

CEMASTEA INFO

Newsletter

RESEARCH AND INNOVATIONS

KEY BASELINE HIGHLIGHTS

- 01**  **95.7%**
of learners intend to pursue STEM-related careers after senior school.
- 02**  **94.3%**
of learners indicated that practical activities improve understanding of STEM concepts.
- 03**  **91.6%**
of learners felt encouraged by their school leadership to pursue STEM education.
- 04**  **76.3%**
of teachers cited inadequate resources as a major barrier to effective STEM implementation.
- 05**  **69.0%**
had no evidence on use of digital resources. Additionally, they had a lesson observation index of 1.3 on a scale of 1.0 to 3.0 which demonstrates the needs for teachers' capacity development on pedagogical instruction with digital resources.

Research Policy Briefs



Editorial Team

Editor-in-Chief

Gladys A. Masai

Editors

Ann Jane Mumbi

Winfred Magu

Philip Maate

Dan Orero

Richard Jakomanyo

Agnes Mwangi

Thuo Karanja

Kizito Makoba

Gregory Njogu

Dr. Mercy Macharia

Benson Mwangi

Feedback: Comments and contributions can be sent to the editor using the email: ceo@cemastea.ac.ke

Contributions may be edited for clarity, space or legal considerations.

From Evidence to Action: Transforming STEM Education

Welcome to the May–July 2026 edition of the *CEMASTEА Info Newsletter*. This issue highlights CEMASTEА’s commitment to strengthening STEM education through research, innovation, teacher capacity development and strategic partnerships.

As Kenya implements Competency-Based Education at Senior School level, attention is shifting from policy intentions to actual classroom experiences. The success of the STEM pathway will depend on how effectively teachers translate curriculum designs into practical, learner-centred and competency-based learning.

This edition presents findings from CEMASTEА’s baseline study on STEM pathway implementation. The results are encouraging: 95.7 per cent of learners intend to pursue STEM-related careers after Senior School, while 94.3 per cent indicated that practical activities improve their understanding of STEM concepts. This strong interest provides a firm foundation for developing the innovative and technically skilled workforce envisioned in Kenya’s development agenda.

The research also identifies areas requiring urgent attention. Inadequate laboratories, textbooks, digital devices and other learning resources continue to limit effective implementation. Digital resources were absent in nearly seven out of every ten lessons observed. Teachers therefore require sustained professional support in inquiry-based learning, competency-based assessment, effective questioning and technology integration. These findings demonstrate the importance of translating research evidence into targeted interventions. CEMASTEА’s virtual laboratories are one such response, expanding opportunities for curriculum-aligned practical learning, particularly in schools with limited physical laboratory facilities. Training county trainers and thousands of Junior School teachers further illustrates how technology can promote equitable access to quality STEM education.

This issue also celebrates collaboration and innovation across Africa. The International Webinar on Competency-Based, Innovation and Industry-Aligned STEMI Education brought together participants from 14 African countries to explore stronger education–industry partnerships, maker spaces and emerging technologies. Kenya’s best-ever performance at the Pan African Mathematical Olympiad further demonstrates the potential of sustained mentorship and institutional collaboration.

Other highlights include Quality Assurance and Standards Officers’ training, STEM outreach activities, Afrocentric hands-on fabrication and sustainable waste-management innovations. Together, these initiatives demonstrate what can be achieved when research, professional learning, leadership and partnerships work in harmony.

We invite you to read, reflect and engage with the experiences shared in this edition. May they inspire continued efforts to transform STEM classrooms into spaces where every learner can investigate, create, innovate and develop solutions to the challenges facing Kenya and Africa.

Contents

Editorial.....	2
From Evidence to Action: Transforming STEM Education.....	2
Contents.....	3
STEM PATHWAY IMPLEMENTATION UNDER CBE.....	4
<i>Promising Beginnings, Strategic Opportunities</i>	4
The Competency-based STEM classroom: Lesson Observations Lense.....	6
Encouraging Progress Towards Learner-Centred STEM Education.....	6
Harnessing Virtual Laboratories for Effective Learning in STEM.....	9
CEMASTEА Virtual Labs FAQs	10
Innovative Teaching of STEM.....	11
Africa Convenes to Chart the Future of Competency-Based STEMI Education.....	12
From Theory to Machine: Building Afrocentric STEM Competence Through Hands-On Fabrication	14
PICTURE SPEAK.....	15
YAMO USSOUKRO! TEAM KENYA ACHIEVES ITS BEST-EVER PERFORMANCE AT PAMO 2026!.....	17
2026 QASO TRAINING	18
CEMASTEА Participates in the 2026 KESSHA Conference	19
Turning Waste into a Resource: Aerobin Composting at the CEMASTEА ESD Garden.....	20
Frequently Asked Questions (FAQs).....	22
FABLE: The Dancing Monkeys.....	23

STEM PATHWAY IMPLEMENTATION UNDER CBE

Promising Beginnings, Strategic Opportunities

By CEMASTEIA Research Directorate

Kenya has embarked on one of the most ambitious education reforms in its history through the implementation of Competency-Based Education (CBE). At the Senior School level, the STEM pathway is expected to accommodate approximately 60% of learners and nurture a generation of innovative problem-solvers, critical thinkers and skilled STEM professionals capable of driving the country's socio-economic transformation. STEM Education is one of the key enablers of the Bottom-Up Economic Transformation Agenda (BETA).

CEMASTEIA is mandated to strengthen capacity in STEM education through training and research. This mandate reinforces the Centre's commitment to evidence-based practice by positioning research as a cornerstone for developing effective training programs, informing policy decisions, and advancing innovation in STEM education.

One of the most encouraging findings is the overwhelming enthusiasm among learners. More than 95.7% of learners pursuing the STEM pathway expressed their intention to pursue STEM-related careers after Senior School, while over 94.3% reported that practical activities significantly enhance their understanding of STEM concepts. This strong learner interest demonstrates that the STEM pathway is already resonating with learners and aligns closely with their future career aspirations. The findings present an encouraging scenario while also highlighting key training needs requiring strategic attention.



School leaders have also played a critical role in creating supportive learning environments, with 72.1% of teachers indicating that their principals provided clear guidance on CBE implementation. Most learners also acknowledged receiving encouragement from their HoIs to pursue STEM subjects. Such pedagogical leadership support is essential in sustaining learner motivation and fostering a positive culture around STEM education.

However, the study also revealed several implementation challenges that require collective action. Many schools continue to face inadequacies in textbooks, laboratory facilities, digital resources, and technical-track learning resources. While digital literacy is a compulsory component of the STEM pathway, this study established that access to computers and other ICT resources remains limited in many institutions, particularly public schools.



Further findings indicate that 76.3% of teachers who responded to the questionnaire cited inadequate resources as a primary barrier to practical and competency-based learning. Learners reported that access to laboratories and computers is often highly controlled or restricted to scheduled lessons. The study also found that although teachers are committed to implementing CBE, a significant proportion still require additional support to deliver learner-centred and inquiry-based instruction effectively.



Despite the growing emphasis on technology-enhanced learning, lesson observations conducted in this study revealed limited integration of digital technologies, with nearly seven in every ten (69.0%) lessons showing no evidence of digital resource use.

Additionally, learners had insufficient opportunities to explain their reasoning, investigate problems, or apply knowledge in authentic contexts. These findings underscore the need for continuous teacher professional development and instructional support. A notable emerging concern is the shortage of specialized teachers in some of the Technical Studies and Applied Sciences subjects.

As schools expand the offering of Technical Studies subjects under the STEM pathway, this study recommends strategic investments in teacher recruitment, upskilling teachers in related subjects, and the collaborative introduction of short courses for teachers by relevant agencies to ensure teachers have the knowledge and skills needed to teach these subjects. The findings point to several priorities moving forward: Strengthening teacher capacity development; Expanding access to laboratories and digital infrastructure; Enhancing instructional leadership in schools; and Promoting equitable access to STEM learning resources. Equally important, is sustaining learners' positive attitudes through career guidance, mentorship programmes, STEM clubs, and partnerships with industry, Technical and Vocational Education and Training (TVET) institutions, and institutions of higher learning.



This baseline study confirms that Kenya's Senior Schools have made significant progress in laying the foundation for the successful implementation of the STEM pathway. Learner interest is high, institutional goodwill exists, and schools are embracing the reforms.

With continued collaboration among the Ministry of Education, CEMASTE, the Teachers Service Commission, school leaders, teachers and other education stakeholders, the STEM pathway can become a powerful catalyst for nurturing the innovative, skilled and globally competitive workforce envisioned in Bottom-Up Economic Transformation Agenda (BETA) 2023-2027, Kenya Vision 2030, Agenda 2063 and the United Nations Sustainable Development Goals (SDGs).

As STEM pathway implementation progresses, school leaders will remain central to this transformation. Their commitment to pedagogical leadership, resource mobilization, parental empowerment and engagement, and support for teachers will continue to shape the success of STEM education and, ultimately, the future of Kenyan learners.

The Competency-based STEM classroom: Lesson Observations Lense

By Karanja Mutitu, PhD.

As Kenya implements the Competency-Based Education (CBE) curriculum at Senior School level, attention is increasingly shifting from curriculum designs and policy frameworks to what happens inside classrooms. While schools have made significant progress in preparing for the STEM pathway, the quality of classroom pedagogy will ultimately determine whether learners develop the competencies envisioned under CBE.

A CEMASTEIA baseline study conducted recently across the country's eight regions sought to analyze pedagogical practices of teachers implementing STEM subjects in Grade 10. Through lesson observations, teacher questionnaires, learner surveys, focus group discussions, and interviews with school leaders, the study provides valuable insights into the current status of classroom implementation, emerging successes, existing challenges, and opportunities for improvement.

Encouraging Progress Towards Learner-Centred STEM Education



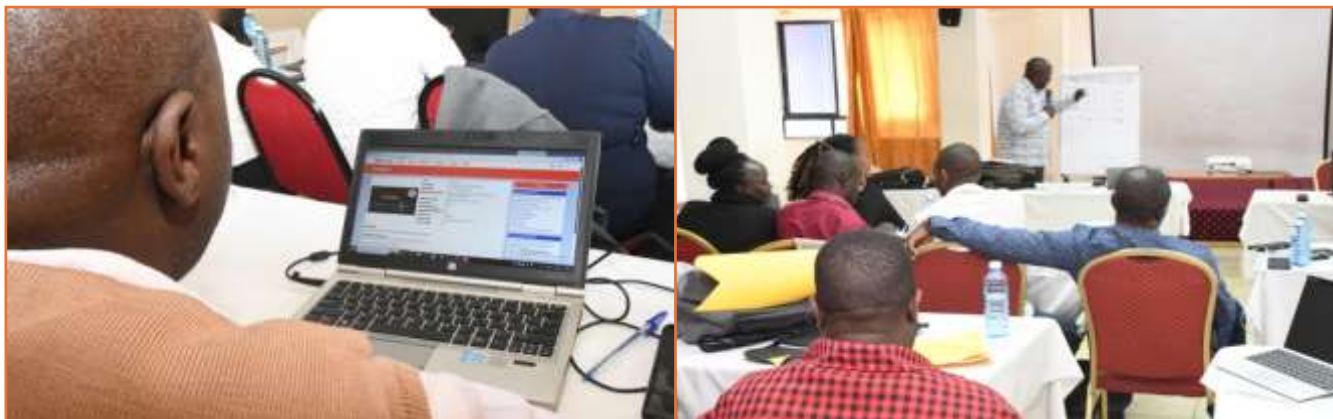
Teachers conducting activities during training at CEMASTEIA

A total of 185 lessons were observed across the 20 sampled counties. The scores for the aspects of lesson observation were between 1-3 and the average scores were interpreted in a scale as; $1 \leq x \leq 1.67$; Not evident (not observed at all), $1.67 < x \leq 2.34$; partly evident (observed but inconsistently, or with limited effectiveness); and $2.34 < x \leq 3$; clearly evident (observed consistently and appropriately during the lesson).

The findings reveal that many teachers are embracing key principles of CBE. Learners reported high levels of participation during STEM lessons, with over 95% indicating that teachers encourage active engagement and more than 93% of the learners acknowledging that group discussions help them understand STEM concepts better. Teachers demonstrated reasonable use of learner-centred approaches, collaborative learning, formative assessment, and immediate learner feedback.

Equity and inclusion during classroom participation emerged as one of the strongest areas of lesson implementation, achieving a lesson observation index of 2.36. This indicated that many teachers were making deliberate efforts to involve all learners in classroom activities. Similarly, learners' encouragement to communicate ideas using correct STEM language and terms recorded a lesson observation index of 2.37, while teachers' provision of immediate feedback scored 2.44. These findings suggest that teachers were increasingly moving away from predominantly teacher-centred classroom interactions toward more inclusive, interactive, and learner-responsive pedagogical practices consistent with the principles of Competency-Based Education.

Despite the aforementioned successes, the study found that competency-based pedagogy remains largely at the "partly evident" level, with an overall lesson observation index of 1.96. Even among teachers who had undergone in-service training, the average score was 2.05, indicating that many expected CBE pedagogical practices are yet to become consistently embedded in classroom instruction.



Teachers conducting the Lesson Study process

Perhaps, the most significant finding was the gap between teachers' self-reported practices and what was actually observed during lessons. While teachers generally rated themselves highly on learner-centred instruction, professional document preparation, and competency-based assessment, classroom observations revealed that more than half of the observed lesson plans showed no evidence of being derived from schemes of work.

The majority of the lesson plans lacked clearly stated learning outcomes, key inquiry questions or mainstreamed competencies and values. The lesson preparedness indices ranged between 1.67 and 1.84 among the teachers who had not been retooled/in-serviced and those in-serviced, respectively, indicating inconsistent CBE implementation. Without clear alignment between curriculum designs, schemes of work, lesson plans, learning outcomes, and assessment strategies, teachers are unlikely to facilitate meaningful competency development.

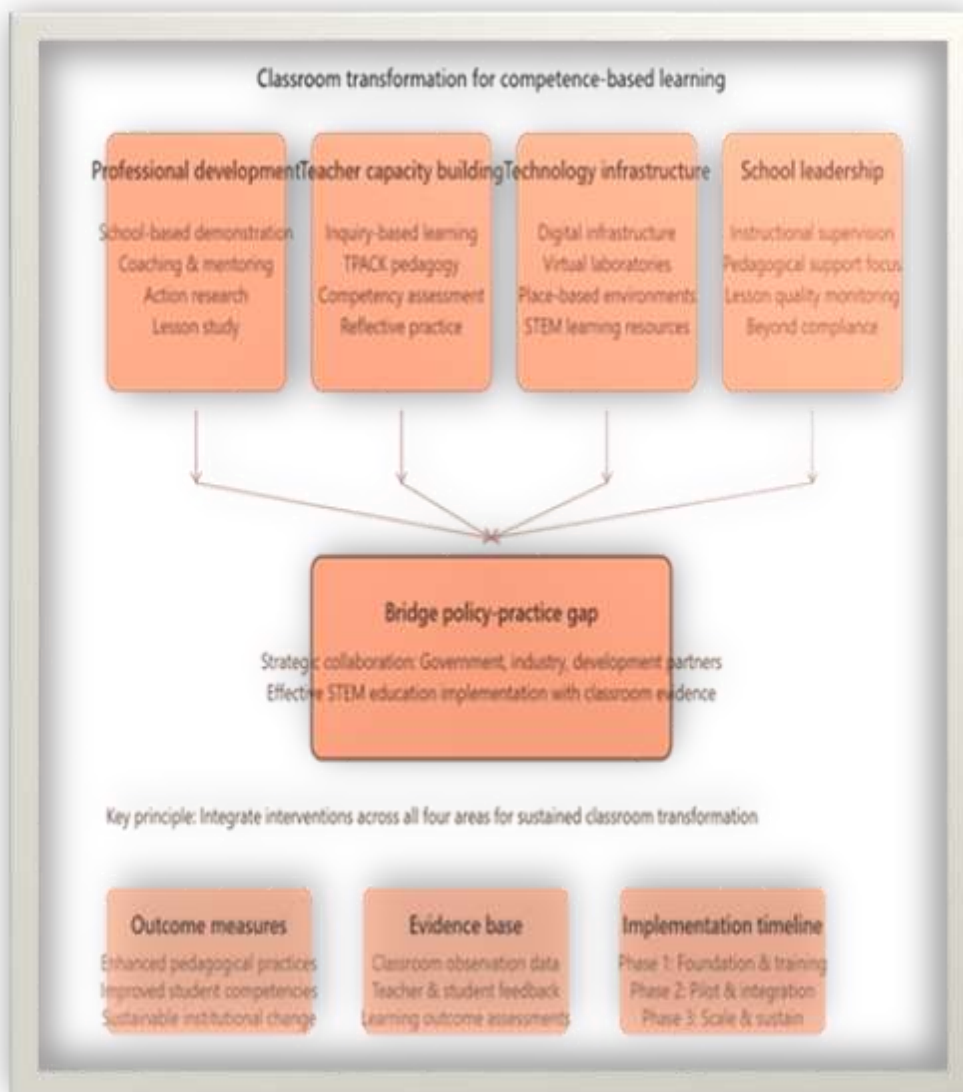
One of the central pillars of CBE is developing critical thinking and problem-solving skills. However, lesson observations revealed limited opportunities for learners to explain their reasoning, justify answers, or substantiate their ideas. The lesson observation index for prompting learners to justify answers or explain their thinking was at 1.95. Similarly, treating learners' ideas as opportunities for learning scored 2.03. In many classrooms, teachers asked questions primarily to obtain correct answers rather than stimulate deeper thinking. As a result, learners often participated through chorus responses or brief factual answers without being challenged to analyse, evaluate, or explain scenarios related to their responses.

These findings highlight the need for greater emphasis on Inquiry-Based Learning (IBL), problem-based learning, and effective questioning/problem posing strategies that promote creativity, critical thinking, and the ability to solve real-life problems using classroom-learned concepts.

Another notable pedagogical challenge identified by the study was the limited use of digital resources in STEM instruction. Digital resource integration recorded a lesson observation index of 1.43, placing it firmly within the "not evident" category. In fact, digital resources were absent in nearly seven out of every ten lessons observed. The low level of technology integration may be attributed to several factors, including inadequate ICT infrastructure, limited access to devices, connectivity challenges, and insufficient Technological Pedagogical Content Knowledge (TPACK) among teachers. Given that digital literacy is one of the core competencies under CBE, addressing this challenge stands out as a national teacher capacity development priority.

CBE expects learners to connect classroom learning with real-life situations and contemporary challenges. However, the study found limited integration of authentic learning experiences. Linking lesson content to real-life situations achieved an index of 2.01, while integration of contemporary and emerging issues scored 1.46. Deliberate mainstreaming of values recorded an index of 1.62. These findings suggest that many STEM lessons remained focused on content coverage rather than helping learners apply knowledge to solve real-world issues. Teachers require continuous support to design learning experiences that connect STEM concepts to environmental sustainability, climate change, entrepreneurship, emerging technologies, health, industry, and community challenges.

Looking Ahead



The findings point to several practical and operational interventions that can accelerate classroom transformation towards Competence-based learning (CBL):

First, there is a need to scale up classroom-focused professional development programs that go beyond awareness creation in traditional conference workshops to school-based demonstration, coaching, mentoring, action research, and lesson study approaches. Secondly, teacher capacity building should prioritize Inquiry-Based Learning (IBL), Technological Pedagogical Content Knowledge (TPACK), competency-based assessment, and reflective learning practices.

Additionally, there is urgent need to invest in digital infrastructure, virtual laboratories, place-based learning environments and technology-enabled learning resources to support competence-based STEM instruction.

Further, school leadership should strengthen instructional supervision by focusing more on pedagogical support and lesson quality rather than compliance with professional documents alone.

This baseline study, provides classroom evidence for government institutions, industry, and development partners for enhancing strategic collaboration to bridge the gap between

policy and practice. This will ensure effective implementation of STEM education initiatives.

As Kenya progresses with Senior School CBE implementation, the challenge before us, is no longer understanding what CBE requires. The challenge is ensuring that every STEM classroom consistently translates learning outcomes into meaningful learning experiences that nurture learners' self-efficacy to become critical thinkers, innovators, and problem-solvers, with the potential to drive Kenya's socio-economic transformation. Strengthening classroom pedagogy remains the most strategic investment in achieving the vision of Competency-Based Education.

Harnessing Virtual Laboratories for Effective Learning in STEM

By LMakanda & AMumbi

For decades, exorbitant laboratory costs have limited hands-on STEM education in many schools, creating an inequity in practical learning. Virtual laboratories are emerging as the ultimate equalizer, offering scalable, safe, and highly interactive digital environments where learners can master complex scientific concepts and bridge this 'application gap' from any device, anywhere.

In line with this innovation, CEMASTEAs has embarked on developing virtual labs and has already built the capacity of 8,563 Junior School STEM teachers to utilize them. This initiative has significantly enhanced digital literacy, a core competency in the Competency-Based Education (CBE) framework for both teachers and learners. Moving forward, CEMASTEAs is developing additional virtual labs customized to the CBE curriculum and plans to scale up training for more STEM educators. The rollout of Competency-Based Education (CBE) in Junior Schools continues to gain momentum with learners successfully transitioning to Grade 10 this year.

Studies conducted by CEMASTEAs between 2023 and 2025 highlight that while teachers are steadily improving their pedagogical practices, inadequate teaching and learning resources in STEM subjects remain a challenge. To address this, CEMASTEAs, with support from the Ministry of Education, have developed virtual laboratories in Mathematics and Integrated Science. These tools are set to play a critical role in ensuring that schools without physical laboratories can still conduct practical lessons effectively. The virtual laboratories are designed to provide learners with practical, hands-on experiences that build scientific and mathematical skills even in the absence of physical labs.



Ms. Joyce Ireri, the Assistant Director at the State Department of Basic Education



Participants explore the CEMASTEAs Virtual Lab in Mathematics and Integrated Science respectively during the JS county trainers training at CEMASTEAs



A nationwide rollout of the training was undertaken after 240 county trainers underwent intensive training at CEMASTEAs in June 2026 and later cascaded the knowledge in June 24 - 26, 2026 to 7,000 Junior School Mathematics and Integrated Science teachers. He added that the content is aligned with the curriculum, making the labs a practical and effective teaching tool. During the opening session, the Chief Guest, Director of Junior and Senior School at the State Department of

Basic Education, represented by Ms Joyce Ireri, the Assistant Director, emphasized that teachers are the vanguard of this transformation. She urged them to embrace the virtual labs with enthusiasm, noting that these tools will be catalysts for creativity, innovation, problem-solving and that Kenya's future in science and technology rests on how well learners are prepared. CEMASTEAs is committed to support the successful implementation of the virtual labs.

CEMASTE Virtual Labs FAQs

What are CEMASTE Virtual Labs?

CEMASTE Virtual Labs is a digital platform designed to support STEM teaching and learning through interactive, curriculum-aligned virtual laboratory experiences. The platform allows learners and educators to conduct simulated experiments and explore scientific and mathematical concepts in an interactive environment.

Who can use CEMASTE Virtual Labs?

The Virtual Labs are designed for learners and educators across different levels of education, including Junior School, Senior School and teacher training institutions. The platform also provides tools to help teachers integrate virtual experiments into their lessons.

Which subjects are covered by the CEMASTE Virtual Labs?

The platform currently provides virtual learning experiences in areas including: Integrated Science, Biology, Chemistry, Physics and Mathematics

NB: The available experiments and resources vary by grade and subject.

Are the CEMASTE Virtual Labs aligned with the Kenyan curriculum?

Yes. The Virtual Labs are designed to support curriculum-aligned STEM learning and are aligned with the Kenya Curriculum Framework and Competency-Based Education approaches.

What can learners do in the CEMASTE Virtual Labs?

Learners can interact with virtual apparatus, conduct simulated experiments, manipulate variables, observe outcomes, test hypotheses and complete guided learning activities. The platform also includes pre-assessments, guided procedures and post-assessments.

Are CEMASTE Virtual Labs a replacement for physical laboratories?

No. Virtual Labs are intended to complement physical laboratory experiences. They provide learners with additional opportunities to practise experiments, explore concepts and understand procedures where physical laboratory resources may be limited.

Can teachers use CEMASTE Virtual Labs during classroom lessons?

Yes. Teachers can integrate Virtual Labs into lessons to introduce concepts, demonstrate experiments, reinforce learning and support learner assessment. Teacher support features can also help educators assign experiments and monitor learner progress.

Can CEMASTE Virtual Labs be used outside school?

Yes. The platform is designed to provide flexible access to virtual experiments, allowing learners to explore STEM concepts beyond the physical classroom environment.

Do I need special laboratory equipment to use CEMASTE Virtual Labs?

No physical laboratory equipment is required to conduct the simulated experiments. However, users need a compatible device and access to the platform.

Can CEMASTE Virtual Labs be accessed using a mobile device?

Yes. The platform is designed with multi-device accessibility in mind, including desktops and tablets.

Are CEMASTE Virtual Labs safe?

Yes. Virtual experiments provide a safe environment for learners to explore experiments without the physical risks associated with chemicals, equipment or other laboratory procedures. Experiments can also be repeated as many times as needed.

How do I access CEMASTE Virtual Labs or contact for support on Virtual Labs?

Visit the CEMASTE Virtual Labs platform at stemlab.cemastea.ac.ke and select the appropriate subject, grade or laboratory activity.

What grades are currently supported by the CEMASTE Virtual Labs?

Virtual laboratory resources are being developed and deployed progressively across different grades and subjects. Users should visit the platform to see the experiments currently available for their grade.

Can I provide feedback about the CEMASTE Virtual Labs?

Yes. CEMASTE welcomes feedback and suggestions from learners, teachers and other users to help improve the platform and expand its resources.

Innovative Teaching of STEM

By DRasto



Clockwise: Ms Geraldine Njomo (left, in a black dress), a STEM Facilitator at CEMASTEFA, explains STEM teaching aids to the Principal Secretary for the State Department for Science, Research, and Innovation, Prof. Shaukat Abdulrazak.

A researcher, Shanelle Warukira (right), interacts with STEM teaching models at CEMASTEFA's exhibition booth during the Science, Technology, Research and Innovation (STRi) Expo in Nairobi. CEMASTEFA aims to give practical learning experiences, mentorship and exposure to cutting-edge Science and Technology education in Junior and Senior Schools.

A STEM facilitator at CEMASTEFA, Mr Paul Akoko(Right), using a teaching model in Physics to explain the concept of waves in Physics to Science teachers at the Science, Technology, Research and Innovation (STRi) 2026 expo in Nairobi.

Physics and Biology Technicians at CEMASTEFA, Mr.Evanson Tahairu(Left) and Ms.Diana Mulusa (Right) showcase assorted teaching aids in STEM at the inaugural Science Technology Research and Innovation (STRi) 2026 fair in Nairobi

Physics and Biology Technicians at CEMASTEFA Mr.Evanson Thairu and Diana Mulusa showcase assorted teaching models in STEM at the inaugural Science Technology Research and Innovation (STRi) 2026 fair in Nairobi

CEMASTEFA is championing the use of improvised teaching and learning aids to help learners understand complex concepts in Science, Technology, Engineering and Mathematics (STEM).

At a weeklong fair, CEMASTEFA showcased to learners, teachers and education researchers innovative activities that can enhance the teaching and learning of STEM to help support the government's bid for a 60 per cent transition to the STEM pathway in Senior School among Junior School learners.

The landmark conference offered participants a rare opportunity for collaboration, knowledge transfer, and a platform to showcase innovative approaches in STEM education.

Themes in Artificial Intelligence, collaborative research in education, and innovative STEM teaching dominated the international conference.

Africa Convenes to Chart the Future of Competency-Based STEMI Education

By Dr. MSichangi and GNjogu

For three days, a continent logged on to ask itself a hard question: are our classrooms actually preparing young Africans for the economy that is coming?

From 9 to 11 June 2026, CEMASTEА convened the International Webinar on Enhancing Competency-Based, Innovation, and Industry-Aligned STEMI Education Systems in Africa, and 283 educators, policymakers, innovators and industry players

from 14 countries: Kenya, Nigeria, Ghana, Uganda, Côte d'Ivoire, Namibia, Mozambique, Ethiopia, Lesotho, Benin, Mauritius, Eswatini, Malawi and the DRC, stayed logged on to answer it together.

The stakes were laid out early. Mr. Simon Mururi, representing Kenya's Cabinet Secretary for Education, told participants that African education systems must prepare a workforce ready to compete in an economy increasingly shaped by artificial intelligence, green technology, and advanced manufacturing, rather than one still training students for jobs that no longer exist. Mrs. Gladys A. Masai, CEO of CEMASTEА, called for collective, practical action rather than another round of good intentions, while Dr Pius K. Mutisya, CEMASTEА Board Chair, reaffirmed strategic backing for stronger education–industry ties across the continent.

A Continent Compares Notes: The webinar opened not with new ideas but with accountability: a feedback session that revisited commitments made at the 2025 edition of the webinar. Côte d'Ivoire reported national policy dialogues on STEMI integration and new girls-in-STEM mentorship schemes; CEMASTEА shared how Kenya has been researching teacher readiness for digital learning while training educators to actually use the tools. It was a reminder that a webinar is only as good as what happens after the screens go dark.

From there, attention turned to the classroom itself. A session on competency-based assessment and instructional leadership pushed facilitators and participants to confront an uncomfortable pattern: rubrics that are too complex for learners, classroom observation still a feared exercise rather than a welcome opportunity for coaching, and instructional leaders too buried in administration to actually mentor teachers.





A screenshot of participants

Participants worked through a live case study, a Grade 7 lesson on water filtration, to practice spotting the difference between teaching that is happening and learning that is sticking.

From Classroom to Workshop Bench: Perhaps the liveliest session asked a deceptively simple question: what if every classroom could be a maker space? Facilitators showed how recycled materials, a school garden, or an unused corner can become a hub for prototyping, using design thinking and the SCAMPER technique to turn ordinary lessons, even a Grade 9 unit on renewable energy, into innovation challenges. The message landed: a functioning maker space is less about budget and more about imagination, mentorship and the discipline to keep going after the first prototype fails.

The Industry Question: The webinar closed on its sharpest note yet, a candid conversation about the gap between what classrooms teach and what industry actually needs. The panel discussion brought together representatives from ministries of education, national teacher-training institutes, government agencies and a pan-African youth entrepreneurship program from various African countries. Panelists pointed to a shared set of gaps that are holding back stronger industry ties: too few internships and attachments for learners, a persistent disconnect between teacher training and evolving industry practice, and the assumption that meaningful STEM activity requires large budgets.

Asked for one bold reform, panelists didn't hedge. Calls ranged from a decisive break from theory-only curricula to deeper industry involvement in teacher preparation itself. But it was one closing line that captured the spirit of the entire webinar: school-industry partnership, a panelist said, must be treated as *"a necessity, not an option,"* if Africa is serious about building a STEM ecosystem that works for every learner.

What Happens Next: Countries left with more than notes: mentoring and coaching plans, action plans to establish and strengthen maker spaces, and country-level commitments on industry linkages, all developed during breakout sessions rather than handed down from the podium. CEMASTEIA will track each commitment before delegates reconvene for the 2027 webinar.

From Theory to Machine: Building Afrocentric STEM Competence Through Hands-On Fabrication

By: Enock Nthiwa Kaunda, Mapunga High School.

When I arrived in Lusaka, Zambia, for the 2026 Afrocentric Knowledge Co-Creation Programme (KCCP), I expected advanced pedagogical discussions. What I did not expect was a complete redefinition of how STEM education can be delivered in African contexts. The training, hosted by the Zambia Directorate of National Science Centre (DNSC) in partnership with JICA, brought together educators from 18 African countries under the theme Afrocentric Competence-Based STE(A)M Education Transformation.

As a Physics teacher, I had taught concepts like heat transfer, mechanics, and electricity using textbooks and diagrams for years. But the 2026 KCCP challenged us to move beyond theory. We were organized into groups and tasked with designing and fabricating actual learning environments using low-cost, locally available materials. I was assigned to the Agro Machinery Group, where we built four functional machines: an Incubator, Dehuller, Grinding Mill, and Pellet Maker.



Participants engaging in a hands on activity

From Theory to Practice: Over 280 contact hours, we didn't just talk about STEM; we lived it. Mathematics guided every measurement. Physics shaped every mechanical and electrical decision. Biology informed the incubator temperature and humidity controls. Agriculture influenced our understanding of maize processing and seed production. Every subject converged in every machine. The project demonstrated that real-world problems do not respect subject boundaries, and neither should our teaching.

Competence Through Creation: The project followed a clear learning process: Explore → Plan → Create → Test → Improve → Share. We engaged in collaborative problem-solving to address challenges such as alignment issues, electrical integration, and material constraints. We

worked in subgroups, presented to the plenary, and learned from each other, embracing the spirit of Ubuntu. The four machines now stand as tangible evidence of what Afrocentric STEM education can achieve. The incubator, with its 2,115-egg capacity, is designed to address food security challenges. The dehuller reduces post-harvest losses by processing maize efficiently. The grinding mill produces flour for household consumption. The pellet maker converts agricultural waste into valuable animal feed, demonstrating how waste can become a resource.

Lessons for Competency-Based Education: The Agro Machinery experience taught me that competence is not developed through lectures; it is forged through doing. Learners develop critical thinking when troubleshooting alignment issues. They learn collaboration when working in subgroups. They build creativity when proposing design modifications. They understand entrepreneurship when seeing income-generating opportunities in the machines they build.

The Way Forward: The 2026 Afrocentric KCCP proved that African educators can create a world-class learning environment using locally available materials and indigenous knowledge. But this requires intentional investment in teacher professional development, workshop infrastructure, and community partnerships.

PICTURE SPEAK



Education Cabinet Secretary Mr Julius Migos Ogamba at CEMASTEAs exhibition booth during the 2026 Kenya Secondary Schools Heads Association (KESSHA) conference in Mombasa. The conference focused on equipping principals with collaborative leadership tools.



Mrs. Gladys Masai, Ag. CEO, CEMASTEAs speaking at the 2026 Kenya Secondary School Heads Association (KESSHA) Conference.



(Left to Right) Chairman of the Board of Governors at CEMASTEAs, Dr. Mutisya, OGW, poses for a group photo with QASOs after the closure of a capacity-building workshop for 92 QASOs at CEMASTEAs. Dr Mutisya tasked QASOs to lead the quest for quality delivery of the STEM curriculum in schools for meaningful education. Quality Assurance and Standards Officers (QASOs) exploring Artificial Intelligence (AI) in teaching and learning. Their role in mentoring teachers, monitoring instructional quality, and supporting curriculum implementation directly influences the quality of education learners receive.



(Left to right) Mrs Gladys Masai, Ag CEO, CEMASTEА, making her opening remarks during the Training of County Trainers on CEMASTEА Virtual Labs in Karen. County trainers actively engaged in hands-on practice, enhancing their skills and strengthening capacity in STEM education through innovative virtual lab experiences.



Learners from various schools interacting with CEMASTEА's teaching and learning resources during STEM Outreach activities in Nyamira and Taita Taveta counties, fostering curiosity and strengthening skills in mathematics and science.



(Left to right) Mrs Gladys Masai, Ag. CEO, CEMASTEА, addressing staff during the medical camp; CEMASTEА staff participating in wellness screenings. The Human Resource Department organised the medical camp.

YAMOUSSOUKRO! TEAM KENYA ACHIEVES ITS BEST-EVER PERFORMANCE AT PAMO 2026!

By MMungai

Kenya made history at the 33rd Pan African Mathematical Olympiad (PAMO 2026) held in Yamoussoukro, Côte d'Ivoire, recording its highest-ever continental ranking by finishing 5th overall in Africa.

This remarkable achievement is a testament to the dedication of our students, coaches, partners, and institutions committed to nurturing mathematical excellence among Kenyan learners.



Left to right: Mr Collins, Gilbert, Baraka, Kibe, Tumi, Juni, Abigail and Madam Nancy Nui, CEMASTEА.

Through rigorous training camps, mentorship, and strategic preparation, these institutions continue to provide Kenyan students with opportunities to excel on the continental and global stage.

As Team Kenya celebrates this historic milestone, attention now turns to the 67th International Mathematical Olympiad (IMO) to be held in Shanghai, China, from 13th to 21st July 2026. Kenya's IMO team is looking forward to building on the momentum from PAMO and proudly representing the country among the world's brightest young mathematicians.

At CEMASTEА, we remain committed to nurturing talent, promoting STEM excellence, and creating opportunities for learners to compete and succeed internationally. Congratulations to Team Kenya, the coaches, parents, schools, and all our partners for this historic achievement!

Join us in celebrating these outstanding young mathematicians.

TEAM KENYA-PAMO 2026
Brilliance. Determination. Excellence.

Our six exceptional students proudly represent the nation at the Pan African Mathematical Olympiad (PAMO) 2026 and brought home a historic achievement!

Kenya's young mathematicians continue to make us proud on the continental stage!

OUR SIX EXCEPTIONAL STUDENTS

- GILBERT ONGORO**
Captured Kenya's **FIRST-EVER PAMO GOLD MEDAL!**
A historic milestone for Kenya at the Pan African Mathematical Olympiad!
- BARAKA MULWA & KIBE NDUNG'U**
Delivered fierce performance to grab **SILVER MEDALS**.
Two outstanding performances. Two silver medals. One proud nation.
- TUMI NYAGIRO & JUNI MUMO**
Spectacular double-medalists, taking **BRONZE** in both the main event and the PAMO for Girls (PAMOG) division!
Double the effort. Double the medals. Double the pride!

6 STUDENTS | 2 SILVER MEDALS | 3 BRONZE MEDALS | 1 GOLD MEDAL

Your hard work, passion and resilience continue to make Kenya shine on the continental stage.

Congratulations, Team Kenya!
You inspire a generation.

EXCELLENCE | INNOVATION | COLLABORATION | IMPACT

Building a Better Future Through STEM Education



FiTeam Kenya Tumi Nyagiro and Juni Mumo with their medals

2026 QASO TRAINING

By RChiira & AMumbi

Quality and Standards Assurance Officers (QASOs) have been challenged to champion the quality delivery of the STEM curriculum in schools and to support teaching and learning that translate into meaningful learning outcomes.

Dr Pius K. Mutisya, Chairman of the CEMASTEIA Board of Governors, made the remarks while addressing 92 QASOs at the closing ceremony of a three-day workshop organised by CEMASTEIA in late May 2026 to strengthen their capacity to support effective STEM teaching and learning. He emphasized that QASOs have a critical responsibility to support teachers in delivering high-quality lessons aligned with the curriculum and established standards, thereby contributing to improved learning outcomes. Dr Mutisya highlighted the importance of effective STEM curriculum delivery and the adoption of innovative teaching approaches to inspire more learners to pursue STEM pathways and contribute to Kenya's technological and economic advancement. He noted that effective teaching and learning practices would help align classroom practice with national and global aspirations while equipping learners with the knowledge, skills, and competencies needed to develop practical solutions to societal challenges.



Dr. Pius Mutisya, OGW, Chairman, Board of Governors at CEMASTEIA and The Director QASOs in the state department of Basic Education, Madam Evelyn A. Owoko.

The Director of Quality and Standards Assurance in the State Department for Basic Education, Ms Evelyn A. Owoko, also emphasised the importance of strengthening STEM curriculum delivery through innovative and learner-centred approaches. She noted that the retooling workshop would deepen participants' understanding of learner-centred pedagogy, strengthen their lesson observation and teacher-support skills, and enhance their capacity to guide teachers towards improved classroom practices.

Hands-on learning was a key feature of the workshop, enabling QASOs to deepen their understanding of classroom practices that foster critical thinking, creativity, collaboration and problem-solving; competencies central to the Competency-Based Curriculum (CBC). The workshop also explored integrating Artificial Intelligence (AI) into teaching and learning, reflecting the need to equip educators to respond to emerging technologies and evolving demands in education.

The workshop further reinforced CEMASTEIA's commitment to providing continuous professional support for teachers and education quality assurance personnel to strengthen Kenya's STEM ecosystem. The trained QASOs are expected to apply the knowledge and skills gained to support and mentor teachers at the sub-county level, promote effective classroom practices and contribute to improved STEM learning outcomes. These efforts reaffirm CEMASTEIA's commitment to strengthening quality assurance and instructional support across the country while advancing education quality through collaboration, stakeholder engagement and evidence-informed practice.

**CEMASTEIA has
trained 647
QASOs in the last
three years, and
seeking to train
an additional 374
QASOs**

CEMASTEА Participates in the 2026 KESSHA Conference

By AMumbi



The 2026 Kenya Secondary School Heads Association (KESSHA) National Conference took place from June 22–26 at Sheik Zayed Hall in Mombasa. CEMASTEА exhibited at the conference, themed “Strong Schools and Collaborative Leadership for Promoting Competency-Based Education,” which brings together thousands of secondary school heads, policymakers, and education stakeholders to deliberate on strengthening school leadership and advancing curriculum reforms.



As a State Corporation under the Ministry of Education, CEMASTEА continues to champion excellence in STEM capacity development across Africa. At the exhibition, CEMASTEА is showcasing its innovative teacher-training programs, research mandate, and outreach initiatives designed to empower educators and inspire learners to pursue STEM pathways.

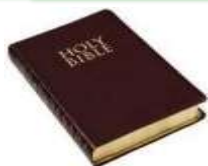


CEMASTEА’s presence at KESSHA 2026 underscores our commitment to nurturing talent, advancing digital readiness, and strengthening Kenya’s education transformation agenda. CEMASTEА is proud to engage directly with school leaders and policymakers as we work together to shape the future of STEM education.



The exhibition highlights CEMASTEА’s role in supporting competency-based curriculum reforms, fostering collaborative leadership, and positioning Kenya as a hub for STEM excellence in Africa.

Hebrews 4:12



For the word of God is living and active, sharper than any two-edged sword, piercing to the division of soul and of spirit, of joints and of marrow, and discerning the thoughts and intentions of the heart.



Surah Fussilat, 41:53

“We will show them Our signs in the horizons and within themselves until it becomes clear to them that it is the truth. But is it not sufficient concerning your Lord that He is, over all things, a Witness?”

Turning Waste into a Resource: Aerobin Composting at the CEMASTEA ESD Garden

CEMASTEА has strengthened its commitment to Education for Sustainable Development (ESD) by installing an **Aerobin composting system at the ESD Garden**. The initiative provides a practical demonstration of how organic waste can be transformed into a valuable resource while promoting sustainable practices.



Left: Aerobin composting unit installed at the ESD garden. Middle: inside the Aerobin containing organic kitchen and garden waste.

Right: Leachate collected from the unit that is used as liquid fertilizer for crops

The Aerobin is an innovative composting unit designed to efficiently decompose organic waste through an aerobic process. It accommodates a variety of biodegradable materials, including vegetable and fruit waste, garden cuttings, leaves and other suitable organic matter generated within the Centre. Through natural decomposition, the waste is converted into nutrient-rich compost and leachate that can be used to improve soil health and support organic plant growth in the Garden.

The installation gives CEMASTEА staff, trainees, and visitors an opportunity to learn about waste segregation, resource recovery, soil conservation, and sustainable agriculture through hands-on experience. Rather than treating organic waste as unwanted material destined for disposal, the system demonstrates the circular economy principle of turning waste into a useful input for food and plant production.

The compost produced can enhance soil fertility, improve moisture retention and reduce dependence on synthetic soil additives. The initiative also reduces the amount of organic waste requiring disposal, supporting cleaner and more sustainable institutional operations.

Through this initiative, CEMASTEА continues to demonstrate that practical innovations can make a significant contribution to environmental sustainability while inspiring others to adopt responsible waste management practices.





ANNOUNCEMENT & CALL FOR PAPERS

23rd Conference on Mathematics, Science and Technology Education in Africa
(COMSTEDA 23)

9th - 13th November 2026

Adwa Victory Memorial Museum, Addis Ababa, Ethiopia

CONFERENCE THEME

Empowering Africa through STEAM Education and Innovation for Sustainable Development and Global Competitiveness

Conference Sub-Themes

Sub-Theme 1
Equity and Inclusion in STEAM Education
Focus: Ensuring that STEAM education is accessible to all learners regardless of gender, disability, geography, cultural or socio-economic background.

Sub-Theme 2
Relevance, Quality and Innovation in STEAM Education and Training
Focus: Curriculum, professional development, pedagogy, and assessment to ensure meaningful and future-ready learning and teaching.

Sub-Theme 3
STEAM for Innovation and Socio-Economic Transformation
Focus: How STEAM education contributes to solving real-world challenges.

Sub-Theme 4
Policies, Strategies, and Partnerships in STEAM Education
Focus: Governance, collaboration, and systemic transformation of STEAM education.

Sub-Theme 5
Digital and Emerging Technologies in STEAM Education
Focus: Leveraging artificial intelligence (AI), robotics, digital public infrastructure (DPI), and open-source mathematical and scientific modeling software to drive inquiry-based learning, automation literacy, and readiness for the Fourth Industrial Revolution.

Conference Format



Learner Presentations
(School Visits)



Panel Discussions and Keynote Speech



Paper & Poster Presentations



Innovations & Exhibitions



Workshops

Important Dates

Call for Papers Opens	24 th June 2026
Approval of Abstracts	30 th August 2026
Deadline for Submission of Full Papers	30 th September 2026
Conference Dates	9 th - 13 th November 2026



Adwa Victory Memorial Museum

Conference Registration

- ☒ Registration fee covers admission to all conference sessions and day conference package (lunch and AM/PM tea)
- ☒ Publication of papers in the Journal on STEM Education in Africa (ISSN 2617-6300) costs an additional USD \$50

Physical Participation
Presenter (Non-student): USD. 100
Presenter (Student): USD. 50
Non-presenter: USD. 30

Virtual Attendance
USD. 30

Payment Details

Bank: NCBA BANK KENYA PLC Account Name: SMASE-AFRICA Account Number: 654 356 0017 Branch: MAMLAKA ROAD SWIFT BIC: CBAPKENX Currency: US DOLLAR ACCOUNT Bank Code: 07 Branch Code: 000 Send Bank Slips to: treasurer@smase-africa.org & info@smase-africa.org

Instruction to Authors

- Paper Abstract:** 250 words and indicate the Sub-theme; **Full Paper:** At most 10 pages, APA referencing style, Times New Roman 12 (No PDF)
- Author Details:** Full name, affiliations, country, e-mail address and WhatsApp telephone number
- Language:** All papers should be submitted in English or translated if they are in other language
- Publication:** Full papers that meet the above criteria will be considered for publication in the Journal on STEM Education in Africa (ISSN 2617-6300)

Ready to Participate?

Submit your abstract & full paper to email

Comsteds23@smase-africa.org



Register now using the link below or scan the QR Code

<https://bit.ly/SmWNT>

ABOUT SMASE-AFRICA

The Strengthening of Mathematics and Science Education in Africa (SMASE-Africa) is a network of African countries and STEM-based organizations established with the aim of promoting STEM education in Africa. SMASE-Africa focuses on supporting development of relevant policies, conducting research, collaboration, advocacy and capacity building in STEM Education.

ABOUT COMSTEDA

COMSTEDA is a SMASE-Africa dialogue forum that brings together educators, policy makers, researchers, teachers, NGOs, and public & private sector stakeholders to present papers, posters, exhibitions, workshops and discuss on matters around STEM education in Africa. Proceedings are published in the Journal on STEM Education in Africa (ISSN2617-6300).

AUC CESA STEM CLUSTER

SMASE-Africa is a member of the African Union Commission's (AUC) CESA (2026-2035) cluster on STEM education which was launched in 2025. The network heeds the African Union's call on "The Africa we want", through implementing dialogue forums such as COMSTEDA to realize the CESA revolutionary approach to achieving Agenda 2063 and global sustainable development goals.

CONTACT US

Comsteds23@smase-africa.org

www.smase-africa.org

(254) 113 088 511

Frequently Asked Questions (FAQs)

About CEMASTEА

What is CEMASTEА?

The Centre for Mathematics, Science and Technology Education in Africa (CEMASTEА) is a Government institution under the Ministry of Education. The Vision is being an empowered, creative and innovative STEM society in Africa. The Mission is to continuously develop capacity in STEM education for sustainable development through training, research, innovation and partnerships with related ecosystems.

What is the mandate of CEMASTEА?

CEMASTEА's mandate is to Develop capacity in STEM education, training and research

Where is CEMASTEА located?

CEMASTEА is located at the Karen Road–Bogani Road Junction in Karen, Nairobi. The postal address is P.O. Box 24214-00502, Karen, Nairobi, Kenya.

Who can benefit from CEMASTEА programmes?

CEMASTEА programmes benefit teachers, teacher educators, education managers, STEM educators, learners and other education stakeholders. Programmes may target different levels of education, including Pre-Primary, Primary, Junior School, Senior School, teacher training institutions and other education stakeholders.

What programmes does CEMASTEА offer?

CEMASTEА offers a range of programmes in STEM education, including Teacher Professional Development (TPD), ICT integration in teaching and learning, STEM education, lesson study, curriculum implementation support, research and knowledge management, and customised training programmes in STEM.

Does CEMASTEА offer online training?

Yes, CEMASTEА offers online and blended learning opportunities through its eLearning Portal. The Portal provides access to various courses, learning materials, assessments and other digital learning resources.

How can I find information about CEMASTEА programmes and activities?

Information about CEMASTEА programmes, training opportunities, news, events, publications and other activities is available on the CEMASTEА website.

How can I contact CEMASTEА? You can contact CEMASTEА through:

Telephone: 020-2044406

Mobile: +254 706 722697 / +254 780 797648

Email: ceo@cemastea.ac.ke

Postal Address: P.O. Box 24214-00502, Karen, Nairobi, Kenya.

E-mail: ceo@cemastea.ac.ke

Website: <http://www.cemastea.ac.ke>

Facebook: Cemastea

X: CemasteaKenya

YouTube: CEMASTEА Educational Channel

Portal Support: portal@cemastea.ac.ke

FABLE: The Dancing Monkeys

AesopFables.com - The Dancing Monkeys - General Fable collection

A prince had some monkeys trained to dance. Being naturally great mimics of men's actions, they showed themselves most apt pupils, and when arrayed in their rich clothes and masks, they danced as well as any of the courtiers.

The spectacle was often repeated with great applause, till on one occasion a courtier, bent on mischief, took from his pocket a handful of nuts and threw them upon the stage.

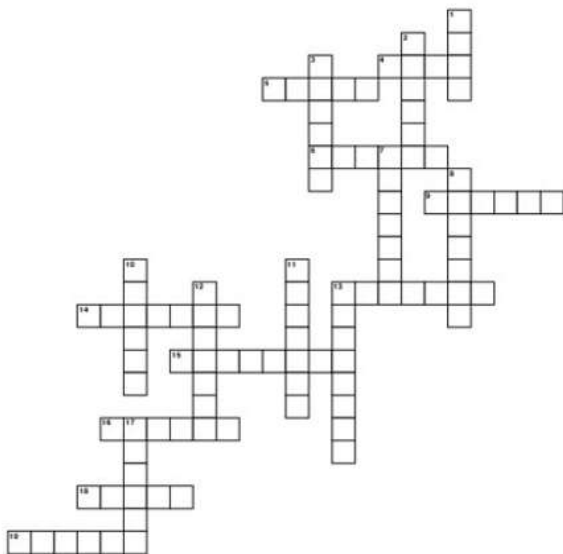


The monkeys at the sight of the nuts forgot their dancing and became (as indeed they were) monkeys instead of actors. Pulling off their masks and tearing their robes, they fought with one another for the nuts. The dancing spectacle thus came to an end amidst the laughter and ridicule of the audience.

Monkeys were trained to dance on stage and did a good job. One day, nuts were thrown onto the stage, and the Monkeys fought over them, dancing no more.

Lesson: Men often revert to their natural instincts.

Science and Innovation



Across

- [4] Invented the telephone
- [5] Pioneered research on radioactivity
- [6] Discovered the expansion of the universe
- [9] Proposed the theory of evolution
- [13] Discovered penicillin
- [14] Discovered electromagnetic induction
- [15] Developed the theory of relativity
- [16] Formulated the laws of motion
- [18] Innovated with alternating current
- [19] Co-discoverer of the DNA structure

Down

- [1] Developed the polio vaccine
- [2] Founded the science of genetics
- [3] Brothers who invented the airplane
- [7] Designed the first mechanical computer
- [8] Theorized about black holes
- [10] Father of computer science
- [11] Developed the germ theory of disease
- [12] Improved the telescope
- [13] Conducted electricity experiments with a kite
- [17] Invented the phonograph





OUR CONTACTS

SCIENCE | TECHNOLOGY | INNOVATION | QUALITY EDUCATION

Empowering
Educators
Transforming
Lives

 **PHYSICAL ADDRESS / LOCATION**




**P. O. Box 24214-00502 Karen,
Nairobi-Kenya**

Karen Road-Bogani Road Junction



 **TELEPHONE, EMAIL & WEBSITE**





TELEPHONE
+254-20-2044406 / +254-706722697 / +254-780797648

E-MAIL
ceo@cemastea.ac.ke

WEBSITE
www.cemastea.ac.ke



 **SOCIAL / DIGITAL CHANNELS**






FACEBOOK
Cemastea

X
@CemasteaKenya

YOUTUBE
CEMASTEA Educational Channel

E-LEARNING PORTAL
portal@cemastea.ac.ke



BETTER TEACHERS | BRIGHTER MINDS | STRONGER KENYA



