REPUBLIC OF GHANA

Ministry of Education

Centre for National Distance Learning and Open Schooling (CENDLOS)

GHANA INTELLIGENT CLASSROOMS INITIATIVE

A National Framework for Intelligent, Inclusive and Future-Ready Education

Including the National Demonstration and Readiness Programme

Creating Equitable, Resilient and AI-Enabled Learning Environments for Every Child in Ghana

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Curriculum-Aware Educational Intelligence

Offline-First Learning Infrastructure

Solar-Powered Classroom Resilience

Teacher-Centred Educational Transformation

Submitted By

NDX Education

Prime Contractor and Programme Integrator

In Partnership With

Data Systems Ltd

National Delivery, Training and Support Partner

Prepared For

The Ministry of Education

The Centre for National Distance Learning and Open Schooling (CENDLOS)

June 2026

Accra, Ghana

Programme Vision

National Demonstration and Readiness Programme
(1,000 Intelligent Classrooms)

Leading Towards

Future National Scale Deployment Across Ghana

"The objective is not simply to deploy technology. The objective is to establish a sustainable national educational intelligence infrastructure that empowers teachers, inspires learners and prepares Ghana for leadership in an increasingly digital and AI-enabled future."

About NDX Education

Building Classrooms Ready for What's Next

NDX Education is a global education technology and transformation company dedicated to helping Ministries of Education, school systems and educational institutions create modern, connected and future-ready learning environments.

Our mission is simple: to help countries deliver intelligent classrooms at scale — and to do so in a way that can be sustained, operated and owned locally.

As education systems around the world prepare learners for an increasingly digital and AI-enabled future, NDX Education works with governments and institutional partners to design and deploy complete educational ecosystems that combine infrastructure, educational intelligence, teacher enablement and long-term capability development.

We believe educational transformation is not achieved through technology alone. Successful transformation requires the integration of curriculum, pedagogy, infrastructure, teacher development, local capability and sustainable delivery models. For this reason, NDX Education takes a systems-based approach to educational modernisation, ensuring that technology, teaching and learning operate together as a unified ecosystem.

Our Vision

To create a world where every learner, regardless of geography or circumstance, has access to a classroom that is ready for the future.

Our Mission

To help Ministries of Education and school systems deliver intelligent, connected and resilient learning environments that improve educational outcomes while building sustainable local capability.

What We Do

NDX Education designs, deploys and supports complete Intelligent Classroom ecosystems, including:

- Interactive learning environments.
- Classroom infrastructure platforms.
- Curriculum-aware educational intelligence.
- Teacher enablement and professional development.
- Offline-first learning environments.
- Solar-powered educational resilience solutions.
- National-scale deployment frameworks.

- Educational analytics and reporting systems.
- Capability transfer and workforce development programmes.

Our solutions are designed specifically for the realities of K-12 education and are particularly well suited to emerging and rapidly developing education systems where connectivity, power availability and long-term sustainability must be carefully considered.

Educational Intelligence Designed for Education

At the heart of the NDX Education platform is AIME Educational Intelligence.

Unlike general-purpose artificial intelligence systems that have been adapted for educational use, AIME has been designed specifically for teaching and learning. The platform combines curriculum-aware educational intelligence, pedagogical reasoning frameworks and specialised language models to support lesson planning, curriculum delivery, assessment preparation, differentiated instruction and classroom engagement.

AIME is designed to support teachers, not replace them. By reducing administrative burden and enhancing access to educational resources, the platform enables teachers to focus more time on teaching, mentoring and supporting learners.

Importantly, AIME operates through an offline-first architecture and can be configured to align with national curricula, local languages, cultural requirements and educational standards.

Designed for Real-World Education Systems

Many educational technologies assume reliable internet access, continuous power availability and highly standardised learning environments.

NDX Education takes a different approach.

Our solutions are designed for real-world conditions, including:

- Variable connectivity.
- Rural and remote learning environments.
- Diverse device ecosystems.
- National-scale deployment requirements.
- Long-term operational sustainability.
- Local ownership and control.

This approach enables education systems to benefit from advanced educational intelligence and modern learning technologies without becoming dependent on continuous cloud connectivity or unsustainable operating models.

Building National Capability

A core principle of every NDX Education programme is capability transfer.

We believe that successful educational transformation requires the development of local expertise, local support capability and long-term national ownership.

Through structured Train-the-Trainer programmes, technical certification pathways, professional development frameworks and operational knowledge transfer, NDX Education works alongside national partners to ensure that capability is progressively embedded within the country.

Our partnerships are measured in years, not months, and are focused on creating sustainable educational ecosystems that continue to deliver value long after initial deployment.

Our Approach

Every NDX Education deployment is guided by four principles:

Curriculum-Aware

Educational intelligence aligned to national curricula, teaching standards and learning outcomes.

Offline-First

Learning and teaching should continue regardless of internet connectivity.

Teacher-Centred

Technology should empower teachers and strengthen professional practice.

Sustainable by Design

Solutions must be financially, technically and operationally sustainable at national scale.

Partnering for the Future

NDX Education works with governments, educational institutions and national delivery partners to create intelligent, inclusive and future-ready learning environments that prepare learners for success in an increasingly digital world.

Our objective is not simply to deploy technology.

Our objective is to help countries build sustainable educational intelligence ecosystems that empower teachers, inspire learners and create lasting national impact.

Executive Summary

Ghana Intelligent Classrooms Initiative

National Demonstration and Readiness Programme

Executive Summary

Ghana Intelligent Classrooms Initiative

National Demonstration and Readiness Programme

Ghana has established itself as a recognised leader in educational development and innovation across Africa. As digital technologies and artificial intelligence increasingly shape economies, societies and future workforce requirements, there is a significant opportunity to further strengthen Ghana's education system through the introduction of intelligent, resilient and future-ready learning environments.

The Ghana Intelligent Classrooms Initiative has been developed through extensive consultation with the Ministry of Education, CENDLOS and key national stakeholders. The initiative is designed to support Ghana's vision for improving educational quality, strengthening teacher capacity, expanding equitable access to learning opportunities and preparing learners for success in an increasingly digital and AI-enabled world.

This proposal presents a National Demonstration and Readiness Programme comprising approximately **1,000 Intelligent Classrooms** across selected Basic and Junior High Schools throughout Ghana. The programme has been designed to validate educational outcomes, teacher adoption, infrastructure performance, implementation methodologies and operational readiness while establishing the foundations for a broader national rollout commencing from January 2027.

The initiative represents far more than a classroom technology deployment. It combines intelligent classroom infrastructure, curriculum-aware educational intelligence, teacher empowerment, professional development, local capability development and resilient solar-powered infrastructure within a single integrated ecosystem designed specifically for the realities of education in Ghana.

At the heart of the solution is the Intelligent Classroom platform comprising:

- **aimePANEL** interactive teaching and learning environments.
- **aimeHUB** classroom intelligence and orchestration systems.
- **AIME Educational Intelligence**.
- Curriculum-aware educational intelligence frameworks.
- Offline-first learning infrastructure.

- Integrated learning analytics and reporting.
- Solar-powered classroom resilience solutions.

A defining characteristic of the Ghana Intelligent Classrooms Initiative is the introduction of educational artificial intelligence directly into the classroom environment through a safe, curriculum-aware and teacher-centred approach.

As artificial intelligence becomes increasingly important to economic development, workforce readiness and national competitiveness, there is a growing need to ensure that learners and educators are able to engage confidently with AI-enabled technologies within structured educational environments. This programme provides Ghana with an opportunity to become a continental leader in the practical application of educational intelligence within schools.

Unlike conventional AI platforms that rely heavily on continuous cloud connectivity and external processing, AIME Educational Intelligence combines advanced local AI technologies operating directly within the educational environment. The platform incorporates a new generation of agile language models and educational reasoning frameworks specifically designed for teaching and learning. These specialised educational models provide intelligent assistance directly where learning takes place, reducing dependence on external services while improving resilience, responsiveness and accessibility.

Importantly, these educational intelligence capabilities can be configured to align with Ghana's curriculum frameworks, pedagogical approaches, language requirements and cultural context. This creates a uniquely Ghanaian educational intelligence environment capable of supporting national educational priorities while preserving local relevance, educational sovereignty and curriculum integrity.

Teachers remain at the centre of the learning process. AIME has been designed specifically to strengthen teaching practice rather than replace it. The platform supports lesson planning, curriculum mapping, differentiated instruction, assessment preparation, learning resource creation, classroom engagement and professional development, enabling teachers to spend more time focused on learning outcomes and learner support.

A fundamental principle of the programme is educational equity. Through its offline-first architecture and integrated solar-powered infrastructure, the solution ensures that teaching and learning can continue regardless of connectivity or power conditions. This enables learners in rural and underserved communities to access the same quality of educational experiences as those in urban centres, helping to reduce educational disparities while supporting national inclusion objectives.

The programme has also been designed around a sustainable operating model. Unlike many cloud-based artificial intelligence platforms that rely on continuous internet connectivity and recurring token-based consumption charges, AIME Educational Intelligence has been architected to operate without ongoing AI token costs. This eliminates one of the largest long-term cost risks associated with large-scale AI deployment and provides a predictable, scalable and financially sustainable model suitable for national implementation.

The partnership framework has been intentionally structured to maximise national ownership, local capability development and long-term sustainability:

- **Ministry of Education and CENDLOS** provide strategic leadership, educational governance and programme oversight.
- **NDX Education** serves as Prime Contractor and Programme Integrator, responsible for the Intelligent Classroom ecosystem, AIME Educational Intelligence platform, capability transfer and overall programme delivery.
- **Data Systems Ltd** serves as National Delivery and Support Partner, providing local deployment, teacher enablement, Continuous Professional Development, technical support and operational services throughout Ghana.

A structured Train-the-Trainer and Capability Transfer framework will ensure that expertise is progressively transferred into Ghana and embedded within national institutions and delivery partners. Working alongside CENDLOS, Data Systems Ltd will deliver ongoing Continuous Professional Development programmes, creating a growing community of educators capable of leading future educational innovation and transformation.

Implementation activities are planned to commence following contract execution and mobilisation in July 2026. Manufacturing, localisation, logistics, deployment, teacher activation, monitoring and evaluation activities will be completed during 2026, culminating in a National Readiness Assessment in December 2026. Subject to successful outcomes and stakeholder approval, the programme is intended to support commencement of a broader national scale-up programme from January 2027.

The initiative is expected to deliver significant benefits across multiple dimensions:

Educational Outcomes

- Improved learner engagement and participation.
- Enhanced curriculum delivery.
- Increased access to STEM, digital skills and AI literacy.
- Improved educational equity and inclusion.

Teacher Outcomes

- Reduced lesson preparation time.
- Enhanced instructional quality.
- Greater access to professional development.
- Increased confidence in technology-enabled teaching.

School Outcomes

- Modernised learning environments.
- Improved educational resilience.
- Increased access to curriculum-aligned resources.
- Enhanced community engagement.

National Outcomes

- Development of a sustainable educational intelligence ecosystem.
- Creation of certified Ghanaian implementation, support and training capability.
- Evidence-based planning for future educational investment.
- Strengthened national readiness for a digital and AI-enabled economy.
- Positioning Ghana as a regional leader in intelligent education.

The Ghana Intelligent Classrooms Initiative represents a strategic investment in educational quality, teacher empowerment, national capability and future workforce readiness. Through strong leadership from the Ministry of Education and CENDLOS, combined with the delivery expertise of NDX Education and Data Systems Ltd, Ghana has the opportunity to establish a model for intelligent, inclusive and future-ready education that can serve as a benchmark across Africa.

The objective is not simply to deploy technology. The objective is to establish a sustainable national educational intelligence infrastructure that empowers teachers, inspires learners and prepares Ghana for leadership in an increasingly digital and AI-enabled future.

Curriculum-Aware. Offline-First. Ghana-Configured.

The Ghana Intelligent Classrooms Initiative introduces advanced educational intelligence directly into the classroom through specialised AI models designed for teaching and learning, configured around Ghana's curriculum, pedagogy, languages and cultural context, and delivered without recurring AI token costs.

1. Vision for Ghana's Educational Future

1.1 Building Ghana's Educational Intelligence Infrastructure

Ghana stands at a pivotal moment in its educational development. As digital technologies, artificial intelligence, and advanced learning systems increasingly shape economies and societies around the world, there is a unique opportunity to position Ghana as a leader in educational innovation across Africa.

The Government of Ghana has consistently demonstrated its commitment to expanding access to quality education, improving learning outcomes, strengthening teacher capacity, and preparing young people for participation in a modern, knowledge-driven economy. The next stage of this journey requires more than the digitisation of classrooms. It requires the creation of a national educational intelligence infrastructure capable of supporting teaching and learning at scale while remaining accessible, resilient, and inclusive.

The Ghana Intelligent Classrooms Initiative has been conceived as a strategic national programme designed to support this vision. The initiative combines intelligent classroom environments, AI-enabled educational support, offline-first digital learning infrastructure, teacher empowerment tools, and scalable implementation models into a unified educational ecosystem specifically designed for Ghana's Basic and Junior High School environment.

The objective is not simply to introduce new technology into schools. The objective is to create a sustainable educational foundation that enables teachers to deliver more effective instruction, supports students with engaging and personalised learning experiences, and ensures that educational opportunity is not determined by geography, connectivity, or infrastructure limitations.

By combining educational intelligence, curriculum alignment, teacher support systems, and resilient classroom infrastructure, Ghana has the opportunity to establish a model for educational transformation that reflects the realities of African learning environments while embracing the opportunities created by emerging technologies.

1.2 Supporting National Education Transformation

The Ghana Intelligent Classrooms Initiative is designed to support and strengthen the strategic priorities of the Ministry of Education, CENDLOS, the Ghana Education Service, and other national stakeholders responsible for advancing educational excellence.

The programme recognises that successful educational transformation must place teaching and learning outcomes at its centre. Technology is therefore viewed not as an end in itself, but as an enabler of improved educational delivery, stronger classroom engagement, enhanced teacher effectiveness, and greater student achievement.

The initiative supports several key national priorities, including:

- Improved learning outcomes across Basic and Junior High Schools.
- Enhanced teacher capacity and professional development.
- Expansion of digital literacy and computational thinking skills.
- Increased access to quality educational resources.
- Greater educational inclusion for underserved communities.
- Strengthened STEM education and innovation readiness.
- Development of future workforce capabilities aligned with a digital economy.

Through a carefully structured national demonstration programme, Ghana will have the opportunity to evaluate and validate innovative educational approaches within real classroom environments, creating a robust evidence base to inform future policy and investment decisions.

1.3 Preparing Learners for the AI Era

Artificial intelligence is rapidly transforming industries, labour markets, and the skills required for future success. Today's students will enter a world where digital fluency, critical thinking, problem solving, creativity, collaboration, and AI literacy are increasingly essential.

Educational systems must therefore evolve to prepare learners not only to use technology but to understand, interact with, and benefit from intelligent systems in ways that enhance human capability and economic opportunity.

The Ghana Intelligent Classrooms Initiative seeks to provide students with early exposure to intelligent learning environments that encourage curiosity, inquiry-based learning, digital confidence, and adaptive problem-solving skills. Through AI-assisted educational experiences, students can engage with learning in more interactive, personalised, and meaningful ways while remaining firmly grounded within the approved Ghanaian curriculum.

This approach supports the development of a generation of learners equipped to participate confidently in an increasingly digital and technologically advanced global economy.

1.4 Creating Equitable Access Across All Regions

One of the defining principles of the initiative is educational equity.

Across many regions of Ghana, schools continue to face varying levels of connectivity, power reliability, infrastructure availability, and access to educational technology. Traditional digital learning models often assume continuous internet access and stable infrastructure conditions that do not always reflect operational realities.

The Ghana Intelligent Classrooms Initiative has therefore been designed around an offline-first philosophy. Educational content, intelligent classroom functionality, teacher support tools, and student learning experiences can continue to operate regardless of connectivity conditions, ensuring continuity of learning and equitable access to educational opportunity.

The programme seeks to ensure that students in rural communities have access to the same quality of educational experience as those in urban centres. It aims to support teachers wherever they are located and to create a resilient learning environment capable of serving every region of Ghana.

This commitment to inclusion extends beyond infrastructure. It includes curriculum alignment, local relevance, cultural contextualisation, language accessibility, teacher empowerment, and long-term national capacity building.

The vision is clear: every Ghanaian learner should have access to high-quality, future-ready educational opportunities regardless of location, circumstance, or infrastructure constraints.

Through strong national leadership, strategic partnerships, and a shared commitment to educational excellence, Ghana has the opportunity to establish a sustainable, scalable, and nationally aligned educational intelligence ecosystem that can serve as a model for the continent and contribute meaningfully to the country's long-term social and economic development.

2. Strategic Context

2.1 Current Challenges Facing Basic and Junior High Schools

Ghana has made significant progress in expanding access to education and improving educational outcomes across the country. Continued investment by Government, educational institutions, development partners, and local communities has strengthened participation rates, expanded school infrastructure, and improved opportunities for millions of learners.

At the same time, the educational landscape is evolving rapidly. The increasing importance of digital literacy, STEM education, artificial intelligence, and technology-enabled learning is creating new demands on educational systems worldwide. To remain competitive in an increasingly knowledge-driven global economy, students must be equipped with the skills, competencies, and learning experiences required for future success.

Basic and Junior High Schools now face the challenge of preparing learners for a world where technology is integrated into nearly every aspect of life and work. This requires new approaches to teaching, learning, curriculum delivery, teacher support, and educational infrastructure.

The challenge is not simply one of technology adoption. It is the creation of learning environments that improve educational outcomes, empower teachers, and provide equitable opportunities for students regardless of their location or socioeconomic circumstances.

2.2 Connectivity and Infrastructure Constraints

While digital learning technologies continue to advance globally, many educational solutions are designed for environments with reliable internet connectivity, stable electrical infrastructure, and extensive technology resources.

In practice, many schools continue to operate under conditions that vary significantly across regions. Connectivity availability, bandwidth capacity, power reliability, and technical support resources can differ considerably between urban, peri-urban, and rural communities.

These realities create challenges for the deployment of conventional cloud-dependent educational technologies. Systems that rely on continuous internet connectivity may become inaccessible during periods of network disruption, while schools experiencing unstable power conditions may face interruptions that affect continuity of learning.

As a result, educational technology investments must be designed to operate effectively within real-world conditions. Infrastructure resilience, offline capability, local content accessibility, and operational flexibility are increasingly important considerations when planning national educational transformation programmes.

Ensuring that teaching and learning can continue regardless of connectivity or power conditions is therefore a strategic requirement rather than a technical preference.

2.3 Teacher Capacity and Professional Development

Teachers remain the most important factor in delivering quality education and improving student outcomes.

Across the world, educators face increasing demands on their time and responsibilities. Lesson preparation, curriculum planning, assessment design, classroom administration, reporting requirements, and differentiated learning support all compete for limited time and resources.

As educational expectations continue to expand, teachers require access to tools, resources, and professional development opportunities that enable them to deliver high-quality instruction efficiently and consistently.

Technology should therefore be viewed as a mechanism for supporting teachers rather than replacing them. Properly implemented educational intelligence systems can assist educators with lesson planning, instructional content development, curriculum alignment, assessment preparation, and classroom management, allowing teachers to focus more time on student engagement and learning.

A central objective of educational transformation must be to strengthen teacher effectiveness, reduce administrative burden, and create opportunities for continuous professional growth.

2.4 STEM, Digital Skills and AI Readiness

The future workforce will require a combination of foundational academic knowledge and advanced digital competencies.

Science, Technology, Engineering and Mathematics (STEM) education is increasingly recognised as a critical driver of economic growth, innovation, industrial development, and national competitiveness. At the same time, digital literacy, computational thinking, data awareness, and understanding of artificial intelligence are becoming essential skills across virtually every sector of the economy.

Educational systems must evolve to provide students with meaningful exposure to technology-enhanced learning environments while maintaining strong foundations in literacy, numeracy, scientific reasoning, creativity, and critical thinking.

The opportunity for Ghana is not simply to adopt new technologies but to create learning experiences that inspire innovation, curiosity, experimentation, and problem-solving among the next generation of learners.

Preparing students for the opportunities and challenges of an AI-enabled future requires educational infrastructure capable of supporting modern teaching methodologies and emerging learning models.

2.5 Educational Equity and Inclusion

Educational transformation must benefit every learner.

A key challenge facing many countries is ensuring that advances in educational technology do not unintentionally widen existing disparities between communities with different levels of infrastructure access and economic resources.

National programmes must therefore be designed with inclusion as a foundational principle. Students in rural and underserved communities should have access to the same quality of learning opportunities as those in major urban centres. Teachers working in remote environments should receive the same level of support as their colleagues elsewhere in the country.

Educational equity requires solutions that are accessible, resilient, affordable, and adaptable to a wide range of operating environments.

It also requires a commitment to cultural relevance, curriculum alignment, language accessibility, and local capacity development so that educational innovation reflects national priorities and local realities.

For Ghana, the opportunity is to create a model of educational transformation that combines innovation with inclusion, ensuring that every learner can benefit from the opportunities presented by modern educational technologies.

2.6 The Opportunity for Ghana

Despite the challenges outlined above, Ghana is exceptionally well positioned to become a continental leader in educational innovation.

The country possesses strong educational institutions, a clear commitment to digital transformation, a growing technology ecosystem, and a demonstrated willingness to invest in future-focused educational strategies.

By embracing intelligent classroom infrastructure, AI-assisted educational support, teacher empowerment programmes, and resilient offline-first learning systems, Ghana has the opportunity to establish a scalable model for educational excellence that reflects both global best practice and local realities.

The Ghana Intelligent Classrooms Initiative has been developed in response to this opportunity. It seeks to provide a practical, sustainable, and nationally aligned pathway for strengthening teaching and learning while building the foundations for a future-ready educational system capable of supporting learners across every region of the country.

3. Ghana Intelligent Classrooms Initiative

3.1 Programme Overview

The Ghana Intelligent Classrooms Initiative is a strategic educational transformation programme designed to support the delivery of high-quality, equitable, and future-ready learning experiences across Ghana's Basic and Junior High School system.

Developed through collaboration between the Ministry of Education, CENDLOS, NDX Education, and Data Systems Ltd, the initiative combines educational intelligence, classroom technology, teacher empowerment, offline-first learning infrastructure, and national implementation capability into a unified educational ecosystem.

The initiative has been designed specifically to address the practical realities of educational delivery within Ghana, recognising the importance of curriculum alignment, teacher effectiveness, infrastructure resilience, and equitable access to learning opportunities.

At its core, the programme seeks to create intelligent classroom environments that enhance teaching and learning while supporting national educational priorities and long-term digital transformation objectives.

Unlike conventional educational technology programmes that focus primarily on hardware deployment or software provision, the Ghana Intelligent Classrooms Initiative takes a comprehensive approach that integrates educational infrastructure, teacher support, learner engagement, educational intelligence, and implementation sustainability into a single coordinated framework.

The programme is intended to provide a practical and scalable pathway towards a future national educational intelligence ecosystem capable of supporting millions of learners and educators across the country.

3.2 Programme Objectives

The Ghana Intelligent Classrooms Initiative has been developed around six strategic objectives.

Strengthen Teaching and Learning

To enhance classroom instruction through intelligent educational tools that support curriculum delivery, student engagement, lesson preparation, and effective learning outcomes.

Empower Teachers

To provide educators with practical tools, resources, and professional development opportunities that reduce administrative burden, improve lesson quality, and strengthen instructional effectiveness.

Expand Equitable Access

To ensure that students and teachers can benefit from high-quality digital learning experiences regardless of location, connectivity availability, or infrastructure conditions.

Build Future-Ready Skills

To support the development of digital literacy, STEM competencies, computational thinking, problem-solving abilities, and AI awareness among Ghanaian learners.

Strengthen Educational Resilience

To establish educational infrastructure capable of operating effectively in diverse environments, including areas with limited connectivity and unstable power conditions.

Create a Foundation for National Scale

To establish a validated implementation model capable of supporting future expansion across the broader educational system through evidence-based planning and continuous improvement.

3.3 Guiding Principles

The programme has been designed around a set of guiding principles intended to ensure long-term educational value and sustainability.

Education First

Educational outcomes remain the primary focus of all programme activities. Technology serves as an enabler of improved teaching and learning rather than an objective in itself.

Teacher-Centred Design

Teachers remain at the centre of the educational process. The initiative is designed to support, strengthen, and empower educators rather than replace traditional teaching practices.

Curriculum Alignment

All educational content, tools, and learning experiences are designed to align with approved Ghana Education Service curriculum frameworks and educational standards.

Inclusion and Equity

Every learner should have access to quality educational opportunities regardless of geography, infrastructure availability, or socioeconomic circumstances.

Local Relevance

The programme will reflect Ghanaian educational priorities, cultural context, language requirements, and classroom realities.

Sustainability

Implementation approaches, support structures, capacity development programmes, and operational models will be designed to ensure long-term sustainability and national ownership.

3.4 Core Components of the Initiative

The Ghana Intelligent Classrooms Initiative combines several integrated components that work together to support teaching and learning.

Intelligent Classroom Environments

Interactive teaching and learning spaces designed to support collaboration, engagement, multimedia instruction, and active participation.

Educational Intelligence Infrastructure

AI-enabled educational systems designed to support lesson preparation, instructional planning, curriculum alignment, assessment development, and adaptive classroom support.

Teacher Capacity Development

Comprehensive training and professional development programmes designed to build confidence, capability, and effective utilisation of educational technology.

Student Learning Engagement

Interactive learning experiences that encourage participation, collaboration, critical thinking, and deeper understanding of curriculum concepts.

Offline-First Educational Infrastructure

A resilient technology architecture designed to operate effectively regardless of internet connectivity conditions and capable of supporting schools across all regions of Ghana.

Monitoring and Continuous Improvement

Data-informed evaluation and reporting mechanisms designed to support evidence-based decision making and programme optimisation.

3.5 National Demonstration Programme

As the first phase of implementation, the initiative proposes the establishment of a National Demonstration Programme involving approximately 1,000 Intelligent Classrooms across selected Basic and Junior High Schools.

The Demonstration Programme will provide the opportunity to validate educational outcomes, teacher adoption, infrastructure performance, implementation methodologies, and operational support models within representative learning environments.

Participating schools will be selected to ensure representation across urban, peri-urban, rural, and underserved communities, providing a comprehensive understanding of how the initiative performs across diverse educational settings.

Subject to contracting, funding approval, procurement activities, and implementation readiness, programme deployment is anticipated to commence from September 2026.

The Demonstration Programme will generate the evidence, operational experience, and implementation insights required to inform future policy decisions and potential large-scale national expansion.

3.6 A Foundation for Long-Term Educational Transformation

The Ghana Intelligent Classrooms Initiative is intended to be more than a demonstration of technology.

It represents an opportunity to establish the foundations of a nationally aligned educational intelligence infrastructure capable of supporting educational excellence, teacher empowerment, digital inclusion, and future workforce development for many years to come.

Through strong national leadership, strategic partnerships, and a commitment to measurable educational outcomes, the initiative seeks to provide Ghana with a practical pathway towards becoming a continental leader in intelligent, inclusive, and future-ready education.

The National Demonstration Programme represents the first step in that journey, creating the knowledge, experience, and evidence required to support informed decisions regarding future national scale deployment and long-term educational transformation.

4. Intelligent Classroom Solution

4.1 Educational Intelligence Infrastructure for Ghana

The Ghana Intelligent Classrooms Initiative introduces a new category of educational infrastructure designed specifically for the needs of Ghana's Basic and Junior High School system.

Rather than deploying isolated devices or standalone applications, the initiative creates a connected educational ecosystem in which classroom technology, educational intelligence, teacher support tools, student engagement platforms, and learning analytics operate together as a unified environment.

The solution has been designed around four core principles:

- Educational outcomes before technology.
- Teacher empowerment rather than teacher replacement.
- Offline-first operation to ensure resilience.
- National scalability and long-term sustainability.

The result is an intelligent classroom environment capable of supporting modern teaching methodologies while remaining practical for deployment across diverse educational settings throughout Ghana.

4.2 The Intelligent Classroom Environment

Each Intelligent Classroom is designed to function as a complete teaching and learning environment that supports curriculum delivery, classroom collaboration, student engagement, and educational continuity.

Within the classroom, teachers are able to present interactive lessons, access curriculum-aligned teaching resources, facilitate collaborative learning activities, conduct assessments, and receive AI-assisted instructional support.

Students participate through interactive learning experiences that encourage engagement, critical thinking, collaboration, problem solving, and active participation.

The classroom environment combines:

- Interactive teaching technologies.
- Educational intelligence tools.
- Digital learning resources.
- Assessment and feedback systems.
- Collaborative learning capabilities.
- Local content access.
- Offline educational functionality.

Together, these elements create a modern learning environment that supports both traditional instructional practice and emerging digital learning methodologies.

4.3 aimePANEL Interactive Teaching Environment

At the centre of the Intelligent Classroom is the aimePANEL interactive teaching environment.

The aimePANEL serves as the primary instructional display and classroom collaboration platform, enabling teachers to deliver engaging and interactive lessons using multimedia content, educational resources, demonstrations, simulations, assessments, and collaborative activities.

The platform supports:

- Interactive lesson delivery.
- Multimedia presentation.
- Digital whiteboarding.
- Classroom collaboration.
- Assessment activities.
- Real-time student participation.
- Curriculum-aligned educational content.

The interactive classroom environment enables teachers to move beyond passive content delivery and create more engaging learning experiences that encourage participation and deeper understanding.

4.4 aimeHUB Classroom Intelligence Engine

The aimeHUB serves as the educational intelligence engine that powers each Intelligent Classroom.

Designed specifically for educational environments, the aimeHUB provides local educational services, content management, classroom orchestration, synchronisation, and AI-enabled educational support without requiring continuous internet connectivity.

The aimeHUB allows schools to maintain access to educational resources and intelligent learning capabilities even when internet connectivity is unavailable.

Key capabilities include:

- Local curriculum content hosting.
- Offline educational intelligence.
- Classroom management and orchestration.
- Local learning resource distribution.
- Intelligent lesson support.
- Secure synchronisation with central systems when connectivity becomes available.

This architecture ensures that educational continuity is maintained regardless of network conditions.

4.5 aime Intelligence for Education

aime Intelligence for Education is the educational intelligence layer that supports teachers and learners throughout the learning process.

Unlike general-purpose artificial intelligence systems, aime Intelligence has been designed specifically around educational workflows, curriculum structures, instructional methodologies, and classroom requirements.

The platform is intended to assist teachers with:

- Lesson planning.
- Curriculum mapping.
- Learning resource generation.
- Classroom activities.
- Assessment preparation.
- Differentiated instruction.
- Educational content development.

For students, educational intelligence provides enhanced learning support through adaptive explanations, guided learning experiences, visual learning aids, and curriculum-aligned educational assistance.

The objective is to provide practical educational support that strengthens teaching effectiveness and improves learning outcomes.

4.6 aimeJAM Student Learning Environment

aimeJAM extends learning beyond traditional classroom interaction by providing students with a collaborative and engaging learning environment.

The platform supports:

- Interactive learning activities.
- Collaborative classroom participation.
- Guided learning experiences.
- Educational reinforcement.
- Student engagement exercises.
- Curriculum-based learning support.

The student experience is designed to encourage active participation rather than passive content consumption.

By enabling students to engage directly with educational materials, classroom activities, and collaborative exercises, aimeJAM helps strengthen understanding, retention, and learner confidence.

The platform also supports learning continuity beyond normal classroom hours, helping reinforce educational progress and encouraging independent learning habits.

4.7 Offline-First Educational Infrastructure

A defining feature of the Ghana Intelligent Classrooms Initiative is its offline-first architecture.

Many educational technologies assume the availability of continuous internet connectivity. However, the realities of educational delivery require a more resilient approach capable of functioning effectively under varying infrastructure conditions.

The Intelligent Classrooms platform has therefore been designed so that core educational functionality remains available even when internet connectivity is limited or unavailable.

Key offline capabilities include:

- Local educational content access.
- Curriculum resource availability.
- Lesson delivery functionality.
- Classroom collaboration tools.
- Educational intelligence support.
- Assessment activities.
- Student learning engagement.

When connectivity becomes available, the system automatically synchronises data, updates content, and exchanges information with central services.

This approach ensures that learning continues regardless of connectivity conditions and supports equitable access across all regions.

4.8 Solar-Powered and Resilient Learning Infrastructure

Educational continuity depends not only on connectivity but also on reliable access to power.

To support deployment across diverse educational environments, the initiative incorporates integrated solar and energy resilience capabilities designed to maintain classroom operation under varying power conditions.

The infrastructure is designed to support:

- Interactive classroom environments.
- Educational intelligence systems.
- Local networking.
- Classroom synchronisation services.

- Teacher and student learning activities.

The energy solution provides schools with increased operational resilience while reducing dependency on unstable power conditions and supporting long-term sustainability objectives.

This capability is particularly important for schools located in areas where power reliability may affect educational continuity.

4.9 Learning Analytics and Educational Insights

The Intelligent Classroom environment generates valuable educational insights that can support teachers, school leaders, and programme administrators.

Learning analytics can help identify:

- Student engagement patterns.
- Classroom utilisation.
- Resource effectiveness.
- Teacher adoption levels.
- Learning progression trends.
- Programme performance indicators.

These insights support evidence-based decision-making while helping stakeholders better understand educational outcomes and implementation effectiveness.

Data collection and reporting will be governed in accordance with national educational policies, privacy requirements, and programme governance frameworks.

4.10 Designed for National Scale

The Ghana Intelligent Classrooms Initiative has been designed from the outset as a nationally scalable educational infrastructure programme.

Every component of the solution has been selected and architected to support deployment at scale while maintaining operational simplicity, educational effectiveness, and long-term sustainability.

The combination of intelligent classroom environments, educational intelligence infrastructure, teacher empowerment tools, offline-first operation, and resilient deployment architecture provides a foundation capable of supporting future expansion across Ghana's educational system.

The result is not simply a collection of technologies, but a nationally aligned educational ecosystem designed to strengthen teaching, improve learning outcomes, and support Ghana's long-term educational transformation objectives.

5. Curriculum Alignment and Educational Outcomes

5.1 Supporting Ghana's Curriculum Vision

The Ghana Intelligent Classrooms Initiative has been designed to support the delivery of Ghana's national curriculum while strengthening teaching effectiveness, learner engagement, and educational outcomes.

The programme recognises that technology alone does not improve education. Sustainable educational improvement occurs when curriculum, pedagogy, teacher capability, learning resources, and classroom practice work together in a coordinated manner.

The initiative therefore places curriculum alignment at the centre of its design philosophy.

Through curriculum-aware educational intelligence, structured pedagogical workflows, teacher support systems, and interactive learning environments, the programme seeks to enhance the delivery of existing curriculum objectives while supporting broader national ambitions around digital transformation, STEM development, and future workforce readiness.

The objective is not to replace established curriculum frameworks but to strengthen their delivery, accessibility, consistency, and effectiveness across the educational system.

5.2 Alignment with Ghana Education Service Standards

The educational intelligence framework underpinning the initiative has been designed to support alignment with approved Ghana Education Service curriculum frameworks, learning standards, assessment requirements, and instructional objectives.

Through the ThinkBook curriculum architecture and educational intelligence framework, curriculum structures can be organised into interconnected learning pathways that support coherent lesson planning, instructional sequencing, assessment design, and learner progression.

This enables teachers to access educational support that is grounded in approved curriculum requirements while maintaining flexibility for local classroom needs and instructional styles.

Curriculum alignment supports:

- Consistent instructional delivery.
- Improved lesson preparation.
- Structured concept progression.
- Curriculum coverage monitoring.
- Enhanced assessment alignment.

- Improved educational quality assurance.

The result is a learning environment that strengthens educational consistency while preserving teacher autonomy and professional judgement.

5.3 Supporting Basic School Education

The programme has been designed to strengthen foundational learning during the critical years of Basic School education.

At this stage of development, students are building essential literacy, numeracy, communication, reasoning, and social skills that form the basis for future academic achievement.

The Intelligent Classroom environment supports foundational learning through:

- Interactive instructional experiences.
- Visual learning resources.
- Teacher-guided educational activities.
- Collaborative classroom participation.
- Continuous reinforcement of core concepts.
- Curriculum-aligned educational content.

Educational intelligence tools can assist teachers in presenting concepts through multiple approaches, helping learners engage with content in ways that support understanding, retention, and confidence.

The emphasis remains firmly on supporting teachers as they deliver high-quality foundational education.

5.4 Supporting Junior High School Education

Junior High School represents a critical transition point where students begin engaging with increasingly complex academic concepts and future educational pathways.

The programme supports Junior High School education by providing enhanced learning environments that encourage:

- Critical thinking.
- Problem solving.
- Analytical reasoning.
- Independent learning.
- Collaborative learning.
- Digital literacy development.

Interactive classroom capabilities allow educators to present complex concepts through engaging and accessible formats, while educational intelligence tools support lesson planning, instructional delivery, and assessment preparation.

The programme is designed to help students develop the knowledge, confidence, and skills required for continued educational progression and future career opportunities.

5.5 Strengthening STEM Education

Science, Technology, Engineering and Mathematics (STEM) education is recognised as a key national priority and a critical driver of future economic growth.

The Intelligent Classrooms Initiative supports STEM education through interactive teaching environments, visual learning tools, collaborative activities, educational simulations, and curriculum-aligned instructional resources.

Educational intelligence can assist teachers in explaining scientific concepts, generating instructional materials, creating practical learning activities, and supporting student exploration of STEM-related topics.

Students benefit from more engaging learning experiences that encourage curiosity, experimentation, inquiry, and problem solving.

The initiative aims to help create stronger pathways into future STEM education, innovation, entrepreneurship, and technology-driven careers.

5.6 Coding, Computational Thinking and Digital Skills

As digital technologies continue to reshape society and the economy, students require opportunities to develop digital confidence and computational thinking skills from an early age.

The programme supports national efforts to expand digital literacy by creating learning environments that expose students to modern technology while encouraging logical reasoning, structured problem solving, and digital engagement.

Areas of support include:

- Digital literacy.
- Information management.
- Logical reasoning.
- Computational thinking.
- Digital collaboration.
- Responsible technology use.
- Introduction to AI concepts.

These capabilities are increasingly important for participation in higher education, employment, entrepreneurship, and lifelong learning.

5.7 Building AI Literacy for Future Generations

Artificial intelligence is becoming a foundational technology across industries, professions, and public services.

Educational systems therefore have a responsibility to prepare learners to understand, engage with, and benefit from AI-enabled environments.

The Ghana Intelligent Classrooms Initiative introduces students to intelligent learning environments in ways that are age-appropriate, curriculum-aligned, and educationally meaningful.

Students are encouraged to:

- Ask questions.
- Explore concepts.
- Develop curiosity.
- Strengthen critical thinking.
- Understand how intelligent systems support learning.

The goal is not simply technological familiarity, but the development of informed, capable, and confident learners who are prepared to thrive in an increasingly AI-enabled world.

5.8 Teacher-Led Educational Transformation

A defining principle of the programme is that educational transformation remains teacher-led.

While educational intelligence can support lesson planning, content development, instructional preparation, and classroom engagement, teachers remain central to the learning experience.

The initiative is therefore designed to strengthen teacher effectiveness rather than automate teaching.

Educational intelligence acts as a capacity multiplier, helping teachers:

- Save preparation time.
- Access curriculum-aligned resources.
- Improve lesson quality.
- Enhance classroom engagement.
- Deliver differentiated instruction.
- Focus more time on student learning.

This approach supports sustainable educational improvement while respecting the vital role of educators within the learning process.

5.9 Measuring Educational Outcomes

The ultimate measure of success for the Ghana Intelligent Classrooms Initiative is improved educational outcomes.

The National Demonstration Programme will therefore incorporate a structured monitoring and evaluation framework designed to assess:

- Teacher adoption and utilisation.
- Student engagement.
- Classroom participation.
- Curriculum delivery effectiveness.
- Learning progression.
- Infrastructure performance.
- Educational impact.

The evidence generated through the programme will provide valuable insights to support future educational planning, policy development, and potential national scale-up.

Through this approach, Ghana will be able to make informed decisions based on measurable outcomes, practical experience, and demonstrated educational value.

5.10 Advancing Ghana's Educational Future

The Ghana Intelligent Classrooms Initiative represents an opportunity to strengthen curriculum delivery, enhance teacher effectiveness, improve learner engagement, and expand access to high-quality educational experiences.

By combining curriculum-aware educational intelligence, teacher empowerment, interactive learning environments, and resilient educational infrastructure, the programme seeks to create meaningful and measurable improvements in teaching and learning.

The initiative supports not only today's educational priorities but also the long-term development of the knowledge, skills, and capabilities that Ghana's future generations will require to succeed in an increasingly digital and AI-enabled world.

6. Teacher Empowerment and Capacity Development

6.1 Teachers at the Centre of Educational Transformation

The success of any educational transformation programme depends ultimately on teachers.

While technology can provide new capabilities, improved educational outcomes are achieved through the knowledge, expertise, commitment, and leadership of educators working directly with learners every day.

The Ghana Intelligent Classrooms Initiative has therefore been designed around a teacher-first philosophy. The programme is intended to strengthen teacher effectiveness, enhance instructional quality, reduce administrative burden, and create opportunities for continuous professional growth.

Educational intelligence is not intended to replace educators. Rather, it acts as a professional support system that enables teachers to spend more time engaging with students and less time undertaking repetitive preparation and administrative tasks.

The initiative seeks to ensure that every participating teacher is equipped with the skills, confidence, and resources required to maximise the benefits of intelligent classroom environments while maintaining ownership of the teaching and learning process.

6.2 Educational Intelligence as a Teacher Capacity Multiplier

Teachers are increasingly expected to deliver high-quality instruction, support diverse learning needs, manage classroom activities, prepare assessments, and continuously adapt to changing educational requirements.

The AIME educational intelligence platform has been designed to support these responsibilities by acting as a capacity multiplier for educators.

The platform can assist teachers with:

- Curriculum-aligned lesson planning.
- Lesson sequencing and structure.
- Resource identification and development.
- Assessment preparation.
- Classroom activity generation.
- Visual learning materials.
- Student engagement strategies.

- Differentiated instructional approaches.

By reducing the time required for lesson preparation and instructional administration, teachers are able to devote greater attention to learner engagement, mentoring, assessment, and educational support.

The objective is to improve both teaching efficiency and instructional quality while preserving the central role of the educator within the classroom.

6.3 Professional Development Strategy

The Ghana Intelligent Classrooms Initiative incorporates a structured professional development framework designed to create sustainable educational capability within Ghana.

Rather than relying on external trainers for ongoing programme delivery, the initiative will prioritise local capacity building and knowledge transfer from the outset.

Professional development will focus on three key areas:

Technology Confidence

Ensuring teachers are comfortable using intelligent classroom technologies and educational intelligence tools.

Pedagogical Innovation

Supporting educators in applying technology-enhanced teaching methodologies that improve engagement, participation, and learning outcomes.

Continuous Professional Growth

Creating pathways for ongoing development, knowledge sharing, and educational excellence across participating schools.

The programme is designed to support both initial implementation and long-term professional growth.

6.4 Train-the-Trainer Model

To ensure sustainability and national ownership, the programme will adopt a Train-the-Trainer approach.

NDX Education will work closely with Data Systems Ltd to develop a cadre of certified national trainers who will become the primary delivery mechanism for teacher training and professional development activities.

This approach will ensure that expertise is transferred into Ghana and embedded within local institutions rather than remaining dependent on external resources.

Under this model:

- NDX Education will provide initial specialist training, educational intelligence expertise, implementation methodologies, and programme knowledge transfer.
- Data Systems Ltd will establish and maintain a national training capability.
- Certified trainers will support school deployments, educator onboarding, and ongoing professional development activities.
- Knowledge and expertise will progressively transition to local delivery teams.

This model creates a sustainable foundation for future expansion and long-term programme support.

6.5 Continuous Professional Development in Partnership with CENDLOS

A key objective of the initiative is to support the long-term development of educational expertise across Ghana.

Following initial deployment and onboarding, Data Systems Ltd will work in alignment with CENDLOS to deliver an ongoing Continuous Professional Development (CPD) programme for participating educators.

The CPD framework will support:

- Effective use of Intelligent Classrooms.
- Curriculum-aligned instructional practice.
- Digital pedagogy.
- Educational innovation.
- AI-assisted teaching methodologies.
- Assessment and evaluation techniques.
- Emerging educational technologies.

This approach ensures that professional development becomes an ongoing process rather than a one-time training event.

By aligning CPD activities with the educational priorities and standards established by CENDLOS, the programme seeks to contribute to a sustainable culture of continuous improvement and instructional excellence.

6.6 Communities of Practice

Sustainable educational transformation requires collaboration and knowledge sharing among educators.

The initiative will therefore support the development of Communities of Practice that enable teachers to share experiences, lesson ideas, best practices, and implementation insights.

These collaborative networks will provide opportunities for educators to:

- Exchange teaching strategies.
- Share curriculum resources.
- Discuss classroom experiences.
- Explore innovative approaches.
- Learn from peers.
- Support professional growth.

Over time, these communities can contribute to the development of a growing national knowledge base around intelligent teaching and learning practices.

6.7 School Leadership and Change Management

Successful implementation extends beyond classroom teachers.

School leaders play a critical role in creating supportive environments that encourage innovation, professional growth, and effective programme adoption.

The initiative will therefore include leadership engagement activities designed to support:

- School readiness.
- Programme governance.
- Change management.
- Staff engagement.
- Educational planning.
- Continuous improvement.

Strong leadership support will help maximise programme effectiveness and encourage long-term sustainability.

6.8 Measuring Teacher Impact

The National Demonstration Programme will incorporate a structured evaluation framework to assess the impact of Intelligent Classrooms on teaching practice and professional development.

Areas of evaluation will include:

- Teacher adoption rates.
- Confidence and competency development.
- Time savings in lesson preparation.
- Classroom utilisation.
- Instructional quality.
- Professional development participation.
- Teacher satisfaction.

Insights generated through the programme will help inform future programme enhancements and support evidence-based decisions regarding wider deployment.

6.9 Building National Educational Capability

Beyond the immediate objectives of the Demonstration Programme, the initiative seeks to contribute to the development of long-term educational capability within Ghana.

Through structured knowledge transfer, local trainer development, collaboration with CENDLOS, and the establishment of sustainable professional development pathways, the programme aims to create a growing community of educators equipped to lead future educational innovation.

The ultimate objective is not simply the deployment of intelligent classrooms, but the development of national expertise capable of sustaining, expanding, and continuously improving intelligent learning environments for future generations of Ghanaian learners.

7. Ghanaian Localisation Strategy

7.1 Designed for Ghanaian Education

The Ghana Intelligent Classrooms Initiative has been designed specifically to support Ghana's educational objectives, curriculum requirements, classroom realities, and long-term national development goals.

Educational transformation cannot be achieved through the adoption of generic technology platforms designed for other educational systems. Successful implementation requires educational intelligence that reflects national priorities, local teaching methodologies, curriculum standards, cultural context, and learner experiences.

The initiative therefore places localisation at the centre of its design philosophy.

From curriculum alignment and language support to culturally relevant learning content and teacher-led instructional practices, every aspect of the programme is intended to support the unique needs of Ghana's educational ecosystem.

The objective is not to introduce foreign educational models into Ghanaian classrooms. The objective is to create intelligent learning environments that strengthen and enhance Ghana's existing educational framework.

7.2 Curriculum Localisation and Alignment

Curriculum remains the foundation of teaching and learning.

The AIME educational intelligence platform has been designed around a curriculum-aware architecture that enables educational content, instructional workflows, assessments, and learning resources to be grounded in approved educational frameworks.

Through the ThinkBook knowledge architecture and curriculum intelligence framework, approved Ghana Education Service curriculum structures can be incorporated into the educational intelligence layer, enabling the platform to support:

- Curriculum-aligned lesson planning.
- Structured instructional sequencing.
- Learning objective mapping.
- Assessment alignment.
- Curriculum resource development.
- Educational progression pathways.

This approach enables educational intelligence that is aligned with what teachers are expected to teach and what learners are expected to achieve.

Rather than generating generic educational content, the platform is designed to support teaching and learning within the context of Ghana's approved curriculum frameworks.

7.3 Supporting Ghana's Language Diversity

Language plays a critical role in educational participation, learner confidence, and knowledge acquisition.

The Ghana Intelligent Classrooms Initiative recognises the importance of supporting Ghana's linguistic diversity and creating educational experiences that are accessible to learners across different regions and communities.

The educational intelligence framework has been designed to support the progressive localisation of learning content, explanations, assessments, and educational interactions across major Ghanaian languages.

Potential applications include:

- Curriculum explanations.
- Lesson reinforcement activities.
- Learning support resources.
- Student guidance.
- Classroom activities.
- Educational content generation.
- Teacher support materials.

By supporting learning in familiar linguistic contexts, the programme aims to improve learner engagement, accessibility, inclusion, and educational outcomes.

The long-term vision is to create an educational intelligence platform capable of supporting multilingual educational experiences that reflect Ghana's linguistic landscape while maintaining alignment with national educational standards.

7.4 Cultural and Contextual Relevance

Educational content is most effective when learners can connect it to their own experiences and environments.

The initiative therefore seeks to ensure that learning experiences are culturally relevant, contextually appropriate, and reflective of Ghanaian realities.

Where appropriate, educational content can incorporate:

- Ghanaian history and heritage.
- National development priorities.
- Local geography and environmental studies.
- Agricultural and economic examples.
- Community-based learning contexts.
- Ghanaian scientific, cultural, and entrepreneurial achievements.

This approach helps learners connect academic concepts with real-world experiences and reinforces the relevance of education within everyday life.

The objective is to create educational experiences that are not only academically rigorous but also meaningful and relatable for Ghanaian learners.

7.5 Local Content Development Framework

The long-term success of educational transformation depends upon the availability of high-quality local educational content.

The initiative therefore includes a framework for the development, adaptation, enhancement, and continuous improvement of Ghanaian educational resources.

Working alongside CENDLOS, curriculum specialists, educators, and other stakeholders, the programme can support the creation and enhancement of:

- Lesson resources.
- Teaching guides.
- Assessment materials.
- Interactive classroom activities.
- Educational diagrams and visual aids.
- Reinforcement exercises.
- Subject-specific learning resources.

This approach enables Ghana to progressively build a growing repository of locally relevant educational resources that remain aligned with national educational objectives.

7.6 Educational Sovereignty and National Ownership

As artificial intelligence becomes increasingly integrated into education systems worldwide, questions of educational sovereignty, content ownership, and long-term control become increasingly important.

The Ghana Intelligent Classrooms Initiative has been designed to support national ownership of educational content, curriculum resources, and implementation frameworks.

The programme seeks to ensure that:

- Ghanaian curriculum frameworks remain the foundation of educational delivery.
- Educational content reflects national priorities.
- Local expertise is developed and retained.
- Educational knowledge remains under national stewardship.
- Long-term capability is built within Ghanaian institutions.

This approach strengthens sustainability while ensuring that future educational innovation remains aligned with national priorities and educational objectives.

7.7 Building a Ghanaian Educational Intelligence Ecosystem

The long-term vision extends beyond classroom technology deployment.

The initiative seeks to contribute to the development of a Ghanaian educational intelligence ecosystem that combines curriculum expertise, teacher capability, educational content development, digital learning infrastructure, and educational innovation within a single nationally aligned framework.

Through collaboration between the Ministry of Education, CENDLOS, Data Systems Ltd, NDX Education, teachers, curriculum specialists, and other educational stakeholders, the programme aims to establish foundations that can continue evolving long after the initial Demonstration Programme has been completed.

This ecosystem approach creates opportunities for continuous improvement, local innovation, educational research, and future programme expansion.

7.8 Creating a Model for Africa

Ghana has long been recognised as a leader in educational development and innovation across the African continent.

By combining curriculum-aligned educational intelligence, teacher empowerment, multilingual capability, cultural localisation, and resilient infrastructure, the Ghana Intelligent Classrooms Initiative has the potential to establish a model for educational transformation that reflects the realities and opportunities of African education systems.

The objective is not merely to adopt educational technology, but to demonstrate how intelligent learning environments can be designed around local needs, national priorities, and educational outcomes.

In doing so, Ghana has the opportunity to position itself at the forefront of educational innovation while creating lasting benefits for learners, educators, and future generations.

8. Partnership Framework

8.1 A Ghana-Led Partnership for Educational Transformation

The Ghana Intelligent Classrooms Initiative has been designed as a nationally aligned educational transformation programme that combines educational leadership, local capability, intelligent classroom infrastructure, educational intelligence, teacher development, and sustainable operational delivery.

The programme is built upon a clear governance and delivery model that provides strong accountability, clear responsibilities, and long-term sustainability.

Under the proposed framework:

- The **Ministry of Education and CENDLOS** provide educational leadership, programme ownership, governance, and strategic oversight.
- **NDX Education** serves as the Prime Contractor and Programme Integrator, responsible for the overall delivery of the Initiative.
- **Data Systems Ltd** serves as the National Delivery and Capability Partner, providing local implementation, support, teacher development, and operational services.

This structure combines national ownership with international educational innovation while ensuring that capability, expertise, and support are progressively embedded within Ghana.

The partnership has been specifically designed to support the successful delivery of the National Demonstration Programme while creating the foundations for future educational transformation at national scale.

8.2 Ministry of Education and CENDLOS – Programme Ownership and Educational Governance

The Ministry of Education and CENDLOS will provide strategic leadership, educational governance, policy alignment, and programme oversight.

As custodians of Ghana's educational vision, standards, and transformation agenda, the Ministry and CENDLOS will ensure that the Initiative remains aligned with national priorities and educational objectives.

Key responsibilities include:

- Educational policy leadership.
- Curriculum guidance and alignment.
- Educational standards and quality assurance.

- Programme governance and oversight.
- Monitoring and evaluation leadership.
- Educational outcomes assessment.
- Future scale-up recommendations.

CENDLOS will play a particularly important role in ensuring that the Initiative remains aligned with Ghana's curriculum frameworks, pedagogical priorities, teacher development objectives, and long-term educational transformation strategy.

The Ministry of Education and CENDLOS will remain the authoritative educational stakeholders throughout programme implementation.

8.3 NDX Education – Prime Contractor and Programme Integrator

NDX Education will serve as the Prime Contractor for the National Demonstration Programme.

As Prime Contractor, NDX Education will hold overall responsibility for programme delivery, solution integration, implementation management, quality assurance, educational intelligence, knowledge transfer, and programme performance.

NDX Education will act as the single point of accountability for delivery of the Intelligent Classroom ecosystem and coordination of all programme implementation activities.

Programme Integration and Leadership

NDX Education will be responsible for:

- Overall programme delivery.
- Solution design and integration.
- Programme management.
- Quality assurance.
- Implementation coordination.
- Reporting and stakeholder engagement.
- Knowledge transfer and capability development.

This approach provides the Ministry of Education and CENDLOS with a clear and accountable delivery structure through a single programme integrator.

Intelligent Classroom Infrastructure

NDX Education provides the complete Intelligent Classroom ecosystem including:

- **aimePANEL** interactive teaching and learning environments.
- **aimeHUB** educational intelligence and classroom orchestration systems.

- Offline-first educational infrastructure.
- Classroom collaboration environments.
- Educational content delivery systems.
- Learning analytics capabilities.

Together, aimePANEL and aimeHUB create a fully integrated classroom environment designed to support curriculum delivery, teacher effectiveness, learner engagement, assessment, and educational continuity.

Educational Intelligence Platform

NDX Education provides the AIME educational intelligence ecosystem including:

- AIME Intelligence for Education.
- ThinkBook curriculum intelligence architecture.
- EduRule pedagogical framework.
- Educational reasoning systems.
- Curriculum-aware content generation.
- Visual learning and educational resource creation.
- Teacher support capabilities.
- Student learning support services.

Unlike generic artificial intelligence platforms, AIME has been specifically designed for educational environments and structured around curriculum delivery and pedagogical effectiveness.

Curriculum, Language and Localisation

Working closely with CENDLOS and educational stakeholders, NDX Education will support:

- Curriculum modelling and alignment.
- Educational content localisation.
- Ghanaian language enablement.
- Cultural contextualisation.
- Educational resource development.
- Continuous platform enhancement.

This localisation strategy ensures that the educational intelligence framework reflects Ghana's curriculum priorities, teaching methodologies, and learner needs.

Solar-Powered Learning Infrastructure

A key component of the Intelligent Classroom ecosystem is resilient energy infrastructure.

NDX Education provides integrated solar-powered solutions designed to support:

- aimePANEL environments.
- aimeHUB systems.
- Classroom networking.

- Educational content delivery.
- Interactive learning activities.
- Local educational services.

The solar infrastructure enhances educational continuity, operational resilience, and equitable access across urban, peri-urban, rural, and underserved communities.

8.4 Data Systems Ltd – National Delivery and Capability Partner

Data Systems Ltd will serve as NDX Education's Ghanaian implementation, support, training, and capability development partner.

As a leading Ghanaian technology and professional services organisation, Data Systems Ltd will provide the local delivery capability required to deploy, support, and sustain the National Demonstration Programme.

This partnership ensures that operational expertise, implementation capability, and long-term support structures are established and maintained within Ghana.

National Deployment

Data Systems Ltd will support programme implementation through:

- Site readiness assessments.
- Logistics coordination.
- Installation management.
- Infrastructure deployment.
- Classroom commissioning.
- Deployment scheduling and coordination.

Working alongside NDX Education, Data Systems Ltd will support the efficient rollout of Intelligent Classrooms across participating schools.

Train-the-Trainer Capability Development

A central principle of the Initiative is sustainable capability development.

NDX Education will provide structured Train-the-Trainer programmes to Data Systems personnel, transferring the expertise required to support:

- Classroom deployment.
- Technical support.
- Teacher enablement.
- Educational intelligence utilisation.
- Operational management.

This creates a certified national capability that remains within Ghana and supports future programme expansion.

Continuous Professional Development

Following certification and programme deployment, Data Systems Ltd will work in partnership with CENDLOS to deliver ongoing Continuous Professional Development programmes.

The CPD framework will support:

- Effective classroom utilisation.
- Digital pedagogy.
- Curriculum-aligned instructional practices.
- Educational innovation.
- AI-assisted teaching methodologies.
- Communities of practice.

This approach creates a sustainable model for long-term teacher development and educational improvement.

Operational Support

Data Systems Ltd will provide:

- Technical support services.
- Field engineering services.
- Preventative maintenance.
- School support.
- Programme coordination.
- Local stakeholder engagement.

This local support structure strengthens programme sustainability and ensures rapid response capability throughout Ghana.

8.5 Knowledge Transfer and National Capability Development

The Initiative has been designed to build Ghanaian capability alongside educational infrastructure.

Knowledge transfer is therefore embedded within the programme from the outset.

Through the structured capability transfer model:

- NDX Education provides expertise, methodologies, tools, and educational intelligence.
- Data Systems Ltd develops certified national implementation and support capability.
- CENDLOS and Data Systems Ltd jointly support ongoing teacher development.
- Teachers build confidence and capability through continuous professional development.
- Learners benefit from improved educational experiences and outcomes.

This model creates sustainable local ownership while ensuring that educational innovation continues to evolve within Ghana.

The long-term objective is to establish a self-sustaining educational intelligence ecosystem supported by Ghanaian expertise and institutions.

8.6 Governance Framework

Strong governance is fundamental to the success of the National Demonstration Programme.

The Initiative will operate through a structured governance framework designed to ensure accountability, transparency, stakeholder engagement, and evidence-based decision making.

Strategic Steering Committee

The Strategic Steering Committee will provide overall programme direction and oversight.

Membership may include representatives from:

- Ministry of Education.
- CENDLOS.
- NDX Education.
- Data Systems Ltd.
- Other designated stakeholders.

Responsibilities may include:

- Strategic guidance.
- Programme oversight.
- Educational outcomes review.
- Performance monitoring.
- Future scale-up recommendations.

Programme Management Office

NDX Education will establish a Programme Management Office responsible for:

- Programme coordination.
- Delivery management.
- Stakeholder engagement.
- Risk management.
- Reporting and administration.

Educational Advisory Group

An Educational Advisory Group may be established to support:

- Curriculum alignment.
- Teacher development.
- Educational outcomes.
- Learning resource development.
- Educational innovation.

Technical Working Group

A Technical Working Group will support:

- Infrastructure deployment.
- Systems integration.
- Operational readiness.
- Support services.
- Continuous improvement.

8.7 Partnership Principles

The Initiative is founded upon a shared commitment to educational excellence and national development.

The partnership will operate according to the following principles:

Ghana First

All programme activities will remain aligned with Ghana's educational priorities and national development objectives.

Educational Outcomes First

Teaching effectiveness, learner engagement, and educational achievement remain the primary measures of success.

Teacher Empowerment

Technology will strengthen and support educators while preserving the central role of teachers within the learning process.

Local Capability Development

Knowledge transfer and national capacity building will be embedded throughout programme delivery.

Sustainability

Educational, operational, technical, and financial sustainability will guide programme decisions.

Accountability

Clear governance, defined responsibilities, and transparent reporting will support successful programme delivery.

Collaboration

Success will be achieved through strong cooperation between government, educators, local industry, and educational innovators.

8.8 One Vision, One Partnership, One Transformational Future for Ghana

The Ghana Intelligent Classrooms Initiative combines national educational leadership, local implementation capability, and world-class educational innovation within a single coordinated framework.

Through the leadership of the Ministry of Education and CENDLOS, the programme integration capabilities of NDX Education as Prime Contractor, and the local delivery expertise of Data Systems Ltd, the Initiative establishes a strong foundation for sustainable educational transformation.

Together, the partners seek to create a nationally aligned, scalable, and future-ready educational intelligence ecosystem capable of supporting learners, educators, schools, and communities across Ghana for generations to come.

10. Implementation Plan and Timeline

10.1 Implementation Strategy

The National Demonstration and Readiness Programme has been designed as an accelerated implementation initiative intended to validate educational outcomes, operational readiness, deployment methodologies, teacher adoption, and programme governance prior to a broader national rollout.

The programme combines infrastructure deployment, educational activation, teacher enablement, and impact assessment within a structured implementation framework that delivers meaningful evidence while maintaining momentum towards national scale deployment.

Unlike traditional pilot programmes, the objective is not simply to test technology. The objective is to establish proven delivery capability, educational readiness, and operational confidence at scale, creating a strong foundation for future expansion.

Subject to contract execution by 30 June 2026 and receipt of agreed mobilisation funding, implementation activities will commence immediately thereafter.

The programme has been designed to complete deployment, activation, evaluation, and readiness assessment during 2026, enabling a potential national scale-up programme to commence from January 2027.

10.2 Programme Delivery Roadmap

The implementation roadmap has been developed around six principal phases:

Phase	Period
Programme Mobilisation	July 2026
Manufacturing, Configuration and Localisation	July – August 2026
Logistics, Readiness and Capability Development	August – September 2026
Classroom Deployment and Commissioning	September – October 2026
Educational Activation and Demonstration Operations	October – November 2026
Evaluation, Readiness Assessment and Recommendations	December 2026

Subject to successful programme outcomes, a broader national rollout programme may commence from January 2027.

10.3 Phase One – Programme Mobilisation

July 2026

Following contract signature and receipt of agreed mobilisation funding, programme mobilisation activities will commence.

This phase establishes the governance, planning, and operational foundations required for successful implementation.

Activities include:

- Programme initiation.
- Establishment of governance structures.
- Formation of the Strategic Steering Committee.
- Establishment of the Programme Management Office.
- Stakeholder engagement.
- School identification and confirmation.
- Deployment planning.
- Resource allocation.
- Risk and readiness assessment.

During this phase, NDX Education will work closely with the Ministry of Education, CENDLOS, and Data Systems Ltd to confirm implementation priorities and final deployment arrangements.

10.4 Phase Two – Manufacturing, Configuration and Localisation

July – August 2026

During this phase, NDX Education will prepare the Intelligent Classroom ecosystem for deployment.

Activities include:

- aimePANEL preparation and configuration.
- aimeHUB configuration and testing.
- AIME educational intelligence provisioning.
- Curriculum integration activities.

- Educational content preparation.
- Localisation and language enablement.
- Solar infrastructure preparation.
- Quality assurance and validation testing.

The objective is to ensure that all systems are fully configured, tested, and deployment-ready prior to shipment.

10.5 Phase Three – Logistics, National Readiness and Capability Development

August – September 2026

This phase focuses on national deployment readiness and capability development.

Activities include:

Logistics and Distribution

- International shipping.
- Customs clearance.
- National warehousing.
- Distribution planning.
- Deployment scheduling.

School Readiness Activities

- Site readiness assessments.
- Infrastructure verification.
- Deployment planning.
- School engagement.

Train-the-Trainer Programme

NDX Education will deliver a structured Train-the-Trainer programme to Data Systems Ltd.

Training will include:

- Intelligent Classroom operation.
- aimePANEL utilisation.
- aimeHUB administration.
- AIME educational intelligence.
- Classroom deployment methodologies.
- Technical support procedures.
- Teacher enablement methodologies.

- Continuous Professional Development delivery frameworks.

This phase establishes the national capability required to support deployment and long-term programme sustainability.

10.6 Phase Four – Classroom Deployment and Commissioning

September – October 2026

Following readiness validation and logistics completion, deployment activities will commence across participating schools.

Activities include:

- Classroom installation.
- Solar infrastructure deployment.
- Network and system configuration.
- Classroom commissioning.
- System testing and validation.
- Operational readiness verification.

Deployment activities will be undertaken jointly by NDX Education and Data Systems Ltd in accordance with agreed implementation schedules.

The objective is to ensure that all participating classrooms are fully operational and educationally ready prior to programme activation.

10.7 Phase Five – Educational Activation and Demonstration Operations

October – November 2026

Following classroom commissioning, participating schools will commence active use of Intelligent Classroom environments.

This phase represents the operational period of the National Demonstration and Readiness Programme.

During this period the programme will validate:

- Curriculum alignment.
- Teacher adoption.

- Learner engagement.
- Classroom utilisation.
- Educational intelligence effectiveness.
- Technical performance.
- Support services.
- Continuous Professional Development delivery.

Teachers will begin utilising:

- aimePANEL interactive teaching environments.
- aimeHUB classroom systems.
- AIME educational intelligence capabilities.
- Curriculum support tools.
- Learning resources and classroom activities.

The objective is to generate practical implementation experience and measurable evidence within live educational environments.

10.8 Continuous Professional Development

October 2026 Onwards

Teacher development is a critical success factor for the Initiative.

Following educational activation, Data Systems Ltd will work in partnership with CENDLOS to deliver Continuous Professional Development programmes for participating educators.

The CPD framework will support:

- Technology-enabled teaching methodologies.
- Digital pedagogy.
- Curriculum-aligned instructional practice.
- Educational intelligence utilisation.
- Classroom innovation.
- Professional communities of practice.

This framework supports both immediate adoption and long-term educational improvement.

10.9 Monitoring, Evaluation and Readiness Assessment

October – November 2026

Monitoring and evaluation activities will operate throughout the demonstration period.

The objective is to assess educational impact, operational effectiveness, and readiness for future expansion.

Evaluation activities will assess:

Educational Outcomes

- Learner engagement.
- Classroom participation.
- Curriculum utilisation.
- Teaching effectiveness.

Teacher Outcomes

- Adoption and utilisation.
- Professional development participation.
- Instructional confidence.
- Productivity improvements.

Infrastructure Outcomes

- System reliability.
- Offline performance.
- Solar infrastructure effectiveness.
- Support responsiveness.

Programme Outcomes

- Deployment effectiveness.
- Stakeholder satisfaction.
- Governance effectiveness.
- National readiness indicators.

The evidence generated through this process will inform future planning and investment decisions.

10.10 Phase Six – Evaluation and National Readiness Review

December 2026

Upon completion of the demonstration period, a comprehensive programme review will be undertaken.

The review will evaluate:

- Educational outcomes.
- Teacher adoption and utilisation.
- Infrastructure performance.
- Operational effectiveness.
- Support model performance.
- Programme governance.
- National readiness indicators.

The review will provide stakeholders with a clear assessment of programme performance and recommendations regarding future expansion opportunities.

The objective is to establish whether the programme has successfully demonstrated readiness for broader deployment.

10.11 Pathway to National Scale-Up

The National Demonstration and Readiness Programme has been intentionally designed to create a bridge between initial deployment and future national expansion.

By December 2026, the programme is expected to have established:

- Proven deployment methodologies.
- Certified national capability.
- Operational support structures.
- Teacher adoption frameworks.
- Educational evidence.
- Infrastructure validation.
- Governance and reporting frameworks.

These foundations will support informed decision-making regarding broader implementation.

Subject to successful outcomes and stakeholder approval, the programme is expected to provide the basis for commencement of a larger national rollout programme from January 2027.

10.12 Key Programme Milestones

Milestone	Target Date
Contract Signature	30 June 2026
Programme Mobilisation Commences	July 2026
Manufacturing & Configuration Complete	August 2026

Logistics & Distribution Complete	September 2026
Train-the-Trainer Programme Complete	September 2026
Classroom Installations Begin	September 2026
Classroom Commissioning Complete	October 2026
Educational Activation Begins	October 2026
Demonstration Operations	October – November 2026
Monitoring & Evaluation Complete	November 2026
National Readiness Review	December 2026
Final Recommendations Issued	December 2026
Potential National Scale-Up Programme	From January 2027

The implementation plan has been designed to deliver meaningful educational and operational evidence within an accelerated timeframe, while establishing the capability, confidence, and readiness required to support future national deployment across Ghana's education system.

11. Monitoring, Evaluation and Impact Assessment

11.1 Purpose of the Monitoring and Evaluation Framework

The National Demonstration Programme has been designed not only to deliver educational benefits but also to generate measurable evidence that can inform future educational policy, investment decisions, and national scale-up planning.

A comprehensive Monitoring, Evaluation and Impact Assessment (MEIA) framework will therefore be implemented throughout the programme lifecycle.

The framework will provide stakeholders with clear visibility into programme performance, educational outcomes, teacher adoption, infrastructure effectiveness, and overall programme value.

The objective is to establish a robust evidence base that supports continuous improvement and informed decision-making.

11.2 Evaluation Principles

The evaluation framework will be guided by the following principles:

Educational Outcomes First

The primary measure of programme success will be improvements in teaching and learning outcomes.

Evidence-Based Assessment

Programme findings will be based on measurable data, observed outcomes, and stakeholder feedback.

Continuous Improvement

Evaluation activities will support ongoing optimisation throughout programme delivery.

Transparency

Programme reporting will provide clear and objective insights into performance and impact.

Scalability

Evaluation findings will support future decisions regarding broader deployment and national expansion.

11.3 Evaluation Framework

The evaluation framework will assess performance across four key dimensions.

Educational Impact

Measurement of the programme's influence on teaching and learning.

Teacher Development

Measurement of adoption, confidence, utilisation, and professional growth.

Operational Performance

Measurement of infrastructure effectiveness, deployment quality, and support services.

Strategic Impact

Measurement of the programme's contribution to national educational objectives and future readiness.

11.4 Educational Outcomes Assessment

The programme will assess a range of educational indicators designed to measure classroom effectiveness and learner engagement.

Areas of assessment may include:

- Student engagement levels.
- Classroom participation.
- Attendance trends.
- Curriculum coverage.
- Learning progression.
- Assessment performance.
- Student confidence and motivation.
- Digital literacy development.

The objective is to understand how Intelligent Classrooms influence both teaching practice and learner experience.

11.5 Teacher Impact Assessment

Teachers are central to programme success.

The evaluation framework will therefore measure how Intelligent Classrooms and educational intelligence capabilities support educators in their daily practice.

Indicators may include:

- Teacher adoption rates.
- Platform utilisation.
- Lesson preparation efficiency.
- Professional development participation.
- Confidence in technology use.
- Classroom innovation.
- Teacher satisfaction.

The programme will also assess the effectiveness of the Train-the-Trainer and Continuous Professional Development models delivered through Data Systems Ltd and CENDLOS.

11.6 Infrastructure and Technology Assessment

The Initiative incorporates intelligent classroom infrastructure, educational intelligence systems, offline-first learning environments, and solar-powered resilience capabilities.

Evaluation activities will assess:

- Classroom availability.
- System reliability.
- Offline operation effectiveness.
- Solar infrastructure performance.
- Educational intelligence utilisation.
- Support responsiveness.
- Technical issue resolution.

These insights will help validate the operational model for future scale deployment.

11.7 Continuous Professional Development Evaluation

A key objective of the programme is the development of sustainable educational capability within Ghana.

The evaluation framework will therefore assess:

- Teacher participation in CPD activities.
- Skills development.
- Adoption of digital pedagogy.
- Educational innovation practices.
- Communities of practice engagement.
- Long-term professional growth.

This assessment will provide evidence regarding the effectiveness of the national capability-building strategy.

11.8 Data Collection Methodology

Data will be collected through a combination of quantitative and qualitative approaches.

Potential methods include:

- Classroom observations.
- Teacher surveys.
- Student feedback.
- School leadership interviews.
- Platform utilisation analytics.
- Programme reporting.
- Technical performance data.
- CPD participation records.

This blended approach will provide a comprehensive understanding of programme performance and impact.

11.9 Reporting Framework

Regular reporting will be provided to programme stakeholders throughout the Demonstration Programme.

Reporting may include:

Monthly Operational Reports

Covering deployment progress, support activities, and infrastructure performance.

Quarterly Programme Reports

Covering educational utilisation, teacher adoption, and programme outcomes.

Mid-Programme Review

Providing a comprehensive assessment of progress and recommendations for optimisation.

Final Demonstration Programme Evaluation

Providing a complete assessment of programme performance, educational impact, and future scale-up readiness.

11.10 Success Criteria

The Demonstration Programme will be considered successful where it demonstrates:

- Strong teacher adoption and utilisation.
- Positive learner engagement outcomes.
- Effective curriculum integration.
- Reliable infrastructure performance.
- Successful delivery of CPD programmes.
- Sustainable local capability development.
- Positive stakeholder feedback.
- Evidence supporting future scale deployment.

Success will be measured not solely by technology utilisation, but by meaningful educational outcomes and demonstrated value for learners, teachers, schools, and communities.

11.11 Informing Future National Scale-Up

The Demonstration Programme is intended to provide the evidence required to support future educational transformation decisions.

The findings generated through monitoring, evaluation, and impact assessment will inform:

- Future programme design.
- Educational policy considerations.

- Teacher development strategies.
- Infrastructure planning.
- Investment decisions.
- National scale-up recommendations.

By establishing a rigorous evaluation framework, Ghana will be able to make informed decisions regarding the future development of Intelligent Classrooms and educational intelligence infrastructure based on measurable outcomes, practical experience, and demonstrated educational value.

The Monitoring, Evaluation and Impact Assessment framework therefore serves as a critical bridge between the Demonstration Programme and the potential future expansion of intelligent learning environments across the nation.

12. Sustainability and National Scale-Up Strategy

12.1 Building a Sustainable Educational Ecosystem

The Ghana Intelligent Classrooms Initiative has been designed as a long-term educational transformation programme rather than a short-term technology deployment.

The success of the Initiative will ultimately be measured not by the number of classrooms installed, but by its ability to create lasting improvements in teaching quality, learner engagement, educational access, and future readiness.

To achieve this objective, sustainability has been embedded into every aspect of the programme's design, including educational delivery, professional development, infrastructure architecture, operational support, and national capability development.

The National Demonstration Programme therefore serves not only as an implementation initiative, but also as the foundation for a sustainable educational intelligence ecosystem capable of supporting future growth and innovation.

12.2 Educational Sustainability

Educational transformation must be owned by educators and embedded within existing educational structures.

The Initiative has therefore been designed to strengthen and enhance Ghana's educational system rather than create parallel processes or dependence on external resources.

Key elements supporting educational sustainability include:

- Alignment with Ghana Education Service curriculum frameworks.
- Teacher-centred implementation.
- Continuous Professional Development.
- Curriculum-aware educational intelligence.
- Local content development.
- Ongoing collaboration with CENDLOS.
- Communities of practice and knowledge sharing.

This approach ensures that educational value continues to increase as teachers gain confidence, expertise, and experience using Intelligent Classroom environments.

12.3 National Capability Development

A defining objective of the Initiative is the creation of sustainable national capability.

Through the partnership between CENDLOS, Data Systems Ltd and NDX Education, expertise will be progressively transferred into Ghana through structured training, mentoring, and operational support programmes.

The programme includes:

- Train-the-Trainer certification.
- Technical skills development.
- Educational intelligence enablement.
- Classroom implementation expertise.
- Professional development delivery capability.
- Support and maintenance capability.

Over time, Ghanaian institutions will develop the expertise required to operate, support, expand, and continuously improve Intelligent Classroom environments independently.

This capability-building approach strengthens national ownership and supports long-term sustainability.

12.4 Sustainable Educational Intelligence

One of the most significant challenges facing large-scale AI deployments is long-term operational affordability.

Many educational AI platforms depend upon continuous cloud processing, external AI services, and usage-based charging models that can create substantial recurring operational costs as deployment scales.

The AIME educational intelligence architecture has been designed around a different philosophy.

By combining:

- Curriculum-aware intelligence.
- ThinkBook knowledge architecture.
- EduRule pedagogical frameworks.
- Offline-first operation.
- Local educational intelligence infrastructure.

the platform significantly reduces dependence on continuous external AI services.

This approach supports:

- Predictable operating models.
- Reduced infrastructure dependency.
- Greater educational resilience.
- Improved long-term sustainability.
- Enhanced suitability for large-scale deployment.

The objective is to ensure that educational intelligence remains accessible and sustainable as the programme grows.

12.5 Technical and Infrastructure Sustainability

The Intelligent Classroom ecosystem has been designed to support operation across a wide range of educational environments.

The architecture incorporates:

- Offline-first functionality.
- Local educational intelligence services.
- Solar-powered resilience infrastructure.
- Reduced dependence on continuous connectivity.
- Modular deployment architecture.
- Scalable support frameworks.

These capabilities ensure that schools can continue benefiting from intelligent learning environments regardless of local infrastructure conditions.

The combination of energy resilience, local intelligence, and offline capability is particularly important in supporting equitable access across urban, peri-urban, and rural communities.

12.6 Long-Term Professional Development

Teacher capability remains one of the most important factors influencing educational outcomes.

For this reason, professional development is not treated as a deployment activity but as a continuous educational process.

Through the partnership between Data Systems Ltd and CENDLOS, participating educators will have access to an ongoing Continuous Professional Development framework designed to support:

- Effective classroom utilisation.

- Digital pedagogy.
- Educational innovation.
- Curriculum-aligned instructional practice.
- Educational intelligence adoption.
- Professional collaboration and knowledge sharing.

As teacher expertise grows, the educational impact of the Initiative is expected to increase correspondingly.

12.7 Pathway to National Scale

The National Demonstration Programme has been specifically designed to generate the evidence, operational experience, and educational outcomes required to inform future expansion.

The programme will provide valuable insights relating to:

- Educational impact.
- Teacher adoption.
- Curriculum utilisation.
- Infrastructure performance.
- Operational effectiveness.
- Sustainability.
- National readiness.

These findings will enable stakeholders to make informed decisions regarding future deployment strategies and broader implementation opportunities.

The Demonstration Programme therefore serves as an important stepping stone towards a potential national educational intelligence infrastructure.

12.8 Future Expansion Opportunities

Subject to successful outcomes and stakeholder approval, the Initiative has the potential to support future expansion across additional schools, regions, and educational programmes.

Future phases may include:

- Additional Basic Schools.
- Additional Junior High Schools.
- Teacher training institutions.
- Regional education centres.

- Expanded curriculum resources.
- Enhanced language support.
- Additional educational intelligence services.

Any future expansion would be informed by the evidence generated through the Demonstration Programme and aligned with national educational priorities.

12.9 Supporting Documentation

This proposal focuses on the educational vision, programme framework, implementation approach, and sustainability strategy for the Ghana Intelligent Classrooms Initiative.

Detailed commercial, technical, and contractual information is provided separately through supporting documentation, including:

- Commercial Proposal and Pro Forma Invoice.
- Technical Specifications.
- Detailed Implementation Schedule.
- Contractual Framework and Terms.

These documents collectively form the complete submission package supporting the National Demonstration Programme.

12.10 Creating a Lasting Educational Legacy

The Ghana Intelligent Classrooms Initiative represents an opportunity to establish a foundation for long-term educational innovation and excellence.

By combining curriculum-aware educational intelligence, teacher empowerment, local capability development, resilient infrastructure, and strong educational governance, the Initiative seeks to create lasting benefits for learners, educators, schools, and communities throughout Ghana.

The National Demonstration Programme is intended to provide the first step towards that vision, generating the evidence, expertise, and experience required to support the future development of a nationally aligned educational intelligence ecosystem capable of serving future generations of Ghanaian learners.

14. Expected National Outcomes

14.1 Transforming Teaching and Learning

The Ghana Intelligent Classrooms Initiative has been designed to deliver measurable educational benefits that extend beyond technology deployment and contribute directly to national educational priorities.

Through the combination of curriculum-aware educational intelligence, teacher empowerment, resilient classroom infrastructure, and continuous professional development, the Initiative seeks to create meaningful improvements across the entire educational ecosystem.

The National Demonstration Programme will provide the opportunity to evaluate these outcomes at scale while establishing a foundation for future educational transformation.

The expected outcomes described below represent the intended benefits for learners, teachers, schools, communities, and Ghana as a whole.

14.2 Learner Outcomes

At the centre of the Initiative are Ghanaian learners.

The programme seeks to create more engaging, interactive, and effective learning experiences that support academic achievement while preparing students for success in an increasingly digital and technology-driven world.

Expected learner outcomes include:

Enhanced Classroom Engagement

Students will benefit from more interactive and participatory learning environments that encourage curiosity, collaboration, and active involvement in classroom activities.

Improved Learning Experiences

The combination of intelligent classroom technologies and curriculum-aligned educational resources will support deeper understanding and improved knowledge retention.

Increased Digital Literacy

Learners will gain greater confidence using digital tools and technology-enabled learning environments.

Stronger Problem-Solving Skills

Interactive learning experiences will encourage critical thinking, creativity, logical reasoning, and structured problem solving.

Greater Exposure to STEM and Emerging Technologies

Students will have increased opportunities to engage with science, technology, engineering, mathematics, digital skills, and foundational concepts related to artificial intelligence.

More Equitable Access to Learning Opportunities

Students across urban, peri-urban, and rural communities will gain access to comparable educational experiences regardless of local infrastructure limitations.

14.3 Teacher Outcomes

Teachers remain the most important factor in educational success.

The Initiative has therefore been designed to strengthen teacher effectiveness, increase confidence, and reduce administrative burden.

Expected teacher outcomes include:

Improved Lesson Preparation Efficiency

Educational intelligence tools will assist teachers with lesson planning, resource development, assessment preparation, and curriculum alignment.

Enhanced Classroom Delivery

Interactive teaching environments will provide educators with new methods for presenting and reinforcing curriculum content.

Increased Confidence in Educational Technology

Ongoing professional development and classroom experience will help teachers build confidence in using intelligent learning environments.

Access to Continuous Professional Development

Teachers will benefit from structured CPD programmes delivered through the partnership between Data Systems Ltd and CENDLOS.

Greater Professional Collaboration

Communities of practice and shared learning opportunities will support collaboration and knowledge exchange among educators.

Reduced Administrative Burden

Educational intelligence tools will help streamline routine tasks, enabling teachers to focus more time on learner engagement and instructional quality.

14.4 School Outcomes

Participating schools are expected to benefit from enhanced educational infrastructure, improved learning environments, and stronger educational performance.

Expected school outcomes include:

Modernised Learning Environments

Intelligent Classrooms will provide schools with future-ready educational infrastructure capable of supporting modern teaching methodologies.

Increased Educational Resilience

Offline-first educational intelligence and solar-powered infrastructure will help maintain continuity of teaching and learning.

Improved Technology Adoption

Schools will develop greater confidence and capability in integrating educational technology into everyday teaching practice.

Enhanced School Reputation and Community Engagement

Participation in a nationally significant educational transformation programme may strengthen school visibility and stakeholder engagement.

Improved Access to Educational Resources

Teachers and learners will benefit from expanded access to curriculum-aligned learning materials and educational intelligence capabilities.

14.5 National Educational Outcomes

The Initiative is intended to contribute to broader educational priorities and national development objectives.

Expected national outcomes include:

Strengthened Curriculum Delivery

Improved access to curriculum-aligned educational resources and teaching support systems.

Enhanced Teacher Development

A sustainable national model for teacher enablement and continuous professional development.

Greater Educational Equity

Improved access to quality learning experiences across diverse geographical regions.

Improved Educational Innovation Capacity

Development of expertise and experience relating to intelligent learning environments and educational transformation.

Evidence-Based Educational Planning

Generation of meaningful data and insights to support future policy and investment decisions.

Increased National Capability

Creation of local expertise in educational technology deployment, educational intelligence, training, support, and programme management.

14.6 Economic and Workforce Development Outcomes

Education plays a critical role in national economic development and workforce readiness.

By supporting digital literacy, STEM engagement, problem solving, and technology confidence, the Initiative contributes to the development of skills increasingly required within modern economies.

Expected long-term outcomes include:

Improved Future Workforce Readiness

Preparation of learners for participation in a technology-enabled economy.

Enhanced Digital Skills Development

Support for the development of digital competencies across future generations.

Increased Innovation and Entrepreneurship Potential

Encouragement of creativity, curiosity, experimentation, and problem-solving abilities.

Support for National Digital Transformation Objectives

Contribution to Ghana's broader ambitions relating to digital development, innovation, and economic competitiveness.

14.7 Building a Ghanaian Educational Intelligence Ecosystem

Beyond individual classrooms and schools, the Initiative seeks to establish the foundations of a broader educational intelligence ecosystem.

Through collaboration between the Ministry of Education, CENDLOS, Data Systems Ltd, NDX Education, teachers, curriculum specialists, and educational institutions, the programme will contribute to:

- Educational innovation capability.
- Curriculum intelligence development.
- Teacher development expertise.
- Local content creation.
- Educational research and evaluation.
- Sustainable support infrastructure.

This ecosystem approach creates opportunities for continuous improvement and future expansion.

14.8 Positioning Ghana as a Leader in Educational Innovation

Ghana has consistently demonstrated leadership in educational development and innovation across Africa.

The National Demonstration Programme provides an opportunity to further strengthen that position by demonstrating how curriculum-aware educational intelligence, teacher empowerment, resilient infrastructure, and local capability development can be combined within a nationally aligned educational framework.

The lessons, expertise, and evidence generated through the programme have the potential to inform future educational transformation initiatives both within Ghana and across the wider region.

14.9 A Lasting National Impact

The ultimate outcome of the Ghana Intelligent Classrooms Initiative is not the deployment of technology, but the creation of lasting educational impact.

Through stronger teaching, more engaged learners, improved access to educational opportunity, enhanced professional development, and the establishment of sustainable national capability, the Initiative seeks to contribute meaningfully to Ghana's long-term educational and economic development.

The National Demonstration Programme represents an important step towards that vision, creating the foundation for a future in which every learner has access to high-quality, future-ready educational opportunities regardless of location or circumstance.

15. Conclusion and Recommendations

15.1 Conclusion

Ghana stands at an important moment in its educational development.

The rapid advancement of digital technologies, artificial intelligence, and new learning methodologies presents an opportunity to strengthen educational delivery, improve learner outcomes, empower teachers, and prepare future generations for participation in an increasingly knowledge-driven global economy.

The Ghana Intelligent Classrooms Initiative has been developed in response to this opportunity.

Through the integration of curriculum-aware educational intelligence, interactive classroom environments, resilient infrastructure, teacher professional development, and sustainable local capability building, the Initiative provides a practical and scalable framework for educational transformation that is aligned with Ghana's priorities and educational objectives.

The proposed National Demonstration Programme represents an opportunity to evaluate this framework at meaningful scale through the deployment of approximately 1,000 Intelligent Classrooms across Basic and Junior High Schools.

Importantly, the Initiative places educational outcomes at the centre of programme delivery.

Teachers remain at the heart of the learning process. Curriculum remains the foundation of instructional practice. Technology serves as an enabler that supports teaching effectiveness, learner engagement, and educational excellence.

The partnership between the Ministry of Education, CENDLOS, Data Systems Ltd, and NDX Education combines educational leadership, local implementation capability, professional development expertise, and educational innovation within a single coordinated framework.

Together, these capabilities create a strong foundation for both the National Demonstration Programme and any future expansion opportunities that may arise from its success.

15.2 Strategic Opportunity

The National Demonstration Programme provides Ghana with an opportunity to:

- Strengthen curriculum delivery.
- Enhance teacher effectiveness.
- Improve learner engagement.
- Expand educational access and equity.
- Build national educational technology capability.

- Establish a sustainable educational intelligence ecosystem.
- Generate evidence to support future policy and investment decisions.

The programme has been intentionally designed to provide measurable educational value while creating the knowledge, experience, and operational capability required to inform future planning.

By adopting a phased and evidence-based approach, Ghana can evaluate educational impact, operational effectiveness, and long-term sustainability before considering broader deployment opportunities.

15.3 Recommendations

To progress the Initiative, the following actions are recommended:

Recommendation 1 – Acceptance of the Proposal for Detailed Review

That the Ministry of Education and CENDLOS accept this proposal for formal evaluation and stakeholder review.

Recommendation 2 – Establishment of a Joint Working Group

That a joint working group comprising representatives from the Ministry of Education, CENDLOS, Data Systems Ltd, and NDX Education be established to support programme planning and implementation readiness activities.

Recommendation 3 – Validation of Demonstration Programme Scope

That the proposed National Demonstration Programme framework, deployment approach, evaluation methodology, and school selection criteria be reviewed and refined through collaborative stakeholder engagement.

Recommendation 4 – Review of Supporting Documentation

That the accompanying documentation be reviewed in parallel with this proposal, including:

- Commercial Proposal and Pro Forma Invoice.
- Technical Specifications.
- Detailed Implementation Schedule.
- Contractual Framework and Terms.

These supporting documents provide the detailed commercial, technical, operational, and contractual information required to support programme implementation.

Recommendation 5 – Commencement of Commercial and Contractual Discussions

That commercial, procurement, and contractual discussions commence to enable detailed planning and programme mobilisation activities.

Recommendation 6 – Programme Mobilisation

Subject to approvals and contractual agreement, that mobilisation activities commence in accordance with the proposed implementation timeline.

15.4 A Shared Vision for Ghana's Educational Future

The Ghana Intelligent Classrooms Initiative reflects a shared commitment to educational excellence, innovation, inclusion, and national development.

By combining strong educational leadership, empowered teachers, curriculum-aligned educational intelligence, resilient infrastructure, and sustainable local capability, the Initiative seeks to create meaningful and lasting benefits for learners across Ghana.

The National Demonstration Programme is intended to provide the first step towards that vision.

Through collaboration, evidence-based implementation, and a continued focus on educational outcomes, Ghana has the opportunity to establish a model for intelligent, inclusive, and future-ready education that can serve both the nation and the wider African continent.

The partners respectfully submit this proposal for consideration and look forward to working alongside the Ministry of Education, CENDLOS, and other stakeholders to support the next stage of Ghana's educational transformation journey.

Appendices

Appendix A – Technical Specifications

Appendix B – Partnership Framework

Appendix C – Demonstration Programme Design

Appendix D – Training Framework

Appendix E – Monitoring & Evaluation Framework

Appendix F – Indicative Commercial Framework

Appendix G – Scale-Up Roadmap

A Shared Vision for Ghana's Future

The Ghana Intelligent Classrooms Initiative represents more than a technology programme.

It is an investment in teachers.

It is an investment in learners.

It is an investment in national capability.

It is an investment in Ghana's future.

By combining curriculum-aware educational intelligence, resilient classroom infrastructure, teacher empowerment, local capability development and sustainable delivery models, Ghana has the opportunity to establish a new benchmark for intelligent, inclusive and future-ready education across Africa.

The National Demonstration and Readiness Programme provides a practical, measurable and scalable pathway to evaluate impact, build confidence, develop local expertise and establish the foundations for future national deployment.

Through the leadership of the Ministry of Education and CENDLOS, together with the expertise of NDX Education and Data Systems Ltd, this initiative can help create learning environments that empower teachers, inspire learners and prepare future generations for success in an increasingly digital and AI-enabled world.

One Vision.

One Partnership.

One Transformational Future for Ghana.

Submitted By

NDX Education

Prime Contractor and Programme Integrator

In Partnership With

Data Systems Ltd

National Delivery, Training and Support Partner

Prepared For

The Ministry of Education

The Centre for National Distance Learning and Open Schooling (CENDLOS)

June 2026

Accra, Ghana

"Creating equitable, resilient and future-ready learning environments for every child in Ghana."