LEARNING BRIEF

How Is AI Being Used by Education Ministries to Improve Service Delivery in Low- and Middle-Income Countries?

AI Observatory

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About the AI Observatory

EdTech Hub's AI Observatory and Action Lab exists to help drive greater equity in learning outcomes in the age of AI. The AI Observatory scans global trends, uses a hypothesis-driven approach to test practical applications, leads innovative pilots, and distils practical insights to support decision-makers in low-and middle-income countries.

Our goal is to ensure AI is integrated effectively and equitably, improving education systems and learning outcomes for all. EdTech Hub's AI Observatory is made possible with the support of the UK's Foreign, Commonwealth and Development Office. https://edtechhub.org/ai-observatory/.

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Abbreviations and acronyms

AA	Anticipatory action
AI	Artificial Intelligence
EdTech	Educational technology
EiE	Education in Emergencies
EMIS	Education management information system
LMIC	Low- and middle-income country
UAE	United Arab Emirates
UK	United Kingdom

Why this matters

The development of Artificial Intelligence (AI) and its use in education is growing exponentially, and while much has been made of AI's potential to enhance learning, amid the rapid pace of change most evidence has been focused on improving outcomes at a student level, such as the use of AI for personalised learning (e.g., ↑Feng & Li, 2024; ↑Omwenga et al., 2025).

One key area of opportunity that is less explored (and was identified as a gap to be investigated in the AI Observatory and Action Lab's theoretical framework)[1] is the potential for AI to enhance education systems and support governments to improve education service delivery, particularly in low- and middle-income countries (LMICs).

Theoretical benefits of enhanced AI integration include improving operational efficiency and reducing costs, thereby enabling funds to be allocated to other areas of educational delivery. However, many of these benefits are not yet rigorously grounded in practical evidence. To address this gap, this brief intends to answer the following question:

> *'How is AI Being Used by Education Ministries to Improve Service Delivery in Low- and Middle-Income Countries?'*

This brief outlines the existing evidence for how AI is being, or could be, used by ministries of education in LMICs to improve education service delivery. The brief highlights key thematic areas of AI use, identifying successes and challenges from practical use cases, and highlighting areas for further exploration.

Most published evidence centres on theoretical use cases of AI to improve education system delivery, and there is relatively little published empirical evidence on AI integration at the systems level, particularly from LMICs. Much of the evidence is also situated in university-level education, which has less relevance to education systems. Nonetheless, examples of AI integration do provide valuable insights into how AI can be used to improve the efficiency of education system delivery and improve student learning outcomes, as well as offering key lessons for future pilots.

[1] See https://edtechhub.org/2025/08/19/a-theoretical-framework-for-education-in-the-age-of-ai/. Retrieved 21 October 2025.

What we're learning

There is a range of functions and processes that lend themselves well to AI integration, where AI is being utilised to support ministries of education in improving education service delivery. These areas cover administrative functions, support for decision-making, and system support for teaching and learning. As AI continues to develop, increasingly sophisticated tools will be able to support a greater variety and depth of education services (↑Molina et al., 2024).

Administrative tasks and processes

The literature highlights how AI tools can help streamline administrative tasks for education stakeholders aiming to improve efficiency by using AI as a time-saving tool (↑Abdallah & Abdallah, 2024; ↑Chen et al., 2020; ↑MBSSE, 2025; ↑Molina et al., 2024; ↑Yılmaz et al., 2025). AI can be used to automate aspects of different systems and tasks, such as data entry and record-keeping (↑Chakraborty et al., 2022; ↑Molina et al., 2024), which saves time and allows officials to focus on other activities, or allows teachers to concentrate more on students (↑Hossain et al., 2024). This also reduces paperwork and helps to centralise data records, making it more accessible to education stakeholders in the broader system.

However, at the teacher level, evidence suggests that the efficiencies of automation are maximised when users (i.e. teachers) have a baseline proficiency in using these tools, meaning that complementary support and training are essential for utilising AI for this purpose (↑Molina et al., 2024). In Rwanda, a national AI teacher training programme was recently implemented to support this kind of integration of AI (↑Day of AI, 2025).

Additionally, AI can be used to enhance coordination across different levels of the education system. AI can improve the portability and governance of data, facilitating its easier dissemination to various levels within the education system (↑Mont et al., 2020; ↑OECD, 2023). AI-driven platforms can also foster enhanced collaboration among education stakeholders at different levels, such as administrators, teachers, and parents, by providing information and assistance, such as helping parents to track student progress and receive relevant updates (↑Yılmaz et al., 2025)

Examples

AI-powered assistants can help automate routine tasks to improve efficiency, for example, Uplanner, a tool developed in Chile and being used in tertiary education institutions in multiple countries, automates processes to provide data-driven, optimised support to both teachers and students, such as automating the scheduling of exams or tutoring sessions (↑Molina et al., 2024). Institutions that use the tool have reported reduced administrative workload as a result of this automation, although more rigorous evidence is needed to fully determine the tool's impact and effectiveness (↑Molina et al., 2024).

↑Schiff's (2022) analysis of AI policies in education found that only a few countries address the use of AI for automating administrative tasks. One such country is Malta, where it is envisaged that AI can be used to automate tasks to improve efficiency and reduce teacher workload, such as in timetable preparation or booking facilities. However, the extent to which this policy goal has been integrated into practice is unclear at this stage (↑Schiff, 2022).

Another example is iMlango, an EdTech programme in Kenya, which uses a digital attendance system. Class and school attendance are tracked and reported using advanced analytics, which are then used by teachers and a field team to identify pupils with low attendance (↑Verma et al., 2025). This emphasises how automation of key tasks can help teachers focus attention on addressing, rather than recording, educational challenges.

Managing, analysing, and utilising data

The integration of AI into education management information systems (EMISs) and other education-focused systems could enhance the efficiency and effectiveness of these systems. EMIS integration within larger government-level digital systems is recognised as a crucial step for the digital transformation of service delivery (↑UNESCO, 2022). The use of AI can significantly enhance the efficiency of collecting, processing, and analysing large-scale data related to education, such as student demographics, attendance, and academic performance (↑Ashraf, 2024; ↑Dai et al., 2025; ↑Harry, 2023; ↑Luan et al., 2020; ↑Wang, 2021). In particular, AI is viewed as having enhanced data collection and analysis capacities with respect to large-scale education data. This kind of data is often not expressed in linear relationships but is multidimensional and contextual, with the use of AI techniques and machine learning representing an opportunity to expand the capabilities of learning analytics in education systems (↑Arar et al., 2025; ↑Luan et al., 2020). To this extent, AI is seen as essential in generating evidence-informed and data-driven decision-making that would otherwise not be possible without automated tools capable of managing and analysing substantial volumes of data (↑Alsbou & Alsaraireh, 2024; ↑Arar et al., 2025; ↑Harry, 2023; ↑UNESCO, 2019).

With respect to data collection, AI can create new capacity for continuous monitoring and data collection, providing real-time and comprehensive education data that can be useful to decision-makers. The automation of monitoring capabilities through the use of AI mechanisms can help provide stronger data foundations to inform more data-driven educational policy (↑Filgueiras, 2024). Furthermore, analysing this data through AI algorithms can help identify system-level patterns and trends to support data-driven decision-making, which can help inform the development of policies and interventions tailored to those identified trends or challenges (↑Maia et al., 2023). Machine learning algorithms can recognise these patterns and make recommendations (with some degree of uncertainty) about useful or optimal actions (↑Filgueiras, 2024).

Having robust AI frameworks and policies, as well as inclusive and high-quality data systems, in place at the ministry level can support this process and serve as a prerequisite for improving data collection and management (↑Maia et al., 2023; ↑UNESCO, 2019). The Government of Tanzania, for example, is beginning to introduce a national AI in education framework to guide how AI-collected data is being used to inform learning and policy (↑Mwakalinga, 2025). These frameworks, policies, and strategies, often developed at the national level with political aims in mind, must be grounded in operational realities and developed in partnership with key implementing institutions to be robust and relevant.

Pre-empting system challenges

One key example of analysing and utilising data that emerged from the literature was its use for pre-empting system challenges. AI can be used to support predictive analysis for education-related issues, such as identifying students at high risk of dropping out (↑Igbokwe, 2023; ↑Molina et al., 2024; ↑Omwenga et al., 2025; ↑Ufomba et al., 2024). AI can monitor and analyse data on relevant indicators, such as test scores and attendance records, and combine this with analysing trends from historical EMIS data to predict which learners may be at higher risk of dropping out (↑Ashraf, 2024; ↑Igbokwe, 2023).

A systematic review of student dropout prediction models in higher education highlighted the significant role of data mining and machine learning algorithms (↑Tete et al., 2022). These models can achieve 80–90% accuracy when accounting for a range of variables such as attendance and socio-economic factors (↑Education for All in India, 2025). However, current models for predicting students at risk of dropout don't take full advantage of the range of variables and techniques that could underpin their effectiveness.

For example, ↑Elbouknify et al. (2025) outline an AI-driven predictive modelling approach that utilises advanced machine learning techniques to identify students at risk of dropping out. When tested using real data provided by the Moroccan Ministry of National Education, the model achieved 88% accuracy, 88% recall, 86% precision, and an Area Under the Curve (AUC) of 87%, demonstrating a highly effective (but not wholly accurate) model for identifying at-risk students.

If accurate models can be developed, predictive analysis can, in theory, enable education stakeholders to take proactive measures and design interventions to appropriately support students before they drop out, thereby helping to minimise learning losses (↑Ashraf, 2024; ↑Molina et al., 2024). However, more rigorous testing is needed to determine the extent to which predictive modelling can inform action.

One particular area that warrants further exploration is the use of AI to support Anticipatory Action (AA) design in Education in Emergencies (EiE) contexts. AA frameworks for EiE integrate educational data into their analysis to define triggers and set thresholds. AI-supported predictive analysis models could, in theory, be integrated into this process, used alongside forecast-based models to provide a more automated approach to identifying context-appropriate thresholds and triggers for AA to mitigate the impact of various crises (climate, conflict, etc.).

Allocating resources

The literature suggests that AI can be used to enhance resource allocation in education systems (↑Ashraf, 2024; ↑MBSSE, 2025; ↑Molina et al., 2024). This is a particularly important area in LMICs, where ministry budgets and resources are more limited, and optimisation of resources could be significant in improving service delivery. AI can be used to streamline expenditure on specific public services, such as education. A recently launched initiative supported by the World Bank in Bangladesh aims to build a centralised platform that integrates budgeting, accounting, and project management systems to improve overall public service delivery (↑Byron, 2025).

AI algorithms can also analyse resource utilisation patterns and identify areas of inefficiency or surplus, recommending optimised solutions such as matching teachers to vacancies or student admissions (↑Ashraf, 2024; ↑Molina et al., 2024). For teacher allocations, using algorithms that rely on a range of data sources, such as geographical preferences, teacher interests, and logistical constraints, AI-supported systems can enhance the efficiency and equity of resource allocation at the national level, while helping ministries to address key educational challenges that often hinder learning outcomes (↑Molina et al., 2024). For example, to more effectively address gaps in teacher distribution, India plans to explore more automated systems for teacher hiring and transfer based on their qualifications and preferences (↑NITI Aayog, 2018; ↑Schiff, 2022).

Additionally, AI systems could be used to identify areas where resource allocation should be prioritised and suggest adjustments accordingly, such as recognising under-resourced students or educational facilities (↑Osegbue et al., 2025). This benefit is recognised in some policies, with Mexico's AI in education strategy claiming its use could "enable poorer citizens to access higher-quality and cheaper services" (↑Schiff, 2022, p. 541). However, the extent to which these policy objectives are being successfully translated into equitable resource allocation is unclear.

Examples

In Sierra Leone, an ongoing project is using algorithms to help support teacher allocations. The algorithm accounts for pupil-to-teacher ratios to ensure all schools can receive qualified teachers, and considers teacher preferences in choosing which schools they should be deployed to (↑Frazer, 2024). While further research is ongoing to determine the impact of this algorithm on learning outcomes, it is perceived as facilitating more convenient teacher transfers, optimal allocation, and distribution of qualified teachers. Teachers are widely supportive of the tool even if the allocation does not always completely match their preferences (↑Frazer, 2024). Other similar examples from South America have helped match teachers to vacancies, reducing teacher shortages and improving the quality of educational opportunities available (↑Molina et al., 2024). Therefore, there is clear evidence that centralising teacher allocation using AI algorithms can be beneficial, although more evidence is needed to assess the impact on learning outcomes.

Developing and rolling out policy and curriculum

AI can also be used to support curriculum development and design (↑Chen et al., 2020; ↑Luan et al., 2020; ↑Yılmaz et al., 2025). Analysing data on student performance and feedback can help identify key gaps in the curriculum where improvements can be made (↑Igbokwe, 2023), and can support the optimisation of curricula by addressing key competency gaps at the national level. To this end, AI can help identify and highlight evidence-based gaps and solutions for curricula improvement (↑Ashraf, 2024).

Evidence from tertiary institutions suggests this approach is particularly useful for creating curricula that align with specific standards or expectations, such as providing content that equips students with the appropriate skills for entry into the workforce (↑Ashraf, 2024; ↑Omwenga et al., 2025). While this is not directly related to education system delivery, there is a clear application for ministries of education to consider regarding how AI could be utilised to address key competency gaps, such as relative performance in basic literacy and numeracy tasks, and adjust curricula accordingly. AI integration within the assessment of curricula standards and curricula development can then also be used to support the development of other relevant areas of delivery, such as developing lesson plans, teacher professional development programmes, and learning materials that are curriculum-aligned (↑Molina et al., 2024).

An additional concept relevant to policy development, in addition to other aspects of education service delivery, is that of 'digital twinning'. A digital twin is a virtual replica of an environment, but crucially, it is a highly detailed copy of physical infrastructure, systems, and processes that can replicate entire learning environments or systems (↑Ağca, 2023; ↑Nalayini & Arunkumar, 2025; ↑van Meerten & Smit, 2024). Using AI, digital twins can mirror the functionality of their real counterparts in real time, through being continuously updated with data that provides real-time synchronisation, to enable dynamic behaviour and response within the digital twin (↑Ağca, 2023; ↑Nalayini & Arunkumar, 2025). These digital twins then enable stakeholders to observe, analyse, and simulate inputs or scenarios within that environment (↑Ağca, 2023) and determine their likely impacts or performance in the equivalent real-world setting (↑van Meerten & Smit, 2024).

For ministries of education, the implications of new initiatives or policies can be modelled through digital twins to predict their impact on education stakeholders within the system, and to help determine their impact on broader system considerations such as cost (↑Ağca, 2023). This enables ministries to predict the outcomes and risks of scenarios within complex systems, helping to make optimised and data-driven decisions with respect to different operations and strategies (↑van Meerten & Smit, 2024). The use of digital twins is not limited to policy and could be applied to a wide range of other applications, such as optimising resource allocation or learning environments (↑Nalayini & Arunkumar, 2025).

Assessing learning

While some aspects of this use case are more related to classroom practice, AI can be integrated to support and enhance the capacity of education systems in performing learning analytics. AI tools can analyse student performance data and identify learning patterns, highlighting particular strengths, weaknesses, and areas for improvement (↑Alsbou & Alsaraireh, 2024; ↑Ufomba et al., 2024; ↑Wang et al., 2024). This kind of use can serve as a foundation to support a wide range of tasks, from national policy to personalised learning plans for students, although a discussion of the use of AI for personalising learning is beyond the scope of this brief.

The data collection and analytical capacity of AI can provide ministries of education with dashboards of key information, such as student performance or teacher effectiveness, which can be analysed to enable data-driven decisions for improving educational delivery and understanding overall performance and trends in learning (↑Alsbou & Alsaraireh, 2024; ↑Dai et al., 2025; ↑Luan et al., 2020; ↑Wang, 2021). AI tools can analyse multiple data sources, creating more reliable evaluations of both student learning and teacher performance (↑Wang, 2021). With respect to the latter, having multiple data sources and points across time facilitates more reliable techniques for ministries to understand teacher effectiveness (↑Wang, 2021). AI can also be utilised to evaluate educational performance data, with AI modelling supporting the allocation of resources or development of policies based on key trends in educational performance that are relevant at a national, state, or local level (↑Maia et al., 2023).

Examples

There are some examples of centralised AI use that can help support learning assessment. One study tested AI-automated early grade reading assessment (EGRA), using automatic speech recognition (ASR) to assess early grade reading for students in South Africa (↑AI for Education, 2025). While these kinds of tools are still in early piloting stages, there is promising potential for integrating AI into national learning assessments to help build dashboards of standardised and consistent measures of student learning outcomes relating to key competencies and educational progress.

However, it is essential that ministries of education have clear policies and support mechanisms about the use of AI, which could help embed these benefits in a systematic way. For example, NITI Aayog, the policy think tank of the Government of India, is considering using teacher professional development to equip teachers with the skills to utilise AI tools and employ predictive analysis tools to take pre-emptive actions to prevent student dropouts (↑Schiff, 2022).

Other ways in which similar tools have been integrated at the ministry level are through partnerships. For example, in the UAE, a partnership between the Ministry of Education and OpenAI to integrate AI technology into education has been formed, with a focus on a 'digital teacher' to support and improve teaching methods, as well as supporting learning analytics through collecting and analysing the academic performance of students (↑Abdallah & Abdallah, 2024). Alongside this, the ministry is focusing on training teachers in AI tutoring and language models to ensure they possess the appropriate skills to integrate these tools at the classroom level (↑Abdallah & Abdallah, 2024). These examples demonstrate that AI use is often best supported through mechanisms and policies that are embedded at a systems level. AI needs to be integrated into government-directed policy and training programmes in order for educators to maximise its use within education systems, as well as to enhance classroom-based activities and learning. Any training related to the use of AI should cover both technical capacity to utilise AI systems and approaches to incorporate AI systems into instruction (↑Feng & Li, 2024; ↑Hossain et al., 2024; ↑Molina et al., 2024). Teachers need to be equipped with the right technical capabilities to maximise the application of AI with the ultimate aim of improving student learning outcomes. However, it is important to emphasise that successful training and distribution of AI tools alone, as with all forms of EdTech, will not causally improve learning outcomes. While embedding AI within systems may remove burdens for teachers, there are a significant number of other important factors, such as pedagogy and student engagement, that will ultimately determine the extent to which AI integration at a systems level will lead to improved learning outcomes. Further details on these considerations at a classroom level will be discussed in future briefs.

Limitations

While evidence has highlighted some successes and use cases of AI, there are very few direct examples of tools embedded at a ministry or systems level. A significant portion of the literature focuses on theoretical discussions about the use of AI, as opposed to practical reflections. Most of the existing empirical evidence focuses on the use of AI to support teachers and students, such as providing automated feedback and personalised learning. However, these have been largely excluded from this brief due to their limited relevance for systems-level analysis. In addition, examples of less successful pilots or projects are not detailed in the literature, and the challenges that are mentioned relate to implementation fidelity and AI adoption rather than potential weaknesses in AI tools themselves.

Additionally, the adoption of AI in education is low compared to other sectors, and many tools remain in an experimental phase with uncertainties about their benefits and limitations (↑Felix & Webb, 2024). This means there is very little empirical evidence that assesses the effectiveness or impact of AI tools, and those that do tend to be confined to specific use cases less relevant to a systems-level analysis, such as the use of generative AI in classrooms (↑Felix & Webb, 2024). Evidence of AI integration at an institutional level also primarily comes from universities, meaning that challenges relevant to ministries of education or similar government structures remain unclear.

Navigating what's ahead

Despite the promise of AI to enhance aspects of education service delivery, several key challenges and areas need to be addressed for AI to be integrated at scale within education systems in LMICs.

Evidence related to AI for enhanced service delivery is still nascent; iterative testing and learning will be critical to evaluate its impact. Crucially, it is imperative that evidence related to the integration of AI at a systems level begins to shift from theoretical discussion towards empirical data derived from practical implementation. The use of AI in education is still in its infancy, with limited robust evidence on its effectiveness, particularly at scale, in real-world contexts. Much of the touted potential of AI remains based on speculation or optimism rather than tested effectiveness.

Due to this lack of data, there is insufficient evidence to determine which AI tools or applications are likely to successfully scale in LMICs, or how national policies should be structured to account for potential AI use cases. In particular, there is a lack of research on the long-term impacts of AI integration on education system delivery, as well as other core aspects of education, such as students' learning.

Therefore, small-scale and iterative testing of the existing theory is a critical first step in moving towards generating this kind of evidence. Ultimately, rigorous testing of potential AI use cases will begin to embed evidence-driven approaches and effective uses of AI, providing the foundation for scaling and adoption at the national level.

In order to successfully integrate AI, **it is essential to navigate ethical considerations by implementing robust governance frameworks that ensure data privacy and address algorithmic bias to prevent the perpetuation of existing inequalities.** A high number of sources indicate issues such as data security and algorithmic bias are essential to navigate for the successful integration of AI (↑Abdallah & Abdallah, 2024; ↑Arar et al., 2025; ↑Ashraf, 2024; ↑Filgueiras, 2024; ↑Galadima & Abdullahi, 2024; ↑Harry, 2023; ↑Kakanuglu, 2025; ↑Langeveldt, 2024; ↑Molina et al., 2024; ↑Yılmaz et al., 2025). In education systems, where AI has access to vast amounts of student data, many authors emphasise the imperative of following proper consent, strict data privacy protocols, and safeguarding measures to prevent sensitive information about children from being externally accessible or used unethically. Having robust ethical governance frameworks and policies in place is essential to guide this process and ensure that AI use adheres to strict safeguarding protocols (↑Fauziddin et al., 2025; ↑Molina et al., 2024). AI algorithms and systems can also replicate existing biases, such as those related to gender, race, or socioeconomic data, if they are trained on biased data. AI is not 'truthful' in this sense and will reflect underlying biases or prejudices in the data and assumptions on which it is being trained, resulting in unequal treatment of marginalised students and the perpetuation of existing inequalities (↑Harry, 2023; ↑Kakanuglu, 2025). In the UK, for example, a GCSE grading algorithm downgraded students' scores based on previous years' results, undervaluing individual performance due to its reliance on location or institutional 'credibility' as assessed by AI (↑BBC, 2020). In Scotland, this led to a 15.2 percentage point reduction in the Scottish Higher pass rate for pupils from the most deprived backgrounds, compared to a 6.9 percentage point reduction for the wealthiest students (↑BBC, 2020). Navigating biases in underlying data and how AI processes them is crucial to ensure AI does not perpetuate underlying inequalities.

To ensure accountability for key decisions, AI integration should be transparent and provide clear explanations of how and why AI algorithms or tools are being utilised in decision-making. In particular, decisions that affect the lives of those involved in the system, such as teacher allocation or decisions around students' educational futures, should have robust accountability and transparency mechanisms due to their significant human impact.

How AI relates to broader EdTech challenges

AI also needs to navigate some of the broader challenges associated with the use of technology in education in LMICs. **For AI to be integrated equitably across education systems in LMICs, sufficient digital infrastructure must be in place to ensure all schools have the opportunity to access it.** In particular, many countries lack sufficient connectivity or digital infrastructure to support the adoption of AI at a systems level. Ensuring that this infrastructure is in place and that all schools have equal access to it is essential for integrating AI and using it equitably across education systems.

Furthermore, **to ensure AI adoption is equitable and inclusive, ministries of education should actively address the digital divide to prevent the exclusion of marginalised schools and users**. Existing and unaddressed digital divides mean that AI adoption could exacerbate existing inequalities, as marginalised users or institutions lack access to the necessary technology and infrastructure required to benefit from AI. Reducing this gap is critical for equitable and inclusive AI adoption (↑Molina et al., 2024) and education ministries should be attentive to navigating this issue to ensure schools and users are not inadvertently excluded from AI usage.

To ensure the equitable implementation of AI and distribution of its benefits, education stakeholders should be adequately trained in how to use AI and interpret its outputs. Inadequate preparation and training can lead to both barriers to AI adoption and an uneven distribution of the benefits that AI may bring, for example, if one state ministry has greater capacity to analyse AI-derived trends than another.

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