

Modern Classrooms in Emerging Markets

What It Actually Takes to Bring AI-Supported Learning into Schools Across Africa, MENA and Asia-Pacific

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Abstract

The global conversation around artificial intelligence in education has accelerated rapidly over the past two years. Governments, investors, technology companies, and education providers increasingly position AI as a transformative force capable of improving learning outcomes, personalising instruction, and expanding access to quality education at scale.

Yet much of this conversation remains heavily centred on high-income markets and assumes the existence of stable connectivity, mature digital infrastructure, well-resourced schools, and low student-to-teacher ratios. **The operational reality across many emerging markets is fundamentally different.**

This paper explores what it practically takes to implement AI-supported learning across emerging markets — examining infrastructural, pedagogical, operational, and policy considerations required to move beyond pilot projects and toward scalable educational transformation.

Key Focus Areas

- Offline and edge AI systems
- Curriculum-grounded orchestration
- Multilingual localisation
- Teacher augmentation
- Mobile-first deployment
- Hybrid cloud architectures

Drawing upon research from UNESCO, OECD, GSMA, the World Bank, HolonIQ, and other international organisations.

The future of AI-supported learning in emerging markets will depend less on isolated AI tools and more on integrated educational ecosystems designed specifically for low-resource, high-demand environments.

Introduction: The Gap Between Assumption and Reality


Artificial intelligence is rapidly becoming one of the defining technological forces shaping the future of education. Yet much of the current discussion is dominated by assumptions rooted in high-income markets.

What AI Models Assume

- **Reliable high-speed internet access**
- **One-to-one device availability**
- **Mature learning management systems**
- **Stable cloud connectivity**

The Emerging Market Reality

- **Intermittent connectivity**
- **Shared devices across students**
- **Overloaded teachers**
- **Highly localised curricula**

 According to UNESCO's 2023 Global Education Monitoring Report, substantial digital inequalities continue to shape educational access and quality worldwide, particularly across low- and middle-income countries.

AI-supported learning in emerging markets cannot simply be imported from high-income educational ecosystems. It must be designed around the operational realities of local classrooms — requiring a shift away from isolated educational software toward integrated, AI-native educational infrastructure.

1. The Infrastructure Reality of Emerging Market Schools

The phrase "modern classroom" often evokes images of fully connected smart environments with cloud-based collaboration systems, interactive displays, AI tutors, and seamless device ecosystems. While such environments exist within some international and private institutions, they are not representative of the majority of classrooms across emerging markets.

Connectivity

Limited internet bandwidth and uneven mobile connectivity quality, particularly in rural regions

Devices

Shared computing resources with minimal IT support and limited technical maintenance capacity

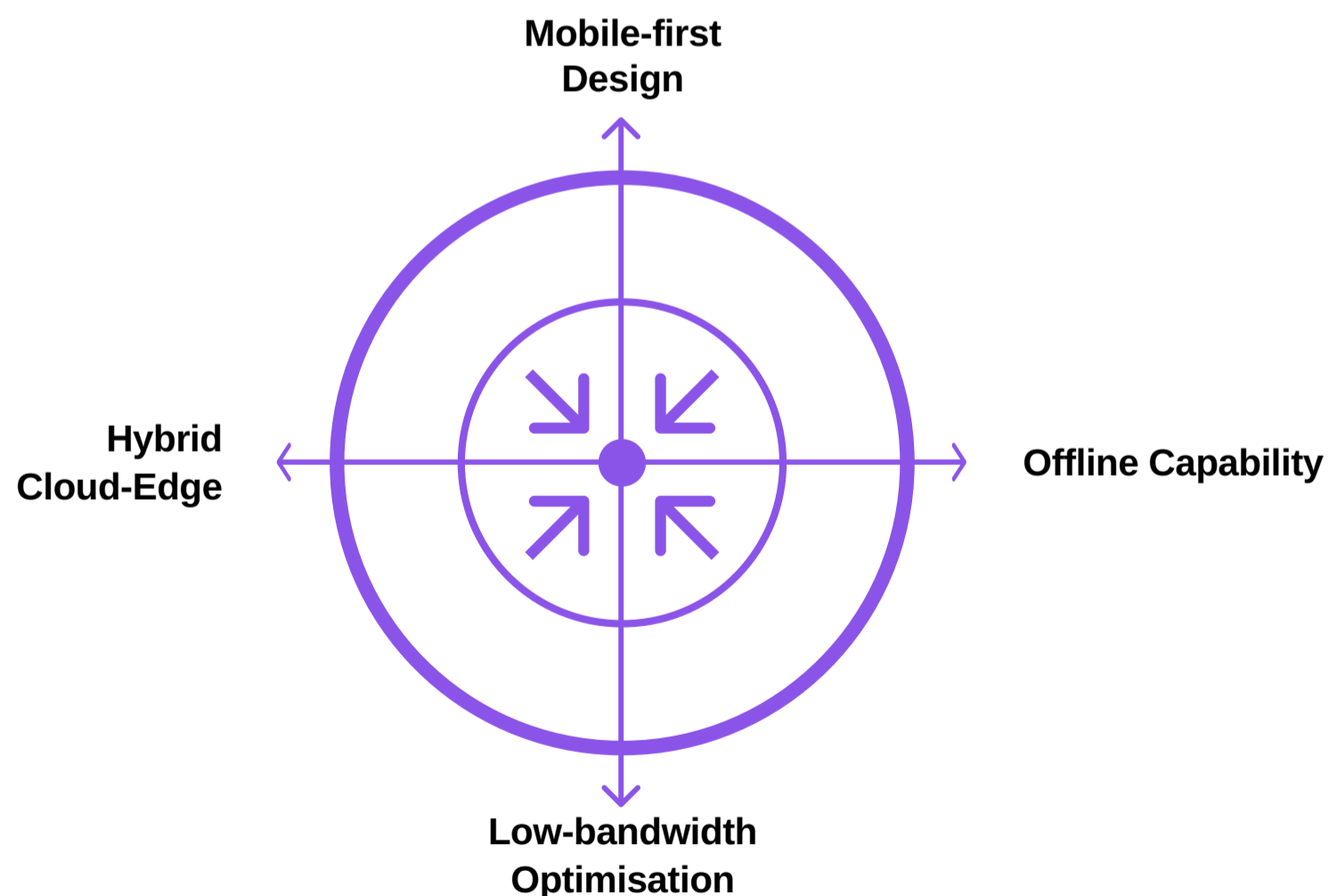
Power

Inconsistent electricity availability disrupting continuous digital learning workflows

Staffing

High student-to-teacher ratios with limited administrative support structures

GSMA's 2024 Mobile Economy report notes that while smartphone adoption continues expanding rapidly across Africa and South Asia, mobile connectivity quality and affordability remain uneven, particularly in rural regions. UNICEF's 2024 digital equity report similarly highlights that substantial portions of children globally still lack reliable digital access both inside and outside school environments.



Cloud-only educational AI systems may function effectively within highly connected urban environments, but they often become fragile within lower-resource deployment conditions. Future educational systems therefore increasingly require hybrid architectures combining cloud orchestration, local edge processing, offline synchronisation, and low-latency local inference. This infrastructural resilience becomes foundational rather than optional.

2. AI in Education Must Be Teacher-Centric

One of the most significant misconceptions surrounding AI-supported learning is the assumption that AI primarily exists to interact directly with students. In practice, the greatest short-term impact of AI within emerging market classrooms may come from **teacher augmentation rather than student-facing automation**.

44M

Teachers Needed

Additional teachers required globally by 2030, with greatest shortages in sub-Saharan Africa and South Asia (UNESCO, 2024)

2030


Target Year

UNESCO's deadline for closing the global teacher gap — a challenge AI-supported systems can help address

What AI Should Do for Teachers

- Automate repetitive planning tasks
- Support curriculum sequencing
- Generate adaptive instructional materials
- Assist with assessment analysis
- Reduce administrative overhead
- Surface actionable instructional insights

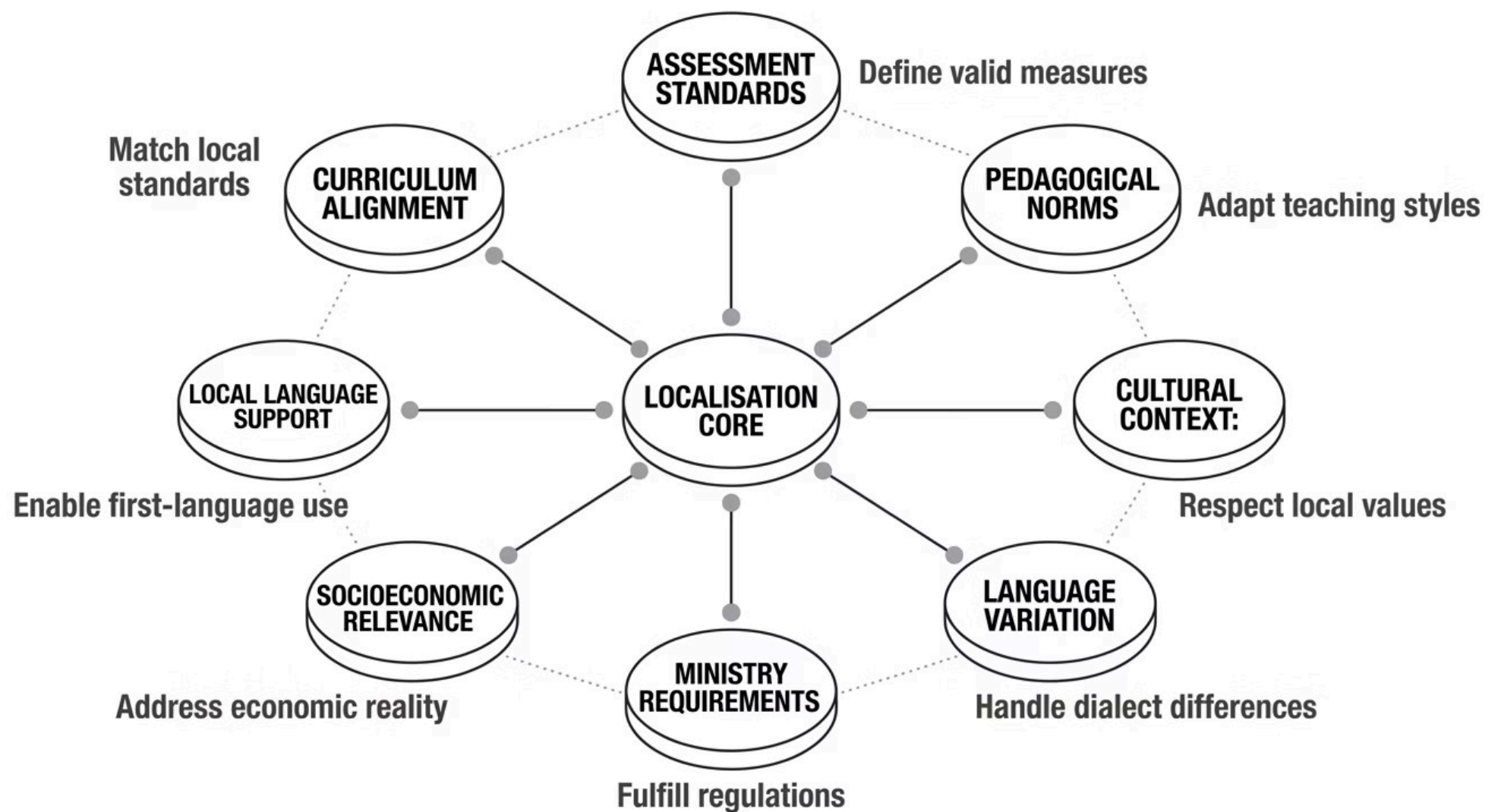
Why AI Adoption Fails

 AI adoption fails when systems are perceived as supervisory, surveillance-oriented, administratively extractive, or technologically overwhelming. Teacher trust is a strategic requirement for long-term adoption.

Education International's 2023 report on teacher wellbeing found increasing levels of stress, emotional exhaustion, and professional overload among educators globally, particularly within rapidly reforming systems. The most effective AI systems are therefore likely to be those that operate quietly in the background, reducing friction rather than demanding continuous interaction.

3. Localisation Is Not Optional

One of the greatest barriers to scalable AI-supported learning across emerging markets is localisation — frequently misunderstood as translation alone. In reality, educational localisation is a far more complex undertaking.



Where Localisation Complexity Is Most Visible

<p>India</p> <p>State and CBSE systems with significant regional variation</p>	<p>Africa</p> <p>Multilingual classrooms spanning dozens of languages and dialects</p>
<p>Gulf Region</p> <p>Ministry frameworks with strict curriculum control requirements</p>	<p>ASEAN</p> <p>Diverse educational ecosystems across rapidly developing economies</p>

The Risk of Ignoring Localisation

Most large AI systems remain disproportionately trained on Western-centric datasets. Without localised grounding, educational outputs risk becoming:

- Curriculum misaligned
- Culturally inappropriate
- Instructionally inconsistent
- Pedagogically shallow

✔ HolonIQ's 2024 market outlook identifies localised AI learning systems as one of the fastest-growing priorities within emerging market educational transformation. Localisation therefore becomes infrastructural rather than cosmetic.

4. Offline and Edge AI Will Define Scalability

One of the most important realities of emerging market educational infrastructure is that internet access cannot be assumed to be permanent, stable, or affordable. Cloud-dependent systems remain vulnerable to connectivity outages, bandwidth limitations, data cost barriers, and rural infrastructure gaps.



Reduced Latency

Local edge processing eliminates dependency on round-trip cloud requests, enabling faster instructional responses



Lower Bandwidth Dependency

Edge architectures allow intelligent workflows to continue even when connectivity is limited or absent



Data Sovereignty

Local processing keeps sensitive student data within national or institutional boundaries



Rural Accessibility

Offline-capable systems extend quality AI-supported learning to the most underserved communities

Gartner's 2024 strategic technology trends report identifies distributed AI and edge intelligence as critical developments shaping next-generation infrastructure systems.

Such models may become particularly important across rural Africa, remote Pacific regions, underserved South Asian communities, and refugee and displacement contexts. The future "modern classroom" in emerging markets is therefore unlikely to resemble a permanently connected cloud terminal — it is more likely to function as a resilient hybrid ecosystem capable of intelligent local operation.

5. Workflow Orchestration & Device Strategy

Beyond Isolated AI Tools

Many current AI education tools remain fundamentally isolated applications — generating lesson content, producing quizzes, or answering student questions. However, teaching itself is a continuous workflow shaped by timetables, curriculum progression, assessment feedback, and classroom context.

Agentic AI systems differ from conventional chatbot systems because they coordinate workflows autonomously rather than merely responding to prompts. Microsoft's 2024 research describes them as *operational collaborators capable of managing multi-step processes and maintaining contextual continuity over time*.

What Orchestration Enables

- Track curriculum progression across terms
- Coordinate lesson sequencing intelligently
- Adapt pacing from assessment data
- Recommend remediation pathways
- Support differentiated instruction
- Maintain continuity across subjects

Device Strategy for Emerging Markets

Many educational transformation initiatives fail because they prioritise software procurement without adequately addressing device ecosystems. Scalable deployment models increasingly combine multiple hardware layers:

01

Teacher Devices

Primary instructional interface and AI workflow hub

02

Shared Student Tablets

Flexible access without one-to-one cost burden

03

Interactive Classroom Displays

Shared visual learning for large groups

04

Edge AI Compute Devices

Local intelligence without cloud dependency

05

Offline Sync Layers

Resilient content distribution across the school

📄 NVIDIA's 2024 report on agentic AI identifies orchestration systems as the next major evolution of enterprise intelligence infrastructure — and for emerging markets facing teacher shortages and operational overload, workflow orchestration may become more valuable than isolated content generation itself.

6. Policy, Procurement & the Real Goal

Government Policy Must Evolve

Traditional educational procurement frameworks are often poorly suited to AI-native infrastructure deployment. Many systems remain designed around static software licences, hardware purchasing cycles, compliance reporting, and isolated platform procurement.

AI-supported learning systems increasingly require more dynamic approaches involving continuous model updates, hybrid cloud-edge infrastructure, curriculum adaptation, and distributed deployment models. Governments therefore need to increasingly view **educational AI as infrastructure rather than standalone software**.

Key Policy Considerations

- Data sovereignty and local hosting requirements
- Curriculum control and ministry alignment
- Teacher training models at scale
- Infrastructure interoperability standards
- Long-term operational sustainability

The Real Goal: Capacity Expansion

Much of the public conversation around AI in education focuses on futuristic personalisation or autonomous tutoring. However, the immediate strategic value of AI-supported learning in emerging markets may be far more operational.



Support More Students

Effectively serve larger cohorts without proportional teacher increases




Improve Consistency

Maintain instructional quality and curriculum continuity across schools



Earlier Intervention

Surface student needs before they become entrenched learning gaps

-  The World Economic Forum's 2024 education systems report argues that future AI adoption in education must prioritise governance, equity, and inclusion alongside technical innovation — especially within emerging markets where poorly implemented technology projects have historically struggled to achieve sustained classroom adoption.

Conclusion

Bringing AI-supported learning into schools across Africa, MENA, and Asia-Pacific requires far more than introducing digital tools or deploying isolated chatbot systems. It requires educational infrastructure designed specifically for the operational realities of emerging markets.

Infrastructure Offline and edge AI capability with hybrid cloud deployment models and resilient device ecosystems	Pedagogy Teacher-centric workflow support with curriculum-grounded intelligence and localisation infrastructure
Architecture Mobile-first design with workflow orchestration systems and offline synchronisation layers	Policy Governance frameworks treating AI as infrastructure, prioritising equity, data sovereignty, and sustainability

The modern classroom in emerging markets will not simply replicate high-income educational technology models. Instead, it is likely to evolve into a distinct category of intelligent educational ecosystem optimised for scalability, accessibility, infrastructure resilience, teacher sustainability, and contextual adaptability.

The most successful AI-supported learning systems will ultimately not be those with the most advanced algorithms alone. They will be the systems capable of operating effectively within the real-world conditions of classrooms across diverse and rapidly evolving educational environments.

The future of AI in education therefore depends not simply on intelligence itself, but on whether educational systems can build the infrastructure necessary to make that intelligence genuinely usable, reliable, and sustainable at scale.

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