



2025 AFRICA REGIONAL CONFERENCE & EXHIBITION ON EDUCATION AND SKILLS DEVELOPMENT (ARC-EDS)

&

GLOBAL EDUCATION EVENT ON QUANTUM SCIENCE AND TECHNOLOGY (IYQ2025)

5th - 7th
August 2025

Accra International
Conference Centre

SUMMARY REPORT

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DEDICATION

To the cherished memory of Hon. Alhaji Dr. Ibrahim Murtala Mohammed (1974–2025), Minister for Environment, Science and Technology of the Republic of Ghana, whose visionary leadership and passionate advocacy for science, education, and youth empowerment illuminated the Opening Ceremony of ARC-EDS 2025 on 5th August.

Tragically, he passed away the following day while on official duty, a loss felt not only by Ghana but by Africa and the global community of science and education.

We honor his life, leadership, and service. May this report stand as part of his enduring legacy, a reminder that his call to action must continue to guide Africa's transformation through education, research, and frontier science.

"Though his voice is stilled, his vision continues to speak to generations yet to come."



*Hon. Alhaji Dr. Ibrahim Murtala Mohammed
Minister for Environment, Science and Technology of
the Republic of Ghana*

EXECUTIVE SUMMARY

The 2025 Africa Regional Conference and Exhibition on Education and Skills Development (ARC-EDS), held from 5–7 August 2025 at the Accra International Conference Centre, brought together more than 800 participants from 23 African countries alongside partners from Europe, Asia, the Americas, and Australia. The conference provided a high-level platform to align Africa’s education and skills agenda with the demands of the labour market, while also advancing the continent’s leadership in frontier science through the International Year of Quantum Science and Technology (IYQ2025).

Over three days, delegates explored bold strategies to tackle youth unemployment through entrepreneurship, innovation, and work-integrated learning; considered the transformative potential of quantum science and technology for Africa’s development; and showcased practical solutions through a vibrant exhibition by institutions and young innovators. The proceedings produced clear recommendations for governments, academia, industry, and civil society, while affirming ARC-EDS as a continental platform for sustained dialogue and action.

The conference concluded with the adoption of the Ghana Quantum Communiqué, the launch of the F.K.A. Allotey Lecture on Quantum Science and Technology, and recognition of outstanding innovations by Technical Universities. ARC-EDS 2025 reaffirmed that Africa’s greatest resource is its people, especially its youth, and that investing in education, skills, and science is central to building an inclusive, innovative, and prosperous future.



INTRODUCTION

The Africa Regional Conference and Exhibition on Education and Skills Development (ARC-EDS) is a flagship platform convened by ESDEV Foundation Africa to foster dialogue, innovation, and collaboration across the continent's education and skills ecosystem. Since its inception, ARC-EDS has created space for policymakers, educators, researchers, industry leaders, and youth to address critical challenges and explore opportunities at the intersection of education, employment, and sustainable development.

The 2025 edition, hosted in Accra, Ghana, was organised under the theme ***"Harnessing Entrepreneurship and Innovation to Tackle Youth Unemployment."*** The conference also carried the distinct honour of hosting one of the official global events of the International Year of Quantum Science and Technology (IYQ2025), positioning Africa at the forefront of frontier science. With a diverse audience representing governments, academia, civil society, private sector, and international organisations, ARC-EDS 2025 provided a truly inclusive forum for advancing Africa's development agenda.

Across three days, the conference combined high-level speeches, keynote addresses, panel discussions, exhibitions, and the launch of new initiatives. Together, these elements reinforced a central message: that Africa's future depends on equipping its youth with relevant skills, fostering a culture of innovation, and embracing the opportunities of emerging science and technology.



ACKNOWLEDGEMENT

The Organizers of the 2025 Africa Regional Conference and Exhibition on Education and Skills Development (ARC-EDS) extend profound appreciation to all institutions, partners, and individuals whose contributions made the conference a resounding success.

We acknowledge with gratitude the support of the Government of Ghana, particularly the Ministry of Education and the Ministry of Environment, Science and Technology, for their leadership and commitment to advancing education, skills development, and frontier science. Special thanks are due to the Ghana Academy of Arts and Sciences, the Ghana National Research Fund, and the Ghana Commission for UNESCO for their intellectual and institutional guidance.

The Organizers are indebted to UNESCO and the International Steering Committee of the International Year of Quantum Science and Technology (IYQ2025) for their collaboration in making this conference one of the official global IYQ events. We further recognise the active participation of the Volta River Authority, the Ghana Atomic Energy Commission, the Electricity Company of Ghana, and leading academic institutions including the University of Ghana, the Kwame Nkrumah University of Science and Technology (KNUST), the University of Cape Coast (UCC), and the University of Mines and Technology (UMaT). The contributions of the Technical Universities of Ghana and international academic and industry partners also enriched the programme with expertise and innovation.

We also extend special appreciation to Ambassador R. M. Chitiga of Zimbabwe for her participation and solidarity, symbolising the pan-African spirit and global collaboration that underpinned the conference.

Finally, we extend our gratitude to the Ghana National Union of Technical Students (GNUTS), private sector sponsors, exhibitors, and civil society partners for their invaluable role in mobilising participation and showcasing solutions. Above all, we salute the dedication of all delegates, youth representatives, and panellists from across Africa and beyond, whose energy and ideas affirmed that Africa's development future rests on collective action, innovation, and education for all.



OPENING CEREMONY

OPENING CEREMONY

The Opening Ceremony of the 2025 Africa Regional Conference and Exhibition on Education and Skills Development (ARC-EDS) marked the official commencement of three days of dialogue, collaboration, and innovation in Accra. Held against the backdrop of the International Year of Quantum Science and Technology (IYQ 2025), the ceremony was both celebratory and forward-looking, bringing together dignitaries, policy leaders, academics, industry partners, and youth representatives to reaffirm Africa's commitment to education and skills development as catalysts for transformation.

The event drew over 1,500 participants' in-person and online, representing a truly global community united around Africa's development agenda in Technical and Vocational Education and Training (TVET) and frontier science. Delegates came from 23 African countries, alongside participants from Asia, Europe, the Americas, and Australia, affirming ARC-EDS as a continental platform with global resonance.

The Opening Ceremony also reflected inclusivity at its core. Among the in-person

participants were 565 high school students from four TVET and three STEM institutions (70% male, 30% female), alongside 135 faculty and students from seven Technical Universities. Over 150 representatives from STEM-focused universities and research institutions such as the University of Ghana, University of Cape Coast, Kwame Nkrumah University of Science and Technology, University of Education, Winneba, University of Mines and Technology, Ghana Atomic Energy Commission, Ghana Academy of Arts and Sciences, Methodist University Ghana, and the Ghana Space Science and Technology Institute enriched the exchanges with academic depth and scientific expertise.

Complementing this academic and youth participation, the Ceremony welcomed more than 300 delegates from government ministries and agencies, civil society organisations, the diplomatic corps, development partners, private enterprises, and technology start-ups. This diversity underscored ARC-EDS's central message: Africa's transformation in education and innovation demands multi-sectoral partnerships and international solidarity.



Chairman's Opening Remarks



Prof. Jophus Anamuah-Mensah, Chairman of International Advisory Board (ESDEV Foundation Africa)

The Chairman of the Conference, Professor Jophus Anamuah-Mensah, delivered the official Opening Remarks with authority and vision. He situated ARC-EDS 2025 within Africa's broader struggle to tackle youth unemployment while harnessing innovation, entrepreneurship, and technical education as engines of growth. Professor Anamuah-Mensah reminded participants that Africa is the youngest continent in the world, with more than 60 percent of its population under the age of 25. This demographic reality, he cautioned, could either become a time bomb of disillusionment if education systems remain mismatched with labour markets, or a springboard for prosperity if young people are equipped with relevant skills.

He emphasised that traditional models of education are no longer sufficient. ***In a rapidly evolving world, where artificial intelligence, automation, and frontier science are reshaping industries, Africa cannot afford to lag behind. Instead, its education systems must pivot towards problem-solving, creativity, and innovation, enabling graduates to thrive not only as job seekers but also as job creators.***

Professor Anamuah-Mensah commended ESDEV Foundation Africa for convening such a diverse gathering of stakeholders, and urged participants to think beyond national borders, recognising that Africa's development

depends on continental collaboration. His call was unambiguous: ***'the time for incremental reform has passed. What Africa needs is a bold transformation agenda that places technical and vocational education, entrepreneurship, and frontier science at the heart of sustainable development'***.

Welcome Address by CEO of ESDEV Foundation Africa



Prof. Francis Owusu-Mensah, Chief Executive Officer (ESDEV Foundation Africa)

The Welcome Address was delivered by Professor Francis Owusu-Mensah, Chief Executive Officer of ESDEV Foundation Africa, who welcomed delegates with warmth and resolve. He reflected on the growth of ARC-EDS from its inception to the present, highlighting how the platform has evolved into a continental convening space where policymakers, educators, industry leaders, and young people co-create solutions.

Professor Owusu-Mensah traced the journey since ARC-EDS 2024, noting that the conference had birthed concrete post-event interventions. These included deep-dive engagements at Ho Technical University, which gave rise to Innovate4Employment and InnovateLaunch – flagship ESDEV initiatives designed to enhance student innovation and job readiness. He also announced proposal for the establishment of a Business Innovation and Incubation Centre (BIIC) in partnership

with Ho Technical University and international collaborators, which is expected to become a model for nurturing entrepreneurship in technical universities.

He further highlighted the pilot of the Kurasa Teaching, Learning and Assessment Platform (TLAP) in collaboration with the Ghana Education Service and Kurasa Africa, which demonstrated significant improvements in teacher efficiency, learner monitoring, and parental engagement. These initiatives, he explained, signal ESDEV Foundation's commitment to not just hosting dialogues, but implementing practical, scalable solutions that tackle the barriers young people face.

Looking forward, Professor Owusu-Mensah called on all stakeholders – governments, private sector actors, international partners, and academia to join forces in reimagining education as the bedrock of Africa's socio-economic transformation. He urged participants to see the conference as a working platform where ideas must translate into partnerships, investments, and actions that impact real lives. His welcome set a visionary tone, positioning ARC-EDS not just as another conference, but as a continental movement for change.

Statement by the Acting Vice-Chancellor of Accra Technical University

Professor Amevi Acakpovi, Acting Vice-Chancellor of Accra Technical University (ATU), welcomed delegates and underscored the urgency of tackling youth unemployment, noting that Africa's youthful population represents both a challenge and a tremendous opportunity.

He stressed that technical and vocational education and training (TVET) must be reframed beyond training for jobs to training

for innovation, entrepreneurship, and transformation. Citing global projections, he highlighted that by 2027 over 85 million jobs may be displaced while 97 million new ones will be created, making it critical for African institutions to prepare learners with digital and emerging technology skills such as artificial intelligence, renewable energy, and cybersecurity.



Prof. Amevi Acakpovi, Acting Vice-Chancellor (Accra Technical University)

He showcased ATU's efforts to bridge the education-to-industry gap through initiatives such as the Centre for Entrepreneurship and Incubation Services, the Drone Competency Centre with Korean partners, the A4 Digital Centre, and the Sustainable Energy Service Centre. These centres, alongside over 30 partnerships forged with local and international stakeholders, are equipping students with practical skills, fostering innovation, and ensuring that graduates are employable and future-ready.

Professor Acakpovi concluded with a call to action, urging Africa's leaders, business executives, and philanthropists to invest in structured, scalable support systems for youth innovation and entrepreneurship. He praised ESDEV Foundation Africa for spearheading ARC-EDS as more than a conference, but as a continental movement uniting ideas with action and preparing Africa's youth to seize opportunities in a rapidly changing global economy.

Goodwill Messages

British Council Ghana



Mr. Nii Dodoo Dodoo, Country Director (British Council, Ghana)

Delivering a goodwill message on behalf of the British Council, Mr. Nii Dodoo Dodoo underscored the organisation's long-standing commitment to education, cultural exchange, and skills development in Ghana and across Africa. He emphasized the Council's readiness to partner with stakeholders in advancing innovation and building future-ready skills among young people.

Ghana National Research Fund



Prof. Abigail Opoku Mensah, Administrator (National Research Fund, Ghana)

Representing the National Research Fund, Professor Abigail Opoku Mensah highlighted the indispensable role of research as the lifeblood of innovation and policy advancement. She noted that without sustained investment in research, Africa risks perpetuating cycles of dependency and underdevelopment. Professor Mensah emphasized that GNRF is committed to prioritising applied research that addresses concrete socio-economic challenges, ranging from youth unemployment to climate resilience and technological

innovation. She called for stronger linkages between research institutions, industries, and government, stressing that when research is translated into practical solutions, it can drive industrial growth, job creation, and inclusive development. The GNRF, she reaffirmed, stands ready to support evidence-based policymaking and to fund initiatives that bridge the gap between academic inquiry and societal impact.

Ghana Commission for UNESCO



Dr. Osman Tahiru Damba, Secretary-General (Ghana Commission for UNESCO)

Dr. Osman Tahiru Damba, Secretary-General of the Ghana Commission for UNESCO, delivered a goodwill message reaffirming Ghana's strong partnership with UNESCO and its commitment to advancing education and scientific research. He stressed that quantum science, though often perceived as abstract, has practical implications for health, communication, energy, and national security. His remarks highlighted the importance of making quantum science accessible to young learners and integrating it into national education strategies.

Ministry of Skills Audit and Development, Zimbabwe

Ambassador R.M. Chitiga, speaking on behalf of the Government of Zimbabwe, delivered a stirring goodwill message that reflected the spirit of pan-African solidarity. She commended Ghana and ESDEV

Goodwill Messages

Foundation Africa for convening ARC-EDS at such a critical juncture, underscoring that the continent's challenges; youth unemployment, technological lag, and climate vulnerability require shared and coordinated solutions.



Ambassador R.M. Chitiga, Permanent Secretary (Ministry of Skills Audit and Development, Zimbabwe)

Ambassador Chitiga emphasized that Zimbabwe, like many African countries, is investing in TVET reforms, innovation hubs, and regional partnerships, recognizing that Africa's comparative advantage lies in the creativity and resilience of its youth. She challenged participants to ensure that ARC-EDS goes beyond dialogue to practical collaboration and urged that lessons learned in Accra be cascaded to local institutions across the continent. Her message was a call to transform Africa's shared challenges into shared opportunities, with education as the binding thread.

UNESCO Country Office (Ghana)



Mr. Prosper Nyavor (UNESCO Ghana)

Mr. Prosper Nyavor, representing UNESCO Ghana, delivered a goodwill message on behalf of Mr. Edmond Mukala. He described the convening of ARC-EDS and the IYQ 2025

Global Education Event as a testament to Ghana's leadership in bridging education, science, and sustainable development. He emphasized that UNESCO regards education as the cornerstone of peace and prosperity, but also as the foundation for innovation and resilience in the face of global challenges such as climate change, technological disruption, and inequality.

Mr. Nyavor commended Ghana for spearheading the UN resolution that declared 2025 as the International Year of Quantum Science and Technology, positioning Africa as a proactive actor in shaping global scientific discourse. He stressed that UNESCO's mandate is to ensure that no learner, regardless of geography, gender, or socio-economic background, is excluded from the opportunities of the future. To this end, he highlighted UNESCO's commitment to supporting curriculum reforms, digital transformation, teacher development, and youth empowerment across Africa.

He further urged African countries to seize the momentum of ARC-EDS to foster regional cooperation and to anchor education systems in values of equity, sustainability, and innovation. His address concluded with an appeal for stakeholders to view the conference not merely as an event, but as a springboard for collective action that would ensure Africa's young people are prepared to thrive in the quantum age and beyond.

Volta River Authority (VRA)

Mr. Samuel Fletcher, Deputy Chief Executive Officer (Services) of the Volta River Authority (VRA), delivered a goodwill message on behalf of the Authority's Board and Management. He reminded participants that while VRA is best known for electricity generation: hydro, thermal, and solar, powering much of the country, it also plays a broader role in national development. Beyond power generation and distribution in the northern

Goodwill Messages

sector, VRA invests heavily in education and social services. It has for decades provided scholarships for students at both secondary and tertiary levels and operates schools that have been running for over 63 years.



*Mr. Samuel Fletcher, Deputy Chief Executive Officer
(Volta River Authority, Ghana)*

The Authority also manages hospitals under VRA Health Services, engages in agriculture and palm farming, oversees hotels and hospitality services, runs inland lake transport through VLTC, and manages real estate properties.

Mr. Fletcher stressed that this wide ecosystem makes VRA not only a provider of energy but also a hub of skills development, employment, and entrepreneurship. He affirmed VRA's commitment to deepening its partnership with education and skills development stakeholders, assuring participants of the Authority's support for initiatives that link education, employment, and innovation.

International Year of Quantum Science and Technology Steering Committee

Professor Joseph Niemelä, speaking on behalf of the IQ 2025 Steering Committee, situated the discussions within the broader global momentum around quantum science. He explained that quantum technologies, ranging from quantum computing to secure communications, precision medicine, and advanced energy solutions, are expected to redefine global competitiveness.



*Prof. Joseph Niemelä, Scientist Emeritus, ICTP
(Trieste, Italy)*

For Africa, he stressed, the challenge is to ensure the continent is not left behind in what could become the defining technological revolution of the 21st century.

Professor Niemelä applauded Ghana's bold leadership in championing the UN resolution for IQ 2025, affirming that this has placed Africa at the centre of the global quantum conversation. He urged governments, universities, and industries across the continent to invest in human capital development, build regional centres of excellence, and demystify quantum concepts for schools and communities. He underscored that Africa's large youthful population can be its greatest advantage if equipped with the tools to participate in the quantum era. His message was not only celebratory but also catalytic, positioning IQ 2025 as a launchpad for Africa to leapfrog into a future of scientific leadership and innovation.

Ministry of Environment, Science and Technology (MEST)

The final goodwill message was delivered by Hon. Alhaji Dr. Ibrahim Murtala Mohammed, Minister for Environment, Science and Technology, whose remarks blended vision, urgency, and heartfelt conviction. He described the conference as timely and transformative, noting that Africa cannot hope to achieve sustainable development without deliberate investment in education, science, and innovation. He called for the development of a unified 40-year national

Goodwill Messages

science and technology plan that transcends political cycles, ensuring continuity and long-term impact. Highlighting the centrality of frontier science, he pointed out that breakthroughs in quantum science, artificial intelligence, biotechnology, and renewable energy have profound implications for Africa's industrialization and human development.

Dr. Murtala Mohammed also stressed the need to address inequalities in access to science education, warning that failure to include rural communities, women, and marginalized youth risks widening the digital and scientific divide. His passionate appeal was for Africa to embrace not just the

consumption of technology but its creation and ownership, so the continent can truly shape its own destiny. His words concluded the Opening Ceremony with gravitas, embodying both national commitment and a continental vision for transformation.



Hon. Alhaji Dr. Ibrahim Murtala Mohammed, Minister for Environment, Science and Technology (Ghana)

Closing of the Opening Ceremony

The Opening Ceremony concluded with a unifying call to action. Speakers collectively emphasized that Africa's demographic realities demand urgent innovation in education, skills development, and scientific research. The morning's exchanges laid a strong foundation for the technical sessions that followed, ensuring that the themes of

entrepreneurship, innovation, and frontier science would remain at the heart of deliberations throughout the conference. The ceremony ended on an optimistic note, with participants inspired to engage actively in the days ahead and contribute meaningfully to shaping Africa's educational and economic future.





PLENARY SESSION ONE

PLENARY SESSION ONE

Day One: Entrepreneurship and Innovation in Tackling Youth Unemployment

The first day of the 2025 Africa Regional Conference and Exhibition on Education and Skills Development (ARC-EDS) opened with a strong focus on entrepreneurship and innovation as levers for addressing the continent's persistent challenge of youth unemployment. Discussions underscored the urgency of bridging the gap between education and the labour market, as well as the importance of embedding digital tools and inclusive practices across Africa's education systems.

Presentations

1. Reimagining the Education – to – Work Pathway: A Call for Bold Partnerships between Industry, Academia, and Government.



Dr. Stephen Nwolley, Chief Executive Officer (Mponu Technology, Ghana)

Dr. Stephen Nwolley delivered the keynote address on reimagining the education-to-work pathway through bold partnerships between industry, academia, and government. He highlighted Africa's pressing need to close the education-to-work gap and positioned the Fourth Industrial Revolution, anchored on artificial intelligence, data, and digital technologies as a defining moment for the continent's future workforce. He argued that computer science and digital literacy should no longer be optional subjects but must become foundational from the earliest levels of education. Drawing on examples of collaborations with universities and industry, he emphasized the creation of locally developed technological solutions such as ERP systems and AI training programmes. Importantly, he called for inclusivity, urging policymakers and

institutions to ensure that learners with disabilities and those in disadvantaged schools are not left behind. Apprenticeship, mentorship, and work-based learning were presented as indispensable strategies for cultivating resilient and employable graduates.

2. Education to avoid Youth Unemployment. Lessons from The Jena Declaration (TJD).



Prof. Dr. Benno Werlen, UNESCO Chair on Global Understanding for Sustainability (Friedrich Schiller University, Jena, Germany)

Prof. Dr. Benno Werlen presented insights from the Jena Declaration, framing youth unemployment not as a lack of education but as a mismatch between educational systems and local production regimes. He stressed that strengthening disciplinary education alone would not solve unemployment unless production systems, labour markets, and innovation ecosystems were developed in tandem. Without alignment, the result would be brain drain rather than job creation. He introduced three priorities

drawn from the Jena Declaration and UNESCO's global consultations: integrated approaches across disciplines, the establishment of living labs linking schools, industry, and communities, and balancing authenticity and authority in the interface between science and society. His reflections underscored the need to reshape curricula to serve local development needs while fostering global competitiveness.

3. Panel Discussion: Curriculum Innovation in TVET & Higher Education: Industry – academic collaborations.

The highlight of the afternoon was a high-level panel discussion moderated by Ms. Sarah Osei, Programmes & Communication Lead at ESDEV Foundation Africa. The panel convened distinguished voices from academia, industry, development cooperation, and international programmes:

The dialogue centred on how African universities and TVET institutions can reposition themselves as engines of innovation and employability. Panelists agreed that many graduates leave institutions with theoretical knowledge but remain ill-equipped for modern labour markets due to outdated training facilities and limited industry exposure. Ms. Songqishe drew on South Africa's automotive industry to illustrate the impact of outdated curricula and training equipment, while Prof. Acakpovi showcased ATU's investments in digital labs, drone technology, and incubation hubs as examples of bridging this gap.

Mr. Boateng, drawing from the BEAR project's experiences across Africa, underscored that sustainable TVET reform must be rooted in national development priorities while aligning with global labour market trends. He highlighted how BEAR has supported curriculum reforms, teacher training, and



Panel Discussion

Prof. Amevi Acakpovi, Acting Vice-Chancellor of Accra Technical University; Nicholas Issaka Gbana, Development Economist and Climate Investment Specialist; Engr. Dr. Stephen Turkson; Ms. Hanna Schlingmann, Project Lead of the DigiVibe Initiative at the AFOS Foundation for Entrepreneurial Development Cooperation; Ms. Odwa Songqishe, Senior Manager at the Automotive Industry Development Centre, Western Cape, South Africa; and Mr. Michael Boateng, National Project Officer and TVET Expert for the Better Education for Africa's Rise (BEAR) initiative.

industry linkages in multiple African countries, creating replicable models that Ghana and its neighbours can adopt. His intervention reinforced the importance of policy coherence, cross-border collaboration, and capacity building for both instructors and institutions.

Mr. Gbana argued that Africa must avoid wholesale importation of curricula that are detached from local production regimes. Instead, training should be oriented towards green economies, local entrepreneurship ecosystems, and climate-resilient sectors.

Ms. Schlingmann highlighted the value of partnerships with development organisations in embedding entrepreneurship and digital competencies, while Dr. Turkson called for institutionalised industry–academia advisory boards to ensure curricula remain responsive to evolving industry needs.

There was strong consensus that apprenticeships, mentorships, and cooperative learning models are critical for preparing students for the realities of work. Panelists urged policymakers to embed these pathways within accreditation systems and to incentivise private sector engagement. They further emphasised the role of incubation hubs, innovation labs, and applied research centres in bridging the gap between theory and practice, and the cross-cutting necessity of ensuring inclusivity for women, learners with disabilities, and those from underserved communities.



Ms. Odwa Sonqishe, Senior Manager (Automotive Industry Development Centre, South Africa)

In conclusion, the panel affirmed that Africa's education-to-employment agenda must be anchored on three interconnected pillars: modernising facilities, building demand-driven curricula through sustained industry partnerships, and ensuring inclusivity in all reforms. The discussion made clear that Africa's demographic dividend will only be realised if education systems decisively shift from theory to practice, from isolation to collaboration, and from exclusion to opportunity.

4. From Innovation to Impact: Reimagining Teaching and Assessment in Africa's Classrooms.



Mr. William Nguru, Chief Executive Officer (Kurasa Africa)

The session was delivered by Mr. William Nguru, Chief Executive Officer of Kurasa Africa, who presented a compelling vision for transforming teaching, learning, and assessment in Africa's classrooms. He began by situating the discussion within the wave of curriculum reforms underway across the continent, including Ghana's Standards-Based Curriculum, Nigeria's competency-based frameworks, Rwanda's digital learning reforms, and South Africa's initiatives to embed 21st-century skills. Despite these reforms, he noted, the majority of schools still rely on manual, paper-based systems that place heavy burdens on teachers, limit timely feedback, and prevent schools from making data-driven interventions.

Introducing the Kurasa Teaching, Learning and Assessment Platform (TLAP), Mr. Nguru demonstrated how digital tools can bridge this gap. He highlighted how TLAP simplifies lesson planning, automates attendance, digitises assessments, and provides real-time dashboards for teachers, administrators, and parents. He shared results from the Ghana pilot, conducted with ESDEV Foundation Africa and the Ghana Education Service, where over 140 teachers and 1,100 students across four regions participated. The pilot revealed measurable improvements in teacher efficiency, stronger learner monitoring, and significantly

improved school–parent engagement. Teachers reported reduced administrative workload, while parents valued the transparent access to student performance data.

Mr. Nguru further emphasised that TLAP is not simply a digital convenience but a strategic enabler of education reform. By providing actionable data, it allows policymakers to track curriculum implementation, identify learning gaps quickly, and allocate resources more effectively. He underlined that digital platforms like TLAP can accelerate reforms, delivering visible results in months rather than years, while reducing long-term system costs.

He concluded with a call to action, urging African governments, private sector actors, and development partners to invest in scalable EdTech solutions that empower teachers rather than replace them. “When teachers succeed every day in the classroom,” he stated, “learners succeed, schools succeed, and nations succeed.” His presentation captured the spirit of ARC-EDS by demonstrating how innovation, when rooted in local realities and aligned with reform agendas, can deliver tangible impact for learners, teachers, and societies.

5. Beyond the Classroom: Strengthening Internships, Co-ops, and Public – Private Partnerships for Work Integrated Learning.

The day concluded with a session led by Engr. Theophilus Tetteh Zogblah of the Commission for TVET (CTVET), who emphasised that education must connect learning with livelihoods through authentic work experiences. He outlined the concept of Work-Integrated Learning (WIL), drawing from international models including the dual

system in Germany, co-ops in Canada, and sandwich programmes in the UK. Evidence shows that WIL improves employability, boosts academic performance, and enhances innovation by exposing learners to real-world challenges. However, challenges remain in Africa, including limited industry absorption capacity, fragmented coordination, and inadequate funding.



Engr. Theophilus Tetteh Zogblah, Deputy Director (CTVET, Ghana)

Zogblah argued for institutionalising WIL through national policies, embedding it in accreditation processes, and creating funding schemes that incentivise employer participation. He highlighted the need for stronger private sector engagement, multi-firm consortia, and regional placement networks to expand opportunities for students.

Salient Points and Key Recommendations

The discussions throughout the day reinforced several central messages. Africa's education systems must be recalibrated to align with labour market demands through sustained partnerships between academia, government, and industry. Competency-based education, supported by digital innovations such as TLAP, is essential for equipping learners with relevant skills. Structural mismatches between education and production systems must be addressed, with policies that prevent brain drain and foster local innovation. Modernisation of facilities, especially in fast-evolving sectors, is a priority, as is the expansion of work-integrated learning pathways. Finally, inclusivity emerged as a cross-cutting imperative, requiring targeted measures to ensure that women, students with disabilities, and learners from underserved communities benefit equally from education and employment opportunities.

Day One set the stage for bold reforms, drawing a clear roadmap that connects education with opportunity, science with society, and innovation with employment. It closed with a collective recognition that Africa's demographic dividend can only be harnessed through decisive action, transformative partnerships, and a relentless focus on equipping young people for the future of work.

Closing Reflection

Day One of ARC-EDS 2025 was a powerful statement of Africa's intent to align education with the demands of the 21st-century economy. From bold visions of digital literacy for all to practical calls for curriculum reform and work-integrated learning, the discussions reflected a shared recognition that the continent's greatest resource, its youth, must be equipped with relevant, future-facing skills. The conversations created momentum for action, forging a continental consensus that Africa cannot afford to delay. As the conference transitioned into Day Two's focus on quantum science and technology, the spirit of collaboration, innovation, and urgency carried forward, signalling that Africa's future will be shaped by its willingness to embrace both immediate reforms and frontier opportunities with equal determination.



PLENARY SESSION TWO

PLENARY SESSION TWO

Day Two: Global Education Event on Quantum Science and Technology

The second day of ARC-EDS 2025 opened with equal ambition, shifting focus from entrepreneurship and employability to the transformative potential of frontier science. With Ghana proudly hosting one of the official global events of the International Year of Quantum Science and Technology (IYQ2025), the day positioned quantum education and research as central pillars of Africa's scientific advancement and economic transformation.

The programme convened leading scientists, educators, and policymakers from across the world to examine how quantum science can be demystified for classrooms, applied within industry, and aligned with Africa's broader development agenda. Beyond knowledge-sharing, the sessions served as a continental call to action, underscoring the urgency of building Africa's capacity in quantum technologies to ensure that the continent is not only a participant but also a contributor to the unfolding global quantum revolution.

Opening Statements Ghana Academy of Arts and Sciences



Prof. Alfred Apau Oteng-Yeboah, Vice-President (Sciences) (Ghana Academy of Arts and Sciences)

Prof. Alfred Apau Oteng-Yeboah, Vice-President (Sciences), Ghana Academy of Arts and Sciences, delivered the first goodwill message on behalf of the Academy's President. He commended ARC-EDS 2025 for providing a platform that elevates the role of science and technology in Africa's development and emphasized the Academy's long-standing mandate to advance scholarship, policy dialogue, and knowledge creation. His remarks highlighted that the integration of quantum science into education and innovation ecosystems is not only a matter of academic relevance but also of strategic importance for Ghana and the continent.

Ministry of Environment, Science and Technology (MEST)



Mr. Wilfred Edem Dennis (Ministry for Environment, Science and Technology, Ghana)

Mr. Wilfred Edem Dennis, Principal Research Officer, delivered a message on behalf of Hon. Dr. Ibrahim Murtala Mohammed, Minister for Environment, Science and Technology. He underscored that quantum technologies are redefining the frontiers of possibility in computing, secure communications, and medical diagnostics. Ghana, he affirmed, is committed to positioning itself within this landscape through investments in education, policy reform, and global partnerships. He stressed that education is the entry point, calling for stronger programmes in physics and computer science, better teacher training, and inclusive opportunities for young people, particularly women and underserved communities. He assured

participants of MEST readiness to collaborate across academia, industry, and international partners to ensure Africa does not merely adopt quantum technologies but actively co-creates and shapes them.

Presentations

1. Quantum Education: What do we want and how can we get there?



Prof. Sergej Faletič, University of Ljubljana (Slovenia)

Prof. Sergej Faletič delivered a thought-provoking presentation on the future of quantum education, raising the central question: what should we teach about quantum science, and how should we teach it? He underscored that while traditional topics such as blackbody radiation, the photoelectric effect, and atomic models are well covered in school curricula, these approaches often fail to capture the essence of quantum mechanics as it underpins today's technologies.

He highlighted the challenges of introducing advanced quantum concepts, such as Schrödinger's equation and the uncertainty principle, at the high school level, given their mathematical complexity. Instead, he advocated for innovative approaches using simplified models, two-state systems, and interactive methods such as games and simulations. These, he argued, can make abstract ideas more accessible while encouraging creative and critical thinking.

Drawing on European initiatives like the

Quantum Technology Competence Framework (QTEdu) and findings from the Jena Declaration (JIREP community), Prof. Faletič identified five core concepts of quantum literacy that should guide curriculum reform: states and superposition, indeterminism, uncertainty, measurement, and the role of quantum technologies in society. He stressed the urgency of cultivating not only a future quantum workforce but also a scientifically literate citizenry capable of navigating the promises and ethical implications of the quantum revolution.

His concluding reflections emphasized that quantum education must go beyond technical knowledge to nurture creativity, problem-solving, and epistemological awareness, equipping learners to thrive in an era where artificial intelligence can reproduce known solutions, but human ingenuity remains essential for discovering the unknown.

2. Easy-to-do Single Photons Experiments for Quantum Education.



Prof. Muhammad Sabieh Anwar, Lahore University of Management Sciences (Pakistan)

Prof. Muhammad Sabieh Anwar, Professor of Physics at the Lahore University of Management Sciences (LUMS), Pakistan, delivered an inspiring presentation that highlighted the transformative potential of experimental approaches to quantum education. He underscored that quantum science need not remain abstract or confined to highly

resourced laboratories in advanced economies. Rather, it can be taught, demonstrated, and experienced through low-cost, do-it-yourself experiments that are accessible to students in developing countries.

Drawing on his pioneering work in establishing physics instructional laboratories at LUMS, Prof. Anwar demonstrated how simple, homegrown experimental setups, built largely by undergraduate students, can replicate foundational quantum phenomena. His laboratory's work on single-photon experiments, wave-particle duality, entanglement, and non-locality showcased the possibility of demystifying quantum concepts in tangible, hands-on ways. He emphasized that such initiatives are already catalyzing enthusiasm in Pakistan, with similar models being replicated in several universities, and argued that Ghana and other African countries could adopt the same approach to democratize access to quantum science.

At the heart of his message was the conviction that democratizing quantum education is not only feasible but essential for ensuring inclusivity in the global quantum revolution. By investing in affordable laboratories, accessible teaching materials, and student-led innovation, Africa can leapfrog traditional barriers to entry. Prof. Anwar's call to action was clear: build simple yet rigorous spaces where young people can "see" and "touch" quantum phenomena, thereby transforming quantum science from an intimidating abstraction into an engaging and empowering educational journey.

3. Ultrasensitive and Affordable Methods for Efficient Cancer Phototherapy.

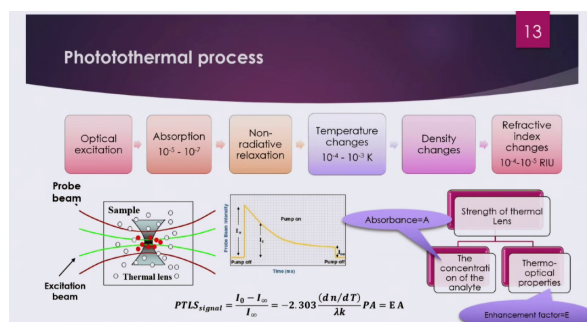
Dr. Humberto Cabrera Morales presented pioneering research on how quantum-



Dr. Humberto Cabrera Morales, ICTP (Trieste, Italy)

inspired optical methods can be applied to pressing global health challenges, with a particular focus on cancer therapy. Speaking virtually from the ICTP in Trieste, he shared his work on photothermal spectroscopy and the development of low-cost, highly sensitive laser-based methods for cancer detection and treatment. He emphasised that these approaches are not only scientifically advanced but also affordable and adaptable, making them especially relevant for developing regions such as Africa.

Dr. Cabrera explained how his team's research on gold nanoparticles and gold nanostars has led to breakthroughs in photothermal therapy. By using light absorption at near-infrared wavelengths, these nanoparticles can be activated to selectively target and destroy cancer cells while sparing healthy tissue. He highlighted that nanostars, in particular, have shown superior thermal conversion efficiency, enabling deeper tissue penetration and greater therapeutic precision. This innovation, he argued, opens the possibility for safer, less invasive, and more accessible cancer treatment options worldwide.



Beyond the science, Dr. Cabrera underscored the capacity-building role of ICTP, which has trained and mentored hundreds of young scientists from Africa, Asia, and Latin America. Through hands-on schools, experimental training, and collaborative projects, ICTP is helping build a global network of researchers equipped to lead the next wave of quantum-enabled medical and technological solutions. He concluded by affirming that breakthroughs in quantum science must be democratised and scaled globally, ensuring that emerging economies are not left behind in both scientific progress and healthcare innovation.

4. Equipping the Next Generation: Quantum Education and Workforce Development.



Prof. Heather Lewandowsky, University of Colorado (Boulder, USA)

Prof. Heather Lewandowsky underscored the importance of aligning quantum education with workforce needs, highlighting that while some industry roles require PhD-level expertise, many opportunities are open to bachelor's and master's graduates in areas such as hardware, software, and business development. She emphasised that hands-on laboratory skills, problem-solving, and interdisciplinary teamwork are essential for preparing students not only for quantum-specific careers but also for broader technology sectors.

Drawing from the Quantum Forge capstone course at the University of Colorado, she

showed how project-based learning enables students to solve real-world industry problems, building both technical and collaborative skills. She stressed the urgency of addressing diversity gaps in the global quantum workforce and called for targeted interventions, such as elective courses, affordable labs, and international partnerships to democratise access to quantum education and ensure inclusivity in the next generation of innovators.

5. Light-Based Security: Experimental Advances in Optical Data Protection.



Prof. John Fredy Barerra Ramirez, University of Antioquia (Colombia)

Prof. John Fredy Barerra Ramirez, coordinator of the Optics and Photonics Group at the University of Antioquia in Medellín, presented pioneering work on optical encryption as a pathway to secure communications. He explained how optical systems, unlike traditional algorithm-based methods, leverage the physics of light-phase, polarization, and diffraction, to generate physical keys that provide robust information security. Through his team's experiments, he illustrated how optical systems can encrypt and decrypt images and even videos at the speed of light, while overcoming long-standing challenges of noise and fidelity. His group's innovative integration of optical encryption with QR codes, enabling high-accuracy recovery of encrypted data despite distortions, was highlighted as a breakthrough with wide-ranging applications.

Prof. Ramirez also emphasized the importance of low-cost innovation for emerging economies. By developing compact optical crypto-systems using 3D-printed components and simplified single-arm setups, his team has demonstrated that secure optical communication research can be advanced with budgets as modest as USD 1,300. This work, which has received recognition from UNESCO and international optics bodies, serves as an inspiring reminder that with ingenuity and creativity, high-impact research in cutting-edge fields is possible outside the world's wealthiest laboratories. His closing message was particularly resonant: low-cost science, when coupled with determination and collaboration, can empower young researchers globally to contribute meaningfully to frontier technologies.

6. Science for All: Diversity, Inclusion, and Representation in Quantum Education.



Dr. Jess Wade, Imperial College (United Kingdom)

Dr. Jess Wade, physicist and leading advocate for diversity in science, delivered an inspiring presentation on the need to embed equity and representation at the heart of quantum education. She noted that the rapid growth of quantum technologies risks replicating existing inequalities if women, minorities, and underrepresented groups are not intentionally included in education, research, and industry pathways.

Drawing on her extensive outreach work, Dr.

Wade highlighted the importance of role models, inclusive teaching practices, and representation in scientific narratives. She stressed that broadening participation is not simply a moral imperative but a scientific necessity, as diverse teams consistently drive stronger innovation and problem-solving. She also called for deliberate reforms in curricula, hiring practices, and international collaboration to ensure that the quantum revolution reflects and benefits the richness of human diversity.

Her closing message was a call to action: the promise of quantum technologies will only be fully realised if every young person, regardless of gender or background, sees themselves as part of the story of science.

7. Showcasing the properties of light and where it comes from: a peep into the quantum world.



Prof. Muhammad Sabieh Anwar, Lahore University of Management Sciences (Pakistan)

The second day of ARC-EDS 2025 culminated in an engaging demonstration session led by Prof. Muhammad Sabieh Anwar (Lahore University of Management Sciences, Pakistan), who invited participants to experience first-hand the beauty of wave-particle duality and quantum phenomena through simple, yet profound, classroom experiments. Under the theme "A Peep into the Quantum World," the session created a memorable bridge between abstract concepts and tangible experiences, bringing quantum science closer to both educators and students.

Prof. Anwar began with a demonstration using a helium–neon laser to reveal interference patterns, illustrating the wave nature of light. Volunteers from the audience, including students, were invited to assist, reinforcing the participatory spirit of the session. He contrasted the coherent, monochromatic properties of laser light with the broad, multi-wavelength output of LEDs, using gratings and spectrometers to highlight how different light sources reveal distinct spectral signatures. These live demonstrations served as accessible analogues for quantum principles, showing how classical experiments foreshadow quantum behaviour.

The highlight of the session was a vivid exploration of emission spectra using gases such as mercury and neon, and later a captivating set of flame tests. With the help of student volunteers, Prof. Anwar demonstrated how different salts, when burned in ethanol, produce distinct colours—green for boron, blue-green for copper, yellow for sodium, and red for lithium—each reflecting the quantised energy levels of atoms.



This simple yet powerful exercise provided direct evidence of the quantisation of energy, one of the cornerstones of quantum mechanics, while also capturing the imagination of young learners.



Beyond the scientific content, the demonstrations underscored the importance of hands-on learning, curiosity-driven exploration, and accessible pedagogy in inspiring the next generation of scientists.

By transforming the lecture hall into a live laboratory, Prof. Anwar not only showcased the universality of quantum principles but also reminded participants that the foundations of frontier science can be taught with creativity, simplicity, and inclusivity. The session closed with resounding applause, reflecting the excitement and inspiration it had sparked among participants.



Salient Points and Key Recommendations from Day Two

Day Two of ARC-EDS 2025 placed quantum science and technology (QST) at the centre of Africa's future development, underscoring its transformative potential for education, industry, health, and innovation. Discussions highlighted both the opportunities and challenges in ensuring that Africa is not left behind in the unfolding second quantum revolution.

A recurring theme was the need for quantum literacy across all levels of education. Speakers emphasized that while advanced quantum theory may be mathematically complex, simplified models, interactive tools, and classroom experiments can make quantum concepts accessible to learners from an early stage. Building capacity for teachers through training and curriculum reform emerged as a critical step towards embedding quantum concepts within existing education systems.



The day also highlighted the importance of hands-on and affordable experimentation. Demonstrations showed that resource constraints should not be a barrier, as low-cost laboratories, homegrown experiments, and DIY approaches can make cutting-edge science accessible to institutions in developing countries. Such initiatives foster creativity and confidence, while enabling Africa to democratize access to frontier knowledge.

Workforce development was another central theme. Evidence from international studies

showed that the quantum workforce is far more diverse than commonly assumed, with roles spanning research, product development, software, hardware, and business. Preparing students with strong laboratory skills, problem-solving capacity, and interdisciplinary teamwork is essential—not only for quantum-specific careers but also for broader technology industries. This calls for targeted interventions such as project-based learning, industry collaborations, and elective courses that make quantum education scalable and adaptable.

Equally important was the call for equity, diversity, and inclusion. As Dr. Jess Wade emphasized, the global quantum revolution must not replicate old inequalities. Women, minorities, and underrepresented groups must be intentionally included through role models, inclusive pedagogy, equitable hiring, and international collaboration. Without deliberate action, the benefits of quantum technologies risk being unevenly distributed.

Finally, the day highlighted the applications of quantum science to Africa's pressing challenges, particularly in health and secure communications. Research on photothermal spectroscopy for affordable cancer therapy and low-cost optical encryption systems showed that quantum science can deliver transformative, practical solutions when innovation is coupled with local adaptation. Africa's participation in global research networks, supported by institutions such as ICTP, UNESCO, and university partnerships, will be crucial to scaling such innovations.

Key Recommendations:

- Integrate quantum literacy into education systems at all levels, with curriculum frameworks that balance accessibility, authenticity, and local relevance.
- Invest in affordable laboratories and hands-on training, enabling learners to experience quantum phenomena directly and demystify abstract concepts.
- Develop workforce-ready programmes that emphasize practical skills, interdisciplinary collaboration, and industry partnerships.
- Promote inclusivity and diversity in all aspects of quantum education and workforce development, ensuring equal opportunities for women and underrepresented groups.
- Strengthen international collaboration and networks, enabling African institutions to access global expertise, training, and resources in quantum science.
- Prioritize applied research and innovation that addresses Africa's development challenges, particularly in health, communications, and energy, ensuring quantum science contributes directly to the SDGs.

Day Two closed with a unified recognition that the quantum future must be inclusive, collaborative, and Africa-centered. By embedding quantum literacy in education, investing in affordable experimentation, and building equitable international partnerships, Africa can move from being a passive beneficiary to an active contributor to the global quantum revolution.



GLOBAL COOPERATION
OF QUANTUM SCIENCE
AND TECHNOLOGY AT
2023

PLENARY SESSION THREE



PLENARY SESSION THREE

Day Three: Charting the Path Forward: Sustaining Momentum beyond IYQ2025

Opening Session

Day Three of ARC-EDS 2025, held in conjunction with the Global Education Event on Quantum Science and Technology, opened on a reflective and solemn note. Ms. Sarah Osei, Programmes and Communications Lead at ESDEV Foundation Africa, welcomed participants and invited them to observe a minute of silence in memory of the late Hon. Dr. Ibrahim Murtala Mohammed, Ghana's Minister for Environment, Science, Technology and Innovation, who had delivered a goodwill message at the opening ceremony but tragically passed away the following day in a helicopter crash while on national assignment. The moment of reflection also honored the memory of Professor Francis Kofi Ampenyin Allotey, Ghana's pioneering physicist, whose legacy framed much of the day's discussions.



Ms. Sarah Osei, Programmes & Communication Lead (ESDEV Foundation Africa)

In her remarks, Ms. Osei highlighted the significance of the third day's agenda, noting that it would combine frontier science presentations with high-level policy and industry dialogue. She stressed the importance of Ghana and Africa seizing the opportunities of the quantum revolution to avoid repeating the missed industrial revolutions of the past. She called for a structured and unified agenda that would bring together government, academia, and

industry to ensure Ghana is an active participant in shaping the global quantum future, rather than a passive consumer.

Following her, Professor Joseph Niemela, Senior Research Scientist at the Abdus Salam International Centre for Theoretical Physics (ICTP) and a member of the IYQ2025 Steering Committee, extended his own words of welcome. He introduced the day's lead speakers, beginning with Professor David Hutchinson of the University of Otago, New Zealand, whose work on ultracold atomic physics and quantum technologies has had global influence. Professor Niemela emphasized the importance of international collaboration and outreach, underscoring the role of science diplomacy in advancing both the International Year of Light (2015) and the International Year of Quantum Science and Technology (2025). He reminded participants that the future of quantum research rests not only in technological breakthroughs but also in people – their education, creativity, and ability to build bridges across disciplines and regions.

Together, the opening remarks set a thoughtful and forward-looking tone for the day's engagements, balancing solemn remembrance with optimism and resolve for Africa's role in the quantum era.

Presentations

1. Cutting-edge research is essential for emerging economies: the future is in our people.



Prof. David Hutchinson, University of Otago (New Zealand)

Prof. David Hutchinson highlighted the indispensable role of cutting-edge research in shaping the future of emerging economies. Drawing lessons from New Zealand, he underscored how investment in quantum science and technology can diversify economies traditionally reliant on agriculture and generate high-value industries through innovation. He pointed to the legacy of the Dodd-Walls Centre and its successful spin-offs as evidence that world-class research can create competitive industries and global companies.

Central to his presentation was the emphasis on people as the true drivers of transformation. Training, retaining, and inspiring young scientists ensures that the benefits of research are sustained across generations.



He reminded participants that just as refrigeration transformed New Zealand's economy in the 19th century, quantum technologies can play a similar transformative role for Africa today provided that investment

in research and education is prioritised. His message concluded with a powerful Māori proverb: "It is people, it is people, it is people."

2. The State of Quantum Science & Technology (QST) in Ghana: Addressing the Quantum Divide and Ensuring Inclusiveness for All Through the SDGs.



Dr. Henry Martin, Kwame Nkrumah University of Science and Technology (Ghana)

Dr. Henry Martin outlined the current state of quantum science and technology (QST) in Ghana, noting that while the country has no national strategy or dedicated centres of excellence, universities are making progress in areas such as simulations, photonics, finance, and computational chemistry. He highlighted promising research initiatives at institutions including KNUST, the University of Ghana, and the University of Cape Coast, while acknowledging persistent challenges of limited funding, weak infrastructure, and declining interest in physics among young students.

He emphasised the importance of demystifying physics through outreach and experiential learning, and called for the establishment of national centres of excellence to anchor Ghana's participation in the global quantum revolution. Dr. Martin concluded with a call for multi-stakeholder partnerships and investment in human capital to bridge the quantum divide and leverage QST for advancing the Sustainable Development Goals, particularly in health, energy, water management, and finance.

3. Panel Discussion: Ghana's Quantum Future: Sustaining momentum for lasting legacies

The panel discussion brought together academia, government, industry, and innovation stakeholders to examine how Ghana can build a sustainable quantum future. This was moderated by Dr. Ralph A. Twum of University of Ghana.



Moderator - Dr. Ralph A. Twum, University of Ghana (Ghana)

Dr. Augustine Larweh Mahu (University of Ghana), representing academia, underscored the urgent need for curriculum reform and capacity-building in universities. He emphasised the importance of strengthening graduate training, investing in laboratory facilities, and forging international collaborations to create a pipeline of skilled scientists.

From the government perspective, Dr. Joseph Essandoh-Yeddu (former Director for Strategic Planning and Policy, Energy Commission) noted that Ghana's energy sector exemplifies how frontier science can directly inform policy and national planning. He stressed that quantum technologies

could help address long-term challenges in energy efficiency, secure communications, and sustainable development, but cautioned that this requires a deliberate national strategy backed by funding and coordination across ministries.

Engr. Dr. Miriam Eduful (Electricity Company of Ghana), offering the industry viewpoint, highlighted the readiness of the private sector to collaborate but pointed out that without a skilled workforce and structured partnerships, industry adoption would lag behind. She called for stronger linkages between universities and companies, particularly in energy and telecommunications, to accelerate applied research and pilot projects.

Prof. Keter Quist-Aphetsi (Chairman of CRITAC, and Chair of Ghana National Cyber Intelligence and Cyber Defense Research Project.), representing the innovation community, underscored the potential for local creativity and start-ups to drive Ghana's quantum ecosystem. He argued that beyond importing technologies, Ghana should foster indigenous solutions, incubation hubs, and entrepreneurship in quantum-enabled industries. Innovation, he stressed, must be nurtured as a culture, supported by flexible policies and international partnerships.

Collectively, the panel converged on the need for a National Quantum Strategy for Ghana, anchored in education, policy



Panel Discussion

alignment, industry partnerships, and innovation ecosystems. They agreed that sustaining momentum beyond IYQ2025 requires moving from dialogue to implementation, ensuring that Ghana is not only a consumer of quantum technologies but also a contributor to their global development.

4. What do Agriculture and Quantum Technology have in common?



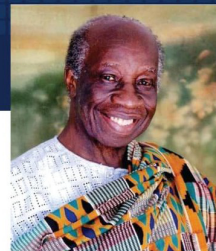
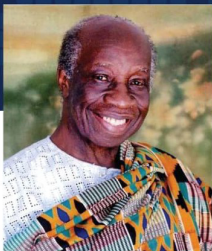
*Prof. Cather Simpson, University of Auckland
(New Zealand)*

Prof. Cather Simpson, a physicist, chemist, and entrepreneur from the University of Auckland, delivered a thought-provoking presentation on the intersection of quantum technologies and agriculture. She

demonstrated how quantum sensing can optimize fertilizer design, assess milk quality, and enable smarter use of marine byproducts, while quantum-assisted breeding and laser-based solutions are being applied to protect honeybee populations—an essential factor for global food security.

She stressed that these innovations not only boost productivity but also reduce environmental impact, helping agriculture meet the challenge of feeding a growing global population while preserving ecosystems. Prof. Simpson cautioned that Africa must actively engage in the global quantum landscape to avoid exclusion and urged stronger collaborations between research centres, governments, and industry to ensure that quantum-enabled agricultural technologies are accessible and relevant to developing economies.

Launch of the F.K.A. Allotey Lecture on Quantum Science and Technology



LAUNCH OF THE F.K.A ALLOTEY LECTURE ON QUANTUM SCIENCE AND TECHNOLOGY

One of the most significant highlights of Day Three was the formal launch of the F.K.A. Allotey Lecture on Quantum Science and Technology, established to honor the enduring legacy of the late Professor Francis Kofi Ampenya Allotey, Ghana's pioneering physicist and mathematician. The lecture is envisioned as an annual platform to celebrate his monumental contributions to science, inspire new generations of African scientists, and position Ghana as a leader in frontier science.

The launch opened with a moving introduction that recounted Professor Allotey's profound influence on Ghana's scientific and educational landscape. His humility, brilliance, and relentless commitment to advancing mathematical and physical sciences in Africa were highlighted as values that continue to shape the continent's aspirations in quantum science and technology.

Introduction to the F.K.A. Allotey legacy; Two keynote reflections were delivered to mark the occasion.

Professor RoseEmma Mamaa Entsua-Mensah, former Deputy Director-General of the Council for Scientific and Industrial Research (CSIR), offered a deeply personal and professional tribute. She recalled her

encounters with Professor Allotey, describing him as a mentor whose groundbreaking work on soft X-ray spectroscopy and the famed "Allotey Formalism" made him the first African to be named after a scientific theorem.



Prof. RoseEmma Mamaa Entsua-Mensah, Former Deputy Director-General (Council for Scientific and Industrial Research, Ghana)

She emphasized his dedication to nurturing young scientists, his pivotal role in establishing the Laser and Fibre Optics Centre in Ghana, and his passionate advocacy for women in science. She portrayed him not only as a distinguished scientist but also as a man of humility, integrity, and vision, whose legacy continues to resonate across Africa and the world.

Representing the Allotey family, Dr. Joseph Essandoh-Yeddu, a close mentee and collaborator, spoke with heartfelt emotion about Professor Allotey's life journey and achievements.



Dr. Joseph Essandoh-Yeddu, former Director for Strategic Planning and Policy (Energy Commission, Ghana)

He recounted his pioneering role in introducing computer science education in Ghana, his instrumental work in advancing energy research and nuclear applications, and his founding role in numerous scientific institutions, including the African Institute for Mathematical Sciences (AIMS). Dr. Essandoh-Yeddu reflected on Professor Allotey's ability to blend scientific brilliance with national service, stressing how his innovations in physics, energy policy, and higher education laid foundations that Ghana and Africa continue to build upon.

In closing, Ms. Sarah Osei, Programmes & Communications Lead at ESDEV Foundation Africa, contextualized the establishment of the F.K.A. Allotey Lecture as both a national tribute and a continental call to action. She highlighted Professor Allotey's central role in founding AIMS and in championing Ghana's successful bid to establish AIMS Ghana as a UNESCO Category II Centre of Excellence. She affirmed ESDEV Foundation Africa's commitment to ensuring that Professor Allotey's vision of science serving society continues to be advanced through this annual lecture.

The launch of the lecture series not only honored the memory of an African scientific luminary but also reaffirmed the collective resolve to embed his legacy into the future of quantum science education and research on the continent.

Quantum Light: the International Day of Light and the International Year of Quantum Science and Technology

Prof. John Dudley delivered the maiden F. K. A. Allotey Lecture, Quantum Light: The International Day of Light and the International Year of Quantum Science and Technology.



Prof. John Dudley, Université Marie et Louis Pasteur (France)

In his address, Prof. Dudley reflected on the history of quantum mechanics and light science, emphasizing the deep interconnections between scientific discovery, global outreach, and sustainable development.

He traced the journey from 19th-century observations of solar spectra through Einstein's photoelectric effect to the formulation of quantum mechanics, illustrating how sustained, long-term research has driven technological revolutions in lasers, semiconductors, and photonics. Prof. Dudley underscored the importance of patience in science funding and policy, noting that groundbreaking discoveries often emerge after decades of inquiry.

The lecture also paid tribute to the late Prof. Francis K. A. Allotey, who played a pivotal role in advancing light-based science in Africa and championed international collaborations through UNESCO. Prof. Dudley emphasized Ghana's leadership in securing the proclamation of both the International Year of Light (2015) and the International Year of Quantum Science and Technology

(2025), calling this a legacy of science diplomacy that continues to inspire global partnerships.

In closing, Prof. Dudley highlighted the promise of Quantum 2.0 – emerging applications in quantum sensing, cryptography, and computing, while stressing education as the foundation for Africa to benefit fully from these advances.

He urged investment in training the next generation of scientists and making science resources open and accessible.

The lecture set a high bar for the new F. K. A. Allotey Lecture Series, blending rigorous history, scientific foresight, and a call to action for Africa to embrace quantum technologies as part of its development agenda.

Exhibition Pitch and Award Ceremony

As part of Day Three, the conference hosted the Exhibition Pitch and Award Ceremony, a culmination of three days of innovation showcases.



Five finalist teams drawn from Technical Universities across Ghana presented their projects before a distinguished jury and audience. The innovations ranged from agricultural solutions and renewable energy applications to digital systems aimed at transforming education and livelihoods.



The pitches reflected the ingenuity and determination of Africa's youth, underscoring their capacity to devise context-specific solutions when given the right support. The winning team, NutriPod from Koforidua Technical University, presented an innovative approach to food preservation and nutrition, which the judges commended for both its practicality and scalability. Runners-up were also acknowledged for their creativity in areas such as clean energy and digital tools for education.



The ceremony reinforced the message that youth innovation must be recognised and supported if Africa is to translate education and research into tangible employment and entrepreneurial opportunities.

Salient Points and Key Recommendations from Day Three

Day Three emphasised that cutting-edge research and quantum science are indispensable for Africa's future prosperity. Presenters stressed that Africa's most valuable resource is its people and that investment in education, creativity, and scientific capacity must drive the continent's development. The state of quantum science in Ghana was reviewed, revealing promising initiatives but also gaps in infrastructure, strategy, and student engagement that urgently require attention.

Discussions highlighted that quantum technologies can directly advance Africa's development goals in areas such as agriculture, energy, and health, provided that governments adopt coherent strategies

and universities strengthen programmes in collaboration with industry. The Exhibition Pitch further demonstrated the readiness of Africa's youth to develop practical solutions to local challenges, if supported with mentorship and resources.

The key recommendations called for African governments to establish national quantum strategies and integrate quantum science into curricula; for research institutions and industry to build centres of excellence and pilot applications in priority sectors; and for youth innovators to be empowered to scale their ideas. The launch of the F. K. A. Allotey Lecture Series was welcomed as a symbolic and practical legacy to sustain momentum beyond IYQ2025.

Closing Ceremony

The closing ceremony of ARC-EDS 2025 marked the conclusion of three transformative days of dialogue, innovation, and collaboration. Professor Francis Owusu-Mensah, Chief Executive Officer of ESDEV Foundation Africa, delivered the



Prof. Francis Owusu-Mensah, Chief Executive Officer (ESDEV Foundation Africa)

official closing remarks, reflecting on the momentum generated since the opening ceremony. He noted that the gathering was not merely a conference but the ignition of a

continental movement—one that brought together governments, academia, industry, civil society, and youth to advance education, entrepreneurship, and frontier science.

Professor Owusu-Mensah underscored that the solutions to Africa's challenges lie not in intentions but in deliberate action, aligned effort, and sustained collaboration. He called for entrepreneurship to be embraced not as a fallback option but as a force for economic dignity, innovation, and resilience. Reflecting on the inaugural F. K. A. Allotey Memorial Lecture and the intense policy and technical dialogues, he emphasised that Africa had positioned itself as a meaningful contributor to the global quantum revolution. Importantly, he invited African countries to partner with the ARC-EDS Secretariat to organise national-level conferences and

exhibitions that spotlight local talent, build awareness, and shift societal perceptions of TVET, STEM, and entrepreneurship. He stressed the importance of biennial gatherings to track progress, conduct tracer studies on showcased innovations, and share best practices across the continent.

The ceremony also witnessed the adoption of the Accra Communiqué on Quantum Science and Technology, a milestone declaration that consolidated the outcomes of the Global Education Event on Quantum Science and Technology held alongside the conference. The communiqué affirmed Africa's determination to close the quantum divide and outlined a series of commitments: the establishment of the Ghana Quantum Consortium, the drafting of

a national quantum strategy, the integration of quantum science into STEM curricula, and the launch of the F. K. A. Allotey Lecture Series as a post-IYQ legacy. It called upon governments, academia, industry, civil society, and development partners to join forces in ensuring Africa's inclusive participation in the global quantum era.

The ceremony concluded with a call to action: to transform ideas into action, to scale the innovations showcased, and to sustain momentum through strong partnerships and continental cooperation. Delegates departed with renewed conviction that Africa must not remain on the margins of the quantum age. As the communiqué declared, the time to act is now. Let's Quantum Together.





EXHIBITION OF INNOVATIVE PROJECTS

EXHIBITION OF INNOVATIVE PROJECTS

The Exhibition was one of the most vibrant components of ARC-EDS 2025, running throughout the three days of the conference and serving as a powerful platform to showcase Africa's ingenuity. It brought together a wide array of institutions, technical universities, and young innovators, reflecting the diversity of Africa's innovation ecosystem.

General Exhibition

The General Exhibition featured leading national institutions and universities whose work is shaping education, science, and industry in Ghana. Participants included the Ghana Atomic Energy Commission, the University of Mines and Technology, Ho Technical University, Accra Technical University, the Electricity Company of Ghana, and the Africa Institute of Excellent Research (AIER). Adding to this, three pioneering TVET high schools: Applied Technical Institute, Accra Technical Training Centre, and Pilot Technical Institute, brought youthful energy to the exhibition, underscoring the growing role of pre-tertiary institutions in advancing technical and vocational education.



These exhibitors used the platform to present cutting-edge research, renewable energy solutions, training equipment, and education technologies, while engaging directly with policymakers, private sector actors, and the broader public. Their participation highlighted the importance of linking institutional expertise with the continent's wider development agenda.

Competitive Exhibition

The Competitive Exhibition drew participation

from all ten Technical Universities across Ghana. Seventeen exhibits were shortlisted for the 2025 ARC-EDS Competitive Exhibition. These exhibits were selected after a rigorous initial screening process, ensuring that only the most innovative, practical, and scalable projects addressing Africa's development challenges advanced to the main conference stage. These institutions showcased innovations ranging from renewable energy and agrifood technologies to digital tools and community-based solutions.



All teams were given the opportunity to pitch their projects to participants and judges on Day One and Day Two, after which five finalists were shortlisted to compete in the Exhibition Pitch and Award Ceremony on Day Three.

Finalists included:

- **Koforidua Technical University – Agri-Sustainability:** An AI-driven Application for Real-Time Agricultural Insights
- **Cape Coast Technical University – Solar Trike:** Compact Solar-Powered Mobility Solution Enhanced with Quantum Dots
- **Koforidua Technical University (Team Bigfoot) – Footwear Soles from Recycled**

Coconut Husks

- **Koforidua Technical University (Team NutriPod/Melddak Agro) – NutriPod:** Affordable and Nutritious Animal Feed from Cocoa Pod Husks
- **Tamale Technical University – Solar-Powered Smart Open-Air Drying System** with Quantum Sensors and Automated Controls

After a compelling round of final pitches, the winners of the 2025 ARC-EDS Competitive Exhibition were announced:

- **1st Place: Koforidua Technical University NutriPod** – Cocoa Pod Husk Animal Feed
- **2nd Place: Tamale Technical University** Solar-Powered Smart Open-Air Drying System
- **3rd Place: Cape Coast Technical University** (Solar Trike)



The other two finalists were highly commended for their creativity and technical ingenuity, reaffirming the strength and promise of Ghana's Technical Universities as hubs of innovation.

Judging Process

The competitive exhibition was evaluated through a two-phase process. During the pre-conference phase, judges reviewed submissions and shortlisted the top five entries based on innovation, impact, and presentation quality. During ARC-EDS 2025, these finalists were assessed through on-site demonstrations, interactive

discussions, and final pitches before the jury and participants.



The Panel of Judges was composed of distinguished experts representing academia, government, civil society, and industry:

- Dr. Sara Jones, City University of London
- Prof. Emmanuel Amankwah, University of Energy and Natural Resources
- Prof. Uriah Stonewell Tetteh, Cape Coast Technical University
- Miss Rita Ayamga Ayinpoka, Women's Commissioner, Ghana National Union of Technical Students (GNUTS)
- Mr. Samuel Tei Kwao, Mechanical Engineer & Technical Director, Havens Technologies and Power Solutions Ltd
- Dr. Glenn Gyimah, Lead Planner for the Exhibition of Technical University Students and Faculty – ARC-EDS 2025

The panel was supported by Prof. Ernest C. Winful, Accra Technical University, ensuring both technical rigor and transparency in the judging process. Evaluation focused on the originality of the innovation, its potential to address real-world challenges, and the clarity of presentation. Final rankings were reached through deliberation and consensus, and feedback was provided to all teams to strengthen future innovations.

Significance

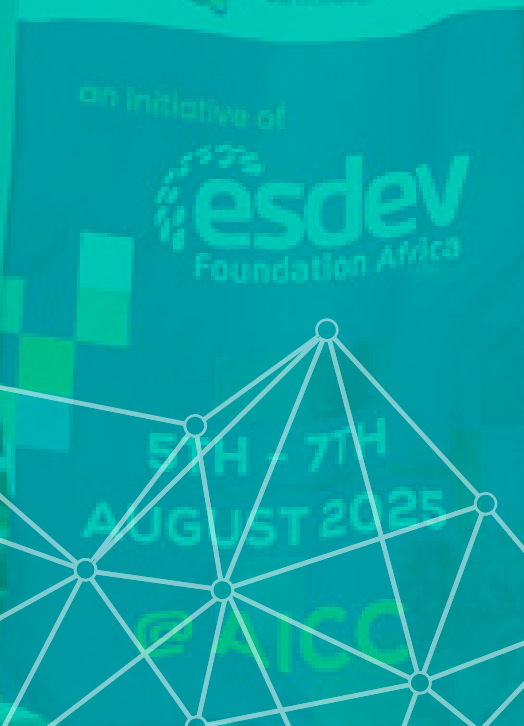
The exhibition underscored that Africa's development will not be driven by ideas alone, but by providing platforms that allow innovators to test, showcase, and scale their

solutions. The dual structure – general exhibition by institutions and competitive exhibition by student innovators, captured the spirit of ARC-EDS: linking education to livelihoods, research to application, and creativity to entrepreneurship. The competitive exhibition, in particular, highlighted the immense potential of Technical Universities as hubs of applied research and innovation, while also underscoring the importance of mentorship, incubation, and investment to translate ideas into sustainable enterprises.





CONCLUSION AND WAY FORWARD



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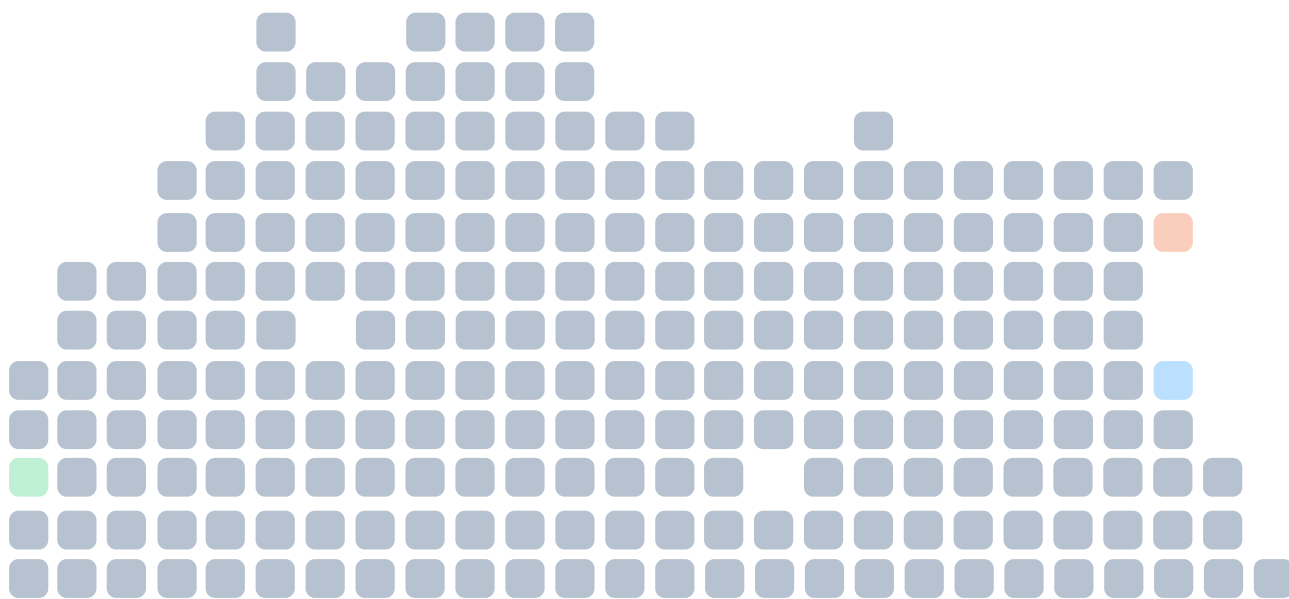
The 2025 Africa Regional Conference and Exhibition on Education and Skills Development (ARC-EDS) reaffirmed Africa's collective commitment to transforming education and skills development into engines of innovation, employment, and sustainable growth. Over three days, the conference brought together governments, academia, industry, civil society, and international partners to share knowledge, showcase innovation, and chart pathways for Africa's future.

Deliberations highlighted that tackling youth unemployment requires a comprehensive approach that aligns education systems with labour markets, scales digital and technological solutions, and invests in innovation ecosystems. At the same time, hosting one of the official global events for the International Year of Quantum Science and Technology (IYQ2025) placed Africa firmly within the global scientific conversation, demonstrating that the continent must not only participate in frontier science but also contribute leadership and vision.

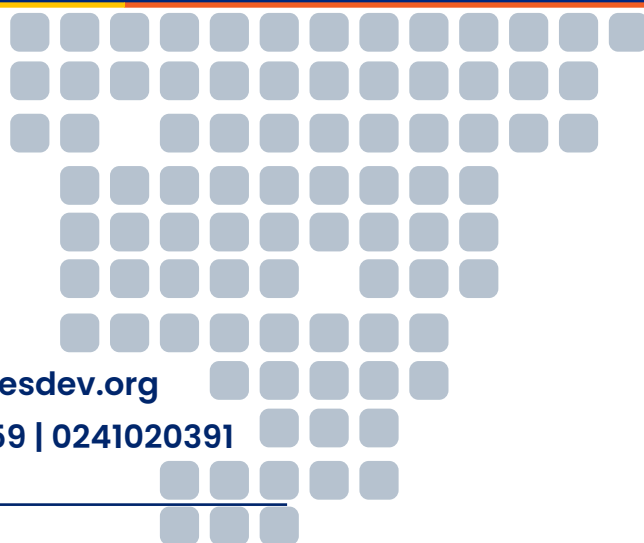
ARC-EDS 2025 also underscored the power of inclusivity and collaboration. With participation spanning 23 African countries alongside partners from Asia, Europe, the Americas, and Australia, the conference reflected a unified resolve to support Africa's development agenda through education, skills, and science. The exhibition, particularly the showcase of innovations from Technical Universities, captured the ingenuity of Africa's youth and reinforced the importance of providing platforms where ideas can grow into transformative enterprises.

Looking forward, ARC-EDS 2025 has set in motion a continental momentum that must be sustained. Education systems must be recalibrated to equip learners for the economies of today and tomorrow; investment in research, digital transformation, and applied innovation must be deepened; and ARC-EDS itself should continue as a continental platform for dialogue, exchange, and action.

As delegates return to their countries and institutions, the call is clear: to turn commitments into tangible outcomes, to nurture partnerships into lasting impact, and to empower Africa's greatest resource, its people, to shape a future where education and science drive transformation across the continent.



The Chief Executive Officer
ESDEV Foundation Africa
No. 2 Kweku Boi Street
Romick Plaza, Adenta
Accra



info@esdev.org
0302502359 | 0241020391

visit: www.arc-eds.com