Transforming Teaching and Learning through LIFT: A Structured Dashboard for Education 5.0

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ABSTRACT

The rapid advancement of digital technologies calls for innovative approaches in language and education that are inclusive, adaptive, and future-ready. This project introduces LIFT (Learning Input Feedback Transformation), a structured dashboard designed to elevate teaching and learning by guiding students from initial input to meaningful outcomes through continuous feedback. The core innovation of LIFT lies in its integration of AI with multilingual and assistive tools, ensuring that learning is both personalized and inclusive, particularly for marginalized and differently abled students. The dashboard is structured into four interconnected components. Learner Engagement (Input Layer) collects data on learning styles, language proficiency, progress, and accessibility needs using tools such as voice-to-text, real-time translation, and sign language recognition. AI Analytics (Processing Layer) applies adaptive algorithms and natural language processing to tailor content, forecast learner performance, and deliver timely support. Teaching and Learning Enhancement generates individualized lesson plans, interactive learning materials, automated grading, and AI-assisted coaching to improve engagement and outcomes. Finally, Feedback and Continuous Improvement ensures personalized feedback for learners and provides educators with actionable insights for refinement. By blending educational creativity with technological inclusion, LIFT ensures that AI complements rather than replaces educators. Its adaptive, multilingual design supports Education 5.0 and advances Sustainable Development Goal 4 (Quality Education). Ultimately, LIFT redefines knowledge delivery and accessibility, making education a powerful enabler of empowerment, equity, and innovation.

Keywords: Digital technologies, teaching and learning, language, education

INTRODUCTION

Education is moving from teacher-centred knowledge transmission to learner-centred, data-informed ecosystems. This shift is driven by advances in artificial intelligence in education, which has grown rapidly across areas such as personalization, assessment, tutoring, and analytics (Wang et al., 2024). Systematic reviews show that AI-powered adaptive learning can improve engagement and outcomes but also risk deepening inequalities if inclusivity is not addressed (Bond et al., 2024). In parallel, the vision of Education 5.0 emphasises human-centred learning ecosystems that balance technological innovation with equity, ethics, and social sustainability (Shahidi Hamedani et al., 2024). Evidence from universal design of learning and learning analytics reinforces the value of designing proactively for learner variability and transforming learning traces into actionable insights (Almeqdad et al., 2023; Roski et al., 2024). Against this backdrop, LIFT emerges as a structured pipeline that brings together learner profiling, AI analytics, multilingual and assistive supports, teaching enhancements, and continuous feedback into a single end product: a dashboard that can be accessed by teachers, parents, and students alike.

Problem Statement

While digital learning platforms are more widespread than ever, they continue to fall short in addressing equity and inclusion. Learners from multilingual, rural, or low-resource backgrounds, as well as those with disabilities, often encounter systemic barriers. Monolingual interfaces and limited translation accuracy prevent learners from fully engaging with content, while the lack of integrated assistive solutions such as sign-language recognition or captioning reduces accessibility for differently abled students (Papastratis et al., 2021; Rastgoo et al., 2021). Even where such solutions exist, they are typically fragmented add-ons rather than being seamlessly integrated into learning platforms (Alaghband & Sadeghi, 2023). At the same time, teachers face data overload, activity logs, quiz scores, and engagement metrics are often scattered across multiple systems, making it difficult to synthesize these into clear, actionable insights (Roski et al., 2024). Without structured feedback loops, educators cannot adapt instruction effectively, while learners and parents remain disconnected from the learning process. These gaps underline the urgent need for an integrated framework like LIFT that combines assistive tools, AI-driven analytics, and continuous feedback into a shared dashboard, thereby creating transparency, personalization, and collaborative accountability across the learning community.

Objectives

The objectives of LIFT are twofold.

1. To provide personalized learning pathways tailored to the diverse needs of learners, particularly with respect to language proficiency and accessibility.
2. To integrate multilingual and assistive technologies such as speech-to-text, real-time translation, and sign-language recognition to ensure equitable access for all students.

Product Description

The end product is a web-based dashboard designed primarily for teachers to plan, monitor, intervene, and reflect, while parents and students access curated read-only views to track goals, progress, and feedback. LIFT dashboard designed based on the curated term LIFT which the first element L stands for the Learner Engagement referring to the Input Layer. The dashboard ingests learning style indicators, language proficiency, accommodations, and ongoing activity via connectors to the Learning Management System (LMS) and content tools. Accessibility inputs can include voice-to-text, real-time translation, and sign-language recognition capture (Papastratis et al., 2021; Rastgoo et al., 2021). Student or parent views show current goals and accessible settings, while teachers can batch-review profiles for a class and spot unmet needs (Matre et al., 2024).

The second element is AI Analytics referring to he Processing Layer. The platform applies adaptive algorithms and NLP to personalize content sequencing, predict risk, and surface explainable recommendations aligned with learning design. Where appropriate, automated assessment of short-answer or essay-type responses expedites timely formative feedback (Gao et al., 2024). The teacher dashboard emphasizes human-in-the-loop control in which all predictions show uncertainty, provenance, and suggested next actions (Bond et al., 2024; Wiley et al., 2024).

Teaching & Learning Enhancement is the third element. From the dashboard, teachers generate individualized lesson pathways, scaffold interactive materials, and trigger real-time coaching (e.g., hints, exemplars, multilingual glossaries). When teachers enable automated scoring or feedback for drafts, the system returns specific, criteria-referenced comments while preserving teacher oversight (Shi et al., 2024). Parents and students see progress snapshots and next-step suggestions written in plain language.

Finally, is the F referring to the Feedback & Continuous Improvement. The dashboard aggregates formative feedback for learners and actionable insights for teachers (what to reteach, who to check-in with, which accessibility supports are under-utilized). A reflection panel summarizes what worked for different subgroups,

supporting iterative course improvement and school-level equity monitoring (Alfredo et al., 2024; Wiley et al., 2024).

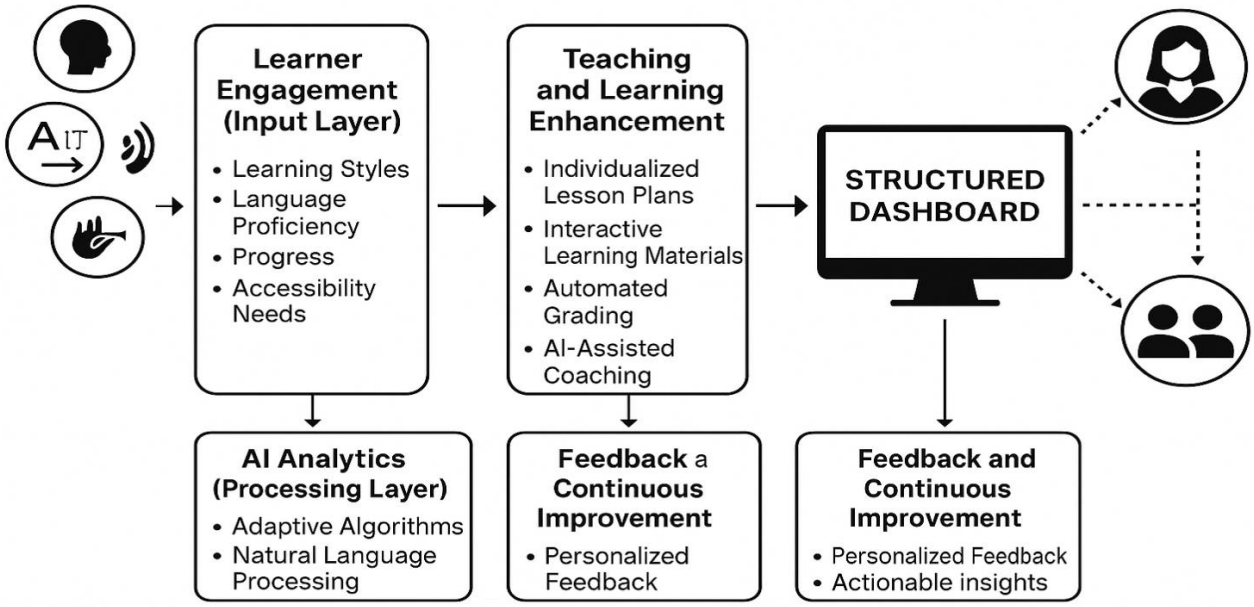

Figure 1 Structured dashboard of LIFT

This figure presents a sequence that is embedded in the teacher dashboard, parents and students' views expose a simplified version (goals, progress, feedback) without predictive controls (Wiley et al., 2024; Alfredo et al., 2024).

METHODOLOGY

This project adopt a human-centred, design-based research approach to co-design with teachers, students, and parents, iterating toward a minimally-viable dashboard that is pedagogically useful and contextually scalable (Wiley et al., 2024; Alfredo et al., 2024). Recent studies show that participatory co-design is widely used in developing educational dashboards to build trust, usability, and alignment with classroom practice. For example, Herodotou et al. (2025) and Alfredo et al. (2024) demonstrated that co-design with teachers and learners improves dashboard relevance, while Mohseni et al. (2023) and Kaliisa et al. (2023) showed how collaborative workshops enhance teacher adoption. Likewise, Pozdniakov et al. (2021, 2022) and Dey et al. (2022) highlighted that iterative prototyping ensures dashboards respond to authentic pedagogical needs. However, these studies often remain narrow in focus, addressing only specific contexts such as teacher analytics or student writing processes. The novelty of LIFT is that it brings everything together in one structured dashboard, while it not only tracks learning progress but also integrates multilingual support, assistive tools for differently abled learners, AI-driven insights, and continuous feedback. In simpler terms, while earlier dashboards focused mainly on usability or single features such as grading or discussion tracking, LIFT is designed for fairness and inclusion, accessible to everyone, and partnership between humans and AI. This makes it a more powerful and future-ready tool that directly supports the goals of Education 5.0 and SDG 4.

The participatory co-design methodology directly supports the project's objectives by ensuring that each design decision is rooted in authentic classroom needs. First, by engaging teachers, students, and parents in workshops and contextual inquiries, the dashboard is structured to create personal learning paths that reflect diverse student needs, abilities, and accessibility requirements. Second, the inclusion of multilingual and assistive technologies such as voice-to-text, real-time translation, and sign-language recognition is embedded from the earliest prototype sprints, fulfilling the objective of using inclusive tools so that no learner is left behind. Third, the co-design process prioritizes teacher input in identifying actionable "jobs to be done,"

allowing the dashboard to deliver smart insights that make teaching more effective and reduce workload, in line with the objective. Finally, the iterative testing and mixed-methods evaluation phases ensure the system is aligned with Education 5.0 and UN SDG 4 by promoting inclusivity, equity, and lifelong learning opportunities. In this way, the methodology is not only technical but also pedagogically grounded, ensuring that the LIFT dashboard advances both innovation and educational transformation.

Potential Findings and Commercialisation

We anticipate that LIFT will yield to improve formative feedback timeliness and higher student participation, consistent with evidence that dashboards can support engagement when human-centred and aligned to learning design (Wiley et al., 2024; Alfredo et al., 2024). In addition, LIFT yield to reduce teacher time-on-marking through selective use of automated assessment and feedback, with teacher control to calibrate and override (Gao et al., 2024; Shi et al., 2024). Furthermore, LIFT is measurable inclusion gains (e.g., more consistent use of captions, translation, or sign-language support) relative to baseline (Papastratis et al., 2021). For commercialization, the product is scalable as a cloud service, integrable with mainstream LMSs and viable as a business-to-business (B2B) offering for schools, universities, and training providers. The assistive-tech and EdTech markets, combined with policy attention to accessibility and SDG 4, create strong demand and partnership opportunities with ministries, NGOs, and industry (Nedungadi et al., 2024).

Overcoming Barriers and Building Responsible AI in Education

To address the first issue with practical barriers, a lot of schools, particularly in rural or low-resource areas, struggle with things like poor internet access and not enough devices, which makes it tough to use AI tools fairly. Some ideas to consider are rolling things out in phases, adding features that work offline, and teaming up with ministries or NGOs to help with hardware support. It's super important to focus on teacher training and leadership support because teachers really need to feel confident and have a solid backing when they're trying out new tech. Having clear rules about data protection and accessibility standards is super important for making sure everything is fair and works well for everyone. These updates match what we've seen in research about digital inequality, the struggles in rural education, and how ready teachers are to use AI (Wang et al., 2024)

Some parts of the original text were too technical, so they have been rewritten in simpler language. To make the ideas more concrete, the project added two short classroom scenarios: one set in a rural multilingual class where students benefit from real-time translation and speech-to-text, and another in an inclusive urban class where captioning and sign-language recognition help differently abled learners. These examples show clearly how LIFT can be used in practice, while also keeping teachers in control of the learning process. This approach aligns with co-design research that shows how teacher involvement and real classroom examples make educational technology more relevant and effective (Sibley et al., 2024).

The third area that need to work on is governance, ethics, and data security. The project has a governance plan that features regular bias checks, a human-in-the-loop review for AI suggestions, and decision logs to keep things transparent about how the system works. There's a bigger focus on keeping data safe by suggesting things like anonymising it, storing it securely, and collecting only what you really need. It's super important to protect kids' rights and privacy in schools. These updates match up with the latest stuff on responsible AI governance and ethics in education (Papagiannidis et al., 2025).

Looking ahead, the paper points out plans to check out how LIFT-enabled classrooms stack up against traditional ones by looking at teacher workload, student outcomes, and inclusivity indicators like how often accessibility tools are used. Additional steps include testing school-level governance measures to ensure long-term fairness, ethical use, and sustainability. These directions build upon prior studies of dashboards and responsible AI implementation in education (Papagiannidis et al., 2025).

Novelty and Recommendations

LIFT's novelty lies in unifying AI analytics, adaptive algorithms, and multilingual assistive tools into a single teacher-centred dashboard explicitly designed for human-AI collaboration. Unlike tool-silos, LIFT couples' predictive insights with explainable next actions and accessibility-aware content generation, then closes the loop with feedback analytics to refine both teaching and system prompts (Bond et al., 2024; Gao et al., 2024). We recommend districts pilot LIFT in co-design partnerships, mandate accessibility-first configurations (WCAG 2.2 AA), and adopt governance for model monitoring, bias audits, and data minimization. Future studies should compare teacher workload, learner outcomes, and equity indicators across LIFT-enabled vs. status-quo courses over a semester and examine long-term impacts aligned with Education 5.0 and SDG 4 (Shahidi Hamedani et al., 2024; Nedungadi et al., 2024).

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