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CEMASTEA

CEMASTEA INFO

Newsletter

Tracing the History

Celebrating 25 years of Service to the Education Sector

Editorial

This year marks the Silver Jubilee of the Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA), which has been leading the way in promoting STEM education in Kenya and throughout Africa for 25 years. This is a noteworthy accomplishment and a major turning point that comes from twenty years of meaningful labour, devotion, and commitment to supporting STEM success. Since its founding in 1998, CEMASTEA has never wavered in its commitment to improving the calibre of STEM education—mathematics, science, and technology—by offering a wide variety of cutting-edge programs for teacher professional development, capacity-building projects, and cooperative collaborations.

Over time, the Centre has evolved from an INSET Unit situated at Kenya Science Teachers College (KSTC) with 16 employees and four departments to a parastatal within the Ministry of Education with a responsibility for training and research. There is a rise in the number of departments and internal functions, with more than 120 employees. As the Centre commemorates this historic occasion, we reflect on our modest history and humble accomplishments while looking forward to the future with fresh vigour and resolve. We are certain that the spirit of resilience, collaboration, and creativity that has distinguished us over the last 25 years will continue to lead the way in reshaping and shaping the future of STEM education in Kenya.

This issue of the Newsletter traces CEMASTEA's journey through articles about our history and our flagship teacher professional development program, which focuses on transforming STEM teachers' classroom practices. We recognize and congratulate leaders who set the standard for our future performance. We also include our typical pieces about creative teaching, book reviews, and updates on the Centre's current activities.

Enjoy your reading, and please offer us comments.

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Thuo Karanja, Editor

CEMASTEA Board Chair, Dr Pius Mutisya OGW (far right), CEO CEMASTEA, Mrs Jacinta Akatsa (next to Board Chair) and Member Board of Directors, Madam Ngina Kairu, (next to CEO) together with members of staff receiving a 1ST Position award category as the Best Education State Corporation during the National Diversity and Inclusion Awards & Recognition (DIAR Awards) gala dinner held on March 22, 2024 at Sarit Expo centre, Westlands, Nairobi.

Contents

Climate Change is Real

Did you plant a tree today ?

Message from the CEO

I am glad to share with our stakeholders some highlights of CEMASTEA's history and accomplishments that have shaped our path over the last 25 years. CEMASTEA was established in response to concerns raised by the Ministry of Education and stakeholders about the persistent poor learning outcomes in mathematics and science subjects. This led to the decision to launch an intervention to boost mathematics and science education. The Ministry of Education developed a concept note and proposal on the subject, but the plan was shelved due to a lack of financing.

According to Mr Oyaya and Mr Wanyama, senior officers at the Ministry of Education, a visit to the Ministry of Education by Japanese officers seeking to launch a STEM education project in 1996 resulted in the rediscovery of the long-forgotten plan. As they say, one thing led to another, and in 1998, negotiations between the Ministry of Education and the Japanese government through JICA resulted in the establishment of the well-known Strengthening Mathematics and Science in Secondary Education (SMASSE) Project. Kenya Science Teachers College housed the initiative in a newly constructed unit known as the INSET Unit. The SMASSE Project's achievements resulted in the development of an institution to institutionalize and regularize INSET for science and mathematics teachers. This is how CEMASTEA was founded in 2006.

At CEMASTEA, we seek to nurture and build human capital in the education sub-sector, notably the professional development of STEM teachers, with an emphasis on delivering 'excellent' learner-centric teaching. Throughout our training, we interacted with science and mathematics professors on numerous occasions, which had a significant impact. Similarly, our classes have changed. We have trained STEM instructors in both secondary and primary schools. Recently, we effectively interacted with junior secondary school teachers to ground them in classroom practice expectations, with a strong emphasis on pedagogical content knowledge. Beyond our training, we execute programs and activities that support teachers and students while simultaneously promoting STEM education. This includes outreach initiatives such as STEM and robotics boot camps, Education for Sustainable Development (ESD), and climate change projects like tree planting. CEMASTEA's local, regional, and global cooperation and collaboration help to strengthen our global position and promote the exchange of knowledge and best practices.

I thank the leaders who came before us for laying the foundations for the structures we are now strengthening. I am particularly aware of the responsibilities played by our County Teacher Capacity Development Committees (CTCDCs) and County Trainers. They serve as the foundation for our county-level programmes. Furthermore, I recognize and respect the hard work and dedication of CEMASTEA staff. They have been critical to the Centre's success, often going above and beyond to ensure that scheduled initiatives are delivered on time. I also want to congratulate our stakeholders, partners, suppliers, and supporters for their contributions to the Centre's phenomenal success.

CEMASTEA continues to adapt to changing educational contexts and environments. We were especially happy of how the Centre handled the challenges that occurred during the onset of COVID-19, demonstrating resilience in the face of adversity. We have adopted the Competency-Based Curriculum (CBC), innovation and technology integration in teaching, and digitization in the Centre's administration. I see a bright future for CEMASTEA, and I am confident that the new strategic plan and expansion efforts will help to reinforce the organization's position as a STEM education leader.

Thank you for joining us on this journey and accepting the invitation to celebrate CEMASTEA's Silver Jubilee with us.
Enjoy the remainder of the reading.

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

Jacinta L. Akatsa, HSC, Chief Executive Officer

CEMASTEA Silver Jubilee Celebrations

Highlights of the Speech by Board Chair, Dr. Pius Mutisya, OGW

Ann Mumbi

While it is a custom at CEMASTEA to end every year by celebrating milestones achieved, 2023 was different. The Board of Governors decided to make it a Silver Jubilee celebration. It was, therefore, pomp and colour as the Board of Governors, management and staff trooped to Maanzoni Lodge, Machakos, on 22nd December to mark 25 years of CEMASTEA's existence. The celebration was hosted alongside the honouring of officers who had recently retired ISO re-certification and the launch of a 'STEM on Wheels' bus. The key highlight of the celebration was the remarks made by the Board of Governors Chair, Dr Pius Mutisya OGW, who took the time to address a cross-section of issues regarding the Centre.

Board Chair, Dr. Pius Mutisya, OGW delivering his remarks during the celebrations

The Chair appreciated management and staff, noting that each was a unique individual with special skills, which contributed immensely to the success of the Centre. He noted that the celebration not only marked a milestone since CEMASTEA's inception but also affirmed the power of teamwork and commitment to the core functions of the Centre. He paid tribute to the members of the Board for continuing to provide technical knowledge and working extra hard to ensure the Centre's operation conformed to government expectations. Board members present during the celebrations included Mrs Ngina Kairu, Ms Nanzala Mayabi, Mr Peterson Maina, Mr Samuel Kiprop, Mr Edwin Murimi and FCPA Edwin Makori.

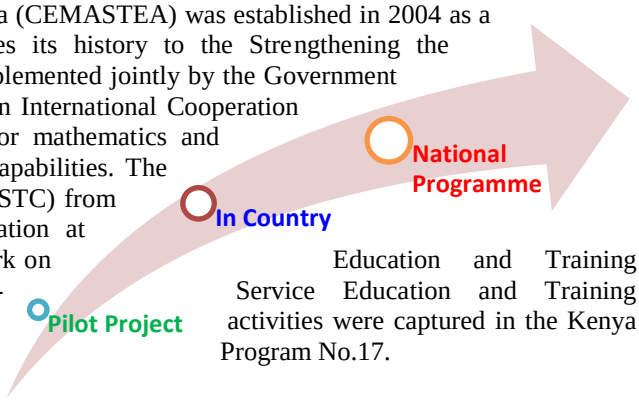
The Chair highlighted the functions of CEMASTEA as a State Corporation and entreated staff to look forward to a bright future as the Centre was destined for greatness. While noting that it takes many years to build an institution and only a short time to bring it down, the Chair urged the staff to keep the Centre's vision alive and ensure more teachers and learners benefit from its programmes. He announced that the fifth-generation Strategic Plan, designed to give CEMASTEA direction for the next five years, was in its last stages of development.

The Chair recognised the retirees for their dedication and service to CEMASTEA and assured them that management will continue to call upon them to support programme implementation. The retirees included Mr Joseph Mathenge and Mr Samuel Gachuhi from the Chemistry department, Ms Amina Sharbaidi and Mr John Odhiambo from the Biology department, Mr Mutua Muyanga from the , Physics department and Mr Alfred Muriithi from the Supply Chain department. During the celebration, the Kenya Bureau of Standards (KEBS) recertified the Centre's ISO 9001:2015 - Quality Management System (QMS) Certificate. Mr. Alex Katiku, Principal Certification Officer and Chief Manager of Planning and Strategy delivered the certificate.

CEMASTEA Board of Governors and members of staff during the retreat to celebrate the Centre's Silver Jubilee

Brief History of CEMASTEA

The Centre for Mathematics, Science, and Technology Education in Africa (CEMASTEA) was established in 2004 as a public institution under the Ministry of Education. The Centre traces its history to the Strengthening the Mathematics and Science in Secondary Education (SMASSE) Project implemented jointly by the Government of Kenya through the Ministry of Education and Japan through the Japan International Cooperation Agency (JICA). The project targeted improving classroom practices for mathematics and science teachers to upgrade young Kenyans' mathematics and science capabilities. The SMASSE project was housed at the Kenya Science Teachers College (KSTC) from 1998 to 2003, when its operations were moved to the current location at CEMASTEA in Karen. In 2005, Sessional Paper No. 1: Policy Framework on Education and Training recognized the role of CEMASTEA as a fully-fledged institution for In-Service Education and Training (INSET) for mathematics, science, and technology teachers. CEMASTEA activities were captured in the Kenya Education Sector Support Program (KESSP 2005-2010) Investment Program No.17.



When technical cooperation with JICA ended in 2013, the Government of Kenya continued to fund the implementation of CEMASTEAs programs. Over a period of time, the expansion of CEMASTEA programs necessitated its own space. This necessitated the conversion of the Centre for Research and Technology (CRT) to the Centre for Mathematics, Science, and Technology Education in Africa (CEMASTEA) in Karen. Japan International Cooperation Agency (JICA), funded the upgrading of CEMASTEA facilities to a modern science complex. His Excellency President Uhuru Kenyatta officially opened the facility in February 2014. Over time, CEMASTEA has developed exceptional competences in planning, coordinating, and implementing Continuous Teacher Professional Development (CTPD) programs. The Centre continues to expand its programmes. It has brought on board Early Childhood Development Education (ECDE) teachers, Junior School (JS) teachers, teacher training colleges, principals, deputy principals, and other education stakeholders in accessing its programmes. In 2022, CEMASTEA was transformed into a State Corporation under the Ministry of Education (MoE) with the mandate of Training and Research. CEMASTEA is set to unveil its fifth generation strategic Plan that envisions leveraging the rich history to steer it to the next level of growth.

The Magic of ASEI-PDSI

The celebration of the silver jubilee would not be complete without mentioning Activities Student-centred Experiment Improvisation (ASEII) and PDSI, P stands for Plan, D for Do, S for See and I for Improve. CEMASTEA has used ASEI-PDSI as a ‘rallying call’ for a paradigm shift in classroom practice from the then predominant teacher centred ‘talk and chalk’ lessons to a more learner-centred ‘activity filled’ and innovative classroom practices that connect to real-world, real-life scenarios and applications that enable learners to see the practical implications of their learning. ASEI-PDSI is a concept that has defined and continues to headline all CEMASTEA’s Teacher Professional Development (TPD) programmes. CEMASTEA's goal has always been to promote successful classroom practices that emphasize inquiry-based and hands-on learning, the development of critical thinking and problem-solving skills, learner engagement, innovation, and creativity. The ultimate goal is to prepare students for the 21st century by providing cutting-edge STEM lessons and learner experiences.

ASEI-PDSI is a comprehensive approach to teacher development that focuses on skills and methods for planning and delivering a 'good lesson'. Good lessons involve active engagement from students through a range of activities such as practice and drill, problem solving in mathematics, experiments and investigations in science, and application of what they have learned. They emphasize scientific and mathematical process abilities including measurement, observation, recording, and inference. Good lessons also encourage critical thinking and problem resolution by asking thought-provoking questions, exercises, or scenarios. They also develop communication and teamwork skills as students react to questions, participate in conversations, and deliver individual and group presentations.

CEMASTEA has provided teachers with creative and hands-on training to improve their subject knowledge, instructional strategies and approaches and classroom management abilities. This, in turn, has had a significant impact on increasing student engagement, improving learning outcomes, and cultivating an outstanding culture. Beyond the classroom, ASEI-PDSI has established and nurtured a community of enthusiastic and devoted practitioners, as well as a network of change-makers who are pushing classroom innovation and influencing the future of education in Kenya and across the continent. Indeed, the implementation of ASEI-PDSI has left an indelible impression on the STEM environment. It is therefore appropriate to declare 'Happy Silver Jubilee, ASEI PDSI' and look forward to many more years of empowering educators and changing STEM education.

Leadership: Heroes that shaped SMASE & CEMASTEA

As we celebrate our Silver Jubilee, we honour the visionary leaders who have guided CEMASTEA to greater heights over the last quarter-century. The Centre has been blessed with remarkable leaders whose devotion, passion, and commitment have helped shape the institution's success and influence. These Kenyan and Japanese leaders dared to dream and envision a future for STEM education in Kenya and Africa. They displayed exceptional foresight, strategic thinking, and unshakable commitment in furthering CEMASTEA's objective and goals, taking sometimes unpopular but brave actions to make their vision a reality. Their transformative leadership paved the way for innovative programs and strategic partnerships that continue to empower teachers and educators, excite students, and catalyze positive change in Kenyan classrooms and across Africa.

Pioneer leaders for the Strengthening of Mathematics, Science in Secondary Education (SMASSE) Project in Kenya included Professor Karega Mutahi, then Permanent Secretary Ministry of Education, Mr Oyaya, then Chief Inspector of Schools (currently referred to Director of Quality Assurance); Mr Bernard Mbugua Njuguna, first Head of INSET Unit (that run the Project) at Kenya Science Teachers College(KSTC); the late Mr Samuel Kibe, a long time Education Consultant for JICA and advisor on STEM education for the SMASSE Project. Directors who have steered CEMASTEA include Mr. Obadiah Maganga, Hon. Mrs Peula Lelei, Mrs Lynette Kisaka, Mrs Cecilia Ngetich, Mr Moses Kawa, and Hon Mr. Stephen M. Njoroge. The Centre also had pioneer staff including the late Ms. July Ominde, Secretary; Ms Jane Marete Senior Administration officer and Mr. Alfred Muriithi, Senior Procurement Officer who made sure that administrative, office and project procurement issues were up to date.

On the Japanese side was the late Mr. Takahiko Sugiyama, first Chief Advisor for the SMASSE Project 1998-2008. Sugiyama oversaw the project spread in Kenya and to 34 countries in Africa with the establishment of SMASE Africa Association. Others included Prof. Shigekazu Takemura, a dedicated and globally renowned expert of Physics Education and Academic Advisor for the project, Mr. Keiichi Naganuma who succeeded Mr. Sugiyama as Chief Advisor, Atsushi Matachi, Academic Advisor, Hazuki Uchiyama, Science Education Expert and Noriaki Tanaka, Project Coordinator. Japan also sent numerous short-term experts in mathematics and science. The founding Kenyan counterparts for the SMASE project were; Dr. Marguerite Khakasa Miheso-O'Connor ,(Kenyatta University; Prof. Justus O. Inyega, University of Nairobi; the late Simon Kinyua, Regina Ng'anga, and Dr. Waitutu Michael (Kenyatta University).

These leaders' visionary leadership and staff's tireless dedication and unwavering commitment to duty laid the foundation for CEMASTEA's success. Their legacy continues to inspire CEMASTEA leadership as it strives to build a brighter and more prosperous future and the pursuit of excellence in STEM education. Indeed, the current leadership looks upon this rich history and draws inspiration to continue along this path of faith, inspiration, and excellence to impact future generations of educators, learners, for many years to come.

National Trainers, Mr. Kizito and Ms Amina (now retired) discussing an activity with a short term JICA expert Prof. Lee Shok Me from Malaysia.

National Trainers: Pioneering Excellence in STEM Education

National Trainers, the backbone of CEMASTEA's mission to elevate STEM education in Kenya and Africa, are experienced educators who undergo rigorous training to become proficient in pedagogical techniques, practices, and the latest STEM educational strategies. Their dedication to professional development, mentorship, and innovative teaching practices has not only transformed classrooms but also ignited a new passion for STEM in the hearts of a new generation of learners. Operating mainly from CEMASTEA, they play a crucial role in disseminating effective teaching practices and methodologies to educators, thereby raising the standard of STEM education. Core functions for National trainers include the development of course programmes and content on pedagogical Content Knowledge (PCK), conducting workshops and training sessions for County trainers and teachers at various educational levels, and the design and development of high-quality teaching and learning resources and materials. They also provide ongoing and school-based support and mentorship to teachers, and conduct educational research to identify effective teaching methods, ensuring the sustained application of best practices in their classrooms.

In order to remain at the top of the pack, National Trainers undertake continuous and comprehensive training covering a wide range of topics, including innovative teaching methodologies, use of technology in education, facilitation skills, learning resources development. They also continuously retool in knowledge and skills in classroom based research, lesson planning, delivery, observation and feedback. These trainings, done in Kenya and some in other nations such as Japan and the Philippines, have equipped National Trainers with the skills necessary to lead and inspire other educators, fostering a collaborative and progressive learning environment. Through their efforts, CEMASTEA continues to make significant strides towards achieving excellence in STEM education.

Evolution: Changes of the Training Facilities

One of the notable transformations that have taken place simultaneously with the increasing number of programmes at CEMASTEA has been the training infrastructure. The Strengthening of Mathematics and Science in Secondary Education Project (SMASSE, 1998-2003) was initially housed in a residential building at the then Kenya Science Teachers College, House Number 47. During this period, the Project operated as the INSET Unit of Kenya Science Teachers College (KSTC), now a constituent College of the University of Nairobi. As a way of ensuring sustainability of the project, JICA supported the construction of the SMASE Complex at Kenya Science, that housed the Project until it became a regular Ministry of Education program implemented county-wide. With the growth of programmes, a bigger space was necessary, hence the shift to the current offices in Karen under the name CEMASTEA.

While the shift to Karen was exciting due to more space and the upmarket 'Karen address', the place needed improvement, because most of the structures were old while others run down. .Despite this, there was one remarkable and iconic building- the farmhouse, a complex residential building with many rooms and huge verandas.

It was famed to have belonged to the owner of the large coffee garden that occupied much of the land then. The building became the home of the biology and mathematics trainers for quite some while. Other buildings were renovated and turned into training rooms through the assistance of JICA. Most of them are still in use ten years down the line.

The next phase of infrastructural growth was the development of the ultra-modern training complex. The construction of the complex started in 2012 with a ground-breaking ceremony presided over by the late Hon. Mutula Kilonzo, then Minister for Education. The complex was a culmination of almost fifteen years of fruitful implementation of the SMASSE project and programme by the Kenyan and Japanese governments through JICA. This magnificent half a billion-shilling complex was a donation from the people of Japan through an Overseas Development Aid (ODA) Grant. Finally, the SMASE Programme had a home! The complex consists of relevant STEM training resources namely training rooms and laboratories, offices and conferencing facilities.

__Top__, the old office block housing Biology and Mathematics departments. __Middle__, the new complex housing the famous Sugiyama Hall, offices, classrooms and laboratories, Bottom; the floating dining hall annex and its ambience

Moments: Celebrating 25 Years' Service to the Nation

Top left;: *CEMASTEA Board members receiving a the ISO 2009:2015 re-certification certificate from Mr. Alex Katiku, Principal Certification Officer, KEBS; right, Martin Mungai receives a trophy for work well done in implementing the Kenya Mathematics Olympaid. (KMO).* ***Middle Left****; Mr Alfred Muriithi and right, Mr John Odthiambo receives certificates of recognition of long service to CEMASTEA. B****ottom left:*** *CEO having a joyous moment with staff and right; ladies have a good time during the celebrations.*

JICA and the Success of CEMASTEA

Japan has a solid history of excellence in science and mathematics education which is modelled in several developing countries through Japan International Cooperation Agency (JICA) programmes. JICA is a governmental agency that delivers Official Development Assistance (ODA) for the government of Japan.

One of the biggest bilateral development organizations in the world, JICA fosters international collaboration while supporting the social and economic development of underdeveloped nations. The area of education is one of the main areas of support. The Japanese education model is notable for its emphasis on science and mathematics education. It emphasizes the importance of laying a solid foundation of fundamental concepts at a young age, providing experiential learning opportunities with real-world applications to improve comprehension, and utilizing instructional strategies that promote cooperative learning and group projects to develop critical thinking and problem-solving abilities.

There is also a focus on improving classroom practices through continuous professional development of teachers to deliver quality teaching. JICA also provides sufficient resources for educational infrastructure, materials, and technology transfer to support effective teaching and learning.

These are some of the tenets on which the SMASE project was modelled along. By adopting some of these principles and contextualizing them to Kenya, JICA assisted CEMASTEA to work towards improving their science and mathematics education. The Government of Japan through JICA sponsored the capacity building of CEMASTEA National trainers and some County trainers through short term technical courses in planning and implementing good lessons. The courses were offered in Japan, the Philippines and in Malaysia. The culmination of the assistance was the putting up and resourcing of the ultra-modern training complex at CEMASTEA.

County Trainers during a recent national training session at Tom Mboya Labour College, Kisumu

County Trainers: Great Teachers who drive SMASE activities at the Counties

CEMASTEA's professional training programs stand out due to their unique and effective approach of using teachers to train other teachers through a cascade model. This training concept was implemented to secure teacher buy-in and a broader national outreach. County trainers, the lead teachers chosen through a competitive process, play a crucial role in training teachers on behalf of CEMASTEA at the County level.

County Trainers (CTs) are exemplary mathematics and science teachers and critical players in planning and implementing SMASE programmes in the Counties. Their number depends on the population of STEM teachers in each County but there are about 1,200 County Trainers spread across all 47 counties in Kenya. Trained at the national level, they implement downstream training at the Counties where they cascade training on Pedagogical Content Knowledge (PCK) and skills to the classroom teachers within their respective counties. Each of the four STEM subjects, Biology, Chemistry, Physics, and Mathematics, is represented. They also assist in the promotion of continuous professional development among STEM teachers by providing mentorship and support. Among these great teachers is a dedicated team called County Trainers Representatives (CTRs), who coordinate other County Trainers for the smooth and seamless implementation of CEMASTEA activities in the counties.

Several County Trainers have walked the SMASE Project and CEMASTEA journey since its inception. The majority of those who started this journey as classroom teachers have advanced and now occupy senior positions in the education and public service sectors.. Some County Trainers have advanced in their careers to be school leaders, including Nancy Mwaura, Principal, Queen of Peace Nembu Girls Secondary, Gatundu Kiambu; Scolastica Mbaa Principal, Moyeni Girls Kinango, Kwale; Jane Musungu, Principal, Precious School Kapsambo; Daniel Mwachi, Principal, Vihiga Friends High School among others. Overall, County Trainers are pivotal in ensuring the success, sustainability, quality and effectiveness of CEMASTEA's STEM education programmes and contributing to the overall improvement of STEM education in the country.

SMASE Africa & Third Country Training Programmes

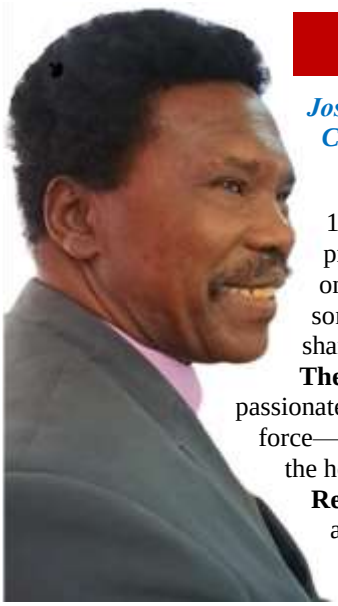
Mary Sichangi and Thuo Karanja

Right, TCTP participants during a laboratory session and left, during a cultural evening

In 2001, a collaborative network of countries, united by a common goal of enhancing mathematics and science education in Africa, was established under Strengthening of Mathematics and Science in Secondary Education in Western, Eastern, Central and Southern Africa (SMASSE-WECSA). This platform, later renamed Strengthening of Mathematics and Science Education in Africa (SMASE-Africa, 2014), was designed to provide a continental and inclusive platform. The network's activities, including capacity development programs, analytical work, advocacy, and provision of expert support to member countries, were all driven by a spirit of collaboration and shared responsibility. One such program, the Third Country Training Programme (TCTP), was a testament to this collaborative spirit, funded under the bilateral agreement between the governments of Kenya and Japan through the Japan International Cooperation Agency (JICA). The aim of TCTP was not just the development of human resources for sustainable development, but also the promotion of cultural, mutual understanding and friendship among participating countries and programme implementers. Since its inception, CEMASTEA and JICA have jointly planned and successfully implemented 34 cohorts of TCTP training, bringing together at least 1,700 participants from 34 African countries.

The training provided participants with a networking opportunity for continuous improvement in mathematics and science classroom practices. Participants collaboratively explored alternative and promising classroom practices through the introduction to effective and efficient learner-centred teaching and learning methodologies based on Activities, Student-Centred and Improvisation through the Plan, Do, See and Improve (ASEI-PDSI) approach. TCTP aims to give continental teachers skills and strategies for improving classroom practices and promoting meaningful learning experiences through lesson planning, development, sourcing, and effective use of teaching and learning resources. During the training, there were demonstration lessons and visits to Kenyan schools for practice lessons. In the spirit of 'all work without play make Jack a dull boy', participants had the opportunity a weekend to tour the City of Nairobi and the Great Rift Valley and a cultural night where the continental cultural diversity in culinary, attires and essential customs were on display.

The capacity development programs culminated in participating countries establishing similar national programs in respective countries of Africa. Analytical work through research conducted in 2015, 2017, 2020, and 2022 revealed on-going mathematics and science programs with varying levels of coverage in some African countries. In order to capitalize on the capacity developed under TCTP and related forums, CEMASTEA continues to conduct annual advocacy forums such as webinars to share promising interventions to support Science, Technology, Engineering and Mathematics (STEM) education on the continent. Long live the continental platforms that promote the development of STEM education in Africa.



Final Word: Teacher Mathenge's Farewell Insights

Joseph K. Mathenge, Retired National Trainer: Remarks during CEMASTEA's Silver Jubilee Celebrations

It is an incredible privilege to stand before you today, as one who has traversed the landscape of 14 remarkable years with CEMASTEA. Today, I bring you a narrative of service, growth, and the profound insights that retirement has gifted me. Each day of the 14 years that I served was a brushstroke on the canvas of our collective journey. Together, we faced challenges, celebrated victories, and built something enduring—a legacy of dedication and resilience. As I bid farewell to my official role, I want to share a few insights that retirement has gracefully unveiled.

The Power of Collective Purpose: CEMASTEA is more than an organization; it is a community of passionate individuals united by a shared purpose. In retirement, I have come to realize that purpose is a magnetic force—it binds people, propels projects, and transforms challenges into triumphs. Our shared purpose has been the heartbeat of our success, and I encourage you to hold onto it as you move forward.

Resilience is a Lifelong Journey: Resilience, a quality we've all embodied, doesn't retire. It evolves. It adapts. In this new chapter, I've discovered that resilience is not the absence of challenges but the unwavering belief that, together, we can conquer anything. So, embrace change, learn from setbacks, and let resilience be the compass that guides your future endeavours.

Embrace the Gift of Time: Retirement, I've learned, is not just an endpoint; it's a doorway to a realm where time becomes a cherished companion. Use this gift wisely. Spend it with loved ones, pursue passions, and savor the joy of simply being. Time, once spent, cannot be regained, so make every moment count.

The Legacy of Learning: In the ceaseless journey of learning, retirement is not a destination but a junction. It's an opportunity to expand one's horizons, explore new passions, and relish the joy of intellectual discovery. Learning should not end with a title or position; it should be a lifelong pursuit.

T**he Ripple Effect of Gratitude:** As I reflect on my time with CEMASTEA, gratitude swells within me. Gratitude not just for the roles we played or the projects we undertook but for the people who made this journey extraordinary. Expressing gratitude is a gift that keeps on giving, creating a ripple effect that echoes through our professional and personal lives. As I embark on this new chapter; I leave youwith a simple yet profound truth: every ending is a prelude to a new beginning. May CEMASTEA continue to be a beacon of innovation, collaboration, and positive change. Thank you for the honour of serving with you. The best is yet to come.

In Leaps & Bounds: CEMASTEA's ICT Journey

By Paul Waibochi, and Ben Mwangi

CEMASTEA Portal: portal.cemastea.ac.ke/

ICT plays a critical role in education. It provides teachers and learners access to various resources, such as educational software, simulations and online platforms that facilitate interactive, engaging and diverse learning experiences. When the SMASSE project was started in 1998, ICT resources to enhance teacher training were limited compared to today. They included Pentium II desktop computers, low-speed laptops, overhead projectors, and television sets. Data storage and transfer were mainly through large floppy diskettes that stored minimal information. It was a matter of pride then to have these resources.

The ever-changing global trends prompted the Centre to embrace the use of technology in the training of teachers. Surveys done in the early stages of the SMASE revealed that the majority of teachers lacked skills relevant for ICT integration; even in contexts where ICT facilities were available, most were used for management and administrative purposes, and rarely were teachers using the for purpose of classroom practices. In the early to mid-2000s, the Centre started to leverage increasing internet connectivity, which had become more accessible. The Centre was able to use web-based resources and communication tools for long-distance training. ICT has now become integrated into CEMASTEA's programmes, enriching training and facilitation experiences and providing access to digital learning resources, interactive simulations, and multimedia content. Digital literacy skills have facilitated better teacher collaboration through virtual classrooms, enriched innovative teaching methods, online discussions, and collaborative lesson study projects.

Over time, the Centre developed a website, a learning management system (LMS) and a repository for learning resources. The continued integration of ICT into the planning and implementation of training programmes has enabled the Centre to transition from physical or in-person to blended training. In 2022, the Centre developed a Learning Management System (LMS) that has enabled courses be implemented fully online. A significant milestone is the digitization of the certification process after training, where participants can download their certificates.

***How times change**: changes in portable data storage media from floppy discs, compact discs to external hard drives capable of storing terabytes of data.*

Currently, the Centre is running robotics and coding boot camps and participating in progressive programmes related to the digital space, technologies and emerging concepts. The Centre has the intention to bring more digital fun to the learner's world with activities related to concepts, including the Internet of Things (IoT), Artificial intelligence (IA) and Augmented reality (AR). The Centre continues to expand its programmes and ICT infrastructure, upgrading hardware, software, and networking capabilities to keep pace with evolving educational needs and technological trends. The Centre has two state-of-the-art teleconferencing facilities that have made long-distance meetings, online courses and webinars easier to manage. Overall, ICT has a multifaceted role in CEMASTEA programmes and continues to contribute to improved teaching quality, enhanced learning experiences, professional development, data-driven decision-making, and research advancements

STEM on Wheels: Popularizing Science and Mathematics through Outreach

By Makoba Kizito

Effective teaching is characterized by a child's interest, motivation, and engagement. To do this, teachers must help children learn by having them observe, listen, explore, experiment, and ask questions. For 25 years, CEMASTEA has been training science and mathematics teachers about learner-cantered teaching strategies that inspire, involve, and spark interest in STEM. Throughout this time, however, the Centre has not had programmes that have direct contact with learners other than when they visit the Centre or during classroom-based activities such as lesson observation during research. When learners visit CEMASTEA, they get a chance to experience science and mathematics, and how they are applied in everyday life. The Centre features a makers-space, innovation math and science rooms, and the state-of-the-art laboratories. The experiences assist learners view mathematics and science from an angle of play and place-based perspectives. However, only a few learners can visit the Centre at a particular time.

In an effort to have more learners experience STEM education, ensure equity in light of the positive feedback from the learners and, the steadily growing requests from schools for visits, the Centre started the STEM outreach programme. We coined the slogan: "If all learners cannot come to CEMASTEA, we go to the schools". This is how the concept of the 'STEM on Wheels' was born. The goal was to bring STEM experiences right in the contexts of the learners. 'STEM on Wheels' brings a mobile STEM lab (bus) to schools, allowing learners and teachers to participate individually and as groups in hands-on activities and experiments. The program is designed to engage learners in STEM subjects and help them develop critical mathematical and science thinking, problem-solving, engineering, and science and mathematical communication skills. The program is run by experienced educators and volunteers who guide learners through the activities as they provide support and encouragement. Learner-driven science experiments, mathematics and science-related activities, robotics, coding, critical thinking, and problem-solving exercises, and Education for Sustainable Development (ESD), are some of the STEM-related activities on offer during the outreaches.

Esther Nyambura, ICT department interacting with young STEMists

Aesops Fables: The Bundle of Sticks

A father had a family of sons who were perpetually quarrelling among themselves. When he failed to heal their disputes by his exhortations, he determined to give them a practical illustration of the evils of disunion; and for this purpose he one day told them to bring him a bundle of sticks. When they had done so, he placed the bundle into the hands of each of them in succession, and ordered them to break it in pieces. They tried with all their strength, and were not able to do it. He next opened the bundle, took the sticks separately, one by one, and again put them into his sons' hands, upon which they broke them easily. He then addressed them in these words: "My sons, if you are of one mind, and unite to assist each other, you will be as this bundle, uninjured by all the attempts of your enemies; but if you are divided among yourselves, you will be broken as easily as these sticks."

Lesson learnt: Union gives strength. *https://www.umass.edu/aesop/content.php?n=4&i=1*

Girls Encouraged to Take Up Science and Mathematics

By Beatrice Macharia and Ann Mumbi

Cake cutting ceremony during the event: From Right: Mrs Jane Mwangi, Chief Principal, Tumutumu Girls; Mr Sammy Nganga, Nyeri County CQASO; Dr Purity Ngina, Regional Manager of Zizi Afrique Foundation, Eng Jacinta Mwangi, Urban Roads Authority director of planning and development, Madam Beatrice Macharia Coordinator, Special Programmes and Student learning at CEMASTEA; and a student at the school

February 11 is the International Day of Women and Girls in Science. It is an annual observance that celebrates the achievements and contributions of women and girls in Science, Technology, Engineering, and Mathematics (STEM). This day is dedicated to promoting gender equality in STEM fields, encouraging more women and girls to pursue careers in science and technology, and breaking historical barriers and stereotypes in the field.

CEMASTEA held the 2024 celebrations at Tumutumu Girls in Nyeri County. During the celebration, attended by a host of accomplished female STEMISTs, girls were encouraged to take science and mathematics subjects to tap into substantial career opportunities in the future. Speaking during the International celebrations of the International Day of Women and Girls in Science hosted at Tumutumu Girls on Sunday, February 11 2024, The Kenya Urban Roads Authority (KURA) Director of Planning and Development, Eng Jacinta Mwangi, appealed to players in the education sector and women in STEM to mentor girls.

Eng Mwangi noted that many girls in Kenya are steering clear of their science careers due to a lack of continuous mentorship and support to pursue sciences. "Many girls are still not getting into the STEM spaces, and hence, there is a need for continuous mentorship on the importance of mathematics and sciences. Regional Manager of Zizi Afrique Foundation, Dr. Purity Ngina, noted that many careers in the 21st century are in Sciences, with projections that 60 per cent of the country's workforce will be in STEM. Therefore, acall to invest in opportunities that ensure young women have the right skills for these careers. Dr Ngina urged girls to take up science and mathematics and other related subjects seriously, adding that this would allow them to fit into the competitive job market.

CEMASTEA CEO Madam Jacinta Akatsa, represented by Madam Beatrice Macharia, encouraged more girls to pursue science and mathematics subjects. CEMASTEA, she said, has a mission to promote gender-responsive STEM education with programmes such as the STEM Outreaches, STEM & Robotics Boot Camps and Mathematics Olympiads focusing on girls' participation. Ivy Waithera, a form four student at the school, said that she had picked three of the sciences, Biology, Chemistry and Physics, as she wants to take a course in Biotechnology. "I urge my fellow girl to embrace STEM subjects as they have numerous job opportunities to fill the gaps of engineers," the student added.

Mrs. Jacinta L. Akatsa, HSC, CEO of CEMASTEA meets with a team from the Kenya Girl Guides Association. Representatives from Ghana, Burundi, Malawi, Madagascar, Nepal, and Zambia attended the meeting. The meeting was a result of the Kenya Girl Guides Association's request for CEMASTEA's support in preparing the STEM Girl Core Initiative. The STEM Girl Core Initiative involves girls coming up with STEM projects, with the best projects proceeding to the other levels of international competitions.

Picture Speak: STEM Outreach it Nyeri County

Communications Department





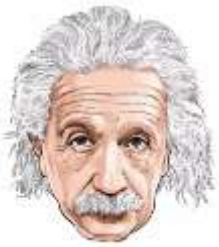



CEMASTEA trainers visited some schools in Nyeri County to show case innovations and demonstrate the fun of hand on mathematics and science education. This was the inaugural STEM on Wheels bus tour.

The focus of this outreach was the junior secondary learners. It was such fun and fulfilling to see learners enjoying STEM outdoors! One of the most liked and interesting activity was the opportunity to 'dissect' a computer and view its inner parts and practically understands their functions. Most confessed that this is only learnt in theory.

At some point the exhibition attracted two very young curious boys who mustered some courage and came, and asked question at their level. It couldn't get better than this!

CEMASTEA also took time during the week celebrate Women and girls in science. See separate story.

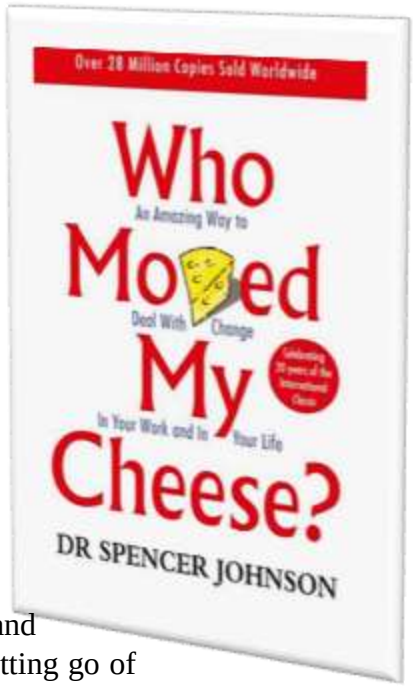


Albert Einstein once said...

...the value of an education is not the learning of many facts, but the training of the mind to think something that cannot be learned from textbooks....

Book Review, Navigating Change: 'Who Moved My Cheese'

Book by Spencer Johnson, Review by ***Esther Nyambura***



In the world of self-help and personal development literature, few books have made as big of an impact as "*Who Moved My Cheese"* by Spencer Johnson. In this timeless classic, Johnson presents a simple yet profound fable that resonates with readers of all ages and backgrounds. Through the story of four characters; Sniff, Scurry, Hem, and Haw, the author illustrates the inevitable changes we face in life and the importance of adapting to them.

In this engaging and relatable tale, the author takes readers on a journey through the maze of life, where cheese represents what we desire and strive for in life, whether it's success, happiness, or fulfilment. The characters' reactions to the shifting cheese supply mirror our own responses to change, from denial and resistance to acceptance and adaptation.

One of the most powerful aspects of "Who Moved My Cheese" is its ability to inspire action. The author doesn't just tell readers to accept change; he provides practical insights and strategies for embracing it. From letting go of fear and embracing uncertainty to proactively seeking out new opportunities, the book offers a roadmap for personal and professional growth.

> *"The quicker you let go of old cheese, the sooner you find new cheese"*

Overall, "Who Moved My Cheese" is a must-read for anyone facing change in their personal or professional lives. The author's engaging writing style, relatable characters, and timeless wisdom make this book a valuable resource for navigating life's challenges with courage and resilience. Whether you're a recent graduate embarking on a new career path or a seasoned professional facing a major life transition, this book offers invaluable insights and inspiration to help you embrace change and thrive in the face of adversity.

Cutting Edge Innovation

Clara Wanjiru, Physics Department

Have you ever thought how many STEM disciplines are involved in the development of a shaver? Make a guess. According to Gillette Innovation Centre, the mission of making good hair-cutting blades is complex. Cutting hair close to the skin without irritating it requires a sharp blade. Delivering the most comfortable shave involves biologists, skin experts (dermatologists), material scientists, chemists, physicists, and mathematicians. Let us take, for example, the application of physics. Due to the load applied on single-blade shavers, skin irritation has been one nagging outcome of such poor shavers. You could have noticed that most modern shavers have more than one blade. Why? Using multiple blades distributes the load and overcomes the application of too much load on a single blade. A shaver with five blades means a single hair can be cut five times in a single stroke. This is as opposed to moving back and forth five times! Now you know.

SMASE Training: Testimony on My Practice

Pauline Wamuyu, Modogashe Secondary School

I am Pauline Wamuyu, a Biology and Chemistry teacher at Modogashe Secondary School, Garissa County. Working in this region has provided me with immense training and workshop opportunities. I have attended different SMASE training organized by CEMASTEA, both online and face-to-face, which have provided opportunities for improving my classroom practice. Participating in the SMASSE program has been transformative. The hands-on workshops and collaborative learning environments have equipped me with innovative teaching methods and resources to engage my students in my Chemistry and Biology lessons.

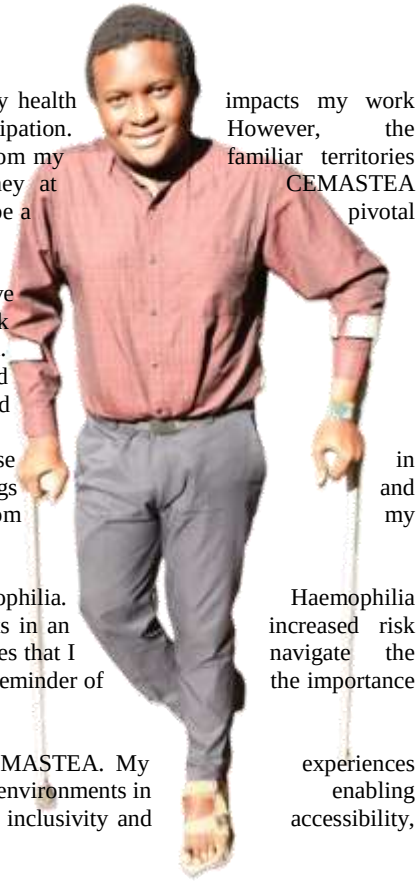
The emphasis on inquiry-based learning has improved student achievement and fostered a deeper understanding and appreciation for the two subjects among my learners. SMASSE has empowered me to be a more effective teacher, and I'm grateful for the opportunity to be part of such an impactful professional development initiative. The knowledge and skills I acquired from training and workshops have equipped me with strategies to plan and effectively implement hands-on activities and ICT integration. I have learnt to identify and download the most appropriate ICT resources that enable me to prepare better learner-centred inquiry-based lessons. I supplement ICT resources with charts and realia to prevent distractions caused by overemphasizing technology.

CEMASTEA ensures effective teaching through school visits for follow-up sessions, during which they conduct lesson observations and provide feedback on lesson strengths and areas of improvement. In our school, we have embraced teamwork and resource sharing. We practice lesson study and team teaching at the departmental level, as is recommended during training and follow-ups. This has had positive outcomes in my classroom practice that motivate me to seek and look forward to more learning opportunities and put more effort into my work. I celebrate CEMASTEA for the opportunity to improve my practice. I am grateful to CEMASTEA for the knowledge and skills they have impacted on me and the impact that has immensely improved and made my classroom practice enjoyable.

Disability Mainstreaming: My Journey at CEMASTEA

Navigating my Professional Spaces with Haemophilia

Haji Luvumbi Humphrey, PSC intern, CEMASTEA



I have lived with haemophilia since a sports injury in 2007 and am always concerned about how my health impacts my work life. Being selected for the Public Service Internship Cohort 5 filled me with immense joy and anticipation. However, the reality of relocation dawned upon me when I received my placement at CEMASTEA, which was far from my familiar territories in Mombasa and Kilifi County. Despite these reservations, I embarked on my internship journey at CEMASTEA with determination and openness. Communicating with human resources about my condition proved to be a pivotal decision. Immediate assurance of accommodation and support eased my apprehensions.

CEMASTEA's disability-friendly infrastructure and the institution's commitment to inclusivity have facilitated my integration into the workplace. The Centre's disability policy allows for flexible work arrangements, including adjusted reporting times and the option to work remotely on days of ill health. Accessible facilities such as ramps, walkways, and designated toilets alleviated physical barriers and underscored the institution's commitment to diversity. Moreover, my colleagues' welcoming attitude and willingness to assist during meals and daily tasks fostered a sense of belonging and camaraderie.
In my role within the Partnerships and Linkages department, I found opportunities to leverage my expertise in Project Management and Monitoring and Evaluation. Engaging with partners and contributing to meetings and agreements became seamlessly manageable, thanks to the supportive environment and understanding from my supervisors regarding my occasional health-related absences.

Reflecting on my journey, I am reminded of the resilience cultivated through years of living with haemophilia. Haemophilia is a rare, inherited blood disorder that causes blood to clot less or take much time to clot. This results in an increased risk of bleeding or bruising. It is through meaningful employment and the support of compassionate colleagues that I navigate the challenges posed by my condition. However, the financial strain of medical expenses remains a constant reminder of the importance of stable employment and accessibility to healthcare.

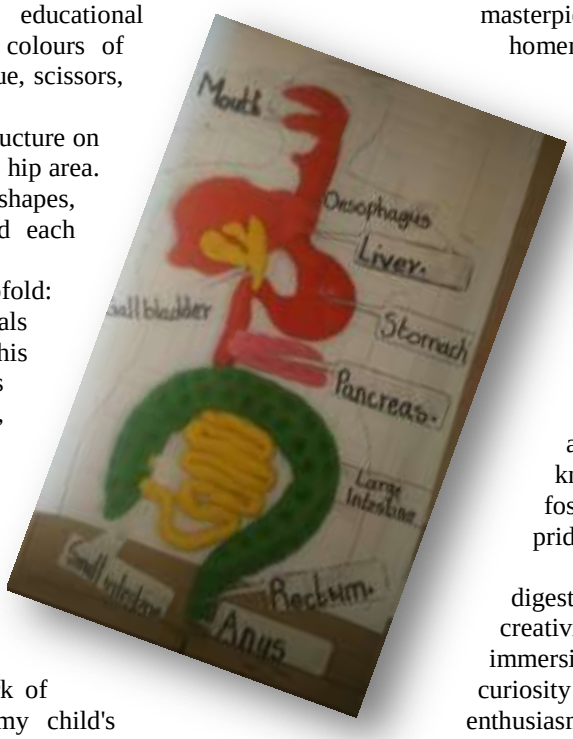
As I continue to forge ahead in my professional journey, I am grateful for the opportunities at CEMASTEA. My experiences underscore the importance of workplace inclusivity and highlight the transformative impact of supportive environments in enabling individuals to thrive despite health challenges. Moving forward, I remain committed to advocating for inclusivity and accessibility, both within the workplace and beyond, as we strive towards a more equitable society.

Innovative Pedagogies

Crafting a homemade digestive system model

Esther Nyambura and Njoki Renee (Daughter)

Want to ignite a child's curiosity and make learning captivating? Look no further than modelling or simulating real-life objects. When my Grade 3 child struggled to grasp the complexities of the digestive system, we embarked on a fascinating journey of creating her digestive system model using homemade clay. With enthusiasm and determination, she spent her afternoon meticulously crafting this educational masterpiece. To bring her vision to life, we gathered the following materials: Assorted colours of homemade modelling clay, carton box, printing paper or manila paper, marker pen, glue, scissors, printed blank labels (optional)



First, we traced the outline of a human body structure on printing paper or Manila paper, capturing the region from the head to the hip area. With skilful hands, she kneaded and moulded the clay into different shapes, precisely replicating the organs of the digestive system. She labelled each structure.

The objective of this hands-on activity was twofold: to create an accurate digestive system model using readily available materials and to simplify understanding of the complex process of digestion. Through this engaging process, she identified each organ and its location and explained its function and the overall digestion process. Listening to her explanation, you might notice a few misconceptions. However, with dedication and learning from her mistakes, she confidently presented and shared her knowledge with her classmates. Creating the digestive system model fostered a deeper understanding and instilled a sense of accomplishment and pride in her newfound expertise.

Crafting this homemade model of the digestive system proved to be an exceptional educational tool. It combined creativity, hands-on learning, and effective communication skills. It provided an immersive experience that transcended traditional classroom teaching, igniting a spark of curiosity and making the learning process truly enjoyable. As a parent, witnessing my child's enthusiasm and growth through this interactive project reaffirmed the value of creative learning experiences. Modelling the digestive system using simple materials not only deepened her knowledge but also sparked her interest in exploring other scientific concepts in a similarly engaging manner.

This endeavour highlights the power of interactive learning and demonstrates how homemade educational resources can effectively supplement traditional teaching methods. Creating a tangible and visually engaging model empowered our child to grasp complex concepts with ease and enthusiasm.

Homemade Modelling Clay

Here we describe a simple process for making homemade modelling clay that is safe for all ages and poses no harm if accidentally consumed. The quantity of the ingredient(s) is not fixed and may vary depending on the type of product or the texture of the clay one wants to achieve.

Requirements: 2 cups of flour;1 cup Salt; 2 Table spoons of vegetable oil; $1\,^{1}/_{2}$ Cup of water;Assorted Food Colour of choice/ experimented with primary colours (red, yellow, and blue) to create a wide range of colours; Bowls;Pan

Steps:

1. Heat water, oil, and salt in a pan until warm.
2. Divide the warm mixture into different bowls, depending on the colours you want to achieve.
3. Add 3 to 4 drops or a pinch of food colour to each bowl as desired.
4. Gradually add flour to each bowl, kneading until the dough becomes smooth and non-sticky.
5. Store the modelling clay in a Ziploc/polythene bag in the refrigerator for about 15 minutes or cover the bowl with cling film foil.

Juma's Quest in Safeguarding His Digital Companion

By Esther Nyambura

Juma's laptop was more than a device; it held his world. When it vanished from his office one Friday afternoon, panic surged. Juma sprang into action, informing security and filing a report. Memories of late-night work sessions flooded his mind, each lost moment feeling like a piece of himself slipping away. Determined to recover his stolen laptop, Juma activated its tracking feature and enlisted tech-savvy friends for help. Days turned into weeks until a ping on his phone signalled hope. Following the signal to a bustling Nairobi digital shop, Juma confronted the thief and reclaimed his digital companion.

The ordeal taught Juma the importance of proactive measures. He invested in a laptop security lock, ensuring it remained bound when not in use. With the right security software, encryption protected against unauthorized access. Regular backups secured his data, while a theft alarm system added an extra layer of protection. A boot-up password ensured only authorized access, providing peace of mind against future threats.

Juma's journey highlights the value of vigilance and proactive measures in safeguarding our digital identity and personal information. In today's digital age, fortifying our devices and protecting our data is essential. By learning from Juma's quest, we become the guardians of our digital realm, ready to face any challenge that comes our way.

Amidst the Calmness of the Trees and Hills

Poem by Humphrey Luvumbi

Amidst the great calmness of trees and hills
Lies a place of great knowledge and insight
CEMASTEA, a lighthouse of inspiration and direction
A centre of excellence where STEM grows

Here teachers come to hone their skills
To learn new ways of teaching and leading
To gain the knowledge and boost confidence
To help their students succeed in everything

CEMASTEA, where hearts and minds come to connect
Where ideas and dreams are nurtured into reality
Where everyone's inspired to bring out their best
To create a future that's delightful

Through patience and perseverance over the years
CEMASTEA has risen to the task
Carving a path as it serves the mission of STEM
And bringing hope to all who ask

With workshops, research and training galore
CEMASTEA equips teachers with skills they adore
From STEM to research, they cover it all
Empowering minds to be able to answer every call

CEMASTEA impact seeks to go just beyond academics
As it instils a sense of ownership to this worthy course
Empowering minds that they do have it in them
All they need is to develop skills and enjoy while doing it

Let's raise a glass for CEMASTEA
For all they work they endeavour each day
For the lives they touch and to the many more
For we seek to get to every part, no one being left behind

Encouraging Word

Surah Al-Hujurat, verse 10: The believers are nothing but brothers, so make settlement between your brothers. And fear Allah that you may receive mercy.

Romans 12: 4-5
4 For as we have many members in one body, but all the members do not have the same function, 5 so we, being many, are one body in Christ, and individually members of one another.

Keeping the Promise: Tracking the Progress of Growing Trees

By Patricik Wanjohi

Top: Students from Kisi School – left and Namilama DEB Primary – right planting seedlings in their school compounds. Both are among the beneficiary schools covered under phase one

CEMASTEA, in partnership with KEFRI, initiated a program to support both primary and secondary schools in establishing tree nurseries. The first phase of the program covered 120 schools spread across 27 counties. Each school received potting tubes and tree seeds suited to their particular regions. The program's objective was to have each school raise at least 10,000 seedlings for planting within the schools and surrounding communities. The program complements the government's efforts to grow 15 billion trees by 2032 and establish 30,000 ha of woodlots in schools and learning institutions. Since its inception, at least 130,000 seedlings have been produced in the beneficiary schools, and this number is expected to rise.

With the current triple planetary crisis facing humanity, i.e. climate change, pollution and biodiversity loss, tree planting and growing helps to alleviate each challenge. The choice to have tree nurseries in schools was informed by the need to teach a tree-growing culture amongst learners with the hope that they will become restoration champions within their communities. The "whole school approach" was applied where every member of the school community is involved, from learners to teachers to management and the community.

The program also promotes environmental education through a practical approach that ensures the holistic development of learners who are expected to extend their knowledge and skills back at home. The benefits realized from this program will contribute to the achievement of targets set under the environment and natural resource sector of the Fourth Medium Term Plan (MTP4). This program made CEMASTEA recognized and awarded as the best education State Corporation on DEIB & Sustainability during the 6th National Diversity & Inclusion Awards. The success of this first phase will inform phase two, which aims to cover more schools and have a footprint in all 47 counties.

Leading from the front

Mr Paul Oyuga, Officer in charge of the tree growing programme at CEMASTEA presenting seedlings to Dr Njoroge Mungai. Each officer at the Centre is expected to grow at least 30 trees every financial year.

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