Issue 015

CEMASTEA INFO
Newsletter

Maker Spaces

Giving learners space and opportunity for Creativity and Innovation

Editorial

We are delighted to present the 15^{5h} edition of the CEMASTEA Info Newsletter to our esteemed clients and stakeholders

We continue to do what delights us; training, research and other related activities in STEM and ICT. The quarter has been busy with numerous activities in and out of the Centre. Central to this Issue is the intentional reporting on the spaces we give our young learners to exercise their creativity through STEM and Robotic Boot Camps. It was a delight for CEMASTEA to host activities that give children a voice and opportunity to showcase their individual and collective talents. It is amazing to see learners keenly crafting solutions to problems they encounter in their environments.

We report on international trade fairs, conferences and various fora that the Centre had the opportunity for representation. The Mombasa International Trade Fair allowed CEMASTEA to showcase teaching and learning innovations at the Ministry of Education stand. The Ministry won various awards, including 2nd place in the education and research category. The Centre also participated and made virtual presentations focusing on STEM at the mEducation symposium in Arlington, in Washington, USA. We also report on a workshop, hosted on behalf of the Ministry of Education [MoE] and the Secretariat of the Association for Development of Education in Africa's Inter–Country Quality Node on Mathematics and Science Education (ADEA-ICQN-MSE). The workshop focused on the status of STEM education in Africa and aimed at harmonising understanding the same.. It is worth mentioning to our readers that CEMASTEA has hosted the ICQN-MSE Secretariat since 2014.

Also covered is the current theme on tree planting, where the Centre has committed to participate in the Presidential Directive on tree planting. This is progressing tremendously, as shown in photos and a piece on the 'Adopt-a-Tree and Tag-a-Virtue Initiative' from Buru Buru Girls, Nairobi. There is a piece on the visit by the King that resonates well with the theme of environmental conservation and his love for nature. We have honoured our colleagues who have worked tirelessly over the years and now proceed to serve the nation well in other capacities even after retirement.

Read on the need to care about what you say and how you say it in the article on '*verbal communication'*. Get more financial freedom as you read the *Book Review* column on 'The Cash Flow Quadrant.'

Enjoy your reading, and kindly give us your feedback.

Thuo Karanja, Editor

Contents

A group of CEMASTEA staff thanking John Odhiambo (in white T-shirt) for his service to the nation and humanity.
Cover Page: Josephine Ayako (eight years) of New Light Schools using Scratch App. to develop a code during STEM Boot Camp at CEMASTEA (*consent to use photo granted by parent*)

Message from the CEO

Makers are people who do things to improve the world around them. They try to find solutions to problems. If something is broken, they try to fix it. The concept of 'maker spaces' and, indeed, its implementation at CEMASTEA is one that I find fascinating and has become a significant talking point in education circles. While necessarily not new, the maker spaces confirm the long-held belief that learners should be accorded opportunities to be innovative through hands-on experimentation and play with the world and the resources around them. They should be allowed to be creative, apply personalised learning strategies, and develop their ideas, approaches, products, or services through actively engaging and solving problems, posing questions, and making decisions.

Recognising and appreciating the facts above, CEMASTEA repurposed one room at the Centre to establish a maker space. The room and associated spaces, including the innovation room, the mathematics room, and the science laboratories, embody our commitment to innovation, experiential learning, and fostering a culture of creativity and collaboration. It speaks to our mission of "developing competencies for sustainable development through training, research and innovation in STEM education." At these spaces, learners are guided to make or ideate on electronics using Arduino kits, robotics using Lego kits, woodworking, coding and programming, or some combination of these skills. Here, learners convene to tinker, explore, design and create 'stuff collaboratively'. As learners interact in the maker's spaces, their experiences go a long way in inculcating problem-solving and critical thinking skills, oral and written communication and leadership skills at a young age. These skills are fundamental in the field of STEM and in preparing the youth for the 21st Century world of work.

CEMASTEA's maker spaces and the innovation laboratory are open to members of the public, especially students and young school-going children. It is a must-go space during school visits to the Centre and STEM Boot Camps. We aim to use these spaces to enhance their educational experiences, enrich our research capabilities, and extend our outreach to the broader society. This aligns perfectly with our long-term and noble endeavour to cultivate trailblazers, lifelong learners and generations equipped to adapt to and thrive in the modern age. The Centre is open to assisting schools with ideas on designing and operationalizing maker spaces.

Readers can reach us via email: ceo@cemastea.ac.ke

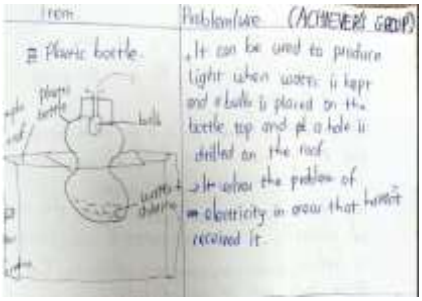
Thank you, and enjoy the issue

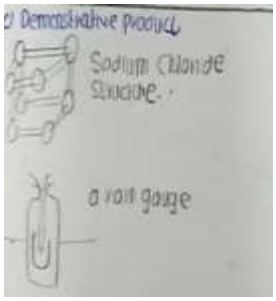
Jacinta L. Akatsa, HSC,
Chief Executive Officer

Makerspaces: Hubs for Creativity and Innovation

By Kizito Makoba

The youth is brimming with original ideas, waiting for a tiny spark to kindle them. While raising awareness of the significance of maker spaces in schools, CEMASTEA's engagement with students from STEM model schools around the country proved that this assertion was accurate. Regarding STEM pedagogies, Education for Sustainable Development (ESD), the creation of maker spaces, and their integration into the teaching-learning process, the Centre has been offering training to teachers and school leadership in STEM model schools. These trainings aimed to create interest in STEM subjects by popularising maker spaces as learning resources to enable learners to develop their creativity, critical thinking and problem-solving skills.

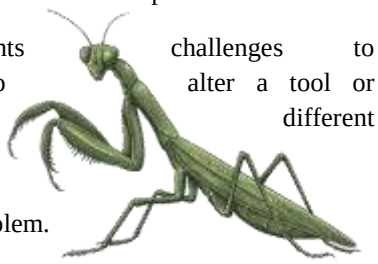




A strategy used to popularise the purposes of a maker space was one whereby teachers and learners engaged in a quick 10-minute STEM challenge 'Magic Plastic Bottle'. The challenge involved developing as many useful products as possible from a used plastic water bottle. Another requirement for the challenge was that it had to be completed outside, preferably in some shade or under a tree. The usage of the outdoors was intended to demonstrate the versatility of maker spaces. Seeing the innovative products the teams created in under 10 minutes was incredible.

The above ideas are evidence of students' innovativeness when given guidance through challenges. Schools can foster children's creativity by setting up maker spaces and regularly posing targeted problems for the students to develop solutions. The Sustainable Development Goals (SDGs) are a suitable starting point for framing the maker space challenges. For instance, SDG No. 6 for clean water and sanitation proposes measures to provide access to clean water and enhanced hygienic conditions. The challenge under this SDG can be to create a project that improves access to clean water and a hygienic environment. The challenges should be open to all students in the school, not only to STEM clubs or a particular group of students. We will likely notice an improvement in the student projects during the Kenya Science Engineering Fairs (KSEF) and other events where students display innovations.

The SCAMPER thinking tool was also introduced to assist pupils while they work on their creations. Substitute, Combine, Adapt, Modify (Magnify, Minify), Put to another use, Eliminate, Reverse (Rearrange) is an abbreviation for the SCAMPER. The fundamental idea behind most of our advancements is SCAMPER. The development of the mobile phone serves as a better example of this. The modern smartphone, with modifications, combines a variety of applications into a single unit. SCAMPER also emphasised how innovations are made possible by carefully studying and evaluating current technologies and formulating ideas for enhancing or improving them. Along with SCAMPER, another element that innovators research and draw inspiration from is the mother NATURE through *biomimicry* or copying nature to come up with solutions.

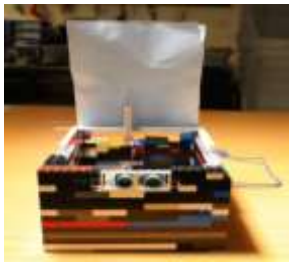


The combination of SCAMPER and *biomimicry* would assist teachers in giving students challenges to sharpen their problem-solving and critical-thinking abilities. Students might be challenged to alter a tool or equipment they use every day, for instance, so that it can do a different task or serve a different purpose. Students could also be given a creature, such as a praying mantis, and asked to explore its behaviour and structure concerning bionics. They are then challenged to create something based on specific traits or attributes of the mantis to address a real-life problem. These events should take place in the maker space.

A simple method to start a maker space is by filling it up with reusable items you use every day, such as cardboard boxes, cello tape, strings, cables, cutting tools, and Styrofoam, among others. Keep adding more supplies following the demands of the student's projects. Therefore, let's encourage innovation in our students by providing maker spaces in our schools. By becoming problem solvers or solution providers, students will be prepared for the rapidly changing world.

Nurturing Young Innovators

By Makoba Kizito, Lucy Mwaniki and Rodney Ndemo



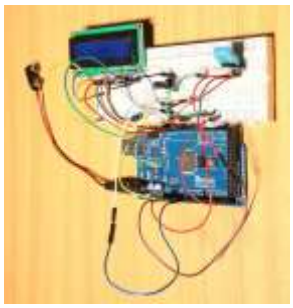
CEMASTEA has established a Makerspace to promote innovation and creativity among students, allowing them to work on projects and solve real-life challenges. The space hosts schools from various educational levels, including high schools, junior secondary schools, and primary schools. Students are drawn to technology and robotics, demonstrating a love for STEM through practical application. The space offers hands-on activities using tools and applications such as Scratch, Lego Ev3 robot, MakeyMakey, and Arduino. This allows learners to explore computational design thinking concepts and brainstorm projects to grow and promote imagination, creativity, innovation, and problem-solving among learners. Some projects created in the maker spaces using Arduino Mega are described below.

Smart dustbin

A Lego dustbin with an ultrasonic sensor detects objects less than 10 cm away, prompting the servo motor to open the lid.

Smart calculator

This calculator showcases keypad programming and uses a Styrofoam LCD screen powered by a 9V battery to perform arithmetic and geometric equations.



Smart home security system

The project used RFID (Radio Frequency Identification) technology to lock and unlock a door using a reader and servo motor, a cardboard box casing, and card input.

Going forward, these experiences could lead to collaborations with other organisations in the STEM space and introduce the concept of developing projects using tools and applications such as Arduino. Teachers and school leaders will be sensitised to sustain these makers' spaces and related activities.

Young Scientists Kenya (YSK) Boot Camp 2023

By Ann Mumbi

Young Scientists Kenya (YSK) partners with various organisations, companies, and STEM experts to offer learning opportunities. CEMASTEA, being among them, was delighted to host YSK's annual STEM Winners Boot camp for its 2022 cohort from 15th to 18th August 2023. The Boot camp allowed the winners to participate in a week-long workshop for mentorship and training on commercialisation, enterprise development, Intellectual Property, and trademarking from experts in these fields. The Boot camp also offered industry visits to enable students to learn about the day-to-day application of STEM in industries. The Boot camp facilitated linkages for the students with individuals, agencies, and companies from the public and private sectors to progress their scientific ideas into commercially viable businesses or explore opportunities for further research.

CEMASTEA and STEM Impact Centre collaborate to host the 3rd STEM Boot Camp

By Kizito, Winfred Magu & Dan Orero

From August 22nd to August 25th, 2023, CEMASTEA and STEM Impact Centre hosted the 3rd STEM and Robotics Boot Camp. The theme, "Igniting the Future: Inspire, Imagine, and Innovate," aimed to bring together Middle School (Grades 4-8) and Secondary School students (Form1-4) to cultivate their creativity and innovation. The Boot Camp sought to encourage learners to pursue STEM careers at the tertiary level, enhance their creativity and innovation and promote a community of problem solvers and critical thinkers. The event featured a range of activities, including Creative Coding (Basic Coding, Makey Makey, Python, Mobile App Development), Robotics (EV3 LEGO Kit/VEX Kit, Arduino Prototyping), Artificial Intelligence/Internet of Things- IoT, Graphics Design (3D-Designs, Graphics Designs), and Mathematics and Science Innovations.

Deputy Director CEMASTEA, Mrs L. Muriithi addressing boot camp participants

STEM education has recently gained significant attention due to its crucial role in shaping innovation and technological advancement. Transformative educational programs like the STEM Boot Camp have emerged to foster a deeper understanding and appreciation for STEM concepts. These initiatives go beyond traditional classroom instruction by encouraging hands-on involvement, honing critical thinking skills, and promoting creativity.

During the opening ceremony, the CEO of STEM Impact Centre and his team expressed their excitement about being part of the Boot Camp. CEMASTEA's Deputy Director of, Mrs. Lydia Muriithi, applauded the impressive turnout and emphasised the pivotal role of mentors in shaping educational journeys. Throughout the week, participants encountered diverse activities encompassing 'scratch & Makey Makey' sessions, exploration of 3D design, mobile app development, and Arduino technology. The immersive experience nurtured a genuine appreciation for innovation.

In the words of Hellen, a participant, "The class is intensive. You have to be attentive all through to get it all." This sentiment underscores the rigorous yet rewarding nature of the STEM Boot Camp. The commitment and effort required signified the depth of understanding and transformation achieved. These initiatives undeniably shape the future of education by fostering creativity, critical thinking, and hands-on engagement. The seeds of innovation sown during such boot camps will inevitably flourish, yielding future generations of scientists, engineers, and problem solvers primed to make meaningful contributions. Each participant received a certificate of recognition during the closing ceremony.

GIRL POWER: KU Female Students in Science and Technology (KUFESST)

By Thuo Karanja, Patrick Wanjohi and Wnfred Magu

CEMASTEA is a renowned institution dedicated to enhancing the quality of mathematics and science education by providing training, resources, and support to learners, STEM teachers and educators. The overarching focus is improving teaching and teaching methodologies and promoting STEM education. On 27th October 2023, the Centre was honoured to host a delegation of students from Kenyatta University Female Students in Science and Technology Club (KUFESST). The club is composed of girls taking STEM-related courses at Kenyatta University. The team of 27 girls visited the Centre to explore collaborative opportunities and exchange knowledge between the university and CEMASTEA in STEM education, outreach and research.

The visit commenced with a presentation by CEMASTEA, providing an overview of their programs, achievements, and ongoing activities. To better understand CEMASTEA's programs, best practices and initiatives in STEM education, the students were taken through a hands-on tour of CEMASTEA facilities. They visited the STEM labs, maker spaces and innovation room, where they interacted with teaching and laboratory scientists, performed mathematics and science activities and got a feel of what goes on at CEMASTEA, particularly the learner-centred programmes aimed at making STEM learning engaging and fun.

There was also a session on reflection and networking that allowed the delegation to connect with CEMASTEA staff, fostering relationships for future collaboration. At this point, the CEMASTEA's CEO, Mrs Jacinta Akatsa, a STEMIST in her own right, being a long-serving biology teacher and published author, gave the ladies an inspiring talk on STEM. She recalled her journey as a student, the gender obstacles she faced, and what good teaching in science and mathematics did to orient her future to what she is today. The delegation tour was organised and coordinated by KUFESST president and vice, Faith Wairimu and Joyce Ochieng, respectively KUFESST President Ms Wairimugave a powerful expose of what the club does, their outreach programmes and their aspirations. She also pointed out possible areas of mutual interest for joint projects and initiatives in which the two institutions could collaborate.

KUFEST delegates from Kenyatta University touring CEMASTEA facilities and listening to remarks by the CEO Madam Jacinta Akatsa.

At the end of the visit, when they visited the Centre's tree nursery, the girls had a short tour and talked about education for sustainable development. Mr Patrick Wanjohi and his team delivered the talk on the effects of climate change and good tree-growing practices. Each girl was given a tree as a sign of climate action and a commitment to protect the world from adverse climate change.

In their feedback on the visit's conclusion, the girls cited it as informative and productive, providing valuable insights into innovative mathematics and science education approaches. They looked forward to furthering our collaboration and contributing to advancing STEM education. There was a need to explore further areas for collaborative research in STEM and motivational outreach tours to students in secondary schools.

Picture Speak: STEM Boot Camps

Status of STEM Education at Basic Learning Levels in Africa

By Mary Sichangi and Ann Mumbi

The Association for the Development of Education in Africa (ADEA) seeks to empower African countries to develop responsive education systems for sustainable development. ADEA achieves these aspirations through thematic-based Inter-Country Quality Nodes (ICQNs) such as the one on Mathematics and Science Education, (ICQN-MSE), a policy dialogue forum for ministers of education that implements programs focused on developing STEM education in African countries.

The Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA), on behalf of the Ministry of Education [MoE], Kenya, hosts the Secretariat of the Association for Development of Education in Africa's Inter–Country Quality Node on Mathematics and Science Education (ADEA-ICQN-MSE) since 2014. The Centre in collaboration with ADEA, hosted an international workshop on the status of STEM education in Africa from 18th to 21st September, 2023. The meeting was aimed at harmonising understanding of the status of STEM education in Africa at basic learning based on findings from two studies conducted in primary (2022) and secondary (2020) levels; discuss the proposed Strategic Framework for ADEA's Inter-Country

Sitted: From Right to left: Ms Ngina Kairu, Member, CEMASTEA Board of Governors, Mr. Charles Chacha Mwita, Director Policy, Partnership and East Africa Cooperation Affairs, MOE – Kenya; Ms. Cecilia Ochoa, Representative of LEGO Foundation; Mrs. Jacinta L. Akatsa CEO, CEMASTEA; Mr. Albert Nsengiyumva, CEO - ADEA; Dr Pius Mutisya, OGW, Chair, CEMASTEA Board of Governors and Shalini Mahadowa-Reechaye, Mauritius.

Workshop participants included senior ministry of education officials from the headquarters, regions, heads of primary or secondary schools, teacher trainers, teachers of STEM subjects, national curriculum development officers, national examination officers, commissions for science and technology, and quality assurance officers. The delegates were drawn from 17 countries that participated in the two studies. The Secondary study was represented by Botswana, Rwanda, South Africa, Ghana, Kenya, Namibia, Uganda, Angola and Morocco and the Primary study was by Eswatini, Nigeria, Ivory Coast, The Gambia, Kenya, Mauritius, Mozambique, Senegal, Malawi and Rwanda. Other guests included The ADEA Secretariat based in Ivory Coast and The LEGO Foundation.

The opening ceremony was graced by the Principal Secretary (PS), State Department for Basic Education Dr. Belio Kipsang, represented by the CEO-CEMASTEA, Mrs. Jacinta Akatsa. The PS pointed out that it was important to understand the current status of STEM education in Africa. Highlighting the critical role of a robust STEM education curriculum, Dr. Kipsang emphasised the need for investment in building STEM institutions. He informed participants that the Ministry of Education had taken various measures to promote STEM education, including capacity-building programs and the transformation of select secondary schools to model STEM education.

The Chief Guest further emphasised that the action points generated in this workshop had the potential to contribute to the Sustainable Development Goals (SDGs), the Continental Education Strategy for Africa (CESA) 16-25, and the objectives of STEM education. The workshop outcomes will drive substantial progress in STEM education across the continent by aligning regional strategies and fostering increased collaboration.

Empowering Future Mathematicians: Highlights from the Kenya Mathematical Olympiad 2023

Martin Mungai

The Kenya Mathematical Olympiad (KMO) 2023, organized jointly by CEMASTEA, the University of Nairobi (UON), and the Centre for Mathematics and Computing (CEMC) from the University of Waterloo, marked a significant milestone in promoting mathematical excellence among Kenyan secondary school students. The competition aimed to identify and nurture mathematical talents, providing a platform for students to showcase their skills and passion for mathematics. The foundation for KMO 2023 was laid with a comprehensive virtual training program for teachers in March 2023 that focused on problem-solving methodologies and building teacher capacity for setting problem-solving questions. A team of mathematics experts from the University of Waterloo, including Prof. Ian Vanderburg and Hon. Wesley Korir, the Director and Strategic Advisor on Africa Initiative to the Director of CEMC, led the training.

Mrs. Jacinta Akatsa, CEO CEMASTEA, led the organizing team for KMO in Kenya 2023; Prof. Stephen Luketero and Dr James Katende from UON; Martin Mungai, the coordinator of the organizing team; Nancy Nui, dean Mathematics at CEMASTEA; and Mrs Beatrice Macharia, the coordinator of the special programs and student learning and Mary Sichangi Coordinator of Partnerships and Linkages at CEMASTEA. The Olympiad run in three rounds, which resulted in the continuous elimination of learners. The process involved learners doing a test that was collaboratively prepared by collaboratively prepared by CEMC, UON, and CEMASTEA. About 8000 learners participated in the first round, out of which 762 high-performing students emerged, earning their spots in Round II.
While teachers were in charge of round one, CEMASTEA and UON staff administered and supervised round two. This further narrowed the pool from 762 students to 64, who once again demonstrated exceptional aptitude. They were selected to progress to Round III. Round III was conducted in 22 centres, with students virtually monitored as they tackled the challenging test. CEMASTEA oversaw the meticulous marking process, resulting in the identification of 24 students who exhibited exemplary performance. These students were then invited to the CEMASTEA campus for an intensive residential training program.

Global Appeal and the Road Ahead

From the residential training, six outstanding students were selected to represent Kenya at the International Mathematical Olympiad (IMO) held at the University of Bath in the UK in June. Six other students were also chosen to participate in the Pan African Mathematical Olympiad (PAMO) in South Africa. In comparison, 12 students earned the opportunity to represent the country at the East African Mathematical Olympiad (EAMO) later in the year. The success of KMO 2023 showcased the dedication of students, educators, and organizers to elevate the standards of mathematical education in Kenya. As the echoes of this achievement reverberate, KMO 2024 is already underway, with participants displaying a heightened enthusiasm to test their mettle and contribute to the legacy of mathematical excellence in the nation. The Kenya Mathematical Olympiad continues to inspire aspiring mathematicians, fostering a love for the subject and shaping the future of mathematical education in the country.

Students from Pangani Girls, Nairobi during the Kenya mathematics Olympiad competition at Nairobi School

Improving Your Verbal Communication

By Ann Mumbi

Everything in our life is a way of communication. In our daily activities, we interact with a variety of people therefore, there is a need to make a deliberate effort to improve our verbal communication. Verbal communication refers to using words to get a message or information across. Words are powerful and have a direct influence on the outcome of a situation, eliciting either a positive or negative reaction They are a reflection of who we are. and define our identity, reveal our attitudes and thoughtfulness.

The choice of words gives listeners an indication of our intelligence or ignorance, too. Unfortunately, most people are pretty careless with the words they choose. Remember the famous saying: "Like a bullet that cannot be returned to the gun once fired, words once spoken cannot be taken back! Thinking before we speak allows us the time to consider the effect of the words we are choosing. It is important, therefore, to 'Think before speaking'. A tool that uses the THINK acronym will train us to think before we speak.

This tool can help us take control, make good decisions, talk less, and listen more in our interactions. It is also useful in situations where words are employed, such ascyberspace. You will agree that hurtful comments online are just as painful as if they are said in person. Cyber bullying-whether by texting, emailing or on social media, can damage friendships, cause trust issues, spread rumours and aggravate mental health problems.

TRUE	Is what you are saying actually true, or fake? Do not hurt others through lies and misinformation
HELPFUL	Are your words helpful? Inspire to assist others make better decisions through offering good advice
INSPIRING	Are others inspired by what you are saying? Inspire by speaking words which have the influence to prompt others to do amazing things
NECESSARY	Do you really need to say it? Avoid unnecessary conversations
KIND	Is what you want to say kind? "If you do not have anything nice to say, say nothing at all"

Showcase of Innovations: The Mombasa International Trade Fair

By Kizito Makoba and Winfred Magu

In promoting the spirit of delivering as one, the Ministry of Education (MoE) brought together its affiliated agencies and institutions to exhibit at its stand at the Mombasa International Trade Fair which took place from 4th -10th September 2023. Some exhibitors included CEMASTEA, Commission for University Education, Jaramogi Oginga University of Science and Technology, Kenya Coast National Polytechnic, Kwale Teachers Training College, KNATCOM, Moi University and Open University of Kenya. The fair under the theme *'Promoting Climate Smart Agriculture and Trade Initiatives for Sustainable Economic Growth'* provided an excellent opportunity for CEMASTEA to showcase its activities and programmes to the public.

Visitors being taken through some of the teaching and learning resources displayed during the Fair by CEMASTEA Staff

During the event, CEMASTEA engaged members of the public in activities that promote critical thinking while having fun. This approach was an excellent way to raise awareness about the centre's programmes and activities. By encouraging critical thinking through game-based activities, CEMASTEA is instilling a desire for learning in STEM. The Ministry of Education won the 2nd position - Best University Stand; 2nd position - The Stand that best interprets the current show theme education and/or research; and 3rd position - The Stand that best interprets the current show theme education and/or research. These awards were a testament to the dedication and hard work that the team had put in to ensure the stand was informative and interactive.

The 2023 Mobiles for Education (mEducation) Alliance Symposium

By Thuo Karanja

Mr Akoko of CEMASTEA and Ms. Effie Akinyi of mEducation Alliance during her visit to CEMASTEA

The 2023 Mobiles for Education (mEducation) Alliance Symposium occurred from September 11th -14th, 2023, in Arlington, Virginia and Washington, D.C. The symposium, an invite-only event, was organised by the mEducation Alliance, a global education consortium whose membership includes the development and donor agencies focused on education, particularly in low-resource contexts. This annual symposium attracts a dynamic line-up of global education policymakers, activists, thinkers, and implementers who network and share best practices and the brightest sustainable educational tech and non-tech STEM interventions.

The 2023 Symposium under the theme '*Inspiring the Next Generation of STEM Leaders-Everywhere!'* had several subthemes, including STEM Stories – Foundational Literacy and Numeracy; #Inspiration STEM is Girl Powered; Inclusive STEM; STEM Empowered Teachers; Youth as Digital Champions and STEMpreneurs and other special sessions! The symposium had highly participatory presentations in dynamic formats through showcase interactive sessions, lightning talks, gallery walks, interviews, facilitated panels, a hands-on STEM education expo/exhibits, team-building exercises and networking opportunities.

The symposium resonated with CEMASTEA's STEM education and programme areas, in particular the subthemes on *'STEM Empowered Teachers', ICT and Technologies in STEM Education, and inclusive STEM*. CEMASTEA was represented at the symposium by Dr. Pius Kimani, Chair of the Board of Governors CEMASTEA, and Mr Thuo Karanja, a National Trainer in STEM Education. The 15-minute virtual presentation under the title *CEMASTEA's 360° Approach to STEM Education*' highlighted CEMASTEA programmes and the impact on the teaching and learning of STEM, gender-responsive pedagogies and inclusive STEM practices.

CEMASTEA's participation at the symposium was made possible by the support of the Partnerships and Linkages department at CEMASTEA and the conference organisers, in particular Anthony Bloome, Executive Director, mEducation Alliance and Mary Effie Akinyi, Communications and Engagement Coordinator mEducation Alliance. In December 2023, Ms. Akinyi had the opportunity to visit and tour CEMASTEA and learn more about what we do. CEMASTEA leadership, through the CEO's office, has committed to continued collaboration with mEducation Alliance.

Paste the link below in your browser to learn more about the symposium.
https://meducationalliance.org/2023-symposium/

Developing Capacity for Implementing Performance Contracts

By Sarah Shompa and Thuo Karanja

Performance contracting is part of broader public sector reforms aimed at improving efficiency and effectiveness in public service management. Implementation of PCs helps clarify obligations, customer orientation, and roles of Ministries, Counties, Department and Agencies (MCDAs) through identifying performance targets, negotiation, vetting, signing, implementation and finally, evaluation of performance contracts. Effective and efficient implementation of PC is envisaged to lead to improvements in service delivery, increased productivity, cost containment and reduction in activities, projects and programs.

While many factors influence the successful implementation of a PC, its practical implementation largely depends on staff competence, commitment and talent to turn decisions and actions into results to meet established targets. Implementation is hampered by missed deadlines and misdirected or wasteful efforts without a capable, result-oriented team. Building capacity is, therefore, central to the success of implementing performance contracting targets for any institution. This enables the optimisation of staff efforts in achieving PC targets on time. Training is more important when there are changes in the PC's structure, as is the case with the 20th PC cycle, with the introduction of productivity mainstreaming and enhanced reporting on assets and liability management. Successful implementation of these target areas requires new skills, competencies and capabilities. CEMASTEA selected staff teams to undergo capacity-building sessions to implement productivity mainstreaming and enhance the assets and liability management PC targets.

The training on productivity mainstreaming was conducted for five (5) days from 2nd to October 6th 2023, by National Productivity and Competitiveness Centre (NPCC) officers. During the one-week training, participants were taken through *an interpretation, expectations and reporting on productivity mainstreaming target for the 20th cycle of the PC; Overview of Productivity Management and measurement; factors influencing productivity; development and validation of measurement Metrics, productivity management framework among others key topics*. Activities during the training included presentations, discussions and case studies on productivity measurements. The team was assisted in developing 12 productivity metrics for CEMASTEA.

The training was conducted by officers from the National Treasury from October 30th to November 3rd. During this training, participants were taken through exciting sessions that focused *on assets and liability management in the Public Sector including Legal framework and key Policy Pronouncements, an overview of 20th Cycle PC Guidelines on asset management and requirements, Access to asset management documents and national Treasury Circulars, checklists and the National Treasury expectations, disposal plan reporting templates, asset management enablers emerging issues*. The team has hands-on experience capturing and entering data on the reporting templates.

These two trainings were timely and an eye-opener for CEMASTEA. Participants in the two workshops developed robust action plans that would enable them to implement the targets for each area successfully. This included strategies of data collection and quarterly reporting to the relevant agencies, organising briefing sessions for management and creating awareness/sensitisation for other staff. The teams were tasked to spearhead developing or customising the notational policies and strategies for CEMASTEA.

Keeping the Promise: Growing of Trees

By Isaac Gathambiri

The tree planting programme by CEMASTEA continues to progress well across the nation. This project is a response to a Presidential Directive on the need to increase our forest cover by planting 15 billon trees by 2032 and be part of the solution to mitigate climate change. Most schools supplied with seedlings and duly inducted on best practice on tree growing by officers from KEFRI have registered encouraging germination success rates. These continue to receive support from officers from KEFRI and CEMASTEA on how to tend to the already germinated trees in preparation for transplanting. CEMASTEA is grateful for the support the project is getting from Government agencies and the Ministry of Education officers across the country. Teachers, learners, school leaders and senior education officials in the counties have participated in the tree nursery preparation, tending and maintenance of the nurseries. The Tree Nursery and Information Centre at CEMASTEA continue to communicate relevant training and information to schools and donate trees to various interested parties. Pictures below show some of the activities happening at the schools.

The Royal Visit: King Charles III & Queen Camilla

King Charles III planting a tree at Karura forest. He is flanked by the Cabinet Secretary for Environment, Climate Change & Forestry, Hon. Soipan Tuya.

Britain's Royal couple, King Charles III and Queen Camilla, were in Kenya for a four-day first state from Monday 30th to November 2nd 2023. The visit, the King's first to a Commonwealth country as king, was full of symbolism as Charles' mother, the late Queen Elizabeth II, learned that she had become U.K. monarch while visiting Kenya in 1952. The couple had a busy schedule, starting with a ceremonial welcome at State House by H.E President William Ruto, where the King inspected a guard of honour and received a 21-gun salute. Despite the prolonged struggle against colonial rule in which thousands of Kenyans died, Kenya and Britain have enjoyed a very cordial relationship and strong cultural ties since independence. While the visit was meant to celebrate the warm relationship between the two countries, the King, in his speech during the State Banquet mounted on his honour, took time to acknowledge the more 'painful aspects' of their shared history.

The King is a lover of nature and things organic, underscoring his commitment to environmental conservation throughout the visit. The couple visited various nature and conservation-related sites, including the Nairobi National Park, and Karura forests, where they met with environmental activist Wanjira Mathai, the daughter of late Nobel laureate Wangari Maathai and planted commemorative trees. The couple also visited the Sheldrick Wildlife Trust (SWT), which operates an orphaned elephant rescue and rehabilitation program and a backyard garden at Mama Lucy Kibaki Hospital, thriving with an organic range of range vegetables and herbs. In Mombasa, the couple visited historical sites such as the Fort Jesus and also interacted with faith and religious leaders in a mosque and a church.

During their busy four-day visit, some Kenyans had to meet the Royal couple as they toured various places in Nairobi and Mombasa. These included young entrepreneurs who have nurtured their start-ups through small-time borrowings, to innovators and 'creatives' including artisans, fashion designers, musicians and artists supported by grants from the British Council. Most Kenyans who had the opportunity to interact with the King found in him, despite being an easy-going person, a keen observer with skills and the ability to comment on contemporary issues.

Aesop's Fables: Do not trust flatterers.

A Fox once saw a Crow fly off with a piece of cheese in its beak and settle on a tree branch. "That's for me, as I am a Fox," said Master Reynard, and he walked up to the foot of the tree. "Good day, Mistress Crow," he cried. "How well you look today: how glossy your feathers; how bright your eye. I feel sure your voice must surpass that of other birds, just as your figure does; let me hear but one song from you that I may greet you as the Queen of Birds." The Crow lifted her head and began to caw her best, but the moment she opened her mouth, the piece of cheese fell to the ground, only to be snapped up by Master Fox. "That will do," said he. "That was all I wanted. In exchange for your cheese, I will give you advice for the future. "Do not trust flatterers."

https://etc.usf.edu/lit2go/35/aesops-fables/394/the-fox-and-the-crow/

Time for Everything: Senior Citizenship Status

By Kizito Makoba, Phillip Maate and Thuo Karanja

We at CEMASTEA and the SMASE community are filled with mixed feelings as we bid our beloved colleagues farewell to a well-earned retirement. As we reflect on these extraordinary citizens' enormous influence on the lives of so many, we are overcome with appreciation and admiration.

Time to leave Top; Chemistry department celebrating Dean Gachuhi and Bottom: Biology trainers celebrate Mr John Odhiambo upon his retirement.

These outstanding workers have served in various capacities for the Kenyan government's Ministry of Education through the Teachers Service Commission and at CEMASTEA. They have demonstrated their exemplary competencies and dedication to their work since they were deployed or employed at CEMASTEA. They include Mutua Muyanga, Physics Department; Amina Sharbaidi and John Odthiambo, Biology Department; Joseph Mathenge, & Samuel Gachuhi (Dean), Chemistry Department; and Mr Alfred Muriithi of the Supply Chain Department. They each have served CEMASTEA for two decades on average.

These outstanding officers have dedicatedly served CEMASTEA and played a pivotal role in advancing high-quality science and maths education nationwide. As they set out on their retirement, we consider their enormous influence on so many lives. Teachers and students are forever changed by their passion, genuine concern, and dedication to education and service. They were and are still a part of the CEMASTEA family, which continues to foster curiosity, dreams, and a love of learning. Their passion for quality and high standards will remind them of their time and place at CEMASTEA.

This team of great teachers and professionals prepared and procured training modules and resources, conducted training to improve STEM teachers' pedagogical content knowledge, and participated in research on effective pedagogy. With a focus on learning design and instruction, our colleagues have amassed a wealth of knowledge and expertise in teacher education. Notwithstanding their differences, these colleagues have contributed priceless life lessons, emphasising the value of kindness, perseverance, and the quest for excellence.

We look forward to seeing them put their accumulated knowledge and skills, ability to multitask, and, in some cases, the ability to do the impossible to use in their respective communities. Beyond CEMASTEA, some, like Ms Amina, Mr Mathenge and Mr Odhiambo John, are renowned KNEC examiners. John is also an expert in matters of inclusive education. Mr Muriithi and Mr Gachuhi are renowned community leaders and entrepreneurs.

There is no doubt in saying that you are our ‘Shujaas’, and this is our hardest goodbye. It feels like we just started yesterday; 20+ years is not just a number; it’s a life we have spent together. Colleagues, as you step into this new chapter, may the warmth of the gratitude and admiration we feel accompany you. May your legacy as exceptional educators endure, shaping the future of those fortunate to come into contact with you. As you continue to share the excitement of learning and leadership, CEMASTEA wishes you a retirement filled with joy, relaxation, more work and the fulfilment that comes from knowing you served well. God bless.

The Adopt-a-Tree and Tag-a-Virtue Initiative

By Margaret Kiprono Buruburu Girls' Secondary School

The 'adopt a tree and tag a virtue' is a service-learning best practice which is implemented by involving the students to plant, adopt and tag the trees with positive virtues which they aim to nurture in their life as the tree grows. The students take on the responsibility of caring for their tree and developing their chosen virtues as a "personal project' under the guidance of a teacher.

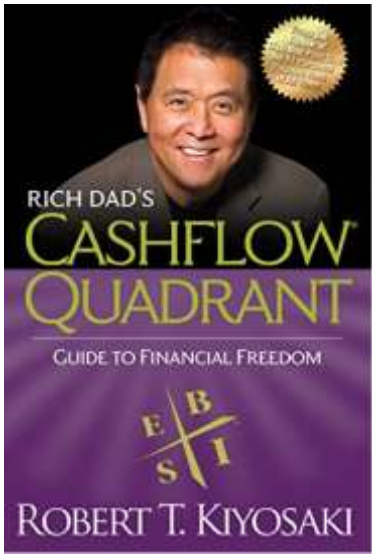
Preliminary data from the initiative indicate that students who participated in the intervention showed an increase in their environmental awareness, community engagement, and character development, which aligns with addressing SDGS. This has been made possible through the assistance given to me by CEMASTEA through mentorship and training on the best practices.

Although the African continent contributes the least to global climate change, it suffers excessively from its adverse effects. The current climatic conditions are affecting African livelihoods and economies unfavourably, thereby becoming a major threat for African countries towards socioeconomic transformation and achieving Sustainable Development Goals (SDGs). Kenya's economy largely relies on tourism and agriculture farming, which are adversely affected by climate change and extreme weather events. Because of this, CEMASTEA has taken the lead in championing activities geared towards addressing sustainable development goals through education.

The need to avoid dangerous levels of global warming and realise Kenya's economic blueprint requires global action. Kenya Vision 2030 provides a blueprint to create "a globally competitive and prosperous country with a high quality of life by 2030." Besides, the 2030 agenda for SDGs advocates for inclusive green growth. This necessitates the scaling up the "Adopt a Tree and Tag a Virtue' initiative in primary and secondary schools towards enhancing environment protection, promoting food security, and enhancing students' character growth and well-being. If school-going children and adolescents are equipped with the basics of Education for Sustainable Development (ESD) skills, the environment protection and food security narrative will move as far as their homes as children will love to practise what they have learnt there. Children are known to be the best ambassadors in the world. It is no wonder education starts with children for the betterment of the community at large.

Something is coming up at CEMASTEA, right from the underground!

BOOK Review: The Cash Flow Quadrant



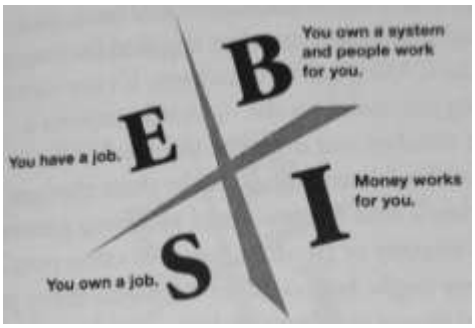
By Esther Nyambura

"You will never know true freedom until you achieve financial freedom."

The CashFlow Quadrant is a powerful tool for understanding how money flows globally and where you stand in the financial landscape. It consists of four distinct quadrants: Employee (E), Self-Employed (S), Business Owner (B), and Investor (I).
Employee (E): This is where most people find themselves. Employees work for a paycheck, earning their income by exchanging time and labour for money. While job security is in this quadrant, it often comes at the cost of limited control over one's financial destiny.

Self-Employed (S): The 'S' quadrant includes professionals like doctors, lawyers, and sole proprietors. While they have more control over their income and schedules, they are often tied to their work, and their businesses may not be scalable.

Business Owner (B): In the 'B' quadrant, individuals own and operate businesses. They have more control over their income and can leverage the efforts of others to create wealth. Business owners are responsible for the systems and operations that generate income.
Investor (I): The 'I' quadrant is where true financial freedom is achieved. Investors make money work for them through stocks, real estate, or other investments. Their income is generated from assets that appreciate over time.
The book's key message is that true financial independence and wealth are found in the 'B' and 'I' quadrants. Individuals can take control of their financial destinies and build lasting wealth by transitioning from the 'E' and 'S' quadrants to the 'B' and 'I' quadrants. This shift requires financial education, risk-taking, and a willingness to break free from the comfort zone of traditional employment.
The author argues that our school systems often fail to teach us about money, leaving many individuals ill-prepared to navigate the complex world of finance. Without a basic understanding of concepts like assets, liabilities, and taxes, people are at a significant disadvantage when it comes to building wealth. It is important to invest in one's financial education continually. This means seeking out knowledge about investing, taxes, and money management. It also means understanding the difference between assets and liabilities.



Kiyosaki's famous mantra is "***The rich don't work for money; they have money work for them.***" So let us all aim to build and acquire income-generating assets rather than rely on earned income.

Encouraging Word

Allah says (24:24): "On the day when their tongues, their hands and their feet will bear witness against them as to what they used to do"

1 Peter 3: 10: For, "Whoever would love life and see good days must keep their tongue from evil and their lips from deceitful speech

Coffee Break

Chemistry Crossword

Adapted by Okeyo Jakomanyo

Across

3. The study of matter

10. Substances that affect the rate of a reaction but are not changed themselves. Also may start or stop a reaction from occurring.

12. Shows how atoms in a molecule are located and connected

14. Substances that enable enzymes to work properly.

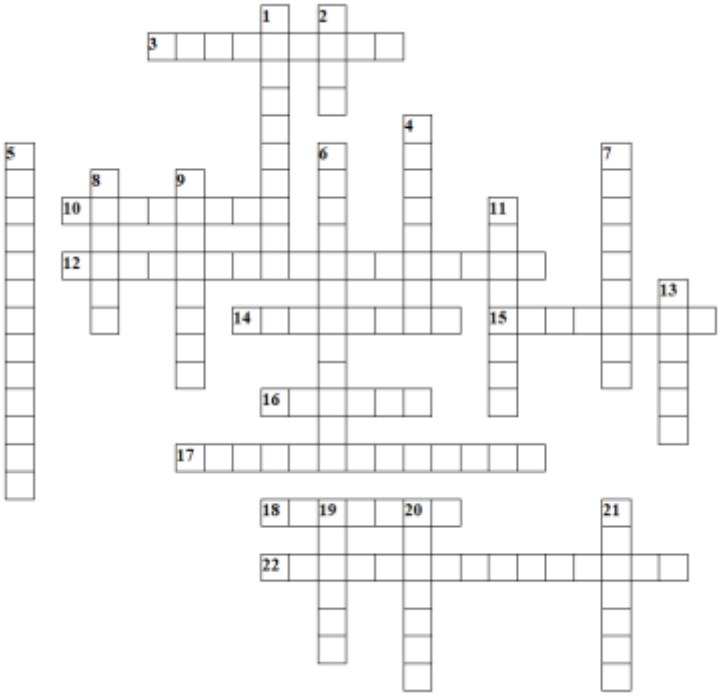
15. Pure substances consisting of two or more atoms in each molecule

16. Positive particle of an atom. The number of these determines what kind of element it is

17. Chart of elements organized according to their atomic structure

18. Pure substances consisting of only one kind of atom in each molecule.

22. Show the number and type of atoms in a molecule



Down

1. Small amount of liquid chemicals would be measured using this metric unit.

2. The smallest unit of an element

4. The metric unit used to weigh of a bar of gold

5. Solid, liquid, gas

6. Shared electrons hold atoms together.

7. Donated electrons form charged particles called ions to stick together

8. Occupies space and has mass

9. Negatively charged particle outside the nucleus

11. A distinct group of atoms bonded together

13. A protein molecule or organic molecule used as a catalyst

19. The ability to do work

20. The part of the atom containing the protons and neutrons

21. Neutrally charged particle found in the nucleus and has mass

Some fun facts about roaches

CHOPPING OFF their heads does not work: cockroaches can live without one for as long as a week. Whacking them is no guarantee either: their flexible exoskeletons can bend to accommodate as much as 900 times their body weight. Nor is flushing them down the toilet a solution: some breeds can hold their breath for more than half an hour. To most, roaches are an unwelcome pest. Their presence is made all the worse because they are indestructible.

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