

Issue 009 January – March 2022

# CEMASTEA INFO

## Newsletter



# Work in Progress



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Jacinta L. Akatsa, HSC.

### **Editors**

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Ann Jane Mumbi  
Winfred Magu  
Benson Mwangi  
Dan Orero  
Philip Maate  
Kizito Makoba  
Dr. Mungai Njoroge  
Njeri Mburu  
Agnes Mwangi  
Richard Jakomanyo

### **Feedback**

Comments and contributions can be sent to the editor using the address below. Contributions may be edited for clarity, space or legal consideration.

[director@cemastea.ac.ke](mailto:director@cemastea.ac.ke)



We once again welcome our readers to the ninth issue of our CEMASTEA Info Newsletter. The return to almost normalcy from the COVID-19 lockdown heralds a new dawn in business. The education subsector must draw lessons from experience and use them to reorganize how to provide education and meet local, continental, and global educational goals such as those in Education for All (EFA) and Sustainable Development Goals (SDGs). The use of ICT should eliminate the excuse for not providing education to those in vulnerable and hard to reach locations.

In the last issue, we focused on the steps CEMASTEA had taken to re-engineer its business processes and offer uninterrupted continuity of its training services. We reported on numerous achievements we made by deploying the power of ICT and the use of remote learning technologies. We are excited about those achievements and are using lessons learnt to reach an even more varied mix of clients.

We report on the various activities undertaken in quarter three. These include the successful start of phase II of training for tutors of mathematics from Diploma Teacher Training Colleges. Another is the successful stakeholders workshop previously postponed due to

the corona pandemic. The Collaborative Lesson Research (CLR) Project that has been ongoing since 2019 was successfully concluded. The Project involved National Trainers from CEMASTEA and teachers from six primary schools, including Ololua and Karen C Primary Schools, learning about Teaching Through Problem Solving (TTPS) and active learner engagement from the JICA experts. The lessons drawn from that experienced project will be cascaded to benefit more teachers. On the continental front, we report on the Ministerial Webinar giving the status of STEM education in Africa.

Other matters reported include implementing customized training for teachers of Aga Khan High School, Mombasa, providing laboratory resources to various schools and school visits to CEMASTEA. Featured too are articles from Biology, Chemistry and Physics Departments disseminating to stakeholders the innovations they had developed in the previous financial year. Staff welfare and safety issues are dear to the centre, and we report on disaster management training and our continued sensitization on mental wellness. The 7<sup>th</sup> International Day for Women and Girls in Science was celebrated during this quarter. We take time to celebrate the Kenyan Nobel Peace Prize icon, Professor Wangari Mathai.

We are a work in progress. Like one college professor said, we believe ‘there is no there’, meaning there is always room for improvement. There is always something to learn and someone better than you. Our focus remains on the improvement of classroom practices. We keep looking for opportunities to work with teachers and other stakeholders to improve education outcomes for our learners.

Enjoy your reading, and kindly give us your feedback.

Thuo Karanja, Editor

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*File Photo: Pupils from  
PCEA Gikurune Primary  
School, Egoji Division in  
Meru County.*

## Message from the Director



I am sure that we all have, at one point or another, come across the famous quote, “If you want to know the end, look at the beginning”. The articles in this issue reflect the immense strides that have been made in ensuring CEMASTEIA’s goals, both short-term and long-term, are ultimately achieved. We started 2022 on a positive note and are optimistic that we are in for a wonderful year.

CEMASTEIA organised and successfully implemented a stakeholders’ workshop from the 14<sup>th</sup> to 15<sup>th</sup> January in Sarova Woodlands Hotel, Nakuru. The workshop focused on enhancing the management of CEMASTEIA INSET activities in Counties. We wish to express our gratitude to our stakeholders who attended the workshop. Globally, STEM education is recognised as fundamental to national development, productivity, economic competitiveness, and social well-being.

CEMASTEIA is at the heart of a concerted effort to develop a STEM education Policy for Kenyan schools. The policy resonates with the National Goal of Education on promoting social, economic, technological and industrial needs for national development as it seeks to improve performance in mathematics, science and technology.

As the host for the Association of Development of Education in Africa (ADEA) Inter-Country Quality Node on Mathematics and Sciences Education (ICQN-MSE), CEMASTEIA on 24<sup>th</sup> February hosted a Webinar to discuss the study findings on the status of STEM education in Africa. Dr Sara Ruto, Chief Administrative Secretary for Education, Ministry of Education delivered the keynote speech. The Webinar adopted findings to represent the status of STEM Education in most African countries and agreed on the need to increase investment in STEM and ensure governance, accountability and sustainability in STEM education.

As part of a deliberate outreach to private schools, we trained teachers from Aga Khan High school, Mombasa in March. The training focused on enhancing effective learner involvement through learner-centred pedagogies. We hope that such activities will open the door to many such partnerships, especially with private schools. CEMASTEIA participated in the First Regional Quality Conference held in Arusha, Tanzania. The conference theme: “Sustained Business Resilience through Management Systems improvement,” resonates with the Centre’s quest to continuously improve the quality of teacher professional development and increase customer satisfaction.

In the spirit of continuous self-improvement, CEMASTEIA staff underwent disaster management training and handling of customer complaints. The experiences were eye-openers as the team gained valuable skills in serving both our internal and external clients.

During the prolonged COVID-19 period, we learned valuable lessons on implementing online and remote training. While we take note of the easing of the stringent COVID-19 protocols, we continue to urge our stakeholders to exercise caution and self-restraint and, where necessary, take personal responsibility to protect themselves from the pandemic. Going forward, we hope to gradually move our training activities from online to face to face.

Enjoy your reading. Thank you,

**Jacinta L. Akatsa, HSC.**



## Phase II Training for Diploma Colleges Mathematics Tutors

Mathematics tutors from 33 (Thirty-three) Diploma Teacher Training Colleges successfully participated in the second phase of training held at CEMASTEА from 28<sup>th</sup> - to 29<sup>th</sup> January 2022. The course theme was *"Enhancing Tutors' Competencies for Effective Delivery of Competency-Based Teacher Education (CBTE) Training in Mathematics at the Diploma Level*. The two-day training attracted tutors from seven regions: Coast, Eastern, Central, Rift Valley, Western, North Eastern and Nyanza. The sessions were facilitated by trainers from CEMASTEА, The Kenya Institute of Capacity Development (KICD), and the Kenya National Examinations Council (KNEC).



Dr. Sara Ruto, Chief Administrative Secretary, State Department of Early Learning and Basic Education, Ministry of Education (MoE) addressing participants during the opening ceremony

The training was opened by Dr Sarah Ruto, Chief Administrative Secretary (CAS), Ministry of Education (MoE). In her remarks, Dr Sarah highlighted that the Global Vision for education is found in the Sustainable Development Goal (SDG) No. 4, target 4.1, which states; "By 2030, all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes." In this spirit, she urged the participants to offer guidance to teacher trainees and change their attitudes towards mathematics by unlearning negative perceptions and appreciating mathematics' significant role in everyday life. The CAS urged the participants to embrace ICT integration and especially the smartphone as a teaching and learning resource. While applauding CEMASTEА for effectively implementing activities by the Ministry, the CAS noted that it promised to continue to support the Centre to continue carrying out its mandate.

The training was closed by the Chief Executive Officer, TSC represented by the late Mr Ezekiel Tumbo, who was until his demise, the Assistant Director, Quality Assurance and Standards. In his remarks, he noted the importance of CBTE globally and the need for participants to align to this new paradigm shift. He informed participants that the impact of the training would be felt once they cascade lessons learnt in their respective colleges. Under CBTE, the TSC encourages teacher trainees to aspire and raise the bar of excellence as educators as they upgrade professionally.

In her remarks, Mrs Jacinta Akatsa, Director, CEMASTEА, thanked the Teachers' Service Commission (TSC) for allowing participants to attend the training and the Ministry of Education for entrusting CEMASTEА to carry out the training. While applauding participants for their consistency, commitment and diligence shown throughout the training, she reminded them that skills gained should be employed in the delivery of mathematics to teacher trainees. She urged participants to keep in mind that ultimately, "The target person is the Kenyan child in the classroom."

Beatrice Macharia & Winfred Magu, CEMASTEА

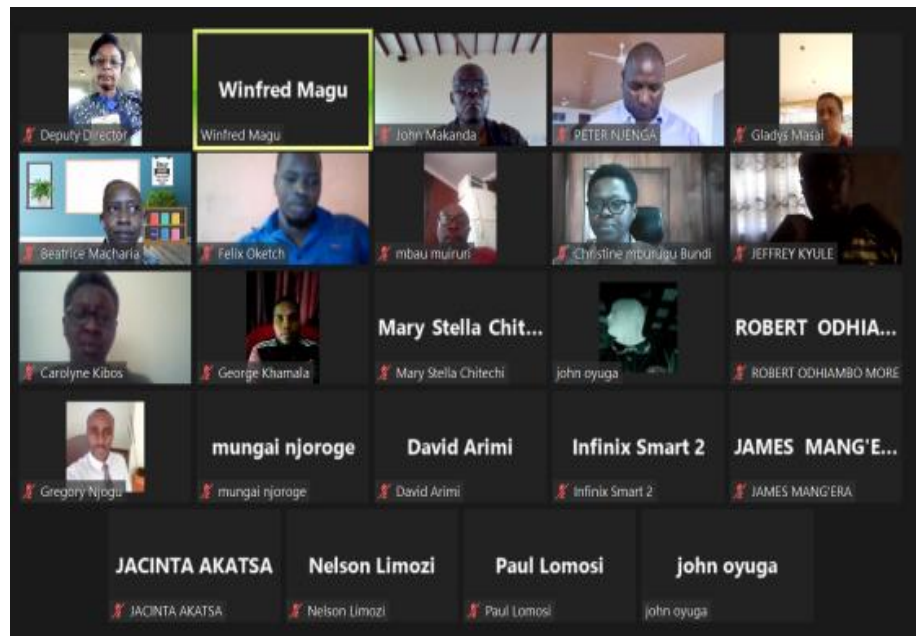
# Training for Teachers of Aga Khan High School Mombasa

CEMASTEА conducted customised training for mathematics and science teachers of Aga Khan High School, Mombasa from March 7<sup>th</sup> to 11<sup>th</sup>. The theme of the training was "Enhancing Effective Learner Involvement through Learner-Centred Pedagogies". The training was planned and implemented remotely by a team of National trainers from CEMASTEА. Some of the sessions facilitated during the training included attitude changes, an introduction to Competency Based Curriculum (CBC), learner centred teaching practices, learner management, and Remote learning technologies

In her opening remarks, Director, CEMASTEА, Mrs Jacinta Akatsa noted that performance in mathematics and science subjects lag behind the art and social sciences subjects. Issues that affect performance include; negative attitude, low entry behaviours and poor instructional methods devoid of meaningful learner participation. She lauded the leadership of the Aga Khan High School for valuing the continuous -professional development of its teachers.

The course was motivated by the school's needs and that its content was carefully and purposefully designed to support these needs. She was optimistic that after going through the training, the teachers' ability to practice learner-centred pedagogies for an effective learning process will be enhanced. The Director challenged the teachers to be creative and innovative, use hands-on activities and integrate ICT in teaching and learning. While teachers expect an attitude change in their learners, the director noted that learners often do not know how to do it. "We keep telling students to work hard, but we do not show them how to do it", she remarked. Teachers, she advised could assist learners in identifying topics and subtopics in challenging subjects and plans their revision timetables to reduce students frustration and negative attitude towards STEM subjects.

During the closing ceremony, the school principal, Mrs. Mary Stella Chitechi, thanked CEMASTEА for organising and facilitating the training. She promised that the school would put in place mechanisms to implement lessons learnt. Deputy Director CEMASTEА, Mrs Lydia Muriithi, reminded the participants that a 21st Century teacher must be willing to unlearn, learn, and relearn to meet the learners' needs. Mr Joseph Kuria, CEMASTEА's Deputy Coordinator, Special Programmes and Student Learning, urged the participants to cascade what they had learnt in their school.



Participants following the proceedings of the closing ceremony

Beatrice Macharia and Winfred Magu, CEMASTEА

## Collaborative Lesson Research Project (CLR)

Science and mathematics teachers from selected primary schools and CEMASTEAs trainers in 2019 participated in a workshop in which a JICA expert in lesson study, Dr Akihiko Takahashi made an exposition on Collaborative Lesson Research (CLR) conducted using the ‘kyozai kenkyu’ approach. ‘Kyozaikenkyu’ refers to a teaching approach where a team of teachers collaboratively study and analyse curriculum materials such as curriculum designs, syllabus and text books and identify possible gaps. From this analysis, teachers design tasks suitable for Teaching through Problem Solving (TTPS). This teaching strategy allows for the development of new knowledge as the learners seek to understand each other’s thinking to their individual solutions for designed tasks.

The training marked the start of the Collaborative Lesson Research (CLR) Project between JICA, CEMASTEAs and five primary schools, Ololua, Karen C, Visa Oshwal, Buru Buru and Kyamulendo. JICA dispatched a long term expert, Professor Tetsuya Takahashi, to CEMASTEAs to work closely with CEMASTEAs CLR team and the schools from January 2021 up to the end of the project, March 2022. In planning a collaborative research lesson, the CLR team comes up with all the anticipated learners’ responses in the order in which the concept in question is to be developed during a class discussion.



Sample Research lessons conducted by the CLR team, Ololua and Karen ‘C’ Primary Schools

During lesson implementation, the teacher presents the task to the learners, and each works out the task individually. The teacher then facilitates a discussion in which learners constructively engage each other to understand the solution to the given task. Some of the learners’ solutions are presented on the board to guide the class discussion.

After a series of seminars and support offered by Professor Fujji, a JICA expert, CEMASTEAs collaborative research team prepared and implemented six mathematics research lessons; three in Karen C Primary School and three in Ololua Primary School. The CLR team from Ololua Primary School, with the support of national trainers from CEMASTEAs, implemented mathematics and science lessons at their school. It was an exciting moment to observe the impact of the professional growth of these teachers as they implemented the research lessons. In each lesson, teachers posed tasks and allowed learners to figure out the solution individually. The teachers then facilitated a class discussion on sampled learners’ solutions. The teacher then guided learners to summarise the critical concept of the lesson.

Agnes Mwangi and Dan Orero, CEMASTEAs

## 2021 SMASE Stakeholder's Workshop

CEMASTEА held a 2021 stakeholder's workshop at Sarova Woodlands Hotel in Nakuru County on the 14<sup>th</sup> and 15<sup>th</sup> January 2022. The workshop's theme was “Enhancing the Management of SMASE Activities at the County Level for Quality Teaching and Learning”. The two-day workshop's objectives included, Sharing experiences on the management of SMASE programs at the County level; Enhancing mechanisms for sustainable management of SMASE programs; Harmonise understanding of the SMASE funding, budgeting and accounting for SMASE funds.

Regional Directors of Education, Teachers Service Commission (TSC) Regional Directors, County Directors of Education, TSC County Directors, Kenya Secondary Schools Heads Association (KESSHA) Chairs, County Quality Assurance Standard Officers (CQASOs), and other guests from the Ministry of Education attended the workshop.

The Chief Guest for the opening ceremony was Director-General, State Department Early Learning and Basic Education, Dr. Elyas Abdi. He lauded CEMASTEА for holding the annual stakeholders’ workshops to review its programs, quoting: “What gets measured gets done”. While there are many stakeholders in the sector, teachers were the most critical link to good performance and there is the constant need to support them. He also noted that through the SMASE program, there was a notable improvement in mathematics and science subjects. The Government, he reported, was ready to support the SMASE program since it had an impact on the economy of the country. In attendance was the TSC CEO, represented by Madam Jane Njagi, the TSC Regional Director, Nairobi County. In her remarks, she appreciated that the participants through the workshop would be sharpened to work better in their counties and improve learning.

Director CEMASTEА, Madam Jacinta L. Akatsa, reported that CEMASTEА had re-engineered its processes to ensure continuity during the COVID-19 period. She appreciated the immense support from the Ministry of Education, the Teachers Service Commission and the County Teacher Capacity Development Committees (CTCDC) in implementing the online programs.

The message from the Chief Guest TSC CEO, Dr. Nancy Macharia delivered by Madam Jane Njagi, TSC Regional Director, Nairobi County emphasized the Commission’s commitment on implementation of continuous Teacher Professional Development (TPD). The Chief Guest recognized the role CEMASTEА continues to play in institutionalizing regular INSET for mathematics and science for teachers. She appealed to the participants to continue working together to entrench effective implementations of the curriculum in schools.

CEMASTEА staff facilitated the workshop's sessions. Sessions included Feedback on 2020/ 2021 SMASE Activities, Financial and Audit Reports and Upcoming SMASE activities. There were sessions and sensitizations on Education for Sustainable Development (ESD), Competency-Based Curriculum, the implementation of STEM Pathway in Senior Secondary and related learning areas in Junior Secondary.

Njeri Mburu and Ann Mumbi, CEMASTEА

*“Life is a matter of choices, and every choice you make makes you.” – John C. Maxwell*



# Innovative Pedagogy: Hands-on Teaching in Genetic Crossings

Genetics, the study of inheritance, is taught in Form Four in the Kenyan Syllabus. It is an exciting learning area, with most ideas being new to most learners. However, studies by CEMASTEAs have revealed that genetics is taught with minimal hands-on experiences for learners. Further, the Kenya National Examinations Council (KNEC) cites learners as having challenges in genetics, such as genetic crossings. Learners are expected to demonstrate both understandings of the science behind genetic crossings to show the inheritance of characteristics and skills of doing the crosses. Assessment analysis reveals that while learners could

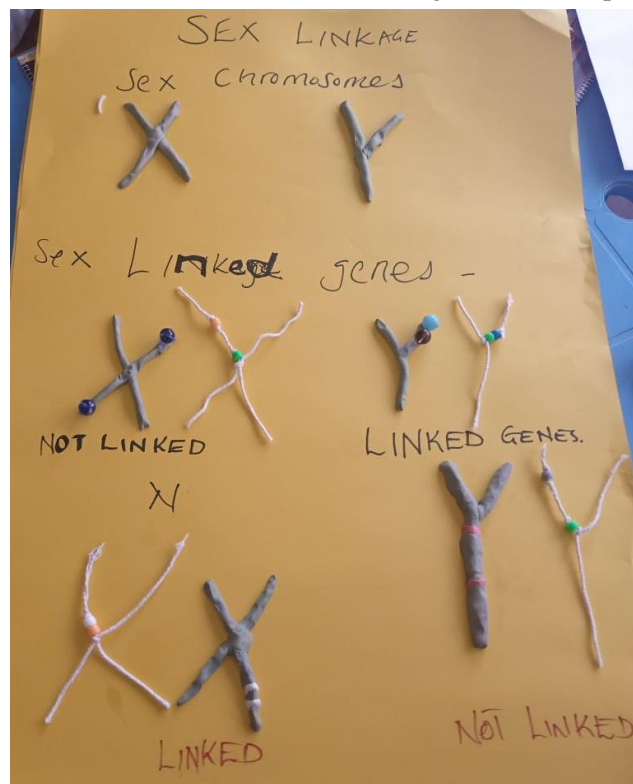


theoretically understand the genetic crossing, they make numerous technical errors in practising the same. This demonstrates a lack of understanding of skills and processes related to genetic crossings, such as the

requirement to circle gametes and ensuring that crossing lines touch the gametes. In its recommendations, KNEC cites the need for teachers to engage learners in hands-on and manipulative skills using simple resources within the learner's vicinity. Such strategies will help to demystify and reinforce learners' understanding of biological concepts and processes in genetics.

One way of overcoming challenges in teachers' experience is to collaboratively develop and try out the effectiveness and innovative teaching resources. This was the spirit adopted during the School-Based Teacher Support System (SBTSS) project workshops organised by the Teachers Service Commission (TSC) and facilitated by CEMASTEAs. In the Project, teachers collaboratively find school-based solutions to the pedagogical challenges.

During the training, teachers demonstrated the possibility of engaging learners in hands-on and mind-on activities in all concept areas of genetics. Using low-cost and locally available resources, biology teachers developed simple yet effective learning activities to learn the concept of linkage, particularly sex linkage and related crosses.



Sample hands on activities from biology teachers depicting the concept of sex linked genes

They incorporated these activities in lessons that peers critiqued for improvement. While most teachers agree that developing innovative teaching and learning activities takes time and effort, their impact is far better than relying on lectures and blackboards to demonstrate genetic crossings on linkage.

Kizito Makoba and Thuo Karanja, CEMASTEAs

## ADEA'S Ministerial Webinar on the Status of STEM Education in Africa



Dr Sara Ruto, Chief Administrative Secretary, Ministry of Education, Kenya.

The Webinar on the status of STEM Education in Secondary Schools in Africa was hosted by the Association for the Development of Education in Africa (ADEA) through its Inter-Country Quality Node on Mathematics and Science Education (ICQN-MSE) on 24th February 2022. In attendance included Ministers of Education in Africa, ADEA Secretariat, ICQN coordinators & Task Force Representatives, AUC cluster on STEM education members, Strengthening of Mathematics and Science Education in Africa (SMASE-Africa) members, Focal Points, Directors of Education in Maths Science Education from African countries, STEM-based organizations, STEM educators or teacher trainers and relevant key education stakeholders.

The Keynote address was delivered by Dr Sara Ruto, Chief Administration Secretary from the Ministry of Education, Kenya.

She highlighted the importance of STEM Education in transforming society to reach global status. She lauded ADEA for her efforts in creating synergies between the public and private sectors. She encouraged the stakeholders to work together to ensure quality STEM education.

During the Webinar, The Report on the Status of STEM Education in Africa was presented in the meeting by the coordinator-ICQN-MSE, Mrs W. Mary Sichangi of CEMASTEAM. While efforts are being made to raise the status of STEM education, the report revealed the existence of prohibiting factors towards the achievement of this goal. Some of the highlighted challenges in the Report included the inadequate resources and facilities to support STEM education, poor teacher instructional practices with an inadequate number of teachers of STEM, and a general lack of interest in STEM subjects among students. During the webinar, Ministers of Education from Mauritius, Sierra Leone, Rwanda, and Ministry of Education officials from Senegal, Namibia and Kenya got an opportunity to make remarks highlighting the status of STEM education in their respective countries. From their presentations, it was clear that the uptake of STEM subjects is low, there are gender differences in enrolment in STEM, and students perceive STEM as a complex discipline. It was noted that African governments are devising various initiatives to promote STEM education. Through the webinar deliberations, it was recommended that countries develop national STEM education strategies and policies; Increase investment in STEM education; Institutionalize monitoring and evaluation mechanisms; Align policies in teacher capacity development; address the gender gap in STEM education and initiate regional assessment programmes for the STEM at basic learning. Similar studies need to be conducted at primary and tertiary levels to have a holistic view of the general status of STEM education in Africa.

One of the study's outputs was the development of a monitoring and evaluation framework to strengthen the capacity of African education systems for the effective delivery of quality STEM education at the secondary school level in Africa. More information on the Report can be accessed via the link:

<https://www.adeanet.org/en/publications/adea>. The forum was officially closed by Albert Nsengiyumva, ADEA's Executive Secretary, who thanked the participants for sharing experiences from their respective countries.

Mary Sichangi, Gregory Njogu & Benson Mwangi, CEMASTEAM

# Promoting Interest in Learning Biology through Place Based Learning

One of the causes of low interest in STEM subjects and, in particular, the low achievement in biology has been the failure of teachers to make learners appreciate the usefulness of what they learn to their immediate world. There are numerous Inquiry-Based Learning (IBL) approaches, such as Project-Based Learning (PBL) and Problem Based Learning (PBL) that teachers can use to register more outstanding learner achievement in biology. In this article, our focus will be on Place-Based Learning (PBL) and how it can be used to make learners' experience authentic learning in biology.



A school kitchen wastes bin that could form one of the stations in Place Based Learning to study dietary and feeding habits in the school

In Place-Based Learning (PBL), the acquisition of knowledge and skills takes place in the context of the natural world through a hands-on and mind-on engagement with authentic, real-world issues. Place-based learning aligns the curriculum with real-world context, experiences or application. Place-based learning is defined as learning from where the learning resource is naturally found instead of bringing the resource into the classroom—in other words, taking the classroom to where the learning resource is located.

Through PBL, we aspire to support teachers start to view the entire school compound and its environs as a learning resource suitable for all aspects of the curriculum. Here we use one example to briefly demonstrate how it can be achieved.

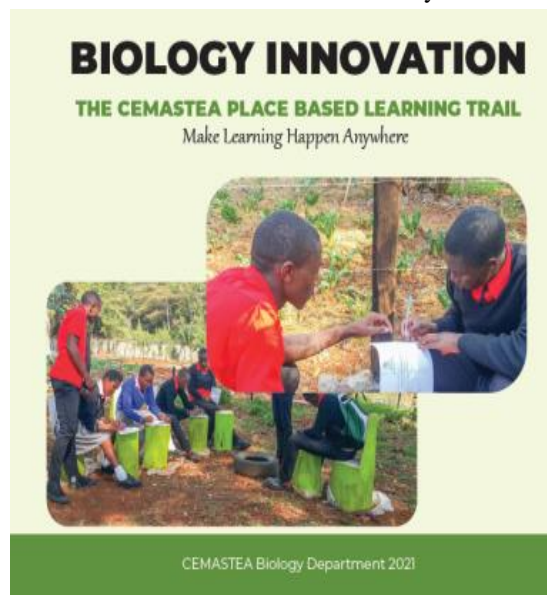
A school kitchen wastes bin that could form one of the stations in PBL to study dietary and feeding habits in the school. Every school has a place where the food remains are discarded after meals. Let us call it the waste food bin. What can be learned from the food bin? Walk with your learners to

the school food bin. Can learners be able to determine the following from the wasted food bin?

- Feeding habits of the school community
- Types of diet; is it balanced, healthy
- Is the school community wasteful or living sustainably?

Teachers can organise learners to inquire by observation, analysis and documenting data on the questions above, including what the school can do to curb food waste. Learners then make presentations on their outcomes. Care should be taken by giving learners protective gloves as they do the analysis and documentation.

At CEMASTE A, we have developed a self-use ten station Place-Based Learning Project with an accompanying booklet that gives guiding instructions to teachers and learners. It is used during school visits at CEMASTE A, with learners getting opportunities to learn a variety of concepts in biology. Feedback from the teachers and learners show an enjoyable and practical way to learn. The booklet can be downloaded from CEMASTE A website/portal.



Cover Page of the Booklet

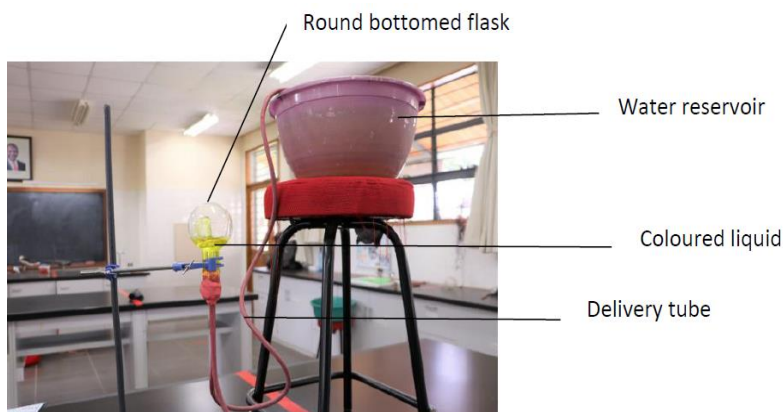
Should a school be interested in implementing PBL in your school, please request a copy of our innovative Place-Based Learning booklet through our Director: [director@cemastea.ac.ke](mailto:director@cemastea.ac.ke). The biology department is ready to work with schools to establish Place-Based Learning sites that could be useful in making the learning of Biology fun.

Makoba E. Kizito & Amina Sharbaidi, Biology Department



## Water Fountain: Atmospheric Pressure in Action

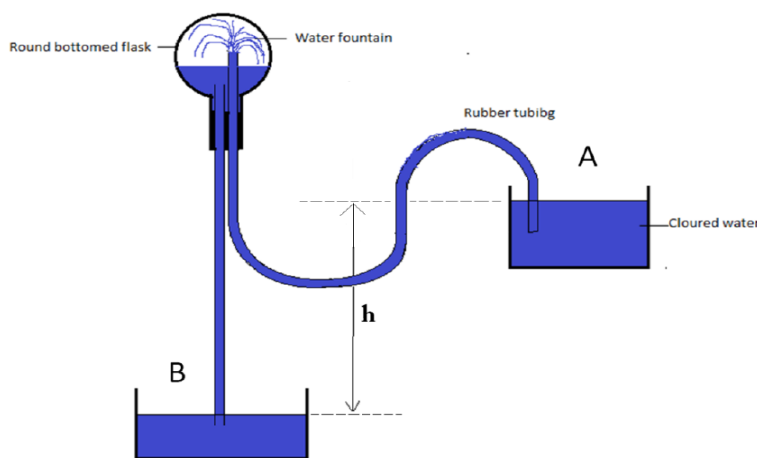
There are many concepts taught in physics that teachers can demonstrate at school using simple, easy find and cost-effective resources. The Physics department at CEMASTE A has developed an innovative way to demonstrate atmospheric pressure in action. Teachers can use "The Liquid Fountain" to teach concepts on the pressure in liquids. The innovation helps learners to experience atmospheric pressure in action. This would provoke development of scientific thinking in explaining a natural phenomenon. The experience could make learners creative and develop innovations that can spark their entrepreneurial skills.



Set up of the water fountain

The fountain is made up of a round-bottomed flask, two delivery tubes, an inlet and an outlet, rubber tubing, coloured liquid and a water reservoir, see figure 1. The flask has a cork stopper with two holes with tubes connected. One of the tubes is the inlet tube which is connected to the water reservoir, and the other is the outlet tube. The outlet has its other opening placed at a lower position than the water reservoir. This height difference is essential as it is the one that creates the pressure difference in operating the fountain.

The setup is shown in the figures. The flask is filled with water and corked with a stopper connected to an inlet tube in one hole and an outlet tube. The pipe from container A is raised above the water level in the round-bottomed flask. The flask is then inverted for water to flow out through the outlet tube. As the water flows out, it creates a partial vacuum in the flask, which causes a suction effect. Atmospheric pressure acting on the water in container A forces it to move through the rubber tubing into the round-bottomed flask to fill the partial vacuum created. Container A is at a higher gravitational potential energy compared to container B, and that causes water to flow from container A to container B. The greater the height (h) between container A and container B, the greater the pressure difference and therefore, the fountain will be more elaborate.



The water fountain illustration

The height-(h) brings about the water pressure ( $h\rho g$ ) at the outlet, where  $\rho$  is the density of water. Once the suction effect is created (caused due to the partial vacuum created by inverting the round-bottomed flask with water), water continues to flow irrespective of the position of the round-bottomed flask. This implies that it can be developed for commercial purposes with some adjustments. This innovation not only serves to enhance the learning of physics but can also spark entrepreneurial skills among learners. It can be used for ornamental purposes at homes, schools and other places with social amenities.

Philip Maate, Dean Physics Department, CEMASTE A



## Chemistry: Improvised Gas Flow meter

Hands-on activities in Chemistry support the development of practical skills and help to shape students' understanding of scientific concepts and phenomena. However, some Chemistry teachers teach gas laws theoretically and do not give students opportunities to investigate the topic due to a shortage of suitable teaching and learning materials. Therefore, students experience difficulties understanding some basic concepts of pressure, temperature, and volume. This results in low retention of gas law knowledge.

The Chemistry department at CEMASTEА has developed an innovation that can be utilized to investigate gas laws. Charles's law demonstrates the relationship between the volume of a gas and temperature at constant pressure. The apparatus is an improvised gas flow meter to demonstrate and verify Charles' law.

This improvised gas flow meter will enable learners to investigate the effect

of temperature on a fixed mass of gas at constant pressure. This will enhance student learning and retention of concepts. The improvised apparatus is made up of locally available materials, and Chemistry teachers can construct and use it to enrich the learning process.

[Samuel Gachuhi, Dean, Chemistry, CEMASTEА](#)



[Ngaru Girls' students being taken through the use of gas flow meter](#)

## Ualimu Bora: STEM Model School Leadership Development and Preparation

What constitutes effective school leadership development and preparation within the African Context?

CEMASTEА participated in an international online symposium organized by the Centre for Leadership & Diversity, University of Toronto, which attempted to address this question. During the symposium held in March 2022, CEMASTEА shared experiences of establishing STEM Model Schools in Kenya. STEM Model schools were established as an intervention to improve academic performance in STEM related subjects among students, enhance uptake of STEM related courses in tertiary institutions, and secure the advancement of Science, Technology, and Innovation (STI). This is an essential strategy for the realization of Vision 2030.

Figure 1 shows an online session by CEMASTEА during the symposium. The session deliberated on strategies and activities adapted by CEMASTEА to support school leaders to transform established STEM Model Schools into Inclusive STEM Model Schools (ISMS).

The Research and Development Knowledge Management (R&D KM) Department at CEMASTEА presented a paper that outlined three aspects of leadership development and preparation key to establishing an Inclusive STEM Model School (ISMS). Figure 2 indicates the three aspects envisioned for ISMS: Maker Space, Education for Sustainable Development, and Research & Development Knowledge Management.

A Maker Space provides students with safe and unique opportunities to construct, discover, and learn. Students get personal opportunities to generate products and services that address contextual problems, which augments learning from classroom interactions with concepts and significant others (teachers and peers). A maker space presents an opportunity of renovating African Indigenous Science–Culture.



CEMASTEА presentation at the CLD Conference – University of Toronto and Leadership development and preparation aspects in STEM model Schools

STEM Model Schools established by CEMASTEА are encouraged to implement Education for Sustainable Development (ESD) projects. ESD projects enable learners to make informed decisions favouring ecological integrity, economic viability and an impartial generational civilization (present and future generations). Maker Spaces and ESD projects generate crucial knowledge and competencies that are not well documented and share risk oblivion. Research & Development Knowledge Management initiatives at the school level are one way of ensuring that knowledge and competencies generated transition into meaningful products and services for the good of society.

Dr. Mungai Njoroge, Coordinator, R&D KM Department, CEMASTEА

## Encouraging Word: Hope and Peace

"Don't be conformed to the patterns of this world, but be transformed by the renewing of your minds so that you can figure out what God's will is—what is good and pleasing and mature." — Romans 12:2

“And whoever relies upon Allah – then He is sufficient for him. Indeed, Allah will accomplish His purpose. Allah has already set for everything a [decreed] extent” [Quran 65:3]





# Picture Speak: Teachers Learning Together





## The 7<sup>th</sup> International Day for Women and Girls in Science

The 7<sup>th</sup> International Day of "Women and Girls in Science" was celebrated virtually on February 11th, 2022, under the theme: "Equity, Diversity, and Inclusion: Water Unites Us". The day aims to recognise the role of women and girls in science as beneficiaries and agents of change. The day's theme spoke to SDG 6 on clean water and sanitation and its benefits to the progress across all Sustainable Development Goals (SDGs). The International Day for Women and Girls in Science forms a curtain-raiser for the International Woman's Day celebrations on March 8th. The UN 2022 theme for International Women's Day was 'Gender Equality Today for a Sustainable Tomorrow'. The tagline "Eliminate the Bias" was also adopted to drive the theme of focus on a world free of biased stereotypes and discrimination against women.



In celebrating the Women in science and experts across the globe, including government officials, international organisations gathered to discuss issues on sustainable development related to economic prosperity, social justice and environmental integrity. The Principal Secretary of State Department for University Education and Research Amb was in attendance. Simon

Nabukwesi, CBS and Principal Secretary State Department for Early Learning and Basic Education Dr Julius O. Jwan, CBS. Prof. Eng delivered the first keynote address. Bancy Mbura Mati, former Director, Water Research and Resource Center (WARREC), Water Management Expert and Professor at Jomo Kenyatta University of Agriculture and Technology titled, "Women, leadership and contribution to SDGs with focus on Water access and security for sustainable development".



Director CEMASTEА, Mrs Jacinta L. Akatsa was among the panellists during the discussions. She was represented by Mrs Mary W. Sichangi, Coordinator, Partnerships and Linkages Department at CEMASTEА. In her contributions, Mrs Sichangi explained CEMASTEА's programs that focus on Women in Science. One of the anchor programmes at CEMASTEА related to accelerating girls' participation in science is the training of teachers in Gender Responsive Pedagogy STEM education. The course, run in partnership with Education Development Trust (EDT) Programme 'Wasichana Wetu Wafaulu', aims at helping schools and, in particular, STEM teachers eliminate barriers that hinder girls' participation in STEM subjects.

Mary Sichangi & Ann Mumbi, CEMASTEА



## UN Celebrates Wangari Maathai

United Nations Postal Administration (UNPA) issued a definitive stamp to celebrate Prof Wangari Maathai's birthday on April 1. The stamp features a quote in German: "When we plant trees, we plant the seeds of peace and hope". Definitive stamps are designed to illustrate the aims and achievements of the United Nations and its family of organizations. They are usually available as regular postages stamps and sold for a limited period.



Prof Wangari Maathai, born in Kenya on April 1, 1940, was the first woman in East and Central Africa to earn a doctoral degree. In 1977 was appointed as Associate Professor of Veterinary Anatomy at the University of Nairobi.

Until her passing on September 25 2011, Prof Wangari contributed immensely to furthering the ideals and goals of the United Nations. She was awarded the Nobel Peace Prize in 2004 in recognition of her work and efforts in environmental protection and conservation, the championing of human rights and women's empowerment, peace and security.

Professor Wangari Mathai founded the famous Green Belt Movement in 1977. Green Belt Movement is a grassroots environmental organization that assists women and communities in planting trees across Kenya to protect the environment and promote sustainable livelihoods. More than 40 million trees have been planted through the Movement. In recognition of her deep commitment, The UN Secretary-General in December 2009 named her a United Nations

Messenger of Peace, with a focus on the environment and climate change. Her legacy and ideals are still being carried out by the Green Belt Movement lead by her daughter, Wanjira Maathai.

The Education for Sustainable Development Committee at CEMASTEVA popularises issues related to climate change and sustainable living. The tree nursery at the Centre has a variety of species that are donated to visiting schools and surrounding communities.

Thuo Karanja, CEMASTEVA

# Mental Health Continuum: Know the State of Your Mental Health

Mental health is “a state of well-being whereby individuals recognize and realize their abilities, can cope with the normal stresses of life, work productively and fruitfully, and contribute to their communities” (WHO: 2003). There was an increase in cases/incidences of mental health in the context of COVID-19 pandemic. It is a silent pandemic with suffering among families and school populations including teachers and students.

One of the factors of mental well-being is having control over our lives, the absence of which may lead to persistent anxiety. An individual can recognize specific behavioural patterns that may require attention sooner rather than later in a self-assessment routine. The mental health continuum is a reliable self-help tool that prompts individuals to embrace preventive and curative measures according to their needs in any given circumstance. The continuum is a range of mental health states of a person, with mental health and mental illness at the two extreme ends. A person may be at one point of the continuum at any given time, depending on the circumstances. However, the mental health state may shift position in the continuum as the situation improves or deteriorates.

<https://safehouseapp.info/2018/01/16/the-benefits-of-the-mental-health-continuum/>



**Healthy:** People who fall in this category are usually contented and happy in their lives. They portray a well-balanced emotional life, are stable, and can cope with the everyday stresses and challenges they may encounter. Most people practice good self-care and social support, such as healthy sleep patterns and regular exercise. They can contribute to their community.

**Reacting:** People who fall in this category may be distressed and unable to cope emotionally with significant events such as bereavement. However, they are capable of performing everyday life functions.

**Injured:** People who fall in this category may show distress and cannot cope with challenging situations over a more extended period. An individual’s typical coping strategies do not quickly alleviate them. This, in turn, begins to impact the performance of everyday life functions.

**ILL:** This is the last category of the continuum. As the name suggests, people falling in this category cannot cope with stress and exhibit significant changes in their thoughts, behaviours, and actions. These symptoms can be substantial and prolonged, and as such, people in this category need the support of professionals.

ALL mental health problems can be helped by support, talking therapies and medication.

Mwangi A, HIV Chairperson



# Road Safety: Everyone's Responsibility

The National Transport and Safety Authority (NTSA) continues to urge Kenyans to exercise caution on our roads, especially during festivities. In April, the authority is running a media campaign on the theme 'Fatal Six: Salama Barabarani' to create awareness of road safety risks and safe road use during the festivities. The fatal six behaviours identified are: 1) Speeding; 2) Lane indiscipline; 3) Drunk driving; 4) Distracted driving; 5) Failure to wear a helmet/protective gear; and 6) Failure to use available pedestrian walkways.

The Committee on Road Safety at CEMASTEА joins NTSA in this noble task of sensitizing its staff, clients and all road users on safe road use. The Committee urges staff and all Kenyan road users to heed the simple and easy to follow laws and regulations that keep them safe on the roads.

We remind them that it's their responsibility to stay safe and keep those they love and the general public safe. We remind them that the simple 'look left, look right, look left again' when crossing a road, whether it is a busy one or not, still works wonders.

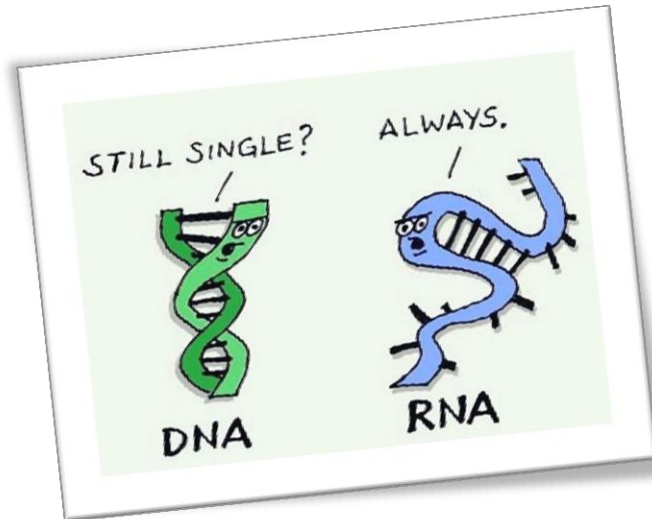
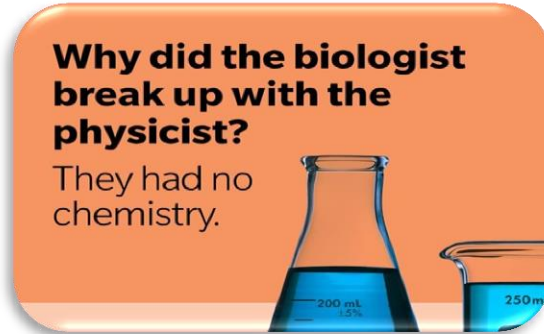
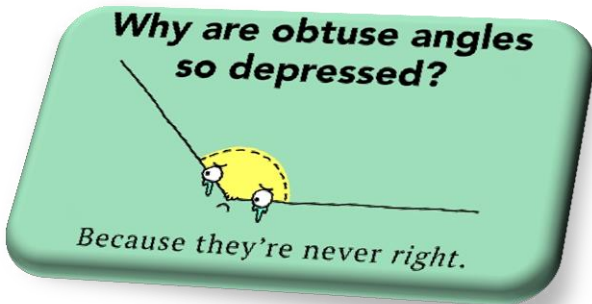
Road Safety Committee, CEMASTEА



## #FATAL 6

 <b>X SPEEDING</b>	 <b>X LANE INDISCIPLINE</b>	 <b>X DRINK DRIVING</b>
 <b>X DISTRACTED DRIVING</b> <small>using mobile phone while driving</small>	 <b>X LACK OF HELMET</b>	 <b>X PEDESTRIAN WALK WAYS</b> <small>Failure to use available pedestrian walk ways</small>

	 <small>This project is funded by the European Union</small>	 <small>Keep our roads safe</small>
 <a href="#">#UsalamaBarabarani</a> <a href="#">#NTSAApp</a>		



**MYTH:** Higher organisms evolved from bacteria.

**FACT:** There's no such thing as evolutionary progress

There's nothing at all primitive about any bacteria; they're all thoroughly modern creatures, having evolved continuously for the last few billion years. Though it's fair to say there's a difference in complexity between multi-cellular and unicellular creatures, terminology like "primitive" and "higher" introduces value judgements. Its like the more close other organisms resemble humans the more "higher" and "lower" it is. This sort of attitude reflects human old arrogance.

**Sources: See More**

- <https://www.rd.com/article/biology-jokes/>
- <https://rb.gy/zadtcq> ;
- <https://www.pinterest.com/pin/368661919468618226/>
- <https://www.zmescience.com/other/feature-post/five-biology-myths/>

Thuo Karanja & Kizito Makoba, CEMASTEAM



# Training on Disaster Management

Disaster management is an essential life skill. It entails learning knowledge, skills and attitudes about preparation for, mitigation and rehabilitation of emergencies and disasters at work, at home in public spaces. Between 8th and 18th February, a group of seventy-two staff members from CEMASTEА attended training on disaster management facilitated by Nairobi Metropolitan Services Disaster Management & Coordination Sector.



Group photo of one of the two cohorts of staff who attended the training

The staff underwent a comprehensive and hands-on exploration of disaster management, from basic skills on personal safety and First aid to a deeper understanding of rescue and evacuation of people and danger and disaster. Some of the topics facilitated included First aid training, classes on fire, choking, suffocation, drowning, electrocution, fainting, nose bleeding, heart attack and seizures. A visit to the Nakuru County fire station offered the team an opportunity to interact with experts on fire management and learn how to manage different classes of fire.

Ms Rose Njuki, head of the Human Resource Department at CEMASTEА, represented the Director during the training. In her remarks, she appreciated the facilitators for conducting the training and imparting such essential skills. She urged staff to utilize the skills and knowledge acquired in cases of emergencies both at CEMASTEА and in the community.



Left: CEMASTEА staff, learning on how best to use a fire blanket in case of a fire at the Nakuru County Fire station looking over is Mr. Wanjiru the facilitator Right: CEMASTEА staff learning how best to lift a victim following an accident, the session was being facilitated by Ms. Jane Njeri from NMS

Winfred Magu, CEMASTEА

## Capacity Building on Handling Customer Complaints

All public institutions must promptly address and resolve customer and public complaints referred to them directly or channelled through the Commission on Administrative Justice (CAJ). CEMASTEА, through its Service Charter, has committed to offering quality services to its stakeholders to resolve complaints in an efficient, timely and professional manner. To achieve this, 20 members of staff representing various departments attended a four days training course in Nakuru County on handling customer complaints. The Commission of Administrative Justice facilitated the training.

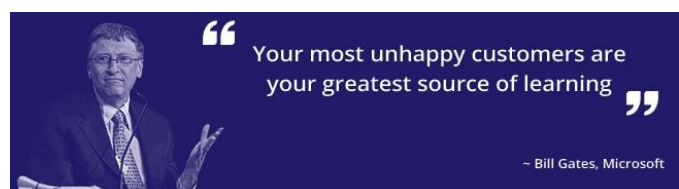
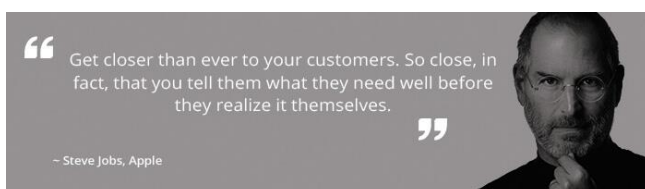


Seated, Mr. Patrick Wanjohi (CEMASTEА), Ms. Elizabeth Mumbi (CAJ), Ms. Rose Njuki (CEMASTEА), Mr. Mohammed Adan (CAJ) and members of staff from CEMASTEА

The training aimed at capacity building staff on complaint handling framework, access to information and how to mainstream the culture of excellent public service. Some of the topics facilitated during the training included *‘effective complaints handling procedures and best practices, ‘Right to information & its applicability’, ‘Importance and instrumentality of the Right to Information’; Highlights of the Access to Information (ATI) Act and ‘Promoting servant leadership, positive organizational culture and customer experience’.*

During the closing ceremony, Ms Rose Njuki, Human Resource Officer representing Director, CEMASTEА, urged members to cascade the skills and knowledge acquired to their colleagues. She appreciated the facilitators from CAJ and for the crucial role the Commission plays in ensuring efficient delivery of services and especially the handling of customer complaints. Mr Patrick Wanjohi, making remarks on behalf of the coordinator, Service Delivery Mr Benjamin Kilonzo, reminded staff of the importance of providing excellent service to all its stakeholders.

### Benjamin Kilonzo and Patrick Wanjohi, CEMASTEА





# Energy Use and Conservation in Schools

Learning institutions, especially boarding schools, both public and private, heavily depend on electricity and wood fuel to meet their energy needs for lighting and cooking. This overreliance has led to vast amounts of firewood being used, exerting pressure on school finances and the environment. The effect on the environment extends to both outdoor and indoor air pollution through smoke, which negatively affects workers' health. This problem presents an opportunity for schools to adopt more sustainable energy practices, including energy-saving lighting and cookers.

One way to reduce energy use is to conduct a school self-energy audit using the whole school approach. The entire school approach brings together school management, teachers, students, facilities and the community around the school. This self-audit could be conducted with the involvement of students in the collection of data which then informs intervention measures. A simplified form shown below can be used to collect data.

Area of energy usage	What is currently being used?	What changes can bring about energy efficiency?
Lighting in buildings including classrooms		
Source of energy for heating and cooking in the kitchen		

Some of the Energy conservation strategies that schools can adopt include using energy saving bulbs for lighting and establishing school woodlots to supply firewood to cut costs. Schools can also install energy-saving pressure cookers that significantly reduce cooking time and firewood.

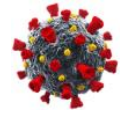


An example of an energy saving commercial pressure cooker that can use both firewood and LPG. This is suitable for schools and will cut cost and reduce impact on human health and the environment.

Patrick Wanjohi, ESD, CEMASTEIA



# COVID-19 Containment: It's Now Upon You



Health Cabinet Secretary Mutahi Kagwe announced the relaxation of COVID-19 containment policies and rules. The review of the measures was based on scientific advice in regard to spread of the disease and the country's preparedness in managing the pandemic. The CS noted that Kenya has done well in its vaccination campaign and is currently reporting low positivity rate. The population also seems to have developed herd immunity.

Some of the measures relaxed included the need to wear a mask in public, need for use of thermos guns to measure human temperatures, and the social distancing rules, the need to limit people attending churches in person was also removed among others. This directive

has several implications. These could include the opening of the business economy and increase in human activities that are more contact based.



Health Cabinet Secretary Hon Mutahi Kagwe (Courtesy)

The need for taking personal responsibility becomes once again more pronounced. COVID – 19 is still here with us. There are people within the populations that have not taken the vaccination. There are people within the population showing signs and symptoms of the disease. There are people in hospitals suffering from its severe effects. Some people are succumbing to the disease. The intention here is not to be alarmist. It is to just help us

take notice. That COVID – 19 is now one of us. The need to take personal responsibility cannot therefore be gainsaid. There is less wearing of masks in public and in fact those wearing them look odd. There is less hand sanitizing going on. Thermal guns are now almost non-existent. It is your life and those of your loved ones at risk. Keep safe, weigh the COVID -9 risks in your environment and take appropriate action.



Thuo Karanja, CEMASTEIA



CONTACTS:

Please visit us on our social media platforms



+254-2044406  
+254-70-6722697  
+254-78-0797648



[director@cemastea.ac.ke](mailto:director@cemastea.ac.ke)



[www.cemastea.ac.ke](http://www.cemastea.ac.ke)



@CemasteaKenya



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