

DEVELOPMENT OF A SOFTWARE TOOL FOR AN ELECTRONIC DIARY AND STUDENT ASSESSMENT IN EDUCATIONAL INSTITUTIONS

Annotation. The theses examine the design and development of a software tool that combines the functions of an electronic diary and student assessment management within educational institutions. The text situates the problem in the broader context of student information systems and the increasing reliance on web-based gradebooks to manage attendance, grading and reporting. Drawing on empirical and review literature, it outlines both the affordances and risks of online gradebooks in relation to transparency, learner stress and parental involvement. It argues that software design must be informed by contemporary understandings of self-regulated learning, learning analytics dashboards and validity and reliability in digital assessment. A conceptual architecture for the tool is proposed, comprising data, application and presentation layers that support configurable grading schemes, outcome-linked rubrics, multi-stakeholder diary views and analytics dashboards. Particular attention is given to data protection and student privacy, with reference to current guidance and legal frameworks. The theses conclude that a theoretically grounded, participatory, and privacy-aware approach to software design can support a more meaningful use of assessment data, strengthen home-school communication, and contribute to a more reflective and equitable assessment culture in schools.

Keywords: electronic gradebook; student information systems; formative assessment; learning analytics dashboards; parental involvement; self-regulated learning; data protection; school management software

The rapid digitalisation of educational systems has transformed how schools collect, manage and use information about learners. Traditional paper-based class registers and grade books are increasingly unable to support real-time progress monitoring, flexible reporting, or data-informed decision-making at scale. In this context, student information systems (SIS) have emerged as a critical infrastructure that integrates attendance, grades, demographics and assessment data to support administrative and pedagogical processes across whole institutions [1]. Against this backdrop, the development of a dedicated software tool that unifies the functions of an electronic diary and assessment management is not merely a technical task but an educational design challenge that must address issues of pedagogy, equity, transparency and data protection.

Electronic gradebooks and online gradebook portals are now widely adopted as part of SIS platforms, particularly in school sectors that emphasise accountability and parental engagement [1], [2]. Research on web-based gradebooks highlights their potential to provide continuous visibility of assessment information, automate calculation of averages and weights, and reduce clerical burdens on teachers [2]. Empirical evaluations of online gradebook management systems report improved timeliness of feedback, more frequent monitoring of performance by students and parents, and high levels of perceived usefulness and usability among teachers when interfaces are designed to align with classroom practices [3]. At the same time, these studies underscore the importance of configurable grading schemes and robust reporting functions that can adapt to diverse curricula and institutional policies.

However, critical analyses of online gradebooks caution that simply exposing more granular assessment data to students and parents does not automatically improve learning outcomes [2]. In some contexts, continuous public visibility of marks may amplify stress, encourage a narrow focus on scores rather than learning, or create opportunities for strategic behaviour that undermines formative intentions. Researchers have noted tensions between transparency, teacher professional judgement and the risk of grade inflation or over-interpretation of partial data [2]. These findings suggest that the design of an electronic diary and assessment tool must incorporate not only technical functionality but also carefully engineered information architectures, access rules and communication norms that frame how assessment data are interpreted and used by each stakeholder group.

A core rationale for developing such a tool is to strengthen home-school communication and parental involvement. Communication technologies, including online portals, messaging and gradebook access, have been shown to increase the frequency and specificity of interactions between parents and schools, particularly in secondary education where informal contact typically declines [4]. Zieger and Tan report that structured digital communication can enhance parents' ability to support homework, track progress and intervene early when difficulties arise, provided that the information is comprehensible and aligned with school expectations [4]. More

recent systematic reviews on parental involvement in digital education emphasise that digital tools can both enable and constrain families, depending on usability, language, device access and the extent to which schools scaffold interpretation of data [5]. Consequently, the proposed software must treat the “electronic diary” not as a mere log of events, but as a communicative space where attendance, homework, behaviour notes and assessment feedback are presented in ways that are accessible, multilingual and sensitive to diverse socio-economic contexts.

From the learner perspective, continuous access to up-to-date assessment information can support self-regulated learning if implemented as part of a broader feedback and reflection ecology. Learning analytics research conceptualises dashboards and progress visualisations as tools that can help students monitor their performance, plan their effort, and adjust their strategies over time. Yet systematic reviews of learning analytics dashboards (LADs) show that many existing tools are weakly grounded in learning theory and often fail to provide actionable guidance beyond descriptive statistics [6]. Matcha and colleagues highlight that dashboards rarely support metacognition or offer concrete indications of effective tactics; evaluations are also frequently methodologically limited [6]. An umbrella review of LAD-focused systematic reviews reveals that, while interest in using dashboards for motivation, equity and inclusion is growing, there remains an “unclear path to data ownership and privacy” and insufficient translation of predictions into pedagogical action [7]. These insights argue for an electronic diary and assessment tool that moves beyond static grade lists to include carefully designed visualisations and narrative feedback that prompt reflection, provide reference frames over time and link directly to recommended next steps.

Assessment validity and reliability pose additional design constraints. Technology-enhanced assessments introduce both opportunities - for richer item types, adaptive testing and immediate feedback - and threats, including construct-irrelevant variance introduced by interface design, device differences or unstable network conditions [8]. Hopster-den Otter et al. emphasise that validity arguments for digital assessments must explicitly address such threats, rather than assuming that traditional paper-based validity evidence transfers unchanged [8]. Practitioner-oriented guidance from assessment consortia stresses that reliable assessment data require clear alignment between learning targets, scoring rubrics, administration conditions and reporting scales [9]. Similarly, NWEA notes that validity and reliability matter not only for large-scale testing but also for classroom assessments, and that misinterpretation of unreliable scores can lead to inappropriate instructional decisions [10]. For the software tool, this implies that gradebook algorithms, weighting schemes and aggregation procedures must be transparent, configurable and anchored in documented assessment policies, with support for both criterion-referenced and standards-based grading.

On this foundation, the proposed software tool can be conceptualised as a modular, service-oriented system integrated with the institution’s SIS. At the data layer, it maintains a secure relational or document-oriented store of enrolments, class rosters, assessment events, rubric definitions and evidence artefacts (such as uploaded assignments or quiz results). The application layer provides services for grade calculation, attendance tracking, timetable and homework scheduling, messaging and analytics. The presentation layer exposes tailored web and mobile interfaces for teachers, students, parents and administrators. Such an architecture supports interoperability via standard protocols and APIs, enabling data exchange with learning management systems, external testing platforms and national reporting services, while also permitting offline-first mobile clients for low-connectivity environments.

The electronic diary functions as the temporal backbone of the system, aggregating daily events, upcoming assessments, homework tasks and behavioural notes into a coherent timeline for each learner and class. For teachers, diary views prioritise planning and recording: quick entry of lesson topics, learning objectives, assigned tasks and informal observations. For students, the emphasis is on clarity of expectations: what needs to be done, by when, and how it will be assessed. Parent-facing diary views focus on interpretability, highlighting missed classes, overdue work and upcoming high-stakes assessments with contextual explanations. Consistency in terminology and symbols across these perspectives reduces cognitive load and miscommunication, while role-based filtering ensures that sensitive notes (for example, safeguarding concerns) are restricted to authorised staff.

Assessment workflows are central to the tool’s value proposition. At configuration time, administrators define institutional grading scales, reporting periods, categories (for example, “diagnostic”, “formative”, “summative”) and rules for how these categories contribute to term or final grades. Teachers then create assessment templates linked to specific learning outcomes or curriculum standards, attaching rubrics that articulate performance levels in descriptive language. When an assessment is scored, the system stores both rubric-level judgements and any numeric marks, automatically computes weighted aggregates according to configured policies, and updates progress indicators in the diary and dashboard views. Crucially, the interface should foreground descriptive feedback and indicators of progress towards outcomes, while allowing numeric or letter grades to be hidden or delayed where schools adopt gradeless or feedback-first approaches. Such configurability allows institutions to align the tool with contemporary understandings of assessment for learning while still meeting reporting requirements informed by validity and reliability guidance [9], [10].

Building on evidence from LAD research, the tool should provide multi-level visual analytics that support the needs of different stakeholders without oversimplifying complex learning processes. For teachers, class-level dashboards might highlight distributions of achievement across outcomes, patterns of missing work, correlations between attendance and performance, and alerts for students whose trajectories suggest risk of underachievement. Matcha et al. caution that dashboards must be user-centred, theoretically grounded and rigorously evaluated, rather than driven solely by available data streams [6]. For students, personal dashboards might present longitudinal views of performance, comparisons to individual goals rather than class averages, and prompts to reflect on study strategies. Masiello and colleagues show that contemporary LAD designs increasingly seek to be “about learning and not just analytics”, integrating pedagogical frameworks and emphasising self-regulation, but also note unresolved questions about ethical data use and ownership [7]. Therefore, the proposed system must allow schools to configure which indicators are displayed, how comparisons are framed and how feedback is coupled to suggested actions, while providing clear explanations of how metrics are calculated.

The handling of personal data in such a system must comply with evolving legal and ethical expectations. Guidance from the UK Department for Education sets out detailed requirements for data protection in schools, including policies for data retention, breach reporting and the use of emerging technologies such as generative AI [11]. In parallel, student privacy portals operated by the U.S. Department of Education articulate obligations under FERPA and related laws, emphasising secure handling of student records and transparent communication to parents and learners about their rights [12]. Translating these principles into system design entails fine-grained, role-based access control; encryption in transit and at rest; comprehensive audit logging; and privacy-by-design defaults such as data minimisation, limited retention and clear consent workflows for optional features. The software must also support the generation of privacy notices, data processing agreements for third-party integrations and tools to honour subject access requests and data deletion where applicable.

The development process for the electronic diary and assessment tool should itself follow a participatory, iterative methodology. The literature on SIS and online gradebook adoption suggests that successful implementations hinge not only on technical quality but also on alignment with teachers’ workflows, perceptions of benefits, and professional development support [1], [3]. Early co-design workshops with teachers, students and parents can elicit user stories, surface contextual constraints and encourage shared ownership of the tool. Prototypes should be evaluated using mixed-methods approaches, combining usability testing, surveys on perceived usefulness and focus groups that explore how the tool affects assessment practices and relationships. Over time, usage analytics - interpreted cautiously and with due attention to privacy - can inform refinements to interface design, feature prioritisation and institutional policies.

In conclusion, the development of a software tool that integrates an electronic diary with comprehensive assessment management offers an opportunity to reconfigure how schools coordinate teaching, learning and communication. To realise this potential, the tool must be grounded in empirical evidence on SIS effectiveness, online gradebook practices, parental involvement, learning analytics dashboards, and the psychometrics of digital assessment [1]–[10]. It must also embody robust approaches to data protection and student privacy that reflect current regulatory frameworks [11], [12]. Conceptually, the proposed system contributes to the ongoing evolution of school information environments from static repositories of records to dynamic, participatory platforms that support formative assessment, self-regulated learning, and collaborative engagement among teachers, learners, and families.

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