics that fit teachers' routines.

4.3 Ethical, Privacy, and Equity Concerns

Teachers discussed ethical, privacy, and equity concerns mainly when responding to Scenario 6, which focused on these issues in the context of LA. Some teachers considered privacy measures of LA platforms sufficient, while others raised concerns about data security, institutional responsibility, and student consent. Teachers in Azerbaijan generally trusted well-known platforms to maintain privacy. Teacher A1 stated, "I haven't encountered any privacy or security issues with platforms like Kahoot and

Google Forms. I think that Google would not like to lose customers for small details, and they protect privacy issues." Teacher A4 added that "games typically don't require private data; just a nickname is sufficient."

However, some teachers emphasized the school's responsibility in safeguarding data confidentiality. Teacher A3 noted that "such systems should be organized and managed by the school or university to ensure data confidentiality. Students rely on the institution to safeguard their data." A similar concern was raised by Teacher A2, who described a lack of confidentiality in their grading system: "We only have a Microsoft Excel file as a Gradebook, which is shared with me. While it provides a general overview of students' results, I find it lacks confidentiality. I'm able to see feedback from other teachers about the students, which can sometimes be confusing." This highlights a potential issue where institutional data-sharing practices may not fully align with privacy expectations.

In contrast, teachers in Finland and Estonia focused more on data consent and technical capabilities to handle individual privacy preferences. Teacher F2 asked, "Some parents don't want to give that consent or something; then what kind of technical capabilities are there to remove individual students and so on?" Teacher F1 emphasized the importance of clear communication about privacy policies: "So someone has to monitor those changes and communicate about them and write them in a reasonable language so that they can be asked for those permissions and so on." Concerns about data-sharing practices within schools indicate that privacy protections may not always align with teachers' expectations.

Estonian teachers placed a strong emphasis on minimizing unnecessary data collection. Teacher E1 argued that "I really don't want to make accounts ... part of the problem comes from the fact that they shouldn't really use their own names." This perspective aligns with efforts to limit personal data exposure. Teacher E1 also mentioned personal strategies to prevent excessive data collection. Teacher E1 said they routinely delete reports they no longer need and avoid collecting unnecessary identifiers, such as surnames, to minimize student-data exposure. Institutional responsibility was another key theme among Estonian teachers. Teacher E3 suggested, "The municipality is responsible for the data processing. They actually should even bring more employees to address data security because it is a very important topic nowadays." This view differs from the Azerbaijani teachers, who primarily saw data protection as the school's duty.

A major concern among Estonian teachers was balancing data privacy and personalized learning. Teacher E1 pointed out a challenge in cases where students or parents opt out of data collection: "Fortunately or unfortunately, no matter how well the school explains the data processing, students always have the option to opt out. Or it depends on their parents. Of course, it is okay if the student's data is not used but I prepare personalized learning for students based on that information. And if they do not agree, then it is impossible to provide the same level of customized learning experiences compared to other students who agreed to share their data." This highlights a difficulty of maintaining student privacy while still providing personalized learning experiences. Teacher E3 took a strict stance to data handling, stating, "If I do not need the data, then I directly delete them from all my databases. There is no point in me keeping them."

4.4 The Role of Teachers

Teachers stressed the importance of using their own expertise alongside data from LA. Teacher A1 said, "I prioritize teachers' observations over data from platforms," and Teacher A3 stated, "I believe that traditional methods are more effective in teaching mathematics." Others acknowledged the potential value of LA but noted the importance of adequate expertise. Teacher E2 said, "The teacher can be very motivated, but if he is an average computer user and the time to learn these systems is again a scarce resource," while Teacher F3 noted that "the teacher's professionalism also becomes really important." These statements showed that teachers see their role as central in interpreting and acting on data, rather than relying solely on automated insights. Several teachers underscored the need of proper training and preparedness. Teacher F2 cautioned against rushing the introduction of new tools: "Then it might torpedo the whole good thing, that the launch was not done carefully and calmly." These remarks showed that teachers believe their own readiness and motivation influence the successful adoption of analytics. Teacher A3 expressed limited experience with these platforms, while Teacher A2 observed that "their effectiveness ultimately depends on how they are implemented and utilized within the school environment."

Teachers also noted that analytics can inform instructional decision-making and professional growth. Teacher E3 said, "When I see that the same question has been asked for five years and 70 percent still don't answer it, then I have to change something in my lesson." which highlighted how data can prompt reflection on instructional strategies. Teacher E1's comment, "If I try the paid version of the learning analytics features and like them, then I would try to convince the management to use them," suggested a proactive approach to integrating analytics at the school level. These perspectives showed that teachers see their involvement and expertise as essential for meaningful and sustained integration of LA.

4.5 Parental Interest

Teachers reflected on parental interest primarily in response to Scenario 5, which explicitly addressed the use of LA as a communication tool between teachers and parents. Teachers described different levels of parental interest in analytics data. Teacher A3 said, "If a student's performance on Blackboard quizzes significantly impacts their exam results, it may lead to parental complaints." Teacher F1 asked, "What would I do with such precise information about my own children?", and Teacher

E3 noted that some parents use analytics to "predict or plan their children's future." These remarks suggest that while parents are interested in data related to their children's academic performance, the practical value of very detailed information is unclear and may not always provide practical benefits. Teacher A4 explained that some parents focus primarily on numerical results rather than behaviour, and Teacher A3 reported to parents on students' attentiveness, participation, and homework completion when addressing concerns about low test scores. These observations reveal a tension between parents' demand for data and teachers' preference for balanced feedback that addresses both academic progress and student well-being. Teacher A2 noted, "It's worth noting that parents are often more focused on numerical results rather than the efforts of students."

Teachers also expressed concerns about parental pressure on students. Teacher A2 described cases where high-achieving students experienced additional stress because their parents expected even higher scores. Teacher F3 acknowledged that parental involvement could be beneficial but warned about "the danger that it slips a little into the wrong kind of interpretation." Teacher E2 believed parents mainly pay more attention to lower grades and focus on finding ways to help their children improve in areas where they are struggling. These viewpoints suggest that parental engagement can be positive or stressful, depending on how LA data is communicated and interpreted.

Some teachers emphasized the role of institutional directives. Teacher A2 worried that school management could "mandate compulsory usage" of platforms, even if teachers are not prepared to use them effectively. Teacher E1 reported that they do not always have freedom to choose tools because the school sometimes requires a specific digital system. Teacher F4 questioned the necessity of sharing every detail of student progress with parents, but Teacher F3 supported systems that help parents offer targeted support at home. These comments show that administrative decisions and policies can either facilitate or limit purposeful adoption of analytics tools.

Teachers identified resource constraints when working with school leadership. Teacher A1 explained that requesting new resources "requires the involvement of the entire school staff" and that the principal's engagement level varies. Teacher E2 said they rely on the school administration to create student accounts and set up equipment. Teacher A4 wanted a more direct way to share analytics results with parents but faced technical challenges when transferring data. These challenges indicate the need for institutional support in helping teachers implement analytics platforms and communicate effectively with external stakeholders.

5. Discussion

This study contributes beyond prior teacher-focused LA work by using a three-country comparison to separate cross-context patterns from context-dependent adoption dynamics. Across Finland, Estonia, and Azerbaijan, teachers consistently emphasized interpretability, trust in data, usability/workload fit, and ethical concerns, suggesting that these are persistent design and implementation requirements. At the same time, the comparison clarifies how national and institutional conditions shape what teachers use LA for: in digitally mature contexts (Finland and Estonia) teachers more often described using analytics to support formative, student-centred decisions and engagement, whereas in an emerging context (Azerbaijan) analytics use was discussed mainly in relation to basic monitoring, assessment recording, and academic integrity. In other words, the contribution is not the existence of these concerns per se, but the comparative insight that system capacity and support influence whether LA is taken up for higher-order pedagogical purposes or constrained to basic oversight functions (Altstadt, 2020; Taagepera, 2018).

Teachers in all three contexts were cautiously optimistic about LA's potential, yet their day-to-day uses of analytics differed. Azerbaijani teachers primarily employed LA tools for monitoring student performance and deterring misconduct, such as using analytics to catch cheating or track completion of assignments. This pragmatic focus on basic assessment integrity is perhaps unsurprising given Azerbaijan's early stage of digital integration and infrastructure limitations (Altstadt, 2020). In contrast, Estonian and Finnish teachers used LA in more student centred and formative ways. Estonian participants spoke of tailoring instruction to student needs—for example, analyzing platform data to pinpoint knowledge gaps and adjust lessons accordingly—rather than simply tracking behaviour. Finnish teachers similarly emphasized using analytics to identify struggling students and personalize support and even as a reflective tool to improve their own teaching practice. This aligns with broader literature that highlights LA's value in the early identification of at-risk learners and in providing personalized feedback to enhance learning outcomes (Foster & Siddle, 2020; Tsai et al., 2021).

Only the Finnish and Estonian teachers highlighted increases in student engagement as a benefit of LA-supported instruction. They observed that digital analytics platforms can make learning "stress-free" or motivating for students, an aspect that Azerbaijani teachers did not mention. The absence of student engagement in Azerbaijan's discussion may indicate that, in less digitally mature settings, teachers are still grappling with foundational issues of implementation (e.g., getting reliable data) and have yet to leverage LA for boosting motivation (Schwartz, 2018). These cross-country differences underscore how context matters: educators in well-resourced, innovation-friendly environments (Finland, Estonia) appear ready to explore LA's higher-order benefits (personalized learning, engagement, professional reflection), whereas those in developing contexts (Azerbaijan) focus on immediate, practical uses of data. Such patterns resonate with the countries' trajectories—Estonia's ambitious post-Soviet digital reforms have made it a world leader in educational technology (Hartwell, 2013), while Azerbaijan's system is still building the basic capacity for data-driven practices (Altstadt, 2020). The Finnish case, with its long-established

pedagogical excellence and early investment in edtech, shows how a strong foundation enables teachers to view LA as an enhancement to student-centred learning rather than just a monitoring tool (Saarela, 2017).

To move beyond describing differences, our comparison suggests three mechanisms that help explain why country-level emphases diverged in the workshops. First, system capacity and tool maturity shaped what teachers considered feasible: where analytics were experienced as integrated and curriculum linked, teachers more readily discussed formative and instructional adaptation (e.g., paying for tool versions to obtain curriculum-specific data), whereas in an early-adoption setting the conversation stayed closer to basic monitoring and data reliability. Second, institutional accountability and stakeholder pressure influenced the perceived purpose of analytics: Azerbaijani teachers described situations where platform-based assessment could trigger parental complaints and where school management might mandate platform use, making defensible reporting and integrity monitoring particularly salient. Third, implementation support and access pathways affected how teachers imagined scaling LA use: teachers described dependence on school-level administration for account setup and equipment, as well as resource requests that required broad staff involvement, which can constrain experimentation and shift attention toward immediate, administratively legible uses of data. Together, these mechanisms suggest that differences are not only "cultural" but also reflect how infrastructure, policy expectations, and support structures condition what teachers can realistically do with analytics.

Despite the differing applications of LA, teachers across all three countries mentioned similar challenges that warrant careful attention. One of the main concerns was the reliability and validity of analytics data. Many teachers were skeptical about whether the numbers truly reflect student learning. For instance, participants noted that some systems register a task as "done" even if a student merely clicks through it, or that quiz scores from game-like apps (e.g., Kahoot) can be misleading because students might guess answers (Herrenkohl & Cornelius, 2013). This skepticism reflects a deeper issue of trust in data. These sorts of issues can be addressed through the use of automated models that can recognize these types of "gaming the system" behaviours (R. S. D. Baker et al., 2013) and identify them for teachers, but if done thoughtlessly, this can simply introduce yet another model for teachers to be skeptical of. Prior research suggests that educators often question the "subjective nature of numbers" produced by LA tools (S. C. Evans et al., 2015). In other words, teachers worry that analytics might not capture the full story of learning, and they fear making decisions based on potentially flawed or superficial metrics.

Another critical barrier identified was the usability and integration of LA tools. Teachers from Estonia, Finland, and Azerbaijan alike reported that many analytics platforms are complex, fragmented, or not user-friendly (Kerr et al., 2013). Several mentioned that data dashboards often present raw graphs that are hard to interpret, requiring teachers to "figure out" the meaning on their own—a tedious process that can discourage regular use. This aligns with the broader finding that if LA systems demand excessive effort or technical savvy, teachers may simply avoid them (Barany et al., 2024). In a recent mixed-methods study grounded in the UTAUT (Unified Theory of Acceptance and Use of Technology) framework, effort expectancy (i.e., how easy or hard the technology is to use) was a significant factor inhibiting K–12 teachers' adoption of LA (Tzimas & Demetriadis, 2025). Many of their recommendations centred on making data outputs easier to interpret. As one Estonian teacher put it, "if the data is presented as some recommendations or as a plan of action, it would be ideal." Rather than overwhelming charts or raw numbers, educators prefer clear guidance—for instance, concrete suggestions on what interventions might help a student flagged by the analytics. This insight from teachers resonates strongly with recent advances in LA design. For example, Khosravi and colleagues (2021) have developed intelligent LA dashboards intended to provide automated recommendations along with supporting teachers in drilling down into more detail as desired.

Concerns around ethics, privacy, and data security emerged strongly, particularly in Finland and Estonia. Teachers in these two EU contexts were acutely aware of student data privacy regulations and the need for informed consent. Finnish and Estonian participants frequently discussed how to handle cases where parents or students opt out of data tracking. For example, a Finnish teacher questioned whether their systems have the technical capability to exclude a student's data if the parents withhold consent. Another Finnish teacher emphasized writing privacy policies in plain language and communicating changes clearly to parents. An Estonian teacher stressed that the municipality (district) should take responsibility by hiring specialists for data security, highlighting an expectation of strong institutional oversight. These perspectives reflect a culture where data ethics are front-of-mind and align with European data protection principles. They mirror broader discussions in LA scholarship about balancing the benefits of data-driven education with privacy rights and ethical use. R. Baker (2023) argues that LA implementations must adhere to clear ethical and privacy principles to maintain trust. In contrast, Azerbaijani teachers appeared less concerned about privacy, often trusting platform vendors by default. One Azerbaijani teacher remarked that they had not "encountered any privacy issues" with popular tools and believed companies like Google "protect privacy" because they wouldn't want to lose users.

The issue of teacher autonomy came up implicitly when discussing analytics that evaluate teaching. While excited about feedback, some teachers worried that LA might be used punitively or limit their freedom to teach as they see fit. This reflects what Buchanan and McPherson (2019) describe as the tension for teachers "in a time of big data"—if data systems are imposed in a top-down manner, they risk undermining teacher agency. One Finnish teacher in our study noted that analytics should

support, not replace, teachers' judgment: they appreciated recommendations but insisted on applying their own contextual knowledge to decide actions. This sentiment aligns with the idea that teachers must be partners in the analytics process, not passive subjects of algorithmic advice (Qazi & Pachler, 2024). Our findings reinforce this—teachers responded more positively to LA scenarios where they remained in control (using data to inform their decisions), and they grew wary when imagining LA as a supervisory "Big Brother." In fact, multiple teachers explicitly mentioned fears of constant monitoring. One teacher mused that if every click and student outcome is tracked by administrators, it could feel like a surveillance system rather than a support tool, a concern raised in scholarship as well (Proudfoot, 2021).

Finally, an important but somewhat under-discussed theme among the teachers was communication of analytics to stakeholders beyond the classroom. While our workshop conversations focused on teachers' direct use of LA, it's worth noting the significant potential of LA in parent engagement and reporting, even if teachers themselves did not emphasize it. Research by Broderick and colleagues (2011) demonstrates that involving parents through LA can have positive effects. In their study, when an intelligent tutoring system sent automated messages to parents about their child's progress, parent logins and engagement with the system increased significantly. Similarly, Bergman and Chen (2017) showed in a field experiment that high-frequency information updates to parents (such as text message alerts for missed assignments or absences) led to improved student outcomes—including higher class attendance and fewer course failures. These findings illustrate a powerful point: LA isn't just for teachers and administrators; it can bridge communication between school and home in ways that benefit students. Teachers in our study did not cite parent reporting as a major use of LA (perhaps because none of the scenarios explicitly prompted it), but if teachers had tools to easily share tailored analytics reports with parents (for example, a dashboard view or weekly summary that could be sent home), they might amplify the support network for each student. Moreover, involving parents via transparent analytics could enhance trust in the technology and provide teachers with allies in acting on data insights.

Beyond documenting common challenges (e.g., interpretability, workload, and ethical concerns), the cross-country comparison helps separate issues that appear broadly shared from those that are strongly shaped by local infrastructure and institutional conditions. This distinction is a key contribution because it supports more context sensitive LA implementation strategies and avoids assuming that design solutions or training models will transfer unchanged across school systems.

5.1 Practical Implications

Building on the insights above, we outline key recommendations to help integrate LA into educational practice in a way that maximizes benefits and minimizes challenges. These implications are directed toward three stakeholder groups, namely teachers, who are the end-users of LA in classrooms; policymakers/administrators, who shape the conditions under which LA is implemented; and parents/guardians, who influence how analytics information is interpreted and acted on outside school. Ensuring that all three groups are supported in meaningful ways can help bridge the gap between the potential of LA and its practical application in K–12 education.

For teachers, developing data literacy is essential for effectively using LA tools. Professional development in data analysis, dashboard interpretation, and statistical literacy can empower teachers to make informed decisions rather than rely on raw numbers without context. Understanding data trends and avoiding misinterpretation allows educators to extract meaningful insights that enhance student learning rather than overwhelm instruction with excessive data points. Training programs that are hands-on and directly relevant to teachers' classroom practices can increase confidence and practical application.

Schools and LA developers should also start small when encouraging teachers to integrate LA into their practice, beginning with a manageable number of tools or metrics before expanding usage. A gradual approach, such as tracking student engagement in a particular subject or monitoring assignment completion trends, allows teachers to begin to see the potential of analytics without feeling burdened by excessive data. Reflection is a key component of this process, helping educators see where the insights gained from analytics can lead to tangible improvements in teaching and learning. Additionally, maintaining a balance between data-driven decision-making and professional judgment is crucial; teachers want LA that can complement their expertise rather than replace it. Teachers' knowledge of students' unique learning contexts remains invaluable in interpreting analytics outcomes, ensuring that interventions are both data-informed and pedagogically sound.

Collaboration among teachers can further enhance the effective use of LA. To support educators in effectively integrating analytics, researchers and developers can design and facilitate professional learning communities, where educators share best practices, discuss challenges, and explore new strategies for incorporating analytics into their instruction. Cross-school or even international teacher networks can facilitate discussions on which LA platforms provide the most useful insights and how best to interpret and act on student data. Open dialogue about usability issues, workload concerns, and necessary training can lead to more informed decisions about implementation, ensuring that analytics tools support rather than hinder effective teaching.

For policymakers, ensuring adequate infrastructure is a foundational step in enabling successful LA adoption. Reliable internet connectivity, access to appropriate devices, and investment in full-featured LA platforms (rather than limited free versions) are essential. Policymakers should prioritize equitable access, preventing disparities where only well-resourced schools benefit from analytics while others are left behind. Additionally, providing ongoing teacher training and professional development is crucial. One-time workshops are insufficient; instead, structured, continuous support, through coaching, peer

mentoring, and embedded training within school schedules, can build long-term competency in using LA effectively (Qazi & Pachler, 2024).

Beyond infrastructure and training, policymakers should focus on integrating LA into existing educational systems to reduce fragmentation. Teachers often struggle with using multiple, disconnected platforms, which increases their workload and reduces the usability of analytics insights. By embedding LA functionality within existing digital learning platforms, or by adopting interoperable solutions, policymakers can streamline data analysis processes, making it easier for teachers to access and act on information. Clear policies on data use and privacy are also necessary to build trust among educators, students, and parents. Transparency regarding how student data is collected, analyzed, and shared, aligned with laws such as the General Data Protection Regulation (GDPR) where relevant, ensures ethical use and prevents concerns about surveillance or misuse of data. Furthermore, policymakers should avoid a compliance-driven approach to LA implementation. Encouraging a culture of trust, providing incentives for innovative teaching, and aligning LA initiatives with broader educational goals can ensure that LA serve as a meaningful asset in improving student outcomes rather than an administrative burden.

For parents and guardians, LA can support home–school communication, but only if information is shared in a way that reduces misinterpretation and pressure on students. Parent-facing reporting should prioritize teacher-curated, plain-language summaries (e.g., weekly progress snapshots with strengths, areas for support, and suggested next steps at home) rather than highly granular clickstream details or rankings. Schools should also establish clear communication norms for parent-facing analytics, specifying what will be shared, how often, and how teachers will contextualize uncertainty because teachers in our study noted that analytics linked to assessment outcomes can trigger parental complaints and increase student stress if interpreted narrowly. Providing guidance for parents on how to use analytics constructively (focusing on growth and support rather than punishment) can help ensure that LA strengthens, rather than strains, the home–school partnership.

5.2 Limitations and Future Work

This study provides insights into teachers' perspectives on LA across three countries; however, several limitations must be acknowledged. The small sample size (12 teachers across Azerbaijan, Finland, and Estonia) limits the generalizability of the findings. Participants were recruited through professional networks, potentially introducing a bias toward those with greater interest or familiarity with technology. From another perspective, contextual and cultural influences unique to each country may have shaped teachers' views in ways that this study could not fully disentangle. Furthermore, the scope of LA discussed focused on currently available mainstream tools, leaving emerging technologies such as AI-driven analytics relatively unexplored. Also, some of the themes are necessarily broad (e.g., usability, ethics, workload) and may appear generic.

In addition, because the study relied on scenario-based discussions, participants responded to hypothetical situations that may not fully reflect their enacted classroom practices. Even with careful translation and localization, the same vignette can be interpreted differently across institutional and cultural settings, which adds uncertainty to cross-country contrasts. For these reasons, the comparative findings should be treated as exploratory signals that motivate further work using larger samples and in-situ or longitudinal designs.

Future research should address these limitations by expanding the sample size, employing quantitative methods (e.g., surveys) alongside qualitative approaches, and incorporating longitudinal studies to track the evolving impact of LA in classrooms. Comparative research across a broader range of countries, with a range of uses and maturity of use of LA, could provide deeper insights into the interplay of policy, culture, and technology adoption. Exploring the perspectives of students, parents, and policymakers would also contribute to a more holistic understanding of the ecosystem in which LA operates. Finally, policy and leadership studies could illuminate the ways that institutional decision-making can facilitate the success of LA implementation.

6. Conclusion

This study explored how teachers in Finland, Estonia, and Azerbaijan understand and use LA. While all teachers saw potential benefits, their practices differed by context. Teachers in Estonia and Finland focused on using analytics to support instruction and student engagement, while teachers in Azerbaijan emphasized monitoring and basic assessment. Across countries, common concerns included data reliability, limited usefulness of platforms, ethical issues, and the challenge of linking data to teaching goals.

The findings show that teachers play an active role in interpreting and applying LA. For these tools to support teaching effectively, they must be easy to use, provide clear insights, and align with teachers' work. Professional development, school-level support, and clear ethical guidelines are also necessary. By focusing on teachers' perspectives in different contexts, this study offers practical insights for designing LA tools that support everyday teaching. Taken together, the findings show that improving teacher-facing LA requires not only better tools but also context-aware implementation support that reflects differences in school infrastructure, norms of data use, and expectations placed on teachers.

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Appendix A: Learning-Analytics Scenarios

1. Scenario 1: Learning analytics for a virtual DNA simulation.

In the context of a biology unit exploring genetics, the teacher introduces a virtual DNA simulation. The learning-analytics toolkit tracks student engagement, comprehension, and interactions within the simulation. As the activity progresses, the toolkit generates comprehensive insights, pinpointing specific aspects that resonate most with the students. With this information, educators can strategically tailor subsequent lessons, placing emphasis on the areas of greatest interest and engagement. This adjustment, guided by real-time analytics, ensures a more personalized and effective learning experience, ultimately contributing to improved student learning outcomes.

2. Scenario 2: Personalized approach to student struggles.

In a high-school algebra class, teacher Anna integrates a popular gamified platform focused on quadratic equations and graphing. A specific challenge emerges when she tries to identify individual student struggles within the game: the platform's analytics show only overall completion rates and scores for the entire class. After integrating a learning-analytics toolkit, Anna receives individualized progress reports for each student and can pinpoint who is struggling with graphing quadratic equations. The toolkit highlights areas of difficulty, enabling her to tailor instruction, providing additional resources, conducting targeted one-on-one sessions, and deploying specific interventions for the students who need them most.

3. Scenario 3: Limited access to student-performance data.

A high-school teacher incorporates an interactive language-arts game into the curriculum. The game yields valuable insights into vocabulary acquisition and comprehension skills, but the teacher struggles to aggregate and analyse individual performance efficiently: the existing system cannot process and present the information cohesively, making analysis time-consuming. Budget constraints also prevent purchase of the game's paid version, limiting access to comprehensive data and hindering its instructional use.

4. Scenario 4: Presenting students' performance through detailed data.

In a geometry class using a gamified platform for problem-solving, students tackle virtual challenges to deepen their understanding of geometric concepts. The teacher needs richer analytics on:

- Geometric-concept mastery—accuracy in applying angles, shapes, and spatial reasoning;
- Progression through geometric challenges—levels cleared and proficiency in increasingly complex tasks;
- Error patterns—common misconceptions revealed through wrong answers.

The existing platform provides only basic completion rates and scores. To obtain finer-grained analytics, the school deploys a geometry-specific learning-analytics toolkit that integrates with the platform and generates detailed student dashboards, visualizing mastery, progression, and error patterns. These actionable insights support personalized instructional planning and foster deeper conceptual understanding.

5. Scenario 5: Learning analytics as a tool to communicate with parents.

In a chemistry class that uses a gamified platform for chemical reactions and molecular structures, traditional communication methods do not fully capture students' interactive learning. The school adopts a science-focused learning-analytics toolkit; Mr. Anderson, the teacher, uses it to convey nuanced progress and achievements to both students and parents. The toolkit supplies detailed, secure online reports on individual performance within the gamified environment, facilitating clear, data-driven discussions about growth and next steps.

6. Scenario 6: Ethical considerations in the adoption of learning analytics.

When a chemistry class implements a learning-analytics toolkit, the principal and staff prioritize responsible data handling and transparency by adopting clear ethical guidelines:

- Informed consent: parents and guardians receive full details of data purposes, types, and uses, and provide consent before integration;
- Anonymous data handling: robust methods anonymize student records while preserving analytic value;
- Secure data storage: data are stored securely, with regular security audits to detect vulnerabilities;
- Transparent communication: ongoing dialogue with students and parents explains benefits and addresses concerns;
- Limited access: only authorized teachers and administrators involved in student support may view the data;
- Continuous review: ethical and legal implications are reviewed regularly, and toolkit updates follow best-practice standards.

These measures ensure a responsible, transparent approach to data privacy and security, fostering trust among students, parents, and teachers and supporting an ethical learning environment.